CHAPTER 1

INTRODUCTION

Background

1. A disaster (from Middle French désastre, from Old Italian disastro, from Latin pejorative prefix dis- bad + astrum star) is the impact of a natural disaster / natural or man-made hazard that negatively affects society or natural environment. Disasters occur when hazards strike in vulnerable areas. The word disaster’s root is from astrology: this implies that when the stars are in a bad position a bad event will happen.

2. We use the term ‘disaster’ often in our everyday lives. It seems that anything from missing the bus to a lost football game can be a ‘disaster’. At the same time we constantly see and hear events such as earthquakes, nuclear accidents or environmental degradation being described as disasters. What then is a disaster? A disaster can be defined as an event that occurs when a hazard affects a vulnerable population or area. Disasters are often portrayed using the following equation:

   Disaster = Hazard \times Vulnerability

As this equation shows, the two key elements to a disaster are hazard and vulnerability.

3. What Is A Hazard? Hazards come in a number of forms: Natural hazards. These include Hydro meteorological (e.g. cyclones, floods), Geological (e.g. earthquakes, volcanoes) and Biological (e.g. epidemics, locust swarms). Technological hazards (e.g. gas leaks, industrial accidents, bridge or building collapses). Environmental hazards (e.g. sea level rise, desertification, climate change). A hazard alone will not cause a disaster. Hazards have to impact on a population or area before they can have disastrous effects. For example, a tsunami traveling over open-ocean is not a disaster, but when it strikes a population located on a coastline, the results can be disastrous.

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1 Disaster - Wikipedia, the free online encyclopedia.
3 Ibid. The use of * indicates the interaction between hazard and vulnerability. It is arguable as to whether this stands for + or x.
4. **What Is Vulnerability?** A population or area being affected by a hazard has to be vulnerable for a disaster to occur. The vulnerability of a population relates to how susceptible it is to the effects of hazards and its ability to cope when struck. Vulnerability is influenced by factors such as location, state of housing, and colonial set up level of preparedness and ability to evacuate and carry out emergency operations. Different populations have different levels of vulnerability; this is one reason why hazards of a similar type and intensity can have quite varied effects on different populations. The root causes of vulnerability have a deeper origin, however, and to see why a population is vulnerable we must look at issues such as poverty, lack of access to resources, environmental and social conditions. In this way vulnerability has a direct relationship to the social, political and economic situation and the status of human rights. Populations suffering from high levels of poverty are often more vulnerable to hazards due to the fact that people’s resources are focused towards day-to-day survival rather than preparing for the possibility of future disasters. This is reflected in the fact that it is the poorest countries who are the hardest hit by hazards as they are often the most vulnerable.

5. **Disasters and Development.** Development plays a key factor in people’s vulnerability to hazards and can have both a positive and negative influence. People in countries that are termed as ‘developing’ often face issues such as poverty, lack of adequate infrastructure, lack of access to resources, and health issues that can increase their vulnerability to hazards. Development efforts aimed at addressing these types of issues can play a positive role in reducing vulnerability. Development can also have a negative influence. The influx of new economic systems, rapid urbanisation, altered food production and other socio-economic changes can increase vulnerability. Also, traditional coping methods such as traditional forms of housing, the growing of hazard resistant crops, traditional knowledge of hazards, methods of food storage, and strong community support can be displaced by the process of development.

6. **Are Disasters Increasing?** We often hear that disasters are happening more often and that the results are also becoming more severe. Is this the case? Is our world really becoming more dangerous to live in? It is clear that the number of disasters affecting the world is increasing. There has been a considerable growth in reported disasters since the beginning of last century, with growth being most notable since the 1940s. 184 disasters\(^4\) were recorded in the period 1940-1949 and some 2773 in the period 1990-1999\(^5\).

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\(^4\) Using the OFDA/CRED International Disasters Data Base (EM-DAT) definition of a disaster event having to fulfill at least one of the following criteria:

- 10 or more people reported killed
7. These statistics show there were 15 times more disasters reported in the 1990s than in the 1940s. What is clear is that we have seen a growth in world population and over the last fifty years. This growth has occurred not only in areas that are vulnerable to hazards (such as in coastal areas and urban centres) but also in populations that face issues that are known to contribute to vulnerability. Another consideration has been the rapid development in communication technology over the last fifty years. Improved access to information means disasters are being covered more effectively and accurately than in the past, resulting in the increase in the numbers of disasters reported. The increase in the number of disasters is therefore being influenced by the fact that we are becoming more aware of the disasters that are (and always have been) happening. The rise in the number of disasters affecting us is a result of a combination of factors. Climate change appears to be creating an increase in hydro meteorological hazards, our improvements in communication technology means more disasters are being reported, and a combination of population growth and an increase in the factors that add to people’s vulnerability have contributed to the increase in disaster events.

8. What Is Disaster Management? Disaster management is often described as a cycle that incorporates a number of stages. This can be represented as follows in diagram from:
9. **Post-Event Pre-Event.** The stages of the disaster management cycle often require different activities and measures and can involve different time scales. Immediately following a disaster, the post event activities of response and relief operations are implemented as quickly as possible. Rehabilitation, restoration and reconstruction activities can take months and years to complete, and the pre-event activities of preparedness, mitigation and prevention are ongoing measures that are aimed at reducing risk and the impact of future disasters.

10. **Types of Disasters.** Disasters can be divided into two; **Natural** and **Man-made.** The former includes Floods, Earthquakes, Forest Fires, Volcanic eruptions etc. while the man-made disasters include accidents, epidemics; uncontrolled spread of diseases, gas leaks, NBC related situations etc. In older days, the probability of most of these disasters occurring was very low. But of late, the probability of these low probability disasters occurring has increased. Some scholars attribute this to the increased footprint of humans (due to increase in population) which has resulted in many hazards getting converted into disasters. A graph depicting the world wide trend of natural disasters is reproduced below:

![TIME TREND OF NATURAL DISASTERS, 1975-2005](image)

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7 General NC Vij, PVSM, UYSM, AVSM (Retired), Vice chairman, National Disaster Management Authority (NDMA), in address to the Higher Command (HC) Course, Army War College, Mhow, 14 November 2006
CHAPTER 1.1

RESEARCH METHODOLOGY

Rationale and Significance of the Study

1. The recent past has been a witness to many disasters – which have struck both developing and developed countries alike, all over the globe. The increasing range and occurrence of disasters has generated global concern. They have affected about one billion people, whilst claiming three million lives. The loss in terms of private, public and community assets has been astronomical; assessing which would be a Herculean task in monetary terms.

2. At the global level, there has been considerable concern over natural disasters. India, in turn has also well understood the need to adopt multi-disciplinary and multi-sectoral approach and incorporation of risk reduction in the developmental plans and strategies. The most reckonable step taken by Govt of India has been to upgrade the erstwhile reactive response of management, to a pro-active one involving preparedness, prevention and mitigation. The approach needs to the translated into National Disaster Framework through lessons learnt from case studies of natural and man-made disasters covering institutional mechanisms, disaster prevention strategy, early warning systems, disaster mitigation and human resource development.

3. The Armed Forces are the most important institution of a nation-state system and, thus, occupy an indispensable spot in this paradigm. Armed forces bring expectation on the unexpected situations and bring normalcy to the abnormal situations. Thus, the role of Armed Forces is being re-defined, the main focus has been upon the potential contribution to disaster relief operations.

4. In keeping with the view, that the Armed Forces play an all important role in the context of Disaster Management, it is therefore, intended to analyse and investigate through case studies the various emerging concepts and complexities of Disaster Management in the Indian context and how their implication would be put to better use in the employability and capability of Armed Forces.
Survey of Work Done in the Research Area and the Need for More Research

5. Many scholars (mostly civilian) have worked on Disasters and Disaster management but hardly any one has discussed the ‘Role of Armed Forces in Disaster Management with specific reference to case studies, where as various works speak about the type of disasters and their possible reasons only. The Contingency Action Plan for Natural Calamities, the government’s blueprint for disaster response, is also more reactive than proactive. It emphasizes relief, not reduction. Crisis management and subsequent relief distribution must not be seen as the primary function of disaster management. It is increasingly evident that there is a need for an integrated approach which incorporated building disaster mitigation contents into the overall development plans, with a view to minimize the impact of disasters. To this end, case studies of Uttarkashi earthquake in 1991 and Orissa cyclone in 1999 would go a long way to give a fair insight of the lacunae and anomalies that came across in the management of disasters. Also, the 26/11 terrorist attack at Mumbai and in case of a possible nuclear disaster in the nation in a futuristic scenario based on threat perception also needs to be addressed in this context.

6. Disasters pose a great challenge to the human developmental cycle and a grave danger to mankind and their resources. They cause enormous destruction of human and animal lives, long lasting traumas and untold misery and know neither national nor regional boundaries. They strike at will and without warning. The only defence against this wrath is forecasting, if possible, proper preparation and planning. It is in keeping with these areas of concern that the research work has taken a holistic look at Disasters and Disaster Management, examined and made an attempt to formalize the role and preparedness of Armed Forces in the management of disasters in the Indian context and suggested objective measures to enhance its effectiveness.

Statement of Aims and Objectives of Study

7. **Aim.** The aim of the research was to examine various facets of Management and Role of disaster control systems in the country through specific case studies, as also to examine and formalize the Role of Armed Forces in Disaster Management in the Indian context.

8. **Objectives.** The objectives of this research work are to:
(a) Find out and analyse various aspects of natural and man-made disasters through case studies and their management.

(b) Know the existing mechanisms and suggest changes, if any.

(c) Analyse and recommend changes to improve existing efficiency of disaster management by the Armed Forces.

**Methodologies and Techniques to be used**

9. **Hypothesis.** Following are the pre-suppositions that needed to be prudently addressed:

   (a) Management of disasters is a continuous problem in the Indian context.
   
   (b) Armed forces can react quickly and respond rapidly to Disaster Management in fully self contained, self sufficient and highly mobile fashion.
   
   (c) Army is being called to manage disasters – wherever a calamity occurs.
   
   (d) Armed forces is perceived by the society and nation to be the most visible and appreciated face in the paradigm of Disaster Management.
   
   (e) Well organised and integrated disaster control organisation will be able to handle the situation in the most effective and efficient way.

10. **Conceptual Framework.** The conceptual framework of the research project is based on the following:-

   (a) **World Vulnerability Profile.** This includes a fair and objective comparison of the following:-

      (i) Time trend of natural disasters from 1975 to 2010.
      (ii) Global Economic losses-Developed and the Developing World.
      (iii) Economic losses due to disasters in India.

   (b) **Approach and Vision of the Govt of India.**

      (i) Creation of a National Executive Committee (NEC).
(iii) Role and Charter of National Defence Management Authority (NDMA).
(iv) Relevance of a Public Awareness Campaign in case of a similar terrorist strike like 26/11 or a possible nuclear disaster in the nation.

(c) **Role of Armed Forces in Management of Disasters.**
(i) Armed forces role as part of the core of the Government’s response capacity.
(ii) Comparison of roles of various armies in disaster relief.
(iii) Armed forces provided timely assistance in casualty management, during the calamities in Orissa, Uttarkashi and Mumbai.
(iv) Preparedness of Indian Armed Forces for management of nuclear disasters and measures to enhance their effectiveness.

11. **Research Design and Methodology.** The research was planned to be conducted over a period of 24 months. It has included the following:
(a) Collecting and researching literature and content through case studies.
(b) Interacting with Govt and other agencies like research scholars, prominent personalities etc.
(c) Carrying out field visits to training institutes like NDMA and NIDM.
(d) Co-opting personal experiences of the researcher.
(e) Collection of findings and generation of research paper.

12. **Data Sources.**
(a) **Primary Data.** Information was collected from interviews, case studies, lessons learnt, and personal experience of the researcher.
(b) **Secondary Data.** Books, magazines, newspaper clippings, internet, periodicals, Army War College journals, publications of UNDP, WHO, World Bank, National Disaster Management Authority (NDMA), National Institute of Disaster Management (NIDM), Seminar Papers by Army Training Command (ARTRAC).

14. **Research Instruments.** Case studies, websites, observation method and interviews with personnel involved in disaster management (rescuers) as well as those who were rescued.

15. This research is dependent on empirical evidences. On conceptualization, application of appropriate concept and hypothesis were helpful in understanding the entire framework of study since significant elements of statistical meticulousness and accurateness (where ever applicable) have been applied for proper prediction and suggestions. However, it is easy to calculate and predict certain economic costs of disaster related damage and casualties, but the real cost of any unforeseen disaster/calamity is beyond the reach of any calculator. Nevertheless, I have considered verifiability, generality, predictability and objectivity scientifically throughout the study.
CHAPTER 1.2

DISASTERS – NATURAL AND MANMADE

1. The Webster dictionary defines disaster as a sudden calamitous event producing great material damage, loss and distress. Very often, the terms, ‘hazards’ are used interchangeably, but their connotation and consequences are distinct and must be kept in view. A hazard is the occurrence of a physical phenomenon at a given site that is capable of causing loss and damages. If a hazard such as the cyclone hits an unpopulated coastal area, it should not be considered a disaster. However, it will be called a disaster, if it hits a populated region and life and property in the area get severely affected. A hazard, therefore, is a pre-disaster situation that could turn into a full-blown disaster if it results in causalities, be they human, socio-economic or infrastructure, it is always the unmanaged hazard that leads to disastrous results. Disasters vary in terms of their intensity, disruptive potential, predictability and direction. They can even be slow in their onset. Disasters occur where vulnerable people are overwhelmed by extreme events or hazards, either, natural, human or a combination of both.

2. Types of Disasters. Graphically these could be classified as under:-

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8 Prof Pardeep Sahni and Dr Alka Dhameja, “Managing Disaster” in Economic news, 12-16 Aug 2000.
9 "Overview of Disaster Management at National Level" P. Michael V. Siromony Director, Natural Disaster Management, Government of India E.Mail: michael@krishi.delhi.nic.in
Chemical Disasters

Toxic Gases & Nuclear Radiation

Food Contamination

Soil Contamination & Pesticides

Water Contamination

Figure 1.2(2)

Water & Climate Related Disasters

Drought
Strom Surges (Ocean)
Avalanches
Hailstorms
Tsunami
Floods
Tornadoes
Hurricanes
Cyclones

Figure 1.2(3)