

CHAPTER I

INTRODUCTION

1.1 HAZARD AND DISASTER

A disaster is the perceived manifestation of a hazard, which is a perceived natural occurrence that poses a threat to both life and property. It can also be described as a hazardous situation or event that poses a threat to human life or has the potential to endanger the environment. (Khan, Vasilescu, & Khan, 2008).

Any event that results in destruction, ecological disturbance, human casualties, or degradation of health and health services on a scale that justifies an extraordinary reaction from outside the afflicted community—or is dealing with emergencies—is considered a disaster. (Mishra, 2014).

The French phrase "Desastre," which combines the two words "des," which means bad, and "astre," which means star, is where the word "disaster" first appeared. As a result, "Bad or Evil Star" is meant by the term "disaster." (Satendra, 2003).

Another definition of a "disaster" is an unanticipated event that results in a significant loss of life and property. Major catastrophes are ones that result in at least one of the following three consequences.:

1. Affecting the Gross National Product by more than 1%
2. Being responsible for more than 100 fatalities at once
3. Affecting more than 1% of a region's total population (Satendra, 2003)

1.2. DISASTER TYPES

There are various ways to categorize disasters but the simplest and the globally accepted types are man-made disasters, natural disasters and quasi-natural disasters.

- **Man-Made Disasters**

Man-made disasters can be simply defined as those disasters that take place due to anthropogenic causes or factors. This kind of disaster takes place in or around populated areas. Man-made disasters comprise disasters like pollution, accidents, and damage of the environment.

- **Natural Disasters**

Natural disasters are those disasters that occur due to natural or physical phenomena. These disasters are more common than man-made disasters. The major natural disasters are hydrological (flood, drought, cyclone, tsunami) climatic (cold and heat waves, global warming, sea level rise, ozone depletion) orographic (landslides, snow avalanches) and geological (earthquake, volcanic eruption).

- **Quasi-Natural Disasters**

These types of disasters are the results of human being's careless exploitation of their social, economic and natural environment. Hence, the most of these catastrophes can be avoided, reduced, or changed. For instance; global warming, which is the consequence of atmospheric pollution, can be checked.

Other than the above-mentioned traditional way of classification of disasters/hazards it can also be classified on the basis of their causes which may be distinguished as:

- Sudden onset of natural phenomena, such as flood, tropical cyclone, earthquake, river erosion, landslide
- Slow onset of natural phenomena, such as drought, climate change
- Sudden onset of events, such as major accident, major civil war, nuclear explosion, war, terrorist attack
- Slow onset of events, such as HIV/AIDS, epidemic, arsenic poisoning through drinking water, systematic discrimination against social groups, occupational hazards (Bhattacharya, 2012).

1.3 DISASTER MANAGEMENT

Mankind has survived and lived with natural disasters since time immemorial, but the rate of these disasters has risen substantially in recent decades. This rise in number and impact of disasters may be caused due to present scientific wisdom and advancement in technology. It is due to the ruthless exploitation of nature that has resulted in occurrences of real catastrophes. The impact of these disasters in the life of human beings is multifarious, thus affecting all domestic, social and economic life. The Natural catastrophes continue to increase in frequency around the world, and their effects on those affected have become more severe region continues to worsen, this is especially true in developing regions.

Therefore, it has become very important to take some serious steps for the management of these disasters. Disaster management has cropped up as a significant field in the contemporary world.

The Red Cross and Red Crescent societies define disaster management “as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to learn the impact of disasters”.

It is a fact that these natural disasters and catastrophes cannot be fully prevented but by applying proper management and mitigation plans at the right time the impact of these disasters may be minimized to a large extent.

Though management plans framed or developed by the government are initiated during the time of calamities or disasters, the community-based approaches are also equally important. In fact, the techniques framed and adopted by the local communities would be more effective because who knows an area better than the local communities themselves.

Apart from management plans, preparedness and mitigation is also equally important. Mitigation embraces any actions done to lessen the impact of the dangers themselves as well as the community's vulnerability in order to lessen the disaster's potential impact. It involves creating a

workable emergency plan, creating a warning system, maintaining inventories, simulating drills, and training employees.

Hence, based upon the above-mentioned facts Disaster Management is a process which encompasses technical, administrative, financial, social and legal actions relating to disasters such as, landslides, earthquakes, cyclones, storms, floods, fires, drought etc. It comprises of developing appropriate policies and institutional organizations in the following areas (Jain, 2008):

- Development of database and early warning communication system
- Disaster preparedness including social preparedness, response, rescue and relief
- Disaster Mitigation
- Rehabilitation and Reconstruction

Principles of Disaster Management (Bhattacharya, 2012):

Disaster Management consists of the following principles:

- Comprehensive – The management should take into account all phases of the disaster management cycle, all stakeholders and all impacts relevant to a disaster.
- Progressive – Integration of disaster risk reduction component building disaster resilient communities.
- Risk driven – Use of sound risk management in assigning priorities and resources.
- Integrated – Ensuring unity of efforts among all levels of government functionaries and all sections of disaster affected society.
- Collaborative – Consensus building decisions among the team on all aspects of management.
- Coordinated – Synchronization of activities with all relevant stakeholders to achieve a common purpose.
- Flexible – Use of creative and innovative approaches in responding to disaster challenges.

- Professional – Science and knowledge-based approach encompassing ethical practices, public stewardship, and continuous assessment leading to improvement.

Disaster Management Cycle:

There are three key stages of disaster management which are as follows:



Fig. 1.1 Disaster Management Cycle (Khan, Vasilescu, & Khan, 2008)

- Prior to a disaster (pre-disaster) - Pre-disaster measures are those performed to lessen property and human losses brought on by possible hazards. For instance, launching awareness campaigns, bolstering the present weak structures, creating strategies for the community and home level catastrophe management, etc. (Khan, Vasilescu, & Khan, 2008).
- During a disaster (disaster occurrence): This phase includes activities which are taken to ensure the needs and provisions are met for the people affected by disaster to minimize the suffering. Activities such as emergency response are planned in this phase.

- After a disaster (post disaster): In this phase different initiatives such as rehabilitation and recovery activities are initiated for the purpose for early recovery of the affected people and communities.

1.4 CONCEPTUAL FRAMEWORK

The study will be based upon the following concepts and issues:

1.4.1 *Disaster*

A disaster is a sudden, catastrophic event that substantially impairs a community's or society's ability to operate and results in losses to people, property, and the environment that are more than what the community or society is able to handle on its own. Even if natural disasters are frequently the result of human activity. (Mohamed, 2019).

1.4.2 *Natural Disaster*

A natural disaster is defined by the UN as, “the consequences of events triggered by natural hazards that overwhelm local response capacity and seriously affect the social and economic development of the region”. Natural disasters can be divided into two categories: Major natural disasters and minor natural catastrophes. Major natural disasters include landslides, floods, cyclones, earthquakes, droughts, and other similar events, whereas smaller natural disasters include cold waves, thunderstorms, heat waves, mudslides, storms, and similar events...

1.4.3 *Man-Made Disaster*

Anthropogenic disasters, usually referred to as man-made disasters, are caused by humans and frequently as a result of negligence and human error, among other things. Major and minor man-made disasters are the two categories into which man-made disasters fall. Major man-made catastrophes include fires, diseases, deforestation, pollution, and other catastrophes. Road/train accidents, food poisoning, industrial catastrophes/crises, environmental pollution, etc. are examples of minor man-made disasters.

1.4.4 Disaster Management

When natural or man-made disasters and catastrophic events happen, key infrastructures and human life are protected from serious damages through the use of disaster management, a strategic planning and method.

1.4.5 Disaster Mitigation

All the actions taken to help people deal with the difficult situations that disasters bring about are categorised as disaster mitigation.

The phrase is also used to describe all preventative efforts, such as long-term risk reduction strategies, that can be performed to lessen the effects of a disaster. (Naidu, 2013).

Two main goals of disaster mitigation are as follows:

- i. To lessen the destructive effects of calamities and scale back their impact.
- ii. To decrease the harmful effects of catastrophes.

1.4.6 Top-Down Approach

The top-down strategy to disaster mitigation is completely dependent on the many disaster management initiatives taken by the government establishments at various levels, including the national, state, tehsil, and block levels, among others. (Singh, 1991)

1.4.7 Community Based Bottom-up Approach

Local residents actively take part in catastrophe mitigation missions in a bottom-up, community-based strategy. Following are some examples of how the global community participates in local communities:

- Involvement of local communities

- Participation at the gramme panchayat and block levels; Non-governmental Organizations (NGOs)
- State-level involvement
- Involvement of central government
- Global community involvement (Singh, 1991)

1.4.8 Disaster Risk Reduction

The focus of disaster risk reduction is on new, global approaches to disaster management. In the broad context of sustainable development, disaster risk management can be defined as the systematic development and application of policies, strategies, and practises to minimise vulnerabilities and disaster risks throughout a society and to avoid (prevention) or limit (mitigation and preparedness) the negative effects of hazards (Niekerk, 2006).

1.4.9 Disaster Risk Assessment

Risk is defined by UNDP as the likelihood of unfavourable outcomes, such as fatalities, property damage, lost livelihoods, disruption of economic activity, and environmental impact, as a result of interactions between natural or human-induced hazards and vulnerable circumstances. By studying hazards and assessing current situations of vulnerability that could possibly harm exposed people, property, services, livelihoods, and the environment on which they depend, risk assessment is a procedure to ascertain the nature and amount of such risk. Assessment of disaster risk includes the following;

- Assessment of the vulnerability of a society, a locality, plant and animal communities,
- Assessment of ability of resistance of a system to a particular hazard/disaster,
- Assessment of ability of resilience of a system, affected such as humans, plants and animals, to recover from damages done by a particular disaster,

- Risk-cost-benefit evaluation,
- Assessment of vulnerable localities,
- Assessment of vulnerability of different sections to a particular hazard, disaster etc.

1.4.10 Vulnerability

Vulnerability is a concept that refers to a combination of risk, social and financial responsibility, and the capacity to deal with an unexpected incident. The degree to which a system, or a portion of a system, may react negatively during the occurrence of a hazardous event, has been defined as vulnerability. Understanding the degree of exposure of people and property to the different dangers that have been identified is the result of vulnerability analysis. There are three main categories of vulnerability: physical, social, and economic. Physical vulnerability pertains to structures, infrastructure, and agriculture. Social vulnerability pertains to vulnerable populations, such as the underprivileged, refugees, women who are pregnant or nursing, people who are mentally or physically disabled, young children, and the elderly (Kumar, 2013).

1.4.11 Environmental Degradation

Environmental degradation refers to the overall reduction in environmental quality due to unfavourable changes brought about by human activities in the fundamental makeup of the environment, to the point where these unfavourable changes have a negative impact on all biological communities generally and human society specifically.

1.5 REVIEW OF SELECTED LITERATURE

Raghavulu and Bose (1992), in their article titled *Centre – State Relation in Disaster Management and Preparedness* describe the emerging pattern of relation between the various central agencies on the one hand and the states on the other with regard to disaster mitigation and preparedness program, especially those concerning cyclone and flood. The paper further discusses the Approaches of Planning and Finance Commission as well as policy making and implementation of mitigation measures. The contribution of NGOs is also discussed in brief. This

paper also highlights the conflicts and controversies between Union and State Governments in the performance of various emergency tasks.

Kumar (1997), in her paper *Disaster Management and Social Development* identifies major types of natural disasters. These disasters include floods, cyclones, droughts and earthquakes. The author describes different disasters and analyses the different causes of these disasters. Management tactics to remain safe during the time of these disasters are described in detail. Furthermore; they analyse these disasters through the concept of Time-Dimension. Exogenous and endogenous disasters are also described briefly in the context of disaster and social response. India's response towards these disasters in different era is also discussed briefly. Finally, preparedness and management plans are suggested which may be useful during the time of the above-mentioned disasters.

Chauhan and Chauhan (1998), in their book *Environmental Degradation: Socio-Economic Consequences* describe how a society perceives environmental hazards, how it responds to them and how it develops a public policy to manage. This paper will provide to the planners, policy-makers and analysts in India an excellent example to emulate at the local, regional or national level and to manage the environment in such a manner that it continues to cater to growing needs without being impaired for our future generation.

Bose (2000), in his article *Are Natural Disasters Man-Made?* excellently highlights the anthropogenic causes of natural disasters with special reference to Uttarakhand. Through this paper the author discusses how due to the developmental activities of the greedy and corrupt politicians and bureaucrats the state of Uttarakhand has become more fragile to natural disasters in recent years. For this the author suggests forming a competent Planning Board with persons of integrity and whose grasp of ecology is as good as their knowledge of economics and above all are conversant with ground reality and do not build fancy econometrics models.

Hodges (2000), in his paper titled *Emergency Risk Management* examines the approach taken in the Australian – New Zealand Risk Management Standard. Various catalysts of change for the

integration of risk management into emergency management are then identified. Finally, the implications for emergency risk management are examined. In his conclusion the author mentions that the traditional and modern Australian approach for risk management has successfully blended together to create a new approach which is now being introduced nationally through publications, training and case studies.

Narayan (2000), in his edited book *Anthropology of Disaster Management* deals with management techniques and disaster management at the close of the millennium and it further presents with the different techniques which equip itself for the 21st century in tribal belts of India which faces disasters like droughts, floods, epidemics, mysterious diseases etc., which lead to de-population, migration and other allied problems.

Parasuraman and Unnikrishnan (2000), in their edited book *India Disaster Report: Towards a Policy Initiative* discuss a complete and comprehensive profile of disaster in the Indian subcontinent within the larger context of globalization in the world economy. Different articles on natural disasters like floods, droughts, cyclones and earthquakes have been published in the book. Apart from the natural disasters, topics related to human induced disasters have also been covered. Relief and rehabilitation operations which often miss the target in India have been addressed and policy recommendations have also been suggested to recognize the humanitarian needs in the context of India towards provision of relief and addressing the task of empowering the most vulnerable.

Singh (2000) in his edited book titled *Disaster Management* provides an indispensable guide for policy-makers, administration and NGOs to plan objectivity for the management of disasters. In his book the author describes in detail the various disaster management strategies that can be adopted for better planning and management.

Chhetri (2001), in his article titled *A Practitioner's View of Disaster Management in Nepal: Organization, Systems, Problems and Prospects* discusses the different preventive and mitigation works done by the government, INGOs and NGOs in Nepal. In addition, different research and

training programs held by different agencies to raise public concerns in the country is also described. Mainly top-down approach for the management of disasters has been emphasized in this article. Role of the Royal Nepal Army and the Nepal Police Force in the rescue operation is also discussed in brief.

Twigg and Stein (2002), in their article *Mainstream Disaster Mitigation: Challenges to Organizational Learning in NGOs* discuss the implications of recent NGO research on disaster preparedness and mitigation for organisational learning. A number of institutional and other obstacles to NGO learning are identified in the research. The authors investigate whether NGOs' internal promotion of disaster mitigation and preparedness (DMP) is supported by the typical processes via which they learn. In order to identify effective techniques for replication elsewhere, comprehend the breadth and nature of pertinent activities, and investigate institutional and other factors affecting NGOs' activity, this paper's ultimate goal is to do all three.

Satendra (2003), in his book *Disaster Management in the Hills* discusses the different issues in managing natural disasters in India, particularly in hilly regions. The author conducts a thorough analysis of Uttaranchal's physical, social, and economic circumstances as well as its susceptibility. Different ideas have been put out by combining catastrophe management with sustainable rural development in novel ways. Proper implementation for the better results of the models has also been discussed in detail.

Victoria (2003), in her article titled *Community Based Disaster Management in the Philippines: Making a Difference in People's Lives* recognizes the community involvement is a crucial extra component in disaster management that is required to reverse the global trend of rising disaster frequency and damage. She also talks on how important disaster-resistant communities are to achieving sustainable development. The paper's main goal is to draw attention to the characteristics, procedures, elements, and benefits of community-based disaster management (CBDM), as they are demonstrated by key participants in the Philippines Disaster Management Forum's excellent community-based preparedness and mitigation practises.

Rai (2004), in his article titled *Community Based Disaster Preparedness in the Darjeeling Hills Context* the importance of local involvement in Darjeeling Hills catastrophe preparedness. In this essay, the author explores how community-based planning for disasters is more practical and crucial given the rising frequency of disasters. The primary goal of the essay is to address a constructive action at the local level as a stopgap measure until a long-term, local and global solution is feasible.

Sharma (2004), in his article titled *Disaster Management Strategies in India* provides a brief awareness of the strategies adopted in India for managing disasters at various levels, and focuses mainly on the disaster management mechanisms that exist at the central, state, district and community levels. The paper also discusses the changes that have taken place in recent years in our strategies for disaster management. In addition, it comprehensively dwells on some of the High-Powered Committee on Disaster Management's recommendations, the need for having a culture of prevention and preparedness for future disasters is emphasized.

Thigale and Khandge (2004), in their article *Coping with Landslide Disasters in the Western Ghats* discuss the factors responsible for slope failures at different altitudes along the Western Ghat. The paper is based on the data collected since 1983. Through the collected data the authors have pointed out that most landslides are slow moving processes and thereby, provide scope for adopting timely control and prevention measures and aid in initiating preparedness and awareness programmes. Further a threefold strategy: (i) preparing a Landslide Hazard Zonation Map, (ii) Adopting area-specific measures and (iii) providing inputs for people's participation through awareness programmes has been suggested to cope with landslide hazards.

Basu (2005), in his article titled *Society and Natural Disasters* throws light on the social role, the reactions of the polity on natural disasters. Through the paper, the author has concluded that sustainable development and effective disaster management policy are the only panacea for all kinds of natural hazards. He further suggests that to achieve these goals human beings in this age

of globalization need, in addition to scientific outlook and temperament, control over aspiration and greed.

Bera (2005), through his paper *Assessment of Landslide Hazard: A Case Study of Gangtok Town of the Sikkim Himalayas* has pointed out the different causative factors responsible for landslides in Gangtok Town. The author further deals with this situation in detail and tries to find a researchable solution for the area covered. In conclusion the author has mentioned by writing that “Keeping in view the acuteness of the problems, it is high time that people from all walks of life should sit together to take necessary preventive measures”.

Kapur (2005), in his article titled *Insensitive India: Attitude Towards Disaster Prevention and Management* examines the attitude of government and media during disasters. He also discusses the importance of information and academia on disasters. This paper paints a dismal picture of Indian society's insensitivity to disaster management and prevention. The author through this paper gives an insight on projects and funds sanctioned for study of disasters through different ways in India.

Panday and Okazaki (2005), in their article titled *Community Based Disaster Management: Empowering Communities to cope with disaster risk reduction* emphasize that Communities and the people who reside there should be the main focus of disaster management initiatives. Though efforts taken up by the government, international communities including donor agencies are very important, without the participation of the local community completion of a project is almost impossible. The authors further state that top-down and command and control approaches often fail to meet the appropriate and vital humanitarian needs. They support the concept of bottom-up approach and note that local communities need assistance in assessing their risk factors, weak points, and capabilities as they see them. The CBDM strategy gives the local community the chance to assess their own circumstances in light of their initial experiences.

Saikia (2005), in his article *Disaster Unpreparedness in Assam* points out the various loopholes in Disaster Management strategies through various examples. In his article the author mentions

the fact that despite being one of the major disaster-prone zones of India Assam is poor in terms of disaster preparedness. According to the author the major reasons behind this problem are lack of political will, shortage of staff, lack of funds and lack of information database. Lastly, he mentions that to end this crisis he suggested some methods such as creation of a GIS database with relevant information; explore possible ex ante financial options including possibilities of risk transfer, particularly for weaker sections of the society; retrofit public/private buildings and enforce codes; identify vulnerable structures and equip control room effectively with maximum manpower.

Srivastava and Gupta (2006), have edited the book *Management of Natural Disasters in Developing Countries* published by Centre for Science and Technology of the Non-aligned and the other developing countries (NAM S & T Centre). The volume has identified and discussed areas of mitigating flood, cyclone, storm surge, earthquakes and related landslides through status paper and projected plans to improve mitigation strategies in the participating countries. This book is a synthesis of seventeen (17) papers on the subject from Bangladesh, India, Indonesia, Malaysia, Mauritius, Nepal, Pakistan, Syria, Thailand and Vietnam. The two papers on Bangladesh focus on mitigating cyclone and storm surge disasters and the emergency support required to mitigate other natural hazards as well like droughts, earthquakes and tornadoes. The paper on India gives emphasis on management of natural disasters including different flood forecasting and cyclone warning methodologies and some research programmes supported by the Department of Science and Technology covering other natural hazards like earthquakes and landslides as well. The role of Natural Resources Data Management System under the Department of Science and Technology is also highlighted. Another paper on cyclone disaster mitigation covers the methodologies of risk analysis, micro zonation, dynamic response analysis and vulnerability analysis besides providing information for design standards. Some other papers by the Department of Science and Technology narrate its programmes towards recent infrastructural facilities created and other significant achievements including new initiatives

taken. The paper on the natural disaster and mitigation in Indonesia laid emphasis on earthquakes, tsunami, floods and hurricanes as well as volcanoes and fire monitoring and mitigation.

Chakraborty (2007), in his book *Natural Hazards and Disaster Management* offers current summary of natural hazard science. There are fifteen different categories of natural dangers covered in the book. The methods used to anticipate or approximate the prediction of these natural disasters have been covered in each instance. Along with explanations of natural hazards, steps that society must do to prepare for calamities have also been covered.

Hines (2007), in her article titled *Natural Disasters and Gender Equalities: the 2004 Tsunami and the Case of India* investigates the relationship between gender and disasters. It focuses on the Indian Ocean Tsunami of 2004 and the negative effects it had on the female residents of the impacted places. Two significant gender issues are discussed in this paper: the reasons why the 2004 Tsunami affected more women than it did males, and the concerns that women faced in the aftermath of the Tsunami. This paper demonstrates how, in the aftermath of the tsunami, societal realities and gender issues were disregarded. Women were thus marginalised throughout the process. The author also notes that the lack of a specific gender analysis at the governmental level, which demonstrated a lack of interest in gender issues, is what is to blame for this attitude toward women.

Gokhale (2008), in her article *Role of Women in Disaster Management: An Analytical Study with Reference to India* discusses the status of Indian women and the part they played in previous natural disasters. This essay is based on a field investigation and analysis of Tamil Nadu, India's, Sumatra Tsunami-affected regions. The author also makes an effort to provide methods for educating and training women so they can carry out their expected obligations in such a situation. The conclusion mentions the necessity for a fresh approach to disaster management as well as the need of including women's vulnerabilities and needs in catastrophe research, planning, and practise.

Jain (2008), in his book *A Practical Guide to Disaster Management* offers a practical guide for handling civil emergencies well. The book provides a ready-to-use resource for all parties involved in disaster management, including community-based groups, administrators, developers, and students, as well as civil engineers, planners, and architects. The book also offers straightforward instructions for managing emergency crises in the event of natural disasters like earthquakes, floods, cyclones, droughts, etc. for field engineers, architects, managers, etc. The book comprises a total of twenty-eight (28) chapters divided under thirteen (13) sections. Section I in general deals with the Indian environment and its disaster preparedness. Section II which contains 'Emergency Measures and Relief Shelters' deals with logistics awareness, emergency planning, relief, shelters, strategy for emergency construction and reconstruction. Section III deals with agencies involved during an emergency. In sections IV to VIII each type of disaster has been exclusively discussed in separate sections namely; floods and dam disasters, cyclones, drought and desertification, earthquakes, volcanoes and tsunamis and fire explaining their causes, relief, rehabilitation and damage mitigation measures under each section. Section IX of the book deals with health and hygiene during an emergency. Services relating to site development, water supply, sanitation and drainage have been dealt within section X. Section XI deals with the policies planning, disaster management and project implementation. Section XII dealing with quality control emphasizes common defects to be avoided in construction. Last but not the least maintenance including safeguarding and rehabilitation of old structures has been dealt with in Section XIII.

Patterson, Weil and Patel (2010), in their article *The Role of Community in Disaster Response: Conceptual Models* offer an overview of models created in the literature as well as conclusions gleaned from Hurricane Katrina research. The authors use a variety of models to show various facets of the spectrum of preparedness and recovery for disasters, starting with notions of risk perception and vulnerability assessments before moving on to notions of resiliency and capacity building. This article's main goal is to highlight the part that civil society or the community plays

in the continuum of disaster preparedness, response, and recovery. It also examines how communities fit into theoretical frameworks for disaster decision-making

Santha and Sreedharan (2010), in their article *Population vulnerability and disaster risk reduction: A situation analysis among the landslide affected communities in Kerala, India* discuss about the communities in the Indian state of Kerala were impacted by landslides. The authors of this report contend that any programme for reducing disaster risk must prioritise reducing vulnerability as its top priority. They also show how the interactions between the natural and social systems are frequently complicated and non-linear. The PAR technique has been used to analyse disaster events like famines, earthquakes, floods, coastal storms, the spread of infectious diseases, etc. This essay also makes an effort to investigate the relationships between the deterioration of the mountain environment and the increase in community vulnerability in Kerala, India. Also covered in detail are elements affecting susceptibility to landslides and other secondary hazards.

Chandra (2011), in his book *Disaster Preparedness and Rehabilitation* addresses all the important methods, considerations and plans that are important for management of natural disasters as well as other catastrophic events. The major topics that he covers are mitigation and preparedness plans, disaster management status and policies in India, rehabilitation and improvement measures, disaster informatics etc. The text further discusses the “how-tos” of avoiding the frequent errors that cause economic disasters to result from natural and human-made calamities. It includes strategies that have been tried and effective for years, but it also concentrates on areas that are frequently ignored and post-disaster planning.

Das, Chatterjee and Roy (2011) in their article *An assessment of anthropogenic impact on natural landscape – The case of Kurseong Town, Darjeeling, West Bengal* have assessed the degree to which human activity has contributed to social and environmental risks such as water scarcity, building congestion, traffic congestion, road accidents, etc. The authors' goal in writing this essay is to evaluate the degree to which urban land uses are intensified; the nature, degree, and forms

of land transformation; their impact on delicate natural systems; the social effects of urbanisation; and the viability of management options. The investigation is carried out using a home survey, satellite imagery, and GIS methods.

Desai (2011), in her edited book *Cloud, Stone and the Mind: The People and Environment of Darjeeling Hill Area* discusses the different disasters in Darjeeling due to unprecedented growth of population and unplanned development in the hill areas. Her main focus is on deforestation due to which disasters like landslides, soil erosion, loss of property and life are taking place. Praful Rao's article on the landslides in Kalimpong is particularly relevant as he discusses in detail the different causes as well as the after effects of landslides in the area.

Joshi, Rawat, Sharma, Kumar and Panda (2011), in their article *Traditional knowledge of natural disaster mitigation and other ethno-medicine practices in Himalaya with special reference to Sikkim* discuss about their different indigenous techniques developed by previous numerous generations, to save their belongings and lives from any future natural disasters. Their paper highlights the relevance of cost-effective traditional practices and means of mitigating disasters by the local communities. Apart from the traditional mitigation practices, use of medicinal plants by the people during disasters in the remote areas is also discussed. Major emphasis has been given to the different traditional housing patterns adopted by the local communities to stay safe from the different disasters.

Paul (2011), in his book *Environmental Hazards and Disasters: contexts, perspectives and management* focuses on the threats to human and welfare as a result of natural disaster. Apart from human and social vulnerability as well as environmental risks due to diverse natural hazards and disasters, socio-cultural, political and physical components of the disasters are also discussed. The major topics covered in this book are application of GIS in hazard studies, resiliency, disaster and poverty, climate change and sustainability and development.

Yadav (2011) in his edited book *Disaster Management in India, Acts: Policies: Guidelines (Vol. I)* describes and analyses a number of guidelines for the effective prevention, preparedness and

responses to any kind of disasters prepared by National Disaster Management Authority (NDMA). Further, guidelines for management of earthquakes, cyclones and biological disasters have also been discussed in detail.

Yadav (2011), in his edited book *Disaster Management in India, Acts: Policies: Guidelines (Vol. II)* describes the guidelines for management of chemical (industrial) disasters, chemical (terrorism) disasters, nuclear and radiological emergencies, psycho-social and health services in disasters and landslide and snow avalanches. Apart from the above-mentioned guidelines, training related to disaster response and civil defence has also been discussed.

Bhattacharya (2012), in his book *Disaster Science and Management* has written on responses to disaster in various cultures and social contexts with an empirical insight. The book primarily consists of six sections: an understanding of disasters and their connection to human development; the international code of conduct and minimum standards of humanitarian response; the science of disasters; the Government of India's efforts to reduce disaster losses; management of disasters; and real-world case studies of responses to disasters, including disaster risk reduction by the poor and the vulnerable.

Bhattacharya (2012), in his article titled *Landslide disaster perception of the AILA cyclone in the Darjeeling town, West Bengal India* attempts to look into the two most serious landslides caused by Aila that happened in Darjeeling Town's Haridas Hatta and Frymal Village. The author looks at whether human influences, in addition to the Aila cycle, are to blame for these violent landslides. He comes to the conclusion that the landslides that occurred in the area were caused by a variety of anthropogenic activities, including slope digging, unchecked community outlets, careless and haphazard high-rise building construction and its excessive pressure on the land, and the poor maintenance of current agricultural land use, such as tea cultivation.

Medury (2013), in her article *Coping with Disasters: A Community Based Approach* discusses about the needs for a Community-Based Approach for the management of disaster. With respect to this she has presented some case studies of success stories of community participatory

management of resources. She has further added various recommendations to strengthen local capacities through community-based organizations/groups and networking between inter-community groups. She concludes that, “In the context of disaster management, provision of goods and services will not serve the desired purpose, if people, essentially the sufferers as well as the providers do not know how to utilize them. The ‘what’, ‘where’, and ‘how’ of disaster management strategies are crucial for their survival”.

Sahni, Dhameja and Medury (2013), in their edited book titled *Disaster Mitigation: Experiences and Reflections* present an outstanding examination of several disaster mitigation measures. The volume provides information about the various aspects of catastrophe preparedness and mitigation. Each chapter's main goal is to shed light on the relevance of the mitigation measures that will help everyone involved in disaster management understand and handle the issue more comprehensively.

Thakur (2013) in her article *Challenges and Opportunities to Disaster Management in India* attempts to analyze qualitatively the challenges to Disaster Management in India and highlight the role of Information Communication Technology (ICT) in effective disaster management. The prime concern of this paper is to recognize and highlight the challenges of dealing with disaster and adaptation in India. The author also highlights the importance of Disaster Risk Reduction (DRR) for the identification of potential disaster.

Wiejaczka, Bucala and Sarkar (2014), through their article titled *Human role in shaping the hydro-geomorphology of Himalayan rivers: study of the Tista River in Darjeeling Himalaya* attempt to characterize the hydro-geomorphology of the Tista River in Darjeeling Himalaya. The paper aims to demonstrate the similarities and dissimilarities in river hydro-morphology between sections permanently transformed by humans and those without permanent hydro-morphological transformations. The examination of the research's findings demonstrates that the habitat quality in river sections with and without discernible anthropogenic pressure is not significantly different.

Khawas and Rai (2015), in their article titled *Earthquake Disaster and Vernacular Construction – Experiences from the Sikkim Himalayan Earthquake, 2011* examine and document some of the most cost-effective traditional building skills and practices used by the local communities of Sikkim in mitigating the impacts of earthquake and other forms of natural disasters. The authors discuss the various types of traditional building of Sikkim and how vulnerable those structures are during the time of a natural disaster. The authors conclude by suggesting that for Disaster Risk Reduction (DRR) there should be a working balance or integration of traditional and scientific technology which can provide a viable option in the face of financial concerns for disaster reduction work.

Marhatta and Dhungana (2015), in their article titled *Knowledge and its management for Disaster Risk Reduction: An approach to Sustainable Development* opine that the modern approach of engineering and technology has overcast the tacit knowledge/technology, often by considering them to be rudimentary or superstitious. The authors have considered different Nepali cultural practices like folklore, songs, stories, anecdotes and proverbs as effective means of socialization, internalization, externalization and combination as proposed by Nonaka and Takeuchi's knowledge management model. They have further given several examples of Nepali proverbs that could be practiced for Disaster Risk Reduction approaches which eventually contribute for sustainable development.

Parmar and Kumar (2015), in the paper *Landslide Disasters and its Management* discuss all the suggestive measures and methods which are applied throughout the world to reduce the vulnerability from the landslides. The paper further suggests how to overcome landslide hazards and how to reduce the economic loss and the loss of human lives. In the conclusion the authors suggest that for landslide management landslide planning should be done on behalf of a local land utilization pattern. The community should also be involved in the afforestation programmes and the effective personalities i.e., teachers, doctors, engineers, technicians, electrician, postman, land use planner, pradhan, gram sewak, block development officer and other important people should be involved in the land use planning.

Pradhan and Pradhan (2015), in their article titled *Disaster Management and Participatory Governance in the Eastern Himalayan Region: Experience from the Darjeeling Hills* throw some light on the status of Disaster Management through Government based Top-Down Approach in the Darjeeling Municipality Area. The paper is qualitative in nature and is written on the basis of interviews conducted on 60 respondents of Darjeeling Municipality Area. Through the study the authors have come to the conclusion that the State Government as well as the Darjeeling Municipality are not adequately prepared to respond to natural disasters in the region, due to isolation of various disaster management agencies the collective resources are not optimally utilized and the role of administration in disaster management in the area is inherently Top-Down.

Singh (2015), in his edited book titled *Disaster Management: Future Challenges and Opportunities* provides extensive information with the most recent statistics about disaster management at the local, regional, national, and worldwide levels. A wide range of important and practical ideas. The book comprises of four sections and twenty-four chapters by some of the renowned researchers and academicians. These chapters deal with different concepts and strategies for the proper management of disasters. The topics covered in this book are community-based preparedness, man-made disasters, management of natural disasters and role of technology in the management of disasters.

Singh (2015), in his article *Vulnerability Analysis and Mitigation: Key to Disaster Management* discusses in detail about the two most important aspects of disaster management i.e., disaster vulnerability and disaster mitigation. The paper highlights the state of disaster management and also has provided empirical evidences. The disasters that the author focuses on are earthquakes, fire hazard and floods. He provides in detail the management strategies to manage these disasters. Lastly the author examines and discusses the role of remote sensing, GIS and GPS; and the role of community in the management of disasters.

Tabisha and Syed (2015), in their article *Disaster Preparedness: Current Trends and Future Directions* examine the strategies adopted for disaster preparedness at governmental and

intergovernmental level in India. The paper also looks at examples of ways in which these policy undertakings are being interpreted and put into practice. The authors have reviewed the various techniques adopted by the government for disaster preparedness and also suggested various strategies and approaches that can be adopted for better preparedness.

Biswas and Pal (2016) in their article titled *Causes of Landslides in Darjeeling Himalayas during June – July, 2015* discuss about the main causal factor of the landslides that took place at Mirik, Darjeeling, Kalimpong and Kurseong during June – July, 2015. The cause is examined based upon some historical analysis without any statistical or physical based model. In findings the authors point out that the causes behind the landslide are heavy rainfall, geology with neo-tectonic activity, presence of Mirik Lake and anthropogenic activities.

Huq (2016), in his article titled *Community Based Disaster Management Strategy in Bangladesh: Present Status, Future Prospects and Challenges* analyses is based on a review of the literature of grassroots community engagement approaches to disaster management in Bangladesh. The need for community-based disaster management, its challenges, and potential solutions are further discussed in the article for the benefit of those affected in the vicinity of disaster-prone locations.

Pal, Biswas, Mondal and Pramanik (2016), in their article titled *Landslides and Floods in the Tista Basin (Darjeeling and Jalpaiguri District): Historical Evidence, Causes and Consequences* analyse the overall scenario of the landslide events and occurrences in the Tista Basin in Darjeeling and Jalpaiguri Districts, in the context of historical evidence. In this article the authors observe that the various causes of landslides in the areas are torrential rainfall, fragile geology, earthquake and anthropogenic cause. The various causes of floods in the study areas as mentioned in the article are sudden cloudburst, geomorphic cause, and anthropogenic cause. The authors conclude that it is impossible to prevent the natural causes of landslides and floods in the study area. However, the anthropogenic causes can be prevented which may lead to reduction in the severity of the basin dynamics.

Bhagat (2017), in his article titled *Community-Based Disaster Management Strategy in India: An Experience Sharing* analyses and evaluates the various programmes framed by the Gujarat State Disaster Management Authority which engages communities to deal with disaster risks. The author has suggested various steps and processes of Community-Based Disaster Management for community resilience.

1.6 RESEARCH GAP

Disaster management has been one of the most serious and challenging issues in the Himalayas, particularly in view of the fragility of the mountains and alarming speed of climate change. On close scrutiny of various literature on disasters and disaster management it has been noted that a considerable amount of work has been done on disasters and their management in many disaster-prone areas on macro-level but no specific, intensive work has been conducted on the Darjeeling Himalayan Region barring a handful of articles mainly focusing on the landslides in the region.

It has also been realized that the works that have been found are mostly done with technical expertise or have been done with a stereotypical top-down approach. Works based on social and community-based bottom-up approaches are almost non-existent.

This study is an attempt to mend the gap. It will closely examine the current scenario of prevalent disasters in the study areas as well as disaster management approaches adopted by the local communities and local government.

1.7 STATEMENT OF THE PROBLEM

In recent years Darjeeling Himalayas is witnessing some of the major environmental problems on a rampant basis. In fact, the frequency of disasters in Darjeeling is a major problem. The very sustainability of the fragile Himalaya is degrading with severe impact on the health and livelihood of the mountain communities living in the region.

The common natural disaster which frequently occurs in this Himalayan region of Darjeeling is landslide which is often accompanied by torrential rainfall with devastating impact on

environment. Apart from landslides, other disasters like soil erosion, forest fires etc. have caused tremendous loss to the region and the society. The chronology of such disasters can be traced from the old records. Among them 1967 landslide worst affected this region and its people followed by major disasters like Aila cyclone (2009) and the recent earthquake (2011). Landslides along NH31A are a frequent phenomenon.

Apart from the above-mentioned problems with rapid urbanization and a phenomenal growth of tourism, Darjeeling has been experiencing an unprecedented rise in population, thus making the area more fragile and unstable.

Though different strategies have been adopted by the government as well as the local body but the implementation of these plans is not wholesome. Most of the plans have top-down approach. Community based bottom-up approach has hardly been used. Other major problems in the area may be lack of technical co-ordination of agencies related to disaster management as well as co-ordination between local body and local community, the lack of public awareness and insufficient means and resources.

Therefore, based on the above given description, the problems may be attributed to:

- Delay in relief and rescue
- Misutilization of relief fund
- Ignorance of the locals
- Poor training of locals
- Lack of technology
- No provision of creating employment
- Lack of coordination among various departments
- Faulty development scheme

1.8 RESEARCH OBJECTIVES

Disaster management can be studied in various ways but the study is never complete without studying the disaster history, present disaster, different disaster management and mitigation

methods opted by the local community as well as the local government of a particular area.

Therefore, the objectives of the present study will be oriented under the following heads:

1. To explore and analyse the history of disasters that took place in the study area.
2. To identify and examine the disasters that are predominant in the study area.
3. To study the various strategies adopted by the local body or local government and Non-Governmental Organizations (NGOs) at the local and regional level for the management/mitigation of the disasters affecting local communities.
4. To analyse the various disaster management/mitigation methods implemented by the local communities.
5. To assess the impact of disasters on the socio-cultural and economic life of the people.
6. To study the impact of disasters on the ecology and the environment of the study area.

1.9 RESEARCH QUESTIONS

The research questions are framed keeping in mind both qualitative and quantitative methods.

These questions have been prepared based on the objectives stated above.

1. What are the different types of disasters that have taken place in the study area in the past?
2. What are the disasters that are predominant in the study area?
3. What are the different disaster management/mitigation strategies adopted by the local government and Non-Governmental Organizations (NGOs) for the management of disasters?
4. What are the different disaster management/mitigation methods adopted by the local community?
5. To what extent the people are aware about the schemes provided by the central, state or the local government?
6. What are the impacts of disasters on the socio-cultural and economic life of the local population of the study areas?

7. What are the impacts of disasters on the environment of the study areas?

1.10 RESEARCH METHODOLOGY

Different aspects have been considered in this study to understand the problem. Discussed below are the methodologies which have been used.

1.10.1 Research Design

The methodology for the present study has been planned by considering two main components.

- Role played by the government (national, state and local) and non-government organizations for the management and mitigation of disasters
- Community level management and mitigation techniques and the effectiveness of the techniques

The methodology adopted helped to critically analyse and evaluate the situations with reference to:

1. History of disaster
2. Causes of disaster
3. Impact of disaster on people
4. Disaster management practices being applied and their impacts
5. Views and opinions of various sections of the society on the management practices adopted by the government.

1.10.2 Sources of data

To examine the above given situations the data for the study shall be collected from primary as well as secondary sources.

1. Primary Sources:

Equipped with the knowledge and information base made available through secondary literature review and review of government policies about disaster management, the process of questionnaire/interview was initiated. The primary data were collected through intensive field study in various disaster-prone areas of Darjeeling Himalaya. To conduct the survey thirteen (13) disaster prone areas were visited.

The intensive field survey was done by empirical study with the help of different tools and techniques namely:

- Interview schedules which were used to conduct intensive field study
- Participant observation method was used to observe the present condition of disasters in the study area and also to collect the narratives regarding disasters and disaster management
- Group Discussions to derive information and perception of the locals regarding disaster and disaster management
- Case Studies was used to portray the current scenario of disasters and disaster management from the perspective of Local Government, Non-governmental Organizations and Local Communities and
- Personal Interviews with village representatives, academicians, government officials, NGOs etc. to know their views on the present condition of disasters and disaster management in Darjeeling Himalayan Region

Further, comparative method was also applied to study the impact of disasters on different areas.

Since disasters are highly influenced by the physical and geographical factors, the methods adopted for the landscape study included detailed analysis of causative factors related to ground cover, anthropogenic factors along and parameters like soil condition, geological setup, weather information etc.

2. Secondary Sources:

Secondary data were collected from different published and unpublished literature available on disaster and disaster management in the form of books, research papers, dissertations, articles, journals and reports. The information available on the internet was accessed to gain knowledge on the most recent and current trends. Apart from published literature, maps, aerial photographs, satellite imageries and other sources also were referred, which helped to understand the extent of disaster and demarcate the disaster-prone areas more precisely.

The data were further enhanced by consulting officials and reports documents of different government ministries and departments.

1.10.3 Selection of Informants

To initiate collection of data from primary sources people from different fields were contacted who represented almost all the groups which were directly or indirectly related to the disasters and their management. The categories of people included were:

- People affected
- People's representatives
- Administration
- NGOs and
- Academicians

1.10.4 Tools and Techniques of Data Collection

The study was conducted by extensive research study and collection of data from both secondary and primary sources.

For primary data collection only, the disaster affected people and the people who were directly or indirectly related with the management of disasters were interviewed. Hence, Heterogeneous Purposive Sampling was used as a method of data collection. The basic primary data were

collected from the people residing in and around major disaster-prone zones or from those people who were rehabilitated due to disasters.

To obtain primary data from the households, partially close-ended as well as open-ended interview schedules were used. The content ranged from socio-economic status of the respondents to disasters and their disaster management. A separate open-ended questionnaire was also prepared to interview the block officers, panchayat members and village representatives focusing on the disasters and disasters management approaches adopted. Participatory Observation and Focused-Group Discussion were the other methods that were used during field survey.

Though, the questions were in English, the native language i.e., Nepali was used for the convenience of the respondents. Information was also obtained through informal conversation and group conversation with the locals and the elderly and more experienced members of the villages.

Before the commencement of the field work a pilot, survey was conducted in various areas of Darjeeling Himalaya to get preliminary idea about the frequency and magnitude of disasters and also to comprehend various aspects of disaster management.

1.10.5 About Field Work

Field work was conducted since 2015 to 2021. The survey was conducted after selecting several disaster-prone areas of Darjeeling hills. These areas were selected on the basis of frequency, magnitude and severity of disaster; and proximity and communicability to the area. The details about the study areas are given in chapter 2.

The primary data collection was mostly conducted in the season of monsoon when the areas were most vulnerable to the disasters. The first phase of primary survey was conducted in the year 2015-2016 in the villages located along National Highway 10. During the phase Limbugaon in Kurseong was visited because a major landslide occurred in the village. The second phase of the

survey was conducted during 2017-2018 when different disaster affected areas of Kurseong were visited. The third phase was conducted in the year 2018-2019 when different areas of Kalimpong and Darjeeling were visited to collect primary data. During this phase major emphasis was given to the areas of Darjeeling subdivision. The last phase was conducted in the year 2020-2021 when some of the areas were re-visited to gain more knowledge about the problem.

1.10.6 Sampling Design

The study area comprises the Darjeeling Himalayan Region consisting of Darjeeling Sub-Division, Kurseong Sub-Division and Kalimpong Sub-Division in Darjeeling District (Note: Kalimpong is now a separate district with effect from 24th February, 2017). A total of 300 persons were interviewed and the universe/population of the study includes the person who were directly or indirectly affected by disaster/disasters. Below is the sample survey area along with number of respondents that were interviewed.

Table 1.1 Sample Study Area and Number of Respondents

District/Sub-Division	Name of the Surveyed Area	Number of Respondents
Darjeeling	Lower Nezi, Goke II	25
Darjeeling	Bijanbari	25
Darjeeling	Som Tea Estate	18
Darjeeling	Sukhiapokhari	19
Kurseong	Limbu Gaon, Tingling Tea Estate	25
Kurseong	Paglajhora	25
Kurseong	Tindharia	26
Kurseong	Ambootia	26

Kurseong	Kalijhora	25
Kalimpong	Baluwakhani, 29 th Mile	26
Kalimpong	Reang	26
Kalimpong	Alaichikhop	17
Kalimpong	Nim Khasmahal	17

1.10.7 Data Processing and Analysis

The collected data were processed and analysed through both Quantitative and Qualitative techniques. The quantitative data were processed through tabulation which was done manually and simple statistical calculation consisting mostly of percentage. The analysed data were then presented both statistically and graphically.

Qualitative technique was used to determine the significance of findings. Further the data were analysed on the basis of systematic and analytical description of facts in the form of case studies.

For the preparation of maps Quantum GIS (QGIS) version 3.18 was used along with Global Mapper.

1.11 RESEARCH ETHICS

It is of immense responsibility to maintain research ethics while conducting field study and when dealing with sensitive topics such as disasters and disaster management. So, while conducting the field work, code of conduct for research was strictly followed. Informed consent of the respondents was obtained for the study. The respondents were informed of the study's goal. Prior to collecting any data, the study's goals were made plain so that no hopes or expectations of assistance would be generated. Regarding the information gleaned from the responders,

confidentiality was upheld. The material was exclusively utilised for academic and research purposes

1.12 RESEARCH PROBLEMS AND LIMITATIONS

Some problems were experienced during present research study. These problems led to certain limitations. The limitations may be summarized as follows:

- Scarcity of Secondary Data

The first limitation was the scarcity of secondary data on disaster management in Darjeeling Hills. There were some articles, research papers, books and government documents related to disasters and the role of governmental organizations in disaster management in Darjeeling Hills but there was almost no literature as far as the role of communities were concerned

- Rapport Establishment

The second problem was the rapport establishment with the informants. Since this topic was very sensitive because of the difference of opinion between the people and the government, it took some effort and time to establish a friendly rapport with the informants. Due to this, it became very difficult to extract some important information from the government officials, local authorities and the local population. The informants were very hesitant to answer some of the questions that were included in the questionnaire/schedule which led to the third problem i.e., repetition of the answers.

- Repetition of answers

This problem was especially faced when interviews were conducted with the affected population. When data were collected from an area, most of the opinions were almost same. Due to repetitive answers problems were faced during the process of analysis of data.

- Communication to the study areas

The fourth and the final problem was related to communication to the study areas. Since the topic dealt with disasters in Darjeeling hills and the field work had to be conducted in disaster prone areas it became very difficult to reach some of the major disaster-prone areas due to the lack of proper communication facilities. Due to this, only those areas were covered which were communicable, while some areas were left out, which was major limitation in this study.

However, in spite of all the limitations and problems stated above, utmost efforts were made to compensate by spending ample amount of time in the study areas.

1.13 SIGNIFICANCE OF THE STUDY

The present study on Disasters and Disaster Management in Darjeeling Hills attempts to highlight the present scenario and gravity of disasters in Darjeeling Hills. This study also tries to draw attention to the role played by the government and local communities in the management and mitigation of disasters. Through this study the level of knowledge and consciousness among the population of Darjeeling Hills regarding disasters and disaster management can be perceived and assessed.

As mentioned in research gap there is a dearth of literature on disaster management in Darjeeling hills and since this study is based upon the primary data collected from field work as well as secondary sources, this study can provide a guideline or can supply some base line data for a researcher dealing with this kind of topics; to the planners, policy makers and administrators belonging to the fields related to disaster and disaster management and NGOs and social workers who are dealing with projects related to disasters and disaster management in Darjeeling Hills.

Lastly since Darjeeling Hills is a disaster-prone area and through the field work it has been found out that there is a lack of understanding about the disaster and the importance of disaster management among the majority of the population, the findings of this study will certainly enhance the knowledge about the disasters and disaster management in Darjeeling Hills.

1.14 OVERVIEW OF CHAPTERS

The thesis contains seven chapters prepared on the basis of the in-depth study about the state of affairs of disasters and disaster management in Darjeeling Hills.

The first chapter is the introductory chapter which basically introduces the background of this study. Apart from the background the chapter also highlights the various aspects related to this thesis such as; conceptual framework, literature review, research gap, statement of the problem, research objectives, research questions, research methodology, limitations of the study and significance of the study.

The second chapter is based upon secondary data. The chapter basically discusses about the physical as well as socio-economic profile of the study area. Apart from Darjeeling Hills as whole, this chapter also discusses about the specific study areas in brief.

The third chapter is based upon both secondary as well as primary sources. This chapter traces the history of disaster in Darjeeling Hills as a whole as well as in the specific study areas.

The fourth chapter is also based upon both primary as well as secondary sources. This chapter provides information on the role of governmental and non-governmental bodies in the management of disasters. Apart from discussing the role of governmental agencies in Darjeeling Hills, this chapter also highlights the role of government for the management of disasters in state as well as country.

The fifth chapter is related to the role of communities in the management of disasters. This chapter is based upon both primary as well as secondary sources. In this chapter apart from discussing about the role played by the communities in the management of disasters a few case studies of some of the communities are also presented.

The sixth chapter highlights the quantitative findings of the study. In this chapter the primary data are analysed and quantified using various statistical techniques and diagrammatic representations.

The Seventh or the final chapter deals with the final analysis and concluding remarks which sum up this thesis as a whole.

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