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Disaster Management – Planning and Mitigation

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ABSTRACT

It is quite widely recognized that in many third world countries, disaster mitigation programmes implemented by government agencies suffer from a series of defects and distortions. These include failure to address vulnerability, failure to involve people, and susceptibility to manipulation. The casual attitude towards the natural disasters whether recurrent ones or non-recurrent ones is an intricate manifestation of an internal hope people have about their lives and homes, combined with a lack of understanding of physical relations that control the severity, magnitude and intensity regarding the development of natural disasters. And hence, mitigation of natural disasters should properly be planned and monitored with the main objectives of better preparedness for meeting any situation in terms of relief, rescue and rehabilitation.

Keywords— Disaster Management

1. INTRODUCTION

A disaster is a phenomenon which puts humans and property in a dangerous and disadvantageous situation. The disasters can be natural or man-made.

1.1 Natural Disasters

- Wind related: Cyclone, storm, hurricane, tornado etc.
- Water related: Floods, cloud burst, drought
- Earth related: Earthquake, tsunamis, avalanches, landslides, volcanoes.

1.2 Man-Made Disasters

- War/battle/riots
- Accidents of trains/vehicles/aeroplanes
- Industrial accidents
- Fire and forest fires
- Nuclear explosions/accidents
- Deforestation/soil erosion/air/water pollution

These disasters are regular phenomenon in the world. Whatever be the type of disaster, the result is loss of lives and damage to the properties. Thus, it is necessary to reduce these effects by

planning beforehand. Disaster management is the discipline dealing with and avoiding risks caused due to hazards/disasters. It involves preparing, supporting and rebuilding society when natural or man-made disasters occur.

2. DISASTER MANAGEMENT

Some of the disasters can be predicted while some cannot. Earthquake prediction is not possible till to date. Someone has rightly said disasters will always come and we will have to live with them. Every year mainly lives are lost due to earthquake. Some of them can be saved by following disaster management principles. The most important activity after earthquake occurrence is Rescue. A properly managed Rescue operation can result in saving of lives. Thus, this chapter focuses on the essentials of rescue operation like rescue workers, rescue plan, safety aspects, casualty management etc. The measures to reduce the adverse effects of disasters are disaster management. It consists of four phases such as (A) Mitigation (B) Preparedness (C) Response (D) Recovery as shown in Figure 1.

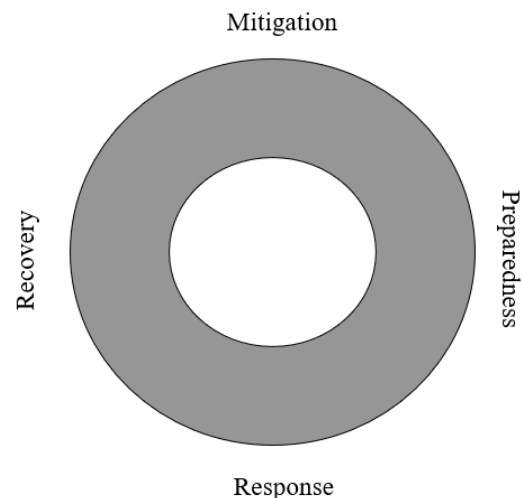


Fig.1: A graphic representation of four phases of disaster management

(A) Mitigation: Mitigation efforts prevent hazards from developing into disasters or to reduce the effects of disasters

when they occur. Example of mitigation are strengthening and retrofitting of buildings to make them earthquake resistance, creating awareness in public about earthquakes through media and schools so that they should know what to do during earthquakes. It also includes enforcement of building codes and their revision from time to time.

(B) Preparedness: In the preparedness phase, emergency managers develop plans of action for when the disaster strikes. It include the proper training programmes for rescue workers, maintenance and checking of equipment and emergency services, evacuation plans and control of supplies etc. It also includes developing volunteers from common people to work during rescue operations.

(C) Response: The response phase is the reflection of country's readiness to cope quickly and effectively during and after disaster. It includes the mobilization of necessary emergency services like police, volunteers, fire fighters and NGO's. A well-practiced plan developed in preparedness phase can result in effective rescue efforts. Rehearsals of rescue plans is essential to achieve optimum output in the response phase; medical facilities should be checked and enhanced from time to time. The response phase starts with rescue phase which is discussed later. For example: to facilitate emergency operations, the earthquake prone regions should be equipped with a number of emergencies centers. The role of such centers should be to maintain stock of food, medicine, building material etc. for emergencies. They should also do the task of survey, assessment of damages and teaching of evacuation measures to common people.

(D) Recovery: The aim of the recovery phase is to restore the affected area. Recovery phase is mainly concerned with rebuilding destroyed property, re-employment, repair of other essential infrastructures and services. The recovery phase starts when the immediate threat to human life has reduced. In the long-term disasters, like wars, famine etc. which may last up to many months, the recovery phase starts early. The recovery phase is generally long and may take up to five years. There are three main categories of recovery phase.

- (a) Restoration: Restoration of essential services, homes and other infrastructure.
- (b) Rehabilitation: Physical and mental treatment of affected people.
- (c) Reconstruction: Reconstruction of collapsed buildings and infrastructure.

All these phases should follow one after the other and the cycle should be completed for effective and result oriented disaster management program.

3. DISASTER RESCUE

The aim of rescue is to save life and minimize injury to people and damage to property. Rescue involves many functions. Some of the common rescue functions are.

- (a) To remove trapped people and support them during rescue operations.
- (b) To recover and identify the dead.
- (c) To provide support to other services or teams.

In order to achieve the aim of rescue all rescuers should be trained property.

3.1 Psychology of rescue

Rescue operation is also full of danger. People tend to react differently to danger. But mostly there is a feeling of anxiety and fear in all the persons because it is not just the victim who faces the danger, but the rescuer also faces the same danger in order to rescue the victim. Dangers are still present when the main danger has passed. The main difference between the condition of rescuer and victim is that the rescuer is better able to handle the situation because he can for see the danger and he is well equipped. It is normal to be anxious and feel fear during danger. Other emotions which arise during a rescue operation are pity, disgust, contempt, pride, concern and many more. The pressure of urgency or emergency is always there on rescuer. It decreases the efficiency of the rescue operations. The rescuer must understand the psychology of victims also in addition to the physical needs. He should help them in coming out of the trauma.

3.2 Rescue Workers

Rescue workers are those persons who are involved in rescue operations. Mainly there are following three types of rescue workers:

- (a) Survivors: Survivors are those persons who have escaped in the danger i.e. they are not injured. The first reaction of survivors, is to help their neighbors and families. Sometimes, they don't know what to do but feel that they must do something. Their intention is good but sometimes it hampers or interrupts the function of trained rescue teams. But survivors are the first one to help victims. For example, in case of fire or toxic gas exist at the site of emergency; the first group to start rescue work is of the survivors. But there is danger also involve with group of rescue workers because they are untrained
- (b) Untrained People: The second group of rescue workers is those people who witness the event or are in the neighborhood of the event. Some of these people have a desire to help the victims. They also bring necessary things with them and can be very effective if these things are properly supervised. But a large number of people are curious and just want to watch without helping rescuers and victims. They can cause interference in rescue operations and should be controlled.
- (c) Trained People: These are the last one to arrive at the scene. These are the trained rescuers from police, fire NGO's and state emergency departments. These people know what to do and how to use the available resources and materials. They can also take the help of untrained people efficiently to carry out rescue operations in proper way.

4. QUALITIES OF RESCUSER

The Rescue operation is a very difficult task. All people are not suited to such work. There are some minimum qualities which a rescuer must possess. The qualities are listed below:

- (a) Physical fitness: The rescue operation requires stamina and physical fitness because they often continue for long time and in challenging environment.
- (b) Interest: The rescuer should have genuine interest in rescue work. He should not have any feeling of impressing people etc.
- (c) Training: The rescuer should have undergone training which will help him in performing the rescue work efficiently and in safe manner.

- (d) Initiative: The rescue operation is a very big and complex process. Thus, it is impossible to closely supervise each team member. Each must be able to see and plan what is needed at the movement and do accordingly.
- (e) Versatility: Each situation or emergency is one of its kind. So the rescuer must be able to understand the problems and use the skills and knowledge to handle new situations.
- (f) Cooperation: Rescue work involves lot of people. To make it successful, a good team effort is needed. Thus, cooperation with other team members is an important quality of the rescuer.
- (g) Leadership qualities: All rescuers should have leadership qualities. They require it at various times. A rescuer having leadership qualities can make proper and safe use many more untrained people.
- (h) Controlled fears: Rescuers must know what are his limitations. He should be aware of any fears he is having and should be able to control them. It is also important that the leader of a rescue team should know if any team member has fear of any kind. Some fears which commonly affect a rescuer should be identified and explained in the training programmes.
- (i) Confidence: A rescuer must have confidence in himself and his acts. His appearance must instill faith and confidence in others also.

5. RESCUE PLAN

The rescue operation should be performed in a planned way. The success of rescue operations depends on the planning of it. The rescue plan consists of following major stages.

5.1 The Reconnaissance

Every member of the rescue team must be trained in rescue reconnaissance. In most of the cases team leader does the reconnaissance but if he has deployed some person for conducting reconnaissance, then the person should take and report the observations back to the leader. The reconnaissance of the disaster area/site should result in an accurate assessment of :

- (i) The number and location of casualties.
- (ii) Dangerous situations such as gas, leak electricity, overhanging walls, unsafe structural components or anything else which may endanger rescue workers or survivors.
- (iii) Access to the casualties.
- (iv) The extent and type of damage.
- (v) Emergency services available and disrupted.
- (vi) Available resources, both personnel and equipment.
- (vii) An approximate analysis of the time, the task will take with available resources.
- (viii) Support agencies.

5.2 Problem Solving Process

This is also called as appreciation process. It is a simple method of problem solving which involves logical assessment of the situation and the reconnaissance. It results in the formation of a workable plan. Experienced persons may use their experience and intuition also to make the rescue plan more effective. The problem-solving process has six steps:

- (a) Define the problem: The problem to be solved should be clearly defined in terms of the task which is to be performed. If the problem is too large or complex to tackle

easily, then it may be divided into a number of small elements, which are connected properly.

- (b) State the aim: The aim is a clear picture of what the rescue team has to do in order to solve the problem. The aim should be clear brief and achievable. For example, one of the aims during an earthquake rescue operation can be, "to rescue the casualty from the basement floor."
- (c) Consider the factors: The factors to be considered in a rescue operation may include:
 - (i) Number and location of casualties
 - (ii) Time
 - (iii) Topography of the area
 - (iv) Weather
 - (v) Available resources, both personnel and equipment
 - (vi) Support requirements and availability
 - (vii) Communication
 - (viii) Priority of tasks.

Each factor should be considered and all the "ifs" and "thens" should be analyzed properly. Each factor should lead to some conclusions. For example:

Factor: A person's legs are trapped under a heavy steel beam.

Conclusion: The rescue team must use cutting and lifting equipment carefully to free the person.

- (a) Determine all possible solutions: Consider all possible solutions, that are practical, for achieving the aim. This is done by considering all the factors listed above.
- (b) Decide on the best possible solution: At this stage one of the best possible solution is selected which takes into account all the factors. It is the solution with the most advantages and least disadvantages.
- (c) Plan: On the basis of best possible solution the plan is developed. The plan must be simple and it must relate directly to the aim. When the rescue plan is completed it should be checked thoroughly with proper reasoning

After the rescue plan is prepared the rescue team should start the action without delay. The team leader should decide and deploy persons for various tasks and give priorities to them. For example, Rescue workers deployed on a collapsed building should carefully observe how the building has collapsed. He should identify and explore the debris, voids etc. This can be used to access the casualties. During disaster management, a leader has to use his experience and training and combine them with effective decision making.

6. RESCUE BY STEPS

A six-phase process for rescue operation at a collapsed structure is given below which explains the rescue operation by steps. These six phases are recognized internationally and are used by rescuers world-wise.

Phase 1: Reconnaissance and Survey

Phase 2: Elimination of utilities

Phase 3: Primary surface search and rescue

Phase 4: Exploration of all voids

Phase 5: Access by selected debris removal

Phase 6: Terminate by general debris removal.

The REPEAT acronym helps the rescuers in learning and remembering these six phases:

Phase 1: Reconnaissance and Survey: After reaching the hazard site, it is difficult to conduct thorough reconnaissance and survey. During reconnaissance, question victims, witnesses and others who are able to provide information such as occupancy of the building, location of victims and potential hazards etc. Survey involves a visual inspection of the site and may identify the type and size of the structure, collapse patterns, possible hazards and location of victims etc.

Phase 2: Elimination of utilities (Risk Assessment and Control): It is one of the most important phases. It involves the assessment of risk and controlling them with the measures available to the rescuers. For example, barricading the site or shutting of power supply etc. It is necessary to control all the possible risks as soon as possible otherwise it may result in more disaster.

Phase 3: Primary Surface Search and Rescue: The third phase include searching surface areas around the collapsed or damaged structure. Any injured person or lightly trapped person should be immediately attended. During the primary surface search, rescuers may become aware of victims located within voids or within damaged structures. The location of victims should be marked and reported to trained persons with appropriate equipment for safely extraction of victims.

Phase 4: Exploration of all Voids: In this phase, specially trained and equipped rescuers explore those places which have been marked during primary surface search. All the places, where the trapped victims might have survived the collapses, are explored although there is no evidence of the presence of such victims. If possible, technical devices can also be used to know the location of the trapped victims.

Phase 5: Access by Selected Debris Removal: Phase 5 involves the removal of selected debris for accessing the trapped victim. This requires specially trained personnel and equipment. As the time passes, the chances of survival of victims decrease. Thus, the rescue operation should be carried out speedily but safely. It is essential to locate all victims before starting phase 6.

Phase 6: Terminate by General Debris Removal: Phase 6 involves the use of heavy plant and machinery to remove all the debris in an attempt to recover and account for all victims. This phase also involves the use of forensic processes to identify victims. It is important to note that the rescue operation must be completed without interruption until phase 6 is completed. Every person known or likely to have been in the structure must be accounted for. It is impossible to tell from external inspection whether victims buried in the debris will be alive or not. Thus, the effort should be continued to save lives, no matter how long it takes.

7. SAFETY IN RESCUE OPERATIONS

The rescue operation involve lot of works which need skills like clearing of debris, operation of equipment, working in dangerous environment like fire and collapsed structure etc. These tasks if not properly carried out, may prove dangerous. Thus, safety in rescue operations is of main importance. It is also needed to observe and follow these safety measures strictly during the rescue operation. Training and exercises also. Most of these safety precautions are very basic and simple.

8. BASIC PRECAUTIONS

- Regularly and carefully check the equipment both before and after the use.
- Ropes can wear and rot, batteries can corrode equipment, machinery can break down.
- Faulty equipment can cost lives. Immediately label the faulty equipment and send it for repair or replace it.
- Protect people at heights or depths with care and monitoring.
- Never ignore the safety limits.
- Control the emotions during rescue operations.

These basic precautions help in protecting the casualty and the rescuer. Other types of safety measures are explained in the following articles.

9. CASUAL SAFETY

The safety of casualties is of prime importance. Every effort is to be made to ensure that no harm should be done to the casualty during rescue operation.

- The injured persons should be given care and first aid immediately.
- They should be handled in a safer way and made comfortable.
- The damaged building parts or the debris should be handled such that no more injury is done to the people trapped inside
- Priority attention is given to the casualties depending on their condition.
- The safety measures should be discussed during the training and exercises along with the dummy casualties.
- The injured persons are sent to the hospitals by the ambulances or other vehicles. These vehicles should be driven by trained drivers.

10. EQUIPMENT SAFETY

- All equipment should be of standard quality and operated as per instructions. They should be operated by trained persons.
- While using power tools such as disc cutters or saws, the operator should wear safety goggles and gloves and take proper care to avoid jamming of blades.
- If the cutting operation is near the trapped casualty, the cutting blades should be directed away from the casualty body.
- Proper care is to be taken while load lifting operations to prevent total collapse or slippage or dropping.
- All rescue equipment should be checked before and after use.

11. CONCLUSIONS

The disaster can lead to breakdown of public services like leakage of Gas or water services or bring down electrical power lines or may cause fire. The casualty should be removed immediately from the dangerous area. In a disaster, it is important that the rescuer must pay heed to own safety also. The following conclusions have been drawn to pay attention to the following utility services during the pandemic:

(a) Leakage of gas: Leakage of gas may cause explosion thus safety precautions must be followed during this hazard.

- Turn off the supply and allow time for the gas to clear.
- Don't use match stick. Use soapy water to find a leak.

- Don't switch on or off any electrical appliances.
 - If a fire is present use water spray and call fire extinguishers.
- (b) Breaking of water Pipes: Water from broken pipes may enter areas in which casualties are trapped. Steps should be taken to reduce the risk of immersion or drowning.
- (c) Broken Sewers: Broken sewers may create problems of flooding and escaping gases sewer gases can be explosive as well as toxic. Thus, following precautions are to be followed during this hazard.
- Take proper action (use of mask etc) before entering the area.
 - Never use an open flame.
 - Pumping can be used to divert the flow away.
- (d) Breaking of electric wires:
- Do not touch the electric wires
 - Avoid water near the electric wires, avoid other conductors also.

- Switch off the electric supply to a damaged building.
- Be careful at night, when it is difficult to see wires.

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