

**A STUDY ON THE IMPACT OF FLOODS ON EVOLVING COMMUNITY
PARTICIPATION IN KUTTANAD**

Dissertation submitted to

Mahatma Gandhi University, Kottayam in partial fulfilment of the requirement for

the degree of

Master of Social Work

Specializing in

COMMUNITY DEVELOPMENT

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2021-2023

CERTIFICATE

This is to certify that this dissertation titled " **A Study on the Impact of Floods on Evolving Community Participation in Kuttanad** " is a record of genuine and original work done by **Grace Thomas, Reg. No 210011034053** of IV semester Masters of Social Work course of this college under my guidance and supervision and it is hereby approved for submission.

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DECLARATION

I, Grace Thomas hereby declare that the research work titled “ **A Study on the Impact of Floods on Evolving Community Participation in Kuttanad** ” submitted to the M G University, Kottayam is a record of original work done by me under the guidance of Dr. Sheena Rajan Philip, Head of the Department, Bharata Mata School of Social Work, Thrikkakara and this research work is submitted in partial fulfilment of the requirements for the award of the degree of Master of Social Work Specializing in Community Development.

I hereby declare that the results embedded in this research have not been submitted to any other University or Institute for the award of degree or diploma, to the best of my knowledge and belief.

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ABSTRACT

Kuttanad, a region in southern Kerala, India has been frequently affected by floods and waterlogging. The study explores the experiences and perspectives of individuals and communities affected by flooding. The findings demonstrate that floods have had a profound influence on community participation in Kuttanad. They have fostered increased solidarity and cooperation and networks aimed at addressing the challenges posed by flooding. Floods have also empowered individuals, encouraging proactive measures such as the construction of embankments and bunds, advocacy for improved infrastructure and better disaster management practices. External interventions from government programs and non-governmental organizations have further shaped community participation by providing resources and support to a certain extent. However, challenges such as unequal access to resources and power imbalances exist, hindering effective collective action. This research contributes valuable insights to policymakers and practitioners, enabling the design of inclusive approaches that enhance community resilience and sustainable development in flood-prone regions like Kuttanad.

Key words: Disaster, Community participation, resilience, Flood

ACKNOWLEDGMENT

I am extending my sincere gratitude to the God Almighty for giving me the spiritual moral and physical strength to pursue my academic goal. I take this privilege to acknowledge all those people who have made this thesis possible and because of whom my research experience has been one that I will cherish forever. I thank the following members for their support.

First, I would like to thank the management, Bharata Mata College, headed by **Rev. Fr. Abraham Oliapurath** and Principal **Dr. Johnson K M**, for supporting me to complete my work as part of my curriculum.

I am highly indebted and thankful to my guide **Dr. Sheena Rajan Philip**, Head of the Department, Bharata Mata School of Social Work, Thrikkakara, Ernakulam, for her valuable advice, guidance, and inspiring encouragement at all phases and till the fruitful completion of the dissertation.

I sincerely express my sense of gratitude to the faculty members of the Department of Social Work, Bharata Mata School of Social Work, Thrikkakara, for their valuable suggestions during my work. My heartfelt thanks to my dear friends, for their great motivation and cooperation, I am grateful to my parents for their encouragement and support during the research. Last but not least I extend my appreciation to the participants who generously dedicated their time and effort to take part in this research. Their willingness to share their experiences and insights has provided the foundation for the findings presented in this research. I'm thankful to all those who have helped me in this work, directly or indirectly.

Most importantly, none of this would have been possible without my family's love, patience, and monetary support. I express my heartfelt gratitude to my family for all their encouragement.

Thank you all,

Grace Thomas

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CHAPTER 1

INTRODUCTION

Disasters are sudden and catastrophic events that can cause significant damage, that causes loss of life and disrupt the normal functioning of communities. These events can take many forms, including natural disasters such as earthquakes, hurricanes, floods and fires, as well as man-made disasters such as industrial accidents, terrorist attacks and pandemics. Disasters can have far-reaching consequences, affecting social, economic and environmental aspects of society.

One of the most remarkable aspects of disasters is their unpredictable nature. For example, natural disasters can strike without warning, leaving little time to prepare or evacuate. This unpredictability contributes to the fear and anxiety associated with such events as people grapple with the unknown and face imminent danger. Moreover, disasters often lead to a cascading effect that triggers secondary impacts and multiplies the initial devastation. For example, an earthquake can lead to landslides that can block roads and hinder rescue efforts.

Disasters have several key characteristics that distinguish them from other types of phenomena. Understanding these characteristics is critical for effective disaster management and response. Here are some key characteristics of disasters:

1. Sudden Onset: Disasters often occur with little or no warning, leaving little time for preparation or evacuation. Whether it is a natural disaster such as an earthquake or a man-made disaster such as a terrorist attack, sudden onset distinguishes disasters from more predictable events.
2. Scale and impact: Disasters have a significant scale and impact, affecting a large geographical area and causing widespread damage and destruction. They have the potential to disrupt entire communities or regions, resulting in loss of life, injury and severe damage to infrastructure, property and the environment.

3. High intensity: Disasters are characterized by high intensity. They involve extreme forces or conditions that are beyond the normal range of human experience. Whether it's the strength of a hurricane, the size of an earthquake, or the intensity of a wildfire, disasters often push human and environmental systems to their limits.

4. Loss and Suffering: Disasters result in various forms of loss and suffering. They lead to loss of life, injuries, displacement and destruction of homes and livelihoods. The physical and emotional toll on individuals and communities can be enormous and requires significant support and resources for recovery.

5. Complexity and interconnectedness: Disasters are complex events that involve interconnected systems. They often trigger a cascade of secondary impacts and interrelated problems. For example, a severe storm can lead to flooding, which in turn contaminates water sources, disrupts transportation and increases the risk of water-borne diseases. Understanding and managing the complexity and interdependencies of these systems is critical to effective disaster response.

6. Long-term consequences: Disasters have long-term consequences that go beyond the immediate impact. The recovery and recovery process can take months or even years. Socioeconomic, environmental and psychological effects can persist long after the disaster itself.

Recognizing and understanding these characteristics can assist in developing preparedness, response and recovery strategies and in mitigating the impact of disasters on individuals, communities and societies as a whole.

Disasters can be categorized into different types based on their origin and characteristics. Natural disasters are not limited, earthquakes, hurricanes, tornadoes, floods, fires, tsunamis, volcanic eruptions, and droughts. These events are caused by

natural forces and processes. On the other hand, man-made or technological disasters occur as a result of human activity and can include industrial accidents, nuclear incidents, traffic accidents, terrorist attacks, and pandemics.

Disasters have a varying impact on different aspects of humankind. The consequences of disasters can be devastating and far-reaching. First, they often result in the loss of human life, leading to immense personal and collective grief. Disasters can also cause widespread damage to infrastructure, including buildings, roads, bridges and utilities, disrupting essential services such as electricity, water and communication systems. The economic consequences are significant, with industries and businesses severely affected, leading to job losses, financial instability and increased poverty. In addition, disasters can have long-term environmental impacts, including pollution, habitat destruction and ecological imbalances. The psychological and emotional toll on survivors is another consequence, as they may experience trauma, anxiety and post-traumatic stress disorder.

The aftermath of the disaster is characterized by the challenging task of recovery and reconstruction. Disaster-affected communities face immense challenges, including restoring essential services, repairing infrastructure and providing humanitarian aid to those affected. Disaster recovery is a long-term process that requires the joint efforts of government agencies, non-governmental organizations and individuals. In addition to physical reconstruction, psychological support is also needed to help survivors cope with the trauma and rebuild their lives. Lessons learned from past disasters play a vital role in shaping disaster management strategies and improving preparedness for future events.

1.1 Disaster Management

Disaster management is a comprehensive approach to preparing for, responding to, recovering from, and mitigating the impact of disasters. It includes a series of stages and phases that govern activities and actions carried out by authorities, organizations and communities. Here are the main stages and phases of disaster management:

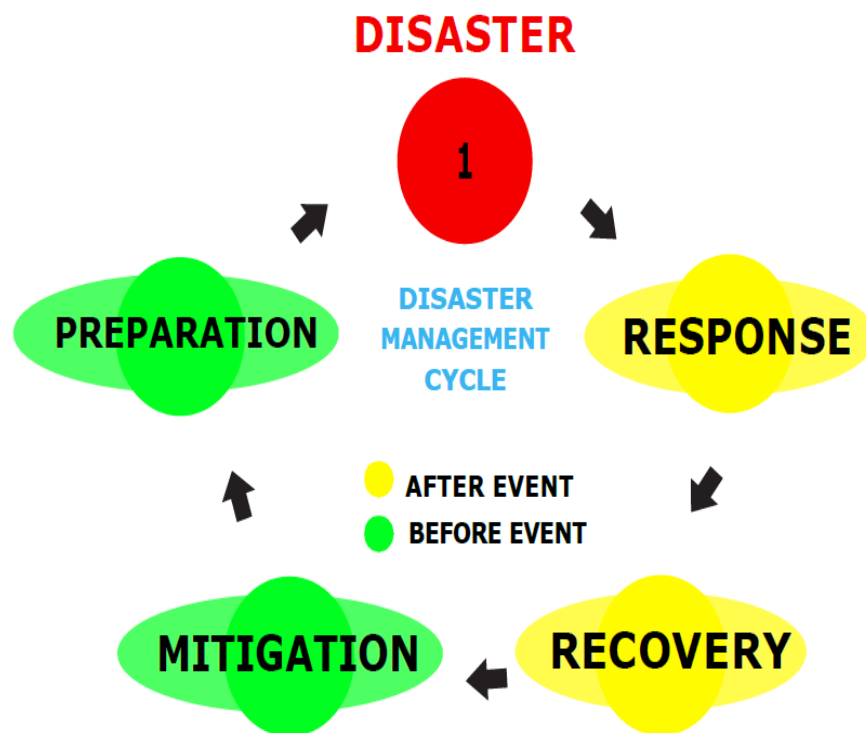


Fig 1.1 Phases of Disaster Management

Preparedness: The preparedness phase focuses on activities and actions taken before a disaster to increase preparedness and reduce potential impact. This includes creating emergency plans, conducting risk assessments, implementing early warning systems,

training emergency response teams, stockpiling necessary supplies, and raising public awareness of potential hazards and appropriate responses.

Mitigation: The mitigation phase involves efforts to minimize or eliminate the risks and vulnerabilities associated with disasters. This includes implementing measures such as land use planning, building codes and technical solutions to reduce the exposure of communities to potential hazards. Mitigation also includes public awareness and education campaigns to promote safer behaviours and practices.

Response: The response phase occurs during and immediately after a disaster. It involves the mobilization of resources and emergency services to address the immediate needs of affected individuals and communities. Response activities include search and rescue operations, medical assistance, emergency shelter, provision of food and water, coordination of emergency communications, and establishment of temporary infrastructure to restore essential services.

Recovery: The recovery phase begins after immediate response efforts and focuses on restoring and rebuilding affected communities to pre-disaster condition or better. This involves assessing damage, reconstructing infrastructure, revitalizing the economy, providing psychological and social support to survivors and restoring basic services. Recovery efforts also include measures to increase resilience and reduce future vulnerabilities.

It is important to remember that disaster management is a continuous and cyclical process. Phases and phases interact and overlap, as lessons from previous disasters inform future preparedness and mitigation efforts. Effective disaster management requires cooperation and coordination between government agencies, non-

governmental organizations, community groups and individuals to ensure a proactive and integrated approach to disaster risk reduction and response.

The "4 R's" of disaster management refer to a framework that highlights key principles and objectives in the various phases of disaster management. These four R's are:

1. Reduction: The reduction phase focuses on activities aimed at minimizing risk and vulnerability to disasters. It involves implementing measures to reduce or prevent the occurrence of hazards, such as land use planning, building codes and regulations, infrastructure improvements and ecosystem restoration. The aim is to mitigate the potential impact of disasters by addressing underlying risks and vulnerabilities in affected areas.

2. Readiness: The preparedness phase emphasizes the preparedness and preparedness of communities and organizations to respond effectively to disasters. It includes developing emergency response plans, establishing early warning systems, training emergency response teams, conducting exercises and drills, stockpiling necessary supplies and equipment, and raising public awareness of potential hazards and appropriate actions to take. The aim is to ensure that all necessary resources and capacities are available to respond quickly and effectively in the event of a disaster.

3. Response: The response phase occurs during and immediately after a disaster. It involves mobilizing resources, coordinating emergency services and providing immediate assistance to affected individuals and communities. This includes search and rescue operations, medical assistance, evacuation, emergency shelter, food and water distribution and restoration of essential services. The goal is to save lives, protect property and provide immediate assistance to people affected by a disaster.

4. Recovery: The recovery phase begins after immediate response efforts and focuses on restoring affected communities to pre-disaster condition or better. It includes damage assessment, coordinating debris removal, repairing or rebuilding infrastructure, supporting the physical and psychological well-being of survivors, providing financial aid and assistance, and restoring essential services. The aim is to facilitate the recovery and reconstruction process and enable affected communities to regain normalcy and rebuild their lives.

The 4 R's framework provides a structured approach to disaster management and emphasizes the importance of risk reduction, preparedness, effective response and comprehensive recovery efforts. By following these principles, authorities, organizations and communities can work to minimize the impact of disasters and build resilience to future events.

1.2 Disaster Management Authority

A Disaster Management Authority (DMA) is a governmental or non-governmental organization responsible for overseeing and coordinating disaster management efforts at the regional, national, or local level.

The role of a disaster management authority generally includes the following duties:

1. Planning and Policy Development: The DMA is responsible for developing disaster management plans, policies and guidelines to ensure a coordinated and effective response to disasters. This includes assessing risks, identifying areas of vulnerability and establishing strategies for mitigation, preparedness, response and recovery.

2. Coordination and Cooperation: The DMA serves as a central coordinating body for various stakeholders involved in disaster management, including government

agencies, emergency services, non-governmental organizations (NGOs) and community groups. It facilitates cooperation, information sharing and resource mobilization among these entities to ensure a comprehensive and integrated approach to disaster management.

3. Early Warning Systems: DMA plays a critical role in establishing and maintaining early warning systems that detect and communicate potential hazards and risks to the population. This includes monitoring meteorological and geological conditions, disseminating warnings and alerts, and coordinating evacuation procedures when necessary.

4. Preparedness and Capacity Building: DMA works to increase the preparedness and capacity building of agencies and communities. This includes conducting training programs, drills and exercises to improve emergency response skills, promoting public awareness and education about disaster risks and appropriate actions, and stockpiling essential supplies and equipment.

5. Response and Recovery: DMA coordinates and supports response efforts during and immediately after a disaster, ensuring a timely and effective response. It mobilizes emergency services, provides logistical support and facilitates the distribution of aid and assistance to affected areas. The DMA also plays a role in the post-disaster recovery phase, coordinating damage assessments, coordinating reconstruction efforts, and facilitating the restoration of essential services and infrastructure.

6. Policy Advocacy and Research: DMA can engage in advocacy and research activities to influence policy development, promote best practices, and incorporate lessons from past disasters into future planning. It can also contribute to research and studies related to disaster management, risk reduction and resilience building.

The specific structure and authority of a disaster management authority depends on the legal and administrative framework of the country or region. In some cases, it may be a separate government agency, while in others it may be a department within a larger ministry or organization. The primary objective of the DMA is to ensure effective coordination, preparedness, response and recovery to minimize the impact of disasters and protect lives and property.

National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA) and District Disaster Management Authority (DDMA) are the three key levels of government bodies responsible for disaster management.

1. National Disaster Management Authority (NDMA):

The NDMA is the highest level of disaster management at the national level. It is typically a statutory body established by law or executive order and operates under the direct supervision of the central government. The NDMA is responsible for formulating national disaster management policies, plans and guidelines. It coordinates and supports the efforts of state and district agencies, promotes capacity building and preparedness measures, and provides overall guidance for disaster response and recovery at the national level.

2. State Disaster Management Authority (SDMA):

The SDMA operates at the state or provincial level within the country. It is established by law or executive order and operates under the supervision of the relevant state government. The SDMA is responsible for the coordination and implementation of disaster management activities within the state. It formulates state-level policies, plans and guidelines for disaster management, oversees the preparedness and response of

various agencies, allocates resources and coordinates with NDMA and other state agencies in times of disasters.

3. District Disaster Management Authority (DDMA):

DDMA is established at the district level within a state or province. It operates under the direction and supervision of the relevant district administration. The DDMA is responsible for the coordination and management of disaster management activities within the district. Prepares and implements district level plans, oversees preparedness measures, coordinates emergency response and ensures effective communication and coordination between local government agencies, emergency services, NGOs and community organizations.

The three levels of authorities, NDMA, SDMA and DDMA, work in a hierarchical manner to ensure effective disaster management. While the NDMA provides overall leadership and policy direction at the national level, the SDMA focuses on coordination and implementation at the state level and the DDMA is responsible for managing disaster-related activities at the district level. This hierarchical structure allows for better coordination, resource allocation and response during disasters, enabling a more effective and integrated approach to disaster management.

1.3 Kerala; Proximity of Disasters

Kerala, a state in South India, is known for its unique geographical features and rich cultural heritage. However, due to its location and climatic conditions, it is also prone to various natural disasters. Here are some key features of Kerala and the types of disasters it experiences:

1. Geographical Features: Kerala is characterized by a diverse topography that includes the Western Ghats, backwaters, rivers and coastal areas. The Western Ghats play a key role in influencing the climate of the region as they receive heavy rainfall during the monsoon season. Backwaters and coastal areas are prone to flooding, while hilly areas are prone to landslides.

2. Monsoon Season: Kerala experiences a long and intense monsoon season from June to September, known as the Southwest Monsoon. During this period, the state receives heavy rainfall that can lead to widespread flooding and landslides. The combination of high rainfall, hilly terrain and inadequate drainage infrastructure can exacerbate the impact of monsoon-related disasters.

3. Floods: Kerala is prone to frequent floods due to heavy rains, overflowing rivers and inadequate drainage systems. Floods can cause significant damage to infrastructure, agriculture and livelihoods. In recent years, the state has witnessed devastating floods such as the 2018 floods that resulted in loss of life and widespread destruction.

4. Landslides: The hilly areas of Kerala are prone to landslides, especially during the monsoon season. Steep slopes and loose soil make these areas highly vulnerable to slope failure, leading to landslides that can cause widespread damage to settlements, roads and infrastructure. Landslides pose a significant threat to the lives and property of people living in the hilly areas of the state.

5. Cyclones and storm surges: The coastal areas of Kerala are exposed to tropical cyclones and storm surges, especially during the pre-monsoon and post-monsoon periods. These events can result in high winds, heavy rainfall and coastal flooding, cause damage to infrastructure, disrupt fishing and coastal activities, and pose risks to coastal communities.

6. Drought: Although Kerala experiences ample rainfall during the monsoon season, it also experiences periodic drought during the summer months in specific regions. Droughts can lead to water shortages, affecting agriculture, livestock and the overall socio-economic conditions of the region.

Due to these characteristics, Kerala faces a number of disasters including floods, landslides, cyclones, storms and drought. Therefore, from Kasargod to Thiruvananthapuram, Kerala is experiencing and striving for various disasters. These disasters have a significant impact on the lives and livelihoods of people in the state.

1.3 Alappuzha; The Venice of East

Alappuzha, also known as Alleppey, is a district in the state of Kerala, India. It is known for its beautiful backwaters, palm-lined canals and tranquil beaches. However, like many other regions in Kerala, Alappuzha is not immune to various types of disasters. Here are some key features of Alappuzha and the types of disasters that have occurred in the district:

1. **Backwaters and Canals:** Alappuzha is known for its extensive network of backwaters and canals, including the famous Vembanad Lake. These bodies of water are a major tourist attraction, but can also contribute to flooding during heavy rains and monsoon seasons.
2. **Coastal Area:** Alappuzha is situated on the coast of the Arabian Sea. This exposes the district to the potential impact of cyclones, storms and coastal erosion. During cyclonic events, coastal communities and infrastructure are at risk of damage from strong winds, heavy rains and tidal waves.

3. Paddy Fields and Agriculture: Alappuzha is famous for its agricultural activities, especially rice cultivation in paddy fields. However, prolonged or excessive rainfall can lead to waterlogging and crop damage. Flooding and salinity intrusion can also negatively affect agricultural productivity in the district.

4. Rivers: Several rivers including Pamba, Manimala and Achankovil flow through Alappuzha. While these rivers provide water sources for irrigation and livelihoods, they can also contribute to flooding during heavy rains. Bank erosion is another problem that can affect settlements and infrastructure along their course.

5. Wetlands and Ecological Vulnerability: Alappuzha comprises a significant part of the Vembanad-Kol wetland system, a Ramsar site of international importance. Wetlands play a vital role in maintaining the ecological balance of the region. However, anthropogenic activities and improper land use can pose a threat to the wetland ecosystem.

In terms of disasters, Alappuzha has experienced various types including:

- Floods: Heavy rainfall during the monsoon season causes rivers and canals to overflow, leading to widespread flooding in low-lying areas of the district.
- Cyclones and storm surges: The coastal areas of Alappuzha are vulnerable to cyclonic storms and associated storm surges, which cause significant damage to coastal communities, infrastructure and agricultural land.
- Waterlogging: Excessive rainfall and insufficient drainage infrastructure can lead to waterlogging in urban and low-lying areas of the district, affecting daily life and transport.

- Coastal Erosion: The coastal areas of Alappuzha are subject to erosion due to natural processes and human intervention. This led to land loss, structural damage and displacement of coastal communities.

To mitigate the impact of these disasters, the district administration along with government agencies are implementing disaster management plans, early warning systems and infrastructure development initiatives.

1.4 Kuttanad; The cultural heritage

The Kuttanad region of Kerala is a Globally Important Agricultural Heritage System (GIAHS) is declared by the Food and Agriculture Organization (FAO). A key feature of Kuttanad is the cultivation of rice at a depth of 1 m to 2 m below sea level in wetlands created by the drainage of brackish water delta swamps. Such rice cultivation is shaped by the specific flow system of fresh and salt water in the region. From the east, Vembanad Lake in Kuttanad is at the receiving end of five major rivers of Kerala: Pamba, Achankovil, Meenachil, Manimala and Muvattupuzha. From the west, Kuttanad receives an inflow of salt water from the Arabian Sea. In the north, the Thanneermukkam salt dam regulates the inflow of salt water into Kuttanad. In the south, the Thottappally Spillway helps drain monsoon water into the Arabian Sea. Under these conditions, paddy is grown in polders, where coconut is grown in garden plots, ducks are reared in waterlogged areas, and fish cultivations. Recently, the region is also a recognized tourist destination. Kuttanad is one of the few areas in India where paddy is grown below sea level. Over 150 years, farmers in this region have developed and mastered the technique of cultivating paddy land below sea level. This unique system in Kuttanad has many similarities with the Dutch polder system, which is also recognized by FAO as GIAHS.

Demography of Kuttanad

Kuttanad is one of the 6 Taluks of Alappuzha District. There are 14 villages and 0 towns in Kuttanad Taluk. According to the 2011 India Census, Kuttanad Taluk has 47,416 households, a population of 193,007, of which 93,013 are males and 99,994 are females. The population of children aged 0-6 is 18,638, which is 9.66% of the total population.

The sex ratio of Kuttanad Taluk is around 1075 compared to 1084 which is the Kerala state average. The literacy rate of Kuttanad Taluk is 88.21%, of which 88.28% males are literate and 88.15% females are literate. The total area of Kuttanad is 289.39 km² with a population density of 667 per km². There are 9.22% Scheduled Caste (SC) and 0.2% Scheduled Tribe (ST) in Kuttanad Taluk.

The agro ecology of the region

Kuttanad or 'low land' is a unique agro-ecological system spread over 10 taluks in three districts of Kerala i.e. Alappuzha, Kottayam and Pathanamthitta. The region extends from 9°17'N to 9°40'N and 76°19'E to 76° 33'E. The geography of the area is characterized by a deltaic formation formed by the confluence of five major rivers, i.e. Achancovil, Manimala, Pampa, Meenachil and Muvattupuzha. It covers an area of 874 km². Of this, an estimated area of 490 km² lies 1 to 2 m below MSL, which is mainly used for rice cultivation. A substantial part of these lands are acquired by the peasants of Vembanad Lake. These lands are not contiguous as canals and waterways surround each strip of land. The garden has an area of approximately 304 km². These garden plots look like islands of different sizes and shapes. The natural intermingling of land and water together with high soil fertility makes this land-water ecosystem ideal for agricultural purposes.

Almost 57 percent of Kuttanad is shared by Alappuzha district with 32 panchayats; about 30 percent is shared by Kottayam district with 27 panchayats; and about 13 percent is shared by Pathanamthitta district with 5 panchayats. Together, they make up about 2.5 percent of the state's geographic area. Almost 95 percent of agricultural holdings in Kuttanad are small or marginal.

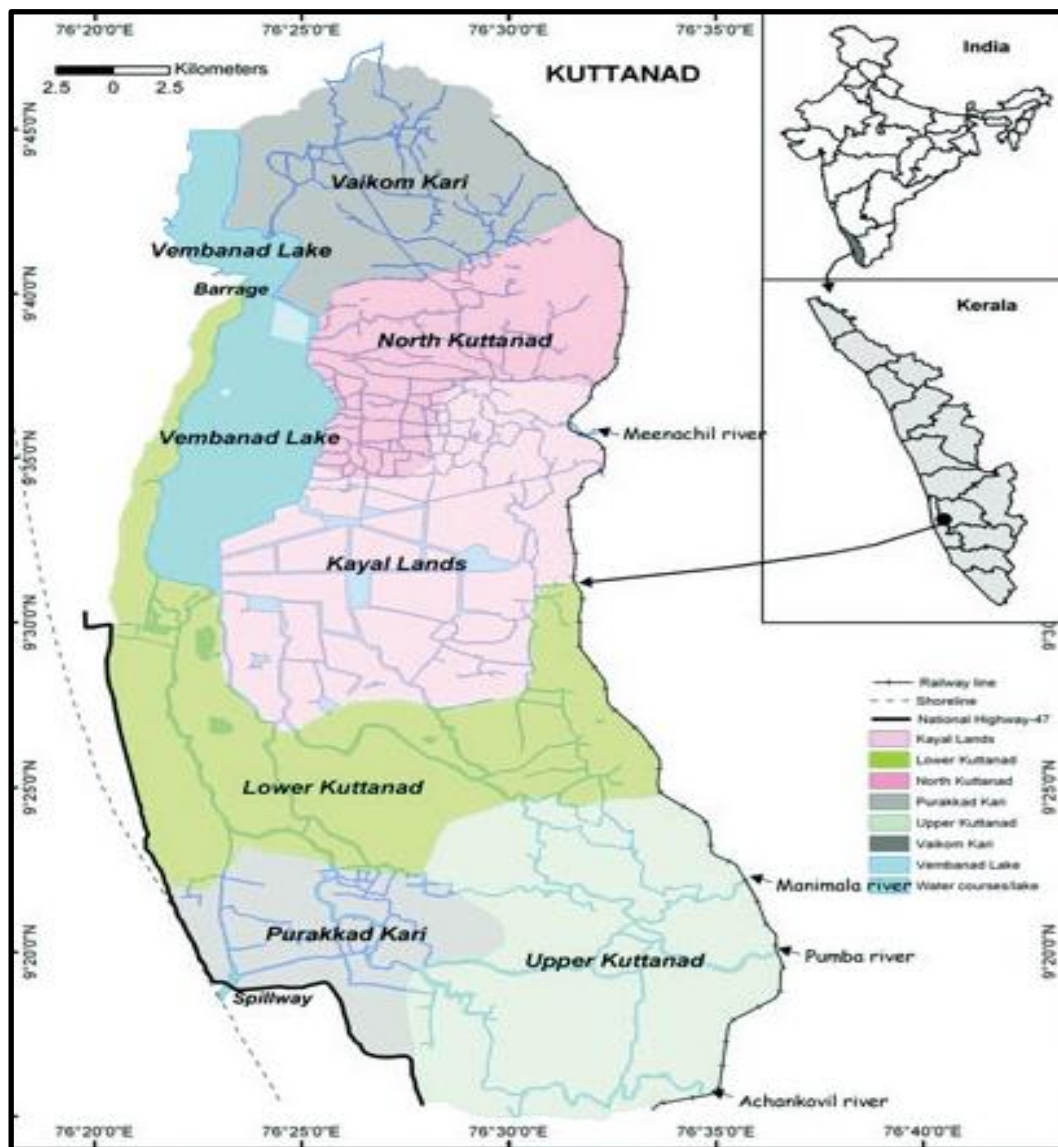


Fig 1.2 Map of Kuttanad Divisions

Rice is the main crop in the wetlands and coconut is the main crop in the garden plots. Bananas, tubers, vegetables and tree spices are grown as intercrops. The entire Kuttanad is divided into six agro-ecological zones based on topography, proximity to salt water intrusion, flooding etc. They are Lower Kuttanad, Upper Kuttanad, North Kuttanad, Kayal Lands, Vaikom Kari and Purakkad Kari. The paddy fields in Kuttanad are wetlands, either natural low-lying land formations or man-made reclamations from the Vembanad lake and are divided into three distinct zones, i.e. Karappadam, Kayal lands and Kari lands.

The Karappadam lands (about 33,000 ha) are areas of alluvial soils located along watercourses and forms the lower flow of the eastern and southern periphery. They are at a higher altitude than the Kayal and Kari soils. They are moderately acidic in reaction. The Kayal lands (about 13,000 ha) represent Padashekharams obtained from the Vembanad Lake with elevations between 1.5 to 2.2 m below MSL. The soils here are neutral in reaction and contain extensive deposits of limestone shell fossils under the topsoil. The Kari lands (about 9,000 ha) have black peat acidic soils and are located at or below MSL in the north (Vaikom), west (Thuravur) and south-west (Ambalapuzha, Thakazhi and Purakkad).

The Vembanad wetland ecosystem has a number of major associated values or functions, which could be called “ecosystem services” (James, 2000). First, the wetland serves as an important buffer for monsoon floods, protecting areas to the west from heavy flooding. Monsoon flows to Vembanad are estimated to range from 10,000 mm³ to 18,000 mm³. Secondly, the Vembanad wetland system is also home to rich flora and fauna. It consists of mangroves and a large number of fish, shrimps, clams, reptiles and birds. The wetland system is one of the richest bird habitats on the west coast of India. Third, the underwater agriculture practiced in the system provides direct and indirect

livelihoods to approximately 1.5 to 2 million people who reside in and near the system. Fourth, the region is also home to thousands of fishing households who derive their livelihood from the rich diversity of fish stocks in the waters.

The backwaters, estuaries, lagoons and canals form the part of an integrated water transport network for the inhabitants of the region. The Kollam-Kottapuram section of the inland canal system on the west coast of Kerala passes through the Vembanad wetland system. Sixth, the backwaters of Vembanad and its surroundings serve as the main base for international and domestic tourism in Kerala. During the monsoon season, many worlds' famous boat races are held in the region. Hundreds of houseboats float in the Vembanad lake throughout the year, providing livelihood to people.

1.5 The great 2018 Kerala flood

During the floods of June, July and August 2018 in Kerala, Kuttanad region was completely affected. Lying 1 to 2 meters below mean sea level, Kuttanad has always been very prone to flooding. Every year during the monsoons some part of this area is flooded. The data show that floods generally occur with varying intensity at recurrence intervals of 2, 5, 10, 25, 50 and 100 years. The August 2018 flood was a once in 100 year or 1% chance event. The Meenachil, Pamba, Manimala and Achankovil rivers, which empty into Vembanad Lake and Kuttanad as a whole, originate in Idukki district.

Idukki experienced "large excess" rainfall between 1 June and 22 August 2018, representing a 92% deviation from normal rainfall. The runoff generated from these four rivers during the rains between 15 and 17 August 2018 was about 1.63 bcm against 0.6 bcm carrying capacity of Vembanad Lake. The remaining amount of about 1 billion cm³ of runoff caused the water level in Vembanad Lake and adjacent areas to rise. The

flood height rose to 8.46 m on 16 August 2018 in Malacca on the Pamba River. This was 0.46 m higher than Malacca's 'high flood level' of 8 m.

More than 50,000 houses were drowned or partially drowned in Kuttanad due to heavy rainfall and the breaching of the polder (castle) walls. More than 200,000 people were evacuated and placed in relief camps in an unprecedented rescue operation using Indian Army and Navy units. The paddy crop grown on about 15,000 ha was destroyed. Almost the entire sown rice area was lost due to floods. The floods also uprooted more than 10,000 coconut palms that were grown along the paddy crop as well as independently on garden plots. The Government of Kerala has been widely praised for its leadership in disaster management and relief during and after the floods. It now faces the daunting task of rebuilding flood-affected regions of the state. The government embarked on a mission to 'Restore Kerala'. Reconstruction of infrastructure and livelihoods in Kuttanad is an integral part of Kerala's recovery.

In this background, the proximity of the recurrent floods and waterlogging is higher and the impact of such phenomena are also higher on the livelihood, agriculture, economy and humankind of the Kuttanad community. As the frequent floods and waterlogging are normal and a natural event for the villagers of the Kuttanad, the only possible solution is to mitigate the consequences and the risk factors. Community participation in disaster management is a critical aspect of ensuring effective and efficient responses to disasters. Involving the local community in preparedness, response, and recovery efforts not only increases overall community resilience, but also strengthens collaboration, coordination, and communication among various stakeholders. This research explores the community participation and the collective responses of the Kuttanad villagers in striving against the recurrent floods and waterlogging and to identify the need of actively engaging the community in disaster

management, authorities can leverage local knowledge, resources and capacity, leading to more effective and sustainable disaster preparedness, response and recovery efforts to fosters a sense of empowerment, ownership and resilience within the community, ultimately creating safer and more resilient societies.

CHAPTER 2

REVIEW OF

LITERATURE

2.1 Introduction

Disasters have a profound impact on communities and their management requires joint efforts and community participation. In the Indian context, the state of Kerala has been particularly prone to various natural disasters, including floods, due to its geographical features and monsoon climate. The Kuttanad region, with its unique ecosystem and vulnerability to floods, has witnessed repeated disasters with far-reaching consequences for its people. This literature review chapter recognizes the importance of community participation in disaster management and aims to explore the existing body of knowledge on community participation in disasters with a particular focus on the Indian context, Kerala and the Kuttanad region.

Understanding the role of community participation in disaster management is essential to effectively address the unique challenges faced by communities in Kerala, especially in flood-prone areas like Kuttanad. This review seeks to examine the available literature, including research studies, reports and case studies, that shed light on the dynamics of community participation in disaster management in the Indian context, with special emphasis on the Kerala and Kuttanad disasters.

By reviewing the existing literature on community participation in disasters in Kerala and the Kuttanad region, this chapter aims to provide insights into effective strategies, lessons learned and knowledge gaps.

2.2 Review of Literature

(Enamul et al., 2022) *Climate Change and Community Resilience*, describes that Building the resilience of communities to climate disasters is a priority in many South

Asian countries. These countries have also committed to achieving the Sustainable Development Goals by 2030. Community programs offer promising opportunities for both of these purposes. When local communities become intimately involved in adaptation initiatives, they can instil local and traditional knowledge, use existing networks, stimulate local capacity and reduce dependence on long-term external support. Communication with people at the lowest level, strengthening local institutions and building resilient communities will be critical for humanity to navigate its way into an uncertain climate future. At a time when climate change puts humanity in a state of uncertainty and bleak futures, stories of innovation, creativity, citizen engagement and the locally applicable solutions provide hope and pathways to sustainability. The general initiatives that already exist in South Asian countries are indicative that locally engaged programs often generate more effective solutions for less costs.

According to (Radhakrishnan & Narayanan, n.d.) in their research article point out that, climate change-induced disasters are expected to have a severe impact on the Global South, which is highly vulnerable with diverse climate-sensitive ecological systems, high levels of socioeconomic inequalities, and marginalized communities dependent on these ecologically sensitive regions. These disasters also vary widely due to different spatial and socio-economic contexts in the affected regions. Countries in the Global South have promoted adaptation as an important climate change action since the early stages of global climate change discussions. However, climate change adaptation to build resilience and reduce vulnerability has been largely ignored in global and national climate action frameworks, and climate change adaptation measures formulated for the Global South have remained ineffective. The governance framework for dealing with climate change disasters in India follows a centralized top-down approach with very little representation and participation of local government and non-state actors.

Addressing climate change and disasters in such contexts then requires localized adaptation methods that involve local level actors and their capacities. This paper, focusing on addressing climate adaptation through the mobilization of localized and contextual knowledge systems, is relevant here. It revisits domestic climate adaptation measures in India through the lens of adaptation policy and seeks to answer how an inclusive institutional framework involving sub-state and non-state actors can assist climate adaptation, particularly in the most ecologically sensitive flood-prone areas. regions in the Global South. It also argues that local sub-state and non-state actors are seen as alternative knowledge regimes that can influence the climate policy process.

This work uses the case of Kuttanad, an ecologically fragile flood-prone deltaic region in the coastal state of Kerala, India. Post-colonial governments with dominant technocratic knowledge that suited the political economy of larger development approaches pursued colonial flood protection policies with dykes. The paper demonstrates the role of sub-state and non-state actors in the co-production of knowledge for inclusive climate adaptation solutions through localized flood management solutions. The study identifies several key findings, namely a) localized flood management strategies provided a platform to engage non-conventional actors in the climate adaptation process; (b) the inclusion of experiential and indigenous knowledge from local communities was key to replicating risk assessment methods; (c) localized and scaled-down interventions were flexible and could be replicated and scaled up; d) The involvement of local government institutions in the early stages was key to creating a bottom-up institutional framework to assist in the scaling-up process. In addition to resulting in scalable and replicable climate adaptation solutions for the region, the larger outcome of the paper enumerates the potential role of these findings

in contributing to a differentiated understanding of climate adaptation measures and inclusive climate change management for complex social-ecological systems.

(Kuruville et al., 2017) identified that in the last few decades, we have seen an increase in the number of devastating floods in India. The low awareness of the general public about construction safety, the inability of administrative authorities and technical experts to adhere to quality standards in the construction industry has created an urgent need to educate officials, public planners and engineers about the consequences of floods. The flood doesn't kill people, it lacks proper preparedness. This highlights the need for effective flood preparedness and prevention that can help individuals and communities prepare, respond and recover from floods. A relative study of a higher risk area was chosen to assess the degree of cultural equivalence in predictors of flood preparedness. Cross-cultural equivalence examined by assessing the extent to which individual hazard beliefs and social characteristics can explain hazard preparedness levels in each location. It has been identified that no building or house has a comprehensive and workable disaster preparedness management plan.

Disasters in Kerala

The state of Kerala witnessed an unprecedented disaster in the form of floods in 2018. The intensity of damage has eased; the floods were the first of their kind for the state since its inception in 1956. Calamity took the lives of more than 450 people; partially destroyed more than 2.8 million homes or fully; displaced and brought over a million people huge losses to people's livelihoods and physical infrastructure of the state. Floods caused destruction in the agriculture, industry and services economy of Kerala. Post-disaster needs assessment (PDNA) by UN agencies estimated the total losses to be around Rs 31,000 crores. The floods in 2018 posed huge challenges to the state

government and civil society. Although the August 2018 flood was the worst natural disaster to hit the state in nine decades (after the 1924 floods) brought the best Kerala society. Forget all socio-economic differences, people voluntarily supported each other during the calamity. Major participation of Kerala civil society has already attracted attention in rescue and rescue operations Worldwide. Spirited participation of youth and students deserves a special mention and that bodes well for her the future of the state in disaster risk reduction (DRR) as well. The collective effort in the first two phases were Rescue and flood relief provided by the state successfully. Now Kerala needs to focus its attention on the rehabilitation, reconstruction and rehabilitation of the state along with the development of thoughtful plans and policies for DRR in the future. (George Abraham, 2019)

A multi-hazard prone state in India is Kerala, prone to various natural hazards, particularly floods, droughts, landslides, lightning, earthquakes and coastal hazards. To deal with the challenges arising from its unique hazard profile, the state has developed an elaborate framework for disaster management in various contexts. The evolution of the spectrum of disaster management in the state can be broadly divided into two periods, pre-tsunami and post-tsunami. In the pre-tsunami phase, traditional approaches were practiced in the state, while the post-tsunami phase witnessed the emergence of holistic modalities. It reveals comprehensive and pragmatic measures to be taken in the field of disaster management, particularly with regard to institutional development, policy design and disaster risk management initiatives. Thus, many challenges and opportunities can be identified in the current state of the state's disaster management framework. Integration of local wells would be most important for sustainable disaster risk planning and management.(Sarun S, 2018)

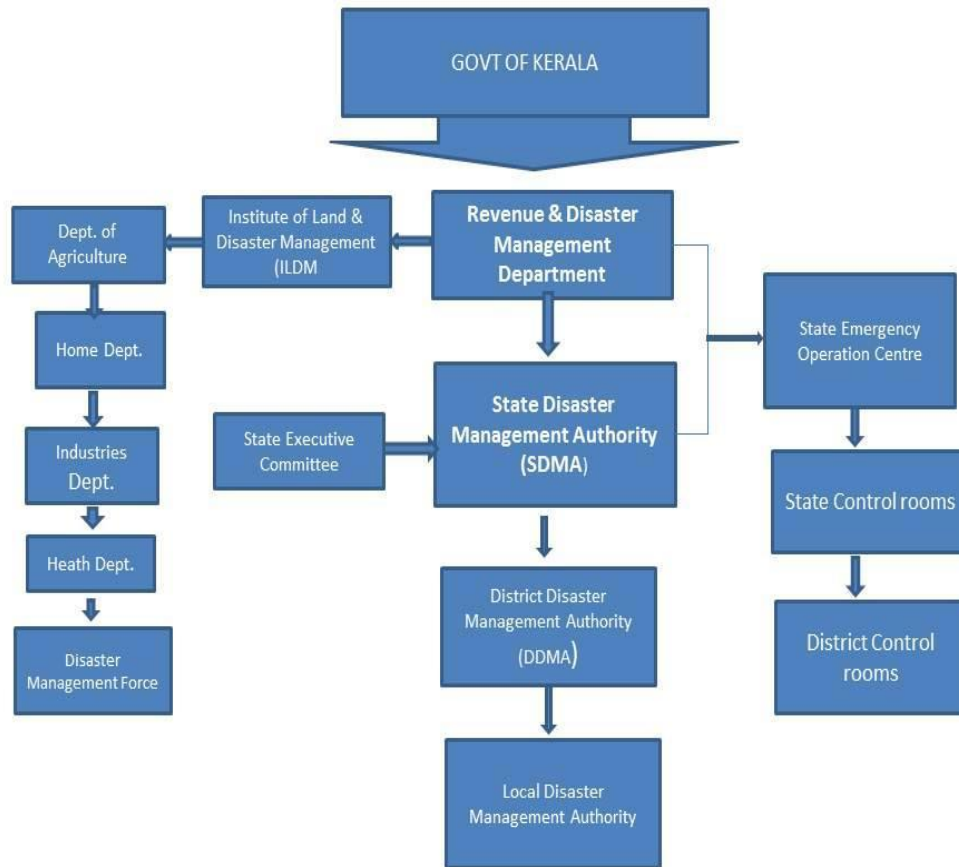


Fig 2.1 Structure of institutional set up for Disaster Management in Kerala (S. Sarun , 2018)

Kuttanad and the roaring disasters

Kuttanad, a taluk in Kerala. It is the lowest elevation in India. This area lies about 4 to 10 feet below sea level. (Suchitra, M 2003) Most of the land in Kuttanad is covered with water. Flooding is a recurring problem in Kuttanad during the monsoon season because of the four main rivers of the area, Pampa, Achankovil, Meenachil and Manimala. People in Kuttanad struggle during floods. People may even lose their lives for lack of better treatment.

The Kuttanad region is located in the heart of the state Kerala and is one of the densest rural places of Kerala. The region is ecologically sensitive and known for its unique

subsea farming practices that have been in use for over 150 years. A proper mapping of the current situation is crucial for the design of any future plans for this region, taking into account the possible threats and consequences of the development that has led to its intensive deterioration. The area is also critical to understanding the functioning of the wetland ecosystem and the impact of human intervention. The area under discussion was known as the 'Rice Bowl of Kerala' due to its share (30 percent) of the state's total rice production. However, this situation has changed today and the area is affected by frequent floods and successive episodes of crop damage. The Kuttanad wetlands area falls under the category of critically endangered wetland systems of India. Through this research, the author intends to develop an integrated planning methodology for the current state of the region as well as formulate key study areas to be explored in the future. (Kumar & Devadas, 2016)

(Sooryalekshmi, 2019) studied the impact of floods in Kerala. According to the National Center for Earth Science Studies, more than 50% of Alappuzha is categorized as a flood-prone area. Most areas in Alappuzha district experienced flooding due to the southwest monsoon, especially in Kuttanad Taluk where numerous roads, barriers etc. were damaged and transport was prohibited. The worst affected places in Alappuzha district were Chengannur and Kuttanad Taluks, where hundreds of people were stranded by floodwaters that quickly reached densely populated areas. Due to heavy monsoon rains and high tides in the sea, Kuttanad Taluk started getting flooded.

(Lakshmi, 2018) described in her study on 'Agricultural Development Agricultural Development and Ecological Imbalance in Kuttanad' as Kuttanad taluk in Alappuzha district of Kerala is famous for agriculture and people of this taluk mainly depend on rice cultivation. This paper studied agricultural development and ecological imbalance in Kuttanad. Farming practice has shifted from traditional style to modern ways in the

present scenario. The traditional farming style is primarily a subsistence program. But the modern style is that it has become commercial, it adopts modern agricultural machinery with hybrid seeds, modern thinking and with a market-oriented outlook. The impact was both negative and positive. Farmers tend to earn more, but the environment is damaged. The adaptation of modern agricultural practices is vital to the development of a nation. The development of agriculture is very essential for the sustainable development of our country. Kuttanad is a densely populated area in Kerala. The place is always flooded with water throughout the year. Here arises the issue of hygiene in Kuttanad. Hanging latrines are very common on the banks of canals in Kuttanad. Septic tanks are often difficult to build. During the rainy season, Kuttanad faces the threat of floods. There is no proper sewage system and waste water from houses and shops is discharged into open fields, which are the main causes of water borne diseases. Although Kuttanad is surrounded by water, potable water is very scarce. The quality of drinking water in Kuttanad is very poor due to the unlimited use of fertilizers and pesticides in paddy cultivation. Saltwater from stagnant water also enters the fields. This deteriorates the water quality. The people of Kuttanad depend on piped water from the Pampa River for drinking water. Water in Kuttanad is polluted not only due to agriculture but also due to municipal waste, coir soaking and lime shell dredging. Drinking water is also polluted by sewage flowing from urban and semi-urban areas of the district. Increased fertilizer application results in water contamination with chemicals such as nitrates and phosphates. The groundwater level has also changed. Tourism also contributes to the problem of waste management in Kuttanad and adjoining areas.

SI No	Year	Environment Disasters
1	2002	Drought
2	2003	Heat wave in Andhra Pradesh for 20 days continuously
3	2002-03	Extreme cold climate in North India
4	2004	Drought like condition in July season
5	2004-05	Extra ordinary rise in temperature during the month of March
6	2005	Flood
7	2005-06	Cold wave
8	2006	Floods in the states of Rajasthan and Andhra Pradesh. Drought in the North eastern sates
9	2007	Extra ordinary difference in temperature
10	2009	Extreme drought all over India
11	2010	One of the hottest years
12	2011	High deficiency in level of rain fall
13	2012	Drought in the states of Punjab, Haryana, Gujarat and Karnataka. Neelem Cyclone and drought in Andhra Pradesh

Table 2.1 Environmental Disasters from 2002 to 2012

From the report of 'A Special Package for Post Flood Kuttanad' by the Kerala State Planning Board states that Ensuring the free and natural flow of waters in Kuttanad also

requires construction of strong outer embankments at padasekharams, construction of side retaining walls as well as unclogging and desilting of drainage canals. In the case of earthen ramparts that are traditionally erected (orumuttu), the pressure of flood water and tides lead to frequent breaches; these frequent violations not only escalated the risks and costs of cultivation, but also required a large workforce. Such a situation is not sustainable. Kuttanad farmers deserve permanent outer enclosures that can withstand the force of water currents. The cleaning must be followed by the construction of strong and sufficiently high bandages on both parties. Much of the clay needed for this rampart construction can be obtained from deepening work on channels. Finally, the unscientific construction of bridges and access roads are the main limitations or an obstacle to the free flow of water and navigation. In the floods of 2018 these unscientific lake bridges and canals adversely affected rescue operations. Smooth navigation was not possible because the bridges did not have the proper height above sea level; they allowed even small boats to pass through. Such bridges need to be identified and reconstructed scientifically without affecting water flow or navigation.

The Kuttanad Wetland in Kerala is located at the southern end of the largest Ramsar site in India - Vembanad-Kol is known for its unique land and water management system, where paddy fields are grown below sea level along with fish farming, practiced in reclaimed polders. However, these polders are highly susceptible to floods, the frequency of which is increasing due to anthropogenic activities and climate change. Flood hazards are associated with loss of property and land which have different impacts on people, since there is a direct link between poverty and exposure to risks, it has attracted the attention of social scientists and policy makers, leading to a shift in the approach to risk and disaster management. This paper is empirical where the data was obtained through field survey in Pulinkunnu Panchayat of Kuttanad located in

Alappuzha district as this Panchayat is highly prone to floods. These two communities were selected because they represent two distinct socio-economic groups that derive their main livelihood directly from natural resources viz. land and water. Uncontrollable pollution is affecting the Kuttanad wetland population living in this panchayat seriously, revealing both inland fishermen and farmers to health hazards. Fishing households achieve a higher average perception physical and social dimensions of flood vulnerability event of 2017 compared to the farming community which can be attributed to the fact that inland fishermen households have poorer access to proper housing, hygiene and drinking water. Their access to road transport networks is also limited compared to farming households Fishermen form a relatively marginalized part of society are more affected by floods. Hence approach to risk management and mitigation efforts must take socio-economic into account population settings especially at the micro level to minimize vulnerability to hazards, risks, leading to disasters. (Chandran, 2022)

Community participation in Disasters

(Goyal, 2019) describes, Disasters have deepened and become more frequent as a result of climate change. The unpredictable and devastating consequences of rising global temperatures have raised the alarm for "rapid and far-reaching" changes in land, energy and urban governance. The recent devastation caused by the Kerala floods in August 2018 brought disaster management into the mainstream of government responsibility. Despite high performance in human development indicators and social infrastructure, the state government's failure to ensure adequate preparedness and mitigation through capacity building has set back the state's development by decades. A lack of trust in the face of administrative negligence and recklessness on the part of management has

hindered the translation of scientific information into understandable warnings for frontline responders. The confusion was significantly man-made as the local administration failed to regulate the blatant violation of coastal zone regulations even after repeated warnings from the Western Ghats Ecological Expert Panel report. The focus of state policy on human development ignored the essential aspect of ensuring the active participation of citizens in the development process. This has led to citizens in a democracy becoming passive recipients of state claims rather than active agents. The laudable role of fishermen in flood rescue and relief in Kerala clearly highlights that communities can no longer be ignored in the cycle of disasters. In a country witnessing a pervasive "regime of non-compliance" with building codes, coastal zone regulations, land use plans and other safety laws, decentralized disaster management can help build community resilience and ensure accountability and transparency of government institutions. This argument is underscored in a scenario where disaster management institutions continue to focus on post-disaster relief and recovery, due to the lack of enforcement powers of disaster management institutions to ensure compliance with preventive measures in development and infrastructure planning.

(Zubir & Amirrol, 2011) describes in their study, Disaster Risk Reduction as a framework that was developed from the concept of protecting communities from risks and their minimization of vulnerability to disaster risks. One of the many aspects of disaster risk reduction is through the participatory involvement of the local community. This article explains the application of systematic disaster management in handling emergency and post-emergency situations by adopting the role of a civilian society in the context of community approaches. These approaches proved to be sufficiently adaptive and comprehensive in difficult times during and after a disaster. Comprehensive and integrated methods from previous experience with assisting the

process of internalizing the concept of disaster risk reduction and strategic planning for disaster management. In many disaster response initiatives, community-based disaster response works well because it responds quickly to urgent needs, allowing aid in the early stages. This approach is also able to mobilize solidarity among members, communities and therefore creates social capital that enables women and minorities to be part of the reconstruction process, empowers the local institutions and can achieve good planning while not excluding high quality results. In addition, community housing may be reconstructed to reduce disaster vulnerability and this can be achieved through good monitoring required responsibility. In this context, people need to understand and accept it. They also have a responsibility for their own survival, it's not just a concern for governments, organizations and other voluntary organizations to find and provide solutions. Existing local and community organizations at the community level, including women's organizations, should be empowered to take action and participate in disaster risk reduction activities. Transfer of expertise to local level, early warning systems and procedures suitable for small scale requirements, as well as transfers of local experiences and their thematic applications must be developed in different communities. The restoration of housing and livelihoods and community needs to be supported to be able to set their own priorities within the rebuilding process. Often expectations for time, quality and engagement are set unrealistically. Communities must be able to set their own priorities and define their own timing. This might mean building safe rooms or core houses first or something damaged shareable houses are repaired. Community-based reconstruction also requires work on governance issues at the village level. In addition, agencies should commit to receiving and processing complaints. Good governance will only work through transparent processes. Open information to communities is also essential, as is broad-based support involved

communities are required continuously and should include dissemination of standards and information regarding rights and access to them. Coordination is best done locally and in a decentralized manner at the corresponding lower institutional level. In addition, the role of the government as a regulator must be strong. The primary role of government is to regulate and govern, integrate for longer-term recovery, and immediate reconstruction. In this regard, clear technical standards and guarantees their widespread acceptance is a crucial point. In addition, reliable support on logistics and material availability is a key factor. Government and non-governmental organizations need to create sustainable network organizations, which are able to institutionalize disaster relief at the local level. These networks can also enhance multi-stakeholder preparedness for natural disasters and establish resource centres that organize contact with local communities.

(Joseph et al., 2020) points out that community actions play an important role in disaster response. This study analyses the socio-demographic and satisfaction variables of community resilience in the context of the 2018 Kerala floods and elucidates its gaps from a developing country perspective. Global literature was also reviewed to examine the state of community resilience and its effectiveness in holistic disaster management. This is an issue that has rarely been addressed in past studies from India. The fisherfolk participated in the rescue mission as a group without much previous experience, but afterwards felt a high level of self-satisfaction. These rescuers were well aware of coastal disasters but had only limited exposure to disaster preparedness and mock exercises. Although limited physical and financial resources prevented them from doing so, they were able to use their social capacities effectively during the disaster. The importance of the resilience of the local population, especially the fishing community, in response to local disasters is highlighted and the shortcomings of existing practices

are identified. The analysis of the 2018 Kerala floods revealed that community resilience plays a key role in coping and recovering natural hazards. The findings shed light on the current issues phase of community engagement in DRR in the Indian context. A comprehensive and integrative approach is necessary to set up a new model in disaster relief operations. The socially evolved nature of resilience may question the importance of physical and economic resources and contemporary disaster management institution development policies. The use of social capacities that are readily available can be activated anytime, freely and in abundance and is essential to a better community resilience in the state. It is concluded that the policy is necessary integration, by incorporating the community to reduce socio-economic impacts and vulnerability to floods and other natural hazards.

(Menon Chandra, 2019) describes the need of a paradigm shift to build Kerala resilient to disasters. Humanitarian action should be built on a solid foundation of values, principles and norms. It must be guided by quality and responsibility. This is only possible if we treat people affected by disaster as dignified human beings and not as hapless victims. Local people are the first (and sometimes the only) responders in crisis situations. The overall goal should be to ensure the active involvement and ownership of people living in disaster-prone and affected areas as key actors in planning, rescue, humanitarian response and recovery efforts. The long-term goal should be to strengthen their resilience.

(Ryan et al., 2020) highlight that Disaster management agencies are investing varying levels of resources in leading communities to prepare for a range of hazards and are increasingly turning to community engagement as a way to increase preparedness. Review findings suggest that most community engagement techniques are effective in producing some level of increased preparedness. For techniques that were found to not

work, the fault lay more with a lack of comparative research, the context, and the skill levels of those doing the job than structural or conceptual problems with the technique itself. Agency efforts to engage communities in preparedness should include a wide range of techniques that work together to change behaviour, including face-to-face community engagement that initiates and supports community-led preparedness activities.

2.3 Research Gap

There are studies that explored the various aspects and impacts of floods on the livelihood and agriculture of Kuttanad. The studies exploring the importance of community participation in Disaster Management with reference to Kuttanad Taluk is very meagre. Therefore, the researcher had identified the existing research gap and the significance in this specific area of study.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The purpose of this chapter is to outline the methodology used in a research study investigating community participation in building resilience within the Kuttanad community. The aim of the study is to explore and understand the various factors, processes and strategies that contribute to community resilience in the face of environmental challenges and disasters. A qualitative descriptive research design with a case study approach was adopted to achieve this objective.

Kuttanad Community Description:

The community of Kuttanad serves as the focal point of this research study. Kuttanad is a region located in the South Indian state of Kerala, known for its distinct social and ecological characteristics. The community inhabiting Kuttanad faces many challenges including recurring floods, ecological degradation and socio-economic vulnerability. Despite these challenges, the community has demonstrated resilience through various initiatives and practices.

The unique socio-cultural structure, local knowledge systems and adaptive strategies of the Kuttanad community provide an interesting context for studying community participation in building resilience. By exploring the experiences and perspectives of community members, as well as the dynamics of their interactions and collective actions, this research aims to uncover valuable insights into effective resilience-building practices within the Kuttanad community.

The following sections of this chapter delve into the specific methods used, including data collection techniques, participant selection, and data analysis procedures.

3.2 Statement of the problem

Kuttanad is a sub- district located in Alappuzha district of Kerala, India. It is situated in the southwestern part of the state and is known for its unique geographical and cultural features. Being a low-lying area, Kuttanad taluk is prone to water logging and flooding, especially during the monsoon season. Therefore, some of the major problems faced by the Kuttanad taluk are: water logging and floods, salinity intrusion, environmental degradation, agricultural sustainability, infrastructure constraints and socio-economic challenges. Efforts have been made by the government, non-governmental organizations, and local communities to address these challenges. In this background, where disaster is becoming a part of life, researchers intend to explore how the collective response mitigates the problems faced by the Kuttanad taluk that aims to resolve water logging issues and promote sustainable practices.

3.3 Significance of the study

Community participation plays a crucial role in effective disaster management. It is vital for building resilience to disasters in Kuttanad. By leveraging local knowledge, mobilizing resources, strengthening social networks, and fostering cooperation, the community becomes an active partner in disaster risk reduction, preparedness, response, and recovery efforts. This inclusive approach enhances the effectiveness, sustainability, and overall well-being of the community in the face of recurring disasters.

3.4 Aim of the study

To understand the community participation in building resilience in the recurring floods and waterlogging.

3.5 Research Objectives

General Objective

- To understand the collective response strategies employed by the Kuttanad community in the face of recurring disasters.

Specific Objectives

- To assess the historical and contemporary disaster experience in Kuttanad.
- To identify the key factors that contribute to resilience building efforts.
- To explore the strategies, practices and mechanisms that the community employs to bounce back from the disaster.
- To assess the effectiveness and limitations of existing resilience- building interventions in Kuttanad.
- To provide recommendations for enhancing community resilience and disaster management.

3.6 Definitions of concepts

1. Disaster

Theoretical: A disaster is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Operational: The flood that causes destruction and deterioration to the livelihoods of Kuttanad.

2. Community

Theoretical: Community is a social group with a common territorial base; those in the group share interests and have a sense of belonging to the group.

Operational: The group of people who are living within the Kuttanad taluk.

3.Resilience

Theoretical: The capacity to withstand or to recover quickly from difficulties.

Operational: The measures adopted by the Kuttanad to mitigate the risks and consequences of flood to sustain the lives.

4.Disaster management

Theoretical: The organization, planning and application of measures preparing for, responding to and recovering from disasters.

Operational: The measures, strategies and interventions adopted by the District Disaster Management Authority and the Local Self Governance Department.

5. Community Participation

Theoretical: Community participation involves both theory and practice related to the direct involvement of citizens or citizen action groups potentially affected by or interested in a decision or action.

Operational: The active participation of the Kuttanad villagers in disaster management.

6. Collective response

Theoretical: Collective actions, situations or feelings involve or are shaped by every member of a group of people.

Operational: The participation of the various stakeholders in the community for disaster risk reduction.

3.7 Research Design

The research design chosen for this study is a descriptive research design with a case study approach. Qualitative research methods are well suited to exploring complex social phenomena, capturing multiple perspectives, and gaining a deep understanding of community dynamics and experiences. The descriptive nature of this design allows for a detailed exploration of the phenomenon of community participation in building resilience, while the case study approach provides an opportunity to explore the community of Kuttanad as a specific research context.

A qualitative descriptive research design was chosen for several reasons. First, it allows the researcher to explore and describe the lived experiences, perceptions and behaviours of community members regarding resilience building efforts. It also facilitates the exploration of community processes, local knowledge and practices that contribute to resilience. Additionally, this design promotes a holistic understanding of community resilience, taking into account the interconnectedness of social, cultural, economic and environmental factors.

The case study approach complements the qualitative descriptive design by focusing on a specific community, namely the community of Kuttanad. By choosing a case study, the researcher can gain a detailed understanding of the unique context, challenges and strengths of the Kuttanad community. This approach also allows for the examination of community participation in resilience-building initiatives within specific geographic, social and cultural settings.

3.8 Universe

Universe includes the people residing in Kuttanad Taluk

3.9 Sampling procedure

The study is conducted using a purposive sampling technique which is a non - probability sampling technique to collect the data.

3.10 Sample

The sample size of the study is 6 native residents of the Kuttanad.

3.11 Inclusion criteria

The people of kuttanad taluk are included.

3.12 Exclusion criteria

People outside the Kuttanad taluk are excluded.

3.13 Pilot study

A pilot study was conducted in the Kuttanad taluk to understand the existing situation and the nature of the recurring floods and waterlogging.

From the pilot study conducted, the researcher identified the scope of community participation and the collective response strategies in mitigating the impact of recurrent floods and waterlogging and to foster a resilient community.

3.14 Tool of Data collection

An interview guide and field observations are used as the tool for data collection.

3.15 Method of Data collection

An in-depth interview used as the method of data collection. A semi structured technique is used to generate in-depth responses.

3.16 Limitations

- The study is mainly concentrated on the lower Kuttanad portion. For effective planning and implementation of the developmental projects in Kuttanad Taluk detailed study of the whole taluk has to be considered.

3.17 Chapterisation

Chapter 1: Introduction

Chapter 2: Review of Literature

Chapter 3: Methodology

Chapter 4: Case Study

Chapter 5: Discussion and thematic analysis

Chapter 6: Conclusion

CHAPTER 4

CASE STUDY

4.1 Introduction

This chapter presents case studies investigating community participation in building resilience against recurrent floods and water logging in the Kuttanad region. Located in the southern state of Kerala, India, Kuttanad is known for its vast rice fields and unique geographical features, but is also prone to frequent flooding and water logging due to its low-lying terrain and proximity to rivers and backwaters.

In order to gain a comprehensive understanding of the dynamics of community participation in resilience building efforts, the researcher adopted the case study method as the primary research approach. The case study method offers an in-depth examination of a specific phenomenon in its real context, which enables a rich and detailed analysis of the researched topic. In this study, the researcher aims to understand how the local community in lower Kuttanad engage in activities to increase their resilience against floods and water extraction.

To collect data for the case study, the researcher used a combination of in-depth and semi-structured interviews as well as field observations. In-depth interviews allowed for detailed exploration of participants' perspectives, experiences, and insights regarding their engagement in resilience-building efforts. The semi-structured nature of the interviews provided the flexibility to explore specific areas of interest in greater depth while allowing participants to share their unique perspectives.

In addition, field observations were conducted to provide contextual information and complement the insights gained through the interviews. By immersing themselves in the community and observing their activities and interactions, the researcher was able to gain a holistic understanding of community engagement and the factors that contribute to their resilience.

The data collection process focused on six respondents residing in lower Kuttanad who were randomly selected to represent a diverse range of community members. These respondents were selected based on their involvement in resilience-building initiatives or their experiences and perspectives relevant to the research objectives. Through these selected participants, the researcher sought to capture a nuanced understanding of community participation in resilience building efforts in the context of lower Kuttanad.

By adopting a case study approach and using in-depth interviews and field observations, this research provides valuable insights into the role of the community in building resilience against recurring floods and water logging in Kuttanad. Findings from this study will contribute to existing knowledge on community participation in disaster resilience and may inform policy and practice aimed at strengthening community resilience in similar flood-prone areas.

4.2 Case Study 1

Name	: A
Age	: 51
Occupation	: Farmer
Educational Qualification	: SSLC

We experienced the flood in 2018 from June 5th onwards. But we couldn't realize it was a disaster that affects Kerala. As we are residing in Kuttanad, we felt it was normal water logging that usually happens every year.

A is residing in the lower part of the Kuttanad Taluk for more than 46 years. Every year, during the months of June, July and August, water level in the Vembanad lake increases and leads to flooding. Occurrence of this phenomenon varies according to the intensity of rainfall received. Floods and water logging due to heavy rainfall are common here. But, in the history of Kuttanad floods, the people witnessed a most drastic one in 2018. That year, the people of Kuttanad faced the unprecedented onslaught of rain from the beginning of June itself. Since Kuttanad is prone to frequent water logging and floods, the people considered it as normal. Due to the distinct geography of Kuttanad, characterized by its backwaters, paddy fields, embankments, canals and wetlands, it takes time to overflow. Flood happens when the water level in the paddy fields and lakes reaches the same level, which is a visible indicator to identify the eminent flood. Elders of the locality, through their traditional knowledge regarding the changes in climate, and the nature of the topography of the land, are able to sense

and predict the occurrence of the flood. The local people mainly use harvested rainwater for drinking and cooking as the water from the rivers and lakes are often contaminated and unsuitable for drinking. Local self-governments make arrangements for the supply of drinking water but that is insufficient to meet the needs of all households in the village.

Sometimes unexpected and unpredicted floods happen and it takes 3 months to get back normal and the situation was challenging to us.

The inner areas of Kuttanad are the most affected by floods. Those areas including Kanakiry, Kuttamangalam villages witnessed the most challenging and dangerous impact on the lives of the people. In 2020, the flood happened three times and it took 3 months to set into the normal situation. Most of the people shifted to their relatives' houses while others moved to shelter provided by the District and Local Administration. But, some still preferred to stay in their own houses, unwilling to stay away from their belongings, cattle and poultry. The isolated houses in between the paddy fields, were the most affected ones during the floods. These houses were washed off in the heavy flow of water. Once the bund in the paddy fields were destroyed, the water enters into the paddy fields and the nearby houses. People usually stay in their own houses as the flood became the part of their life. Most of them use a bed court to keep the valuables and other items safe. The situation sometimes becomes harder to survive due to the high level of water in their houses. The electric power supply will be interrupted or unavailable during the flood times and communication facilities are disrupted. The Kuttanad residents use generators and the people residing on the other side of the lake use generators to charge their mobile phones, torches etc. Use of toilets and the proper

disposal of sanitary pads is not possible during the time of flood. Proper drinking water is one of the major problems faced by them. The water level rises above the water taps immersing and making them unusable.

There are 9 steps for my house and the foundation is constructed using pillars. The structure of the houses in Kuttanad started changing.

Kuttanad is known for its own low-lying topography, situated at or below the sea level. It is one of the few places in the world where farming is carried out below the sea level. The unique geographical characteristics makes Kuttanad vulnerable to flooding during the monsoon season and affects the livelihood. Due to the special features of the Kuttanad land, it is not able to uphold the multi floored houses. The Kuttanad residents started to adopt a new strategy for the construction of houses to reduce the risks of the floods. The people use flood resistant building techniques to protect the houses from the damage caused by the flood. In addition to matching the standards of a flood-resistant home's foundation, piles or columns are employed to lift the structure above the prescribed flood level. Such elevated development helps in preventing flood water from entering the building. To reduce the weight of the building, marine plywoods are used for constructing upper floors for the houses. They use such floors for keeping their valuables and other important documents safe.

A group of people becomes our helping hands, they provide food packets and clothes for us.

Sometimes the situation of the Kuttanad becomes very pathetic to survive due to the heavy flood. The unknown group of people, voluntary organizations and educational institutions provide support for the Kuttanad residents to survive in the situation. They get food packets, clothes and other required essential items for them. The people actively support each other to build a resilient community. The destruction of the bund in the fields will adversely affect the lives of Kuttanad. Therefore, people keep vigil day and night to watch and guard any damage happening to the bund so that immediate action can be called for. They collectively prepare the sacs filled with sand to protect the bunds and the houses. They join the neighbours if staying in their own house causes danger or becomes insecure. Flood relief camps are opened in the schools by the local self government during the flood. The panchayat provides food, shelter and medicines for the people. Mobile dispensaries function every month to provide medicines for them. Apart from supplying essential medicines, training classes are also provided from the health department to avoid and contain water borne diseases. Some people use a houseboat as their temporary shelter. In Kuttanad, 'Padashekara Samathi' is a group of farmers with office bearers and executives, that functions for the protection of bunds and agricultural fields. They also act as a source of rendering information to the villagers on the rising water level and flood situation. Road transportation is not possible in inner rural areas of Kuttanad. So, water transportation is the only possible means for the Kuttanad residents especially during the time of flood. Therefore, mobile shops in boats work during flood to sell the vegetables, groceries and other essentials for their existence.

After the flood goes, it is very difficult to bring it back to normal. Our houses and surroundings are fully covered with mud.

The post recovery phase of the flood is also an important phase in disaster management. The houses and the surrounding are heavily polluted with the mud, rotten weeds and other aquatic plants. During this time, the chances for Athletes Foot and the spread of mosquitoes are high. It is very difficult to clean the houses and the surroundings and to bring them back into normal life. Those who left the houses during the flood face the most difficult to make them clean and suitable to live. The post flood phase is also challenging to Kuttanad, but it has become the part of their life as told by the respondent. The people of Kuttanad have the power to withstand such difficulties in their lives, as they have the sense of unity and we-feeling which allows them to survive in the recurring flood.

If it could be done.....

The effective measures and strategies have to be evolved to reduce the risks and consequences of the flood to the livelihoods of the Kuttanad. Proper construction of bunds and the embankments will help to reduce the consequence of the flood. The bunds for two or three paddy fields have to be strengthened and properly maintained because it can affect a larger population and huge loss of paddy fields. A fund is allotted by the panchayat to construct 'Janakiya Bund', but it hasn't yet been implemented. Frequent cleaning of the lakes, removing the weeds and increasing the depth of the water bodies will result in avoiding the natural flow of water into the Arabian sea. Lack of proper drinking water is one of the major problems faced by the Kuttanad during the flood. So, the panchayat should provide sufficient access to drinking water for them.

Case Study 2

Name	:J
Age	: 47
Occupation	: Business
Educational Background: SSLC	

The houses in the lower Kuttanad are the most affected during the flood. We are not even able to satisfy our basic needs.

J is a native of lower Kuttanad for the past 47 years, who has experienced the challenges of the recurring floods in the most vulnerable areas in Kuttanad. In the months of June and July the bunds that guard the paddy fields get ruptured in the rushing rain and the water level increases. The flood happened due to the torrential rainfall and the varied effect of the tides. The bunds are damaged due to the heavy flow of water and it causes the water to enter into the nearby paddy fields and the lakes. The resultant situation brings challenging experiences to the people residing in the lower Kuttanad areas as they are more prone to the flood than the upper Kuttanad residents. The problems faced by them during the flood are their toilets becoming unusable; scarcity of potable drinking water and the menace of increasing number of mosquitoes and insects. The women are facing serious issue at the time of their menstruation. Proper maintenance of the menstrual hygiene practices become very difficult for them.

The scarcity of pure water for drinking and cooking purposes is one of the notable problems faced by the Kuttanad people. The general feeling is that the local Panchayat is not providing any good assistance for assessing drinking water facilities. They often get water from private service providers on payment.

My father understands and predicts the chance of flood as the water level rises in the paddy fields and he tells the villagers to take the necessary preparations.

The villagers don't get any prior information or warning. But as they are residing in Kuttanad they have the traditional knowledge regarding the flood. The elder persons are the major source to provide information to the villagers who in turn make preparations to cope up with the flood when the water level in the paddy fields and the lakes starts rising. Those who weren't able to survive in their own houses, are shifted to the camps. The others keep their documents and other essentials in a safe place and make a suitable path to enter into the toilets. The livestock rearing is one of the major occupations in Kuttanad. During floods, villagers are very anxious to save the lives of their animals. Mostly, they shift the cattles and pets to higher platforms like bridges. The neighbours also help each other to lift their essential items and to keep in a safe place.

In the history of Kuttanad floods, the 2018 flood was the most dangerous that affected the lives of Kuttanad. The lower parts were completely flooded.

The 2018 flood was at an unprecedented level in the history of Kuttanad, affecting all the regions of Kuttanad. The impact of the flood had distorted the life of farmers and

the common people. The unexpected wave washed away their cultivations and belongings. The surge has not only affected the fields but also their homes, live stocks, aquaculture, agriculture implements, assets, and so on. The lower portions of the Kuttanad were completely filled with water before the 2018 flood. Before 2018, when the state had one of the worst floods in a century, floods happened every year in June, the monsoon season. Waterlogging and flooding were a regular occurrence in people's lives. Kuttanad was impacted by two floods in 2018 as well, one in July and the main flood in August. During the July floods as well, residents of numerous villages were relocated to relief camps, while some opted to remain within boats that had been modified into temporary residences.

We handled the situation together when it became worse.

The villagers helped each other to shift their belongings into a safer place. The bond and commitments between the villagers helped many families in Kuttanad to save their lives and homes. In medical emergencies the people collectively supported each other and shared their resources available. Most important thing was the protection of the bund. The people protected the bunds from getting damaged and any damages observed were got repaired collectively as soon as possible to reduce the risk factors. The Padashekara Samathi takes the complete responsibility regarding the reconstruction of the bunds. When the situation became normal, the community along with the school officials cleaned the schools which had been closed for more than a month and made them suitable for children to start their academics. Cleaning the houses and surroundings is one of the most challenging in the post disaster phase.

The loss of cattle and pets during the flood when we left home made me sad. Because they are also part of our lives.

Livestock rearing is one of the major occupations and source of income for the villagers of Kuttanad. During the time of flood, villagers left their home and they had to reside in the camps or other temporary houses. They were not able to take care of their pets and domestic animals and they used to only shift them to a higher platform. After one month or when they come back to their homes many have lost their pets and animals. It creates an impact in their lives as livestock rearing is one of the major income generating measures in Kuttanad.

If the funds for constructing bunds have been provided by the government, Kuttanad could have withstood the flood to a certain extent. The Kuttanad people were able to survive all the hazardous situations in their life as they have been experiencing from their childhood onwards.

Case Study 3

Name	: K
Age	: 17
Occupation	: Student
Educational Background:	Plus two

Before the flood comes, the water level in the lake decreases and suddenly rises within a limited period of time. The colour of the water changes, these are the indicators for us.

K is a resident of Kuttanad who has withstood the unexpected floods and the challenges created by the recurring floods. In 17 years, the residents cherished dramatic experiences and stories of survival. The residents of Kuttanad know the occurrence of flood as they are witnessing and experiencing the flood every year. The decrease in the water level in the lake and the change in the colour of the water are considered as the indicators for the occurrence of the flood. The people protect their own private property from the flood. But there are places in Kuttanad where such measures are not followed. Therefore, those areas are often adversely affected by the flood. The people require only a night to prepare themselves. Before the water level rises, they usually shift the furniture and other items into a higher platform. The isolated lands are protected and maintained by the Padashekara Samathi. They charge a certain amount from the owners to protect those areas. The Padashekara Samathi arranges people from the community

to repair the bund if any emergency occurs during the floods as a precaution. To protect the houses, the sacs filled with sand are used.

We are the first family who constructed houses on a raised platform using pillars. After that, the neighbours also started to adopt such models.

K adopted the method of constructing housing on a raised platform using pillars to withstand the flood and to prevent the water from entering into the houses. The people in Kuttanad started to change the construction pattern of houses in order to build a resilient community. But from the experience of the 2018 flood, they realized that it is needed to increase the height of the houses. They got help from the voluntary organizations which provided food, cloths and medicines in the camp.

Flood happened in 2020 was also a challenging experience for us. We have struggled a lot. The villagers had supported us to overcome those nights.

The house of K is in between two paddy fields. Therefore, any damages to the bund would adversely affect them. In 2020, they had a challenging experience. The soil has been washed off, the walls have been destroyed and they were not able to enter into the house due to the raised water level. It was a sudden flood and they were not able to protect all the valuable items. They lost some of their household items. It was not safe to stay in their own houses. Therefore, with the help of the villagers they left their house. With the help and support of the villagers they protected their house by providing support to the building using the available woods and sand sacs. They shifted the furniture onto the first floor. But there was an isolated house near to the respondent's

house. It caused the flow of water towards H's house. Therefore, the house was destroyed with the help of the villagers to save the two houses during the flood. The flood in 2020 has affected K seriously because his grandparents were there and also there was nobody other than him to handle the situation. But with the collective response of Kuttanad they could overcome the challenges. This experience is still alive in the memory, added the respondent. The use of heavier machines to reconstruct the bund also affected their house.

I was playing football with my friends, when the bund was damaged unexpectedly, and the water level began rising. We joined the elders to help them handle the situation.

The people in the community actively participated in rescue and other operations during the floods. In the phase of response and recovery, involvement of youth power was evident in the flood mitigation activities. Once the bund is damaged it affects the nearby areas also. Therefore, villagers became a part of the collective response in nurturing resilience for the recurring floods in Kuttanad. The participation of the panchayat or any government agencies are lesser rather than the community itself becoming the warriors to beat the disasters. The collective response and the helping mentally of the villagers have a role in surviving the hardest situations that are faced by the Kuttanad people.

Kuttanad can't resist the flood. Because it happens naturally. But we can mitigate the consequences.

Inflatable rescue boats come handy to enter into the inner and isolated areas for rescue operations. The motor boats are unable to enter such places. Proper access to drinking water during the flood times is needed. The system of mobile water tanks or common rainwater harvesting will help to overcome the issue of drinking water scarcity.

Case Study 4

Name	: R
Age	: 45
Occupation	: Driver
Educational Background:	SSLC

Kuttanad is the native place of R who has been residing there for more than 40 years. During the months of June, July and August probably during the monsoon seasons Kuttanad experiences floods. The lower kuttanad is the most affected due to the recurring flood. Schools are closed during these rainy seasons. The main reason for the occurrence of the floods is the heavy rainfall, the low-lying marshy lands and the flow of water from the western ghats. Embankments help to prevent the entry of excess water into the paddy fields. These embankments are constructed using government funds with the participation of the villagers.

We are not able to use the toilets during the flood. It is one of the major challenges that is faced by us.

The major problem affected by the people of Kuttanad is of the water and sanitation. There is no drinking water for the Kuttanad villagers since the water in the surrounding water bodies are heavily polluted with wastes and other toxic substances. The water level rises above the foundations of the toilets making them unsuitable for use. The adolescent girls and women suffer a major issue in proper disposal of the sanitary

napkins. They used to dispose of the sanitary napkins by burning them on the road sides. Some people may dispose of it directly into the water bodies polluting them.

If the voluntary organizations came to know about the situation of the flooded Kuttanad, they will receive assistance from the voluntary organizations. But it doesn't come about every time in Kuttanad. When the situation becomes challenging/worse, a committee is formed from the community to reduce the risk factors of the flood. Sometimes, the water overflows above the embankment and the water enters into the paddy fields and the houses.

There are many houses where in the grandparents are alone, and nobody is there to help to shift their belongings and other items.

In Kuttanad, there are many houses where the grandparents live alone and nobody is there to help to shift the belongings and other items. During these times, the villagers and the youth support the grandparents. This is one of the most important features of the Kuttanad community in surviving the floods. The panchayat arranges awareness classes for the community to prepare themselves and the precautions to avoid the water-borne and communicable diseases. Through mobile dispensaries, the panchayat distributes the medicines to prevent such diseases.

Kuttanad community is becoming more and more resilient as they face the recurring flood every year through the collective response of the villagers; added the respondent. The embankment was constructed as part of the mass action by the Kuttanad people. Those embankments helped to reduce the consequence to a certain extent.

The agricultural sector of the Kuttanad was the most affected during and after the flood as the people mainly depend on agriculture for their livelihood. The government

responded quickly and without any limits, during the disaster to give critical help and relief supplies. The main issues that farmers face include inadequate support, reduced yields, lack of clean water, delays in receiving aid, loan and interest repayments, and other issues. If the government does not assist these farmers in resolving these issues, they may incur enormous debt and may decide to abandon this industry. The formation of the task force groups from the community will result in the immediate response and recovery actions during the flood.

Case Study 5

Name	: P
Age	: 53
Occupation	: Farmer
Educational Background:	SSLC

The villagers were very confident during the time of the 2018 flood, but we had to shift from here.

P is a farmer in the Kuttanad village. The traditional occupation and the major source of income is agriculture and the farming activities. In the history of Kerala floods, the 2018 flood was the most dangerous and hardly affected. Kuttanad was one among the high-flown areas in Kerala. Since the Kuttanad villagers are rapidly experiencing the flood situations, they are very confident to withstand. The elderly was reluctant to move away from Kuttanad. But, when the situation went wrong, the Kuttanad villagers were shifted to a temporary habitat.

Kuttanad is beautified with the green paddy fields, which is the major source of our income. But due to the recurring flood, agricultural fields were destroyed.

Kuttanad is known as the 'Rice Bowl of Kerala'. It is known for its distinctive geographical and cultural features. Paddy cultivation is one among those distinct features. As Kuttanad is predominantly an agricultural region, paddy cultivation is the

primary occupation of the people here. The unique feature of paddy cultivation in Kuttanad is that the fields are below the sea level and are separated by dikes. The main reason for entering the water into the houses is the breakage of bunds in the paddy fields as they are not strong enough to withstand the force of water. From Veeyapuram, which is located about 35 kilometers south of Alappuzha town, the rivers; the Pampa, the Achenkoil, the Manimala, and the Meenachil drain into the Kuttanad basin in a web-like pattern. They flow across the Vembanad lake and through Kuttanad's whole length, emptying into the Arabian Sea. And it results in the recurring floods during the monsoons. Flood have a significant impact on agriculture. While the region is renowned for its paddy fields, the low-lying nature of the land makes it vulnerable to flooding, particularly during the monsoon season. The primary concern during the flood is the submergence of agricultural fields. When the water level rises, the paddy fields in Kuttanad get completely submerged, leading to crop damage. Apart from this, soil erosion, contamination of fields, crop diseases and pests and the disruption of the farming activities are faced by the farmers in Kuttanad. The duration and the intensity of the flood determine the extent of damage in the livelihood measures of Kuttanad. Even though the intensity of rainfall lessens, there will be an impact on the lives of Kuttanad. The water from the lakes enters into the paddy fields through the damaged bunds. The weakness of the bunds and embankments is one of the reasons for the water logging. Reconstruction of bunds is the only solution to tackle the problem.

Road transportation is not possible during the time of flood. The roads were completely immersed in water and we were unable to relocate through land transportation.

Road infrastructure of Kuttanad gets submerged during floods. This condition of the roads makes the people adopt other means to relocate themselves. Wooden and Plastic canoes or small and big country boats come handy in this situation. Inflatable boats and overboard engines were seen deployed to relocate people during the recent flood situations. Fisherfolks were all in praise when they too used their fishing canoes for rescue operations during the floods.

There is no system to provide prior information on floods. We used to identify the coming flood through our villagers.

In Kuttanad, there is no early warning system from the local-self government department to provide information on the upcoming floods. Though floods have become common and part of Kuttanad life, it has taught the people there to prepare themselves to save their lives. The villagers themselves in Kuttanad become the source of information regarding the occurrence of floods. By observing the water level, they would be able to know the chances for the flood occurrence. They usually shift the items into a higher platform using the wood and stones. Those who aren't able to survive in their own houses shift to the nearby camps. But, on most occasions they didn't prefer shifting to the camps as they were all experiencing the varying intensity of floods. In the 2018 floods, P was involved in animal rescue operations.

The camps were set up in wards as a unit. During that time, they got assistance from outside voluntary organizations and groups.

The precautions that we made helped us to strive for every recurring flood and it is our greatest strength.

The respondent added; the precautions like shifting their belongings onto a higher platform, reconstruction of the bunds and the prior knowledge and information regarding the flood made them survive. But there are problems and challenges withstood by the Kuttanad in every flood. The drinking water scarcity and the situation of unusable toilets are the major issues that are stressed by the respondent. In case of medical emergencies, it was very hard to take the patient to the hospitals. Every Kuttanad villagers stand together to bounce back the floods. Because, they know that otherwise it is not possible to survive. If the bund in an agricultural field is damaged, it will affect the entire community.

The post disaster phase is also important. During those times, cleaning the houses and surroundings was a herculean task for the Kuttanad people. As the water and surroundings were heavily polluted, the chances for the Athletes Foot and Fungal Foot diseases were very high. The panchayat provides medicines for such infections and diseases.

Sometimes sudden floods occur and it completely vanishes the houses and all the belongings, which is the hardest situation and a complete loss for the people. If the fixations and the renovation of the bunds and embankments have been done early in the summer seasons it could help to avoid the destruction in the monsoons.

Case Study 6

Name	: Y
Age	: 26
Occupation	: Self Employed
Educational Background: Post- graduate	

Y is a resident of Kuttanad particularly in the lower Kuttanad portion named Kainakary village. The geography of the whole Kuttanad taluk in Alappuzha district is not similar. Therefore, the impact of the recurring floods and waterlogging nature will also be in a varying condition. The lower Kuttanad is the most affected portion. Due to this, the surviving nature of the lower Kuttanad people is very high. In Kainakary village, the major means of transportation is through water. Therefore, every household has small boats and motor boats. But, in the upper Kuttanad the land is the major means of transportation and every household lack boats. At that time, the households who had boats shared them with others. In this background, the lower Kuttanad is the most affected but the surviving nature is very high. They have utilized their own resources most effectively and efficiently.

We expect floods and water logging every year. Therefore, the villagers haven't been frightened by the floods.

According to Y, from the perception of an outsider the 2018 Kerala flood is a disaster that happened to Kuttanad. But for them it was normal that it happens every year, the only difference was that it impacted the whole Kuttanad Taluk in Alappuzha. Every year, the villagers face water logging and floods. Therefore, the people are not frightened about the floods. To cope with the flood, the villagers repair and reconstruct the damaged bunds. They don't need any political parties or authorities for such works. The community itself builds measures to reduce the risk factors of flood. During the night also, if it seems that situation went wrong the youth and elders participate in the activity of reconstructing the bunds.

Even though the water enters into the houses, people usually stay in their own houses. Because we are not willing to stay in the camps. It's the situation that has been experienced every year.

The people of Kuttanad are overcoming the recurring flood every year. Therefore, they usually stay in their own houses. They shift to camps only if the condition gets worse. The people have an attitude that the floods and waterlogging are habitual in nature, which they survive at all. The serious problem facing Kuttanad is not the sudden increase in the water level because they all are able to sustain. The post recovery phase is the challenging one. Once the bunds have been damaged, the employment opportunity is reduced. The agricultural activities were ceased during that time. The daily wage workers are most affected.

I have been residing in an area that witnessed the frequent floods till 2020.

The 'Sundari Paadam' in ward no 2 of Kainakary panchayat is one of the largest paddy fields. Therefore, it was the one of the areas where frequent floods and waterlogging

occurred. From childhood itself, Y has been witnessing frequent floods. But, now the frequency of floods is actually lower. After 2020, such situations haven't occurred. Using the Government Fund, five crore rupees estimated embankment has been constructed across the paddy fields.

As part of the political party, the respondent has engaged in the activities such as providing food and other essential materials in the camps during the flood. In the common floods, the Kuttanad people don't get a huge assistance from the outside. Because, they have the concept that it was normal for the Kuttanad people. Till now, nobody has died in the flood. Therefore, it didn't become a news in the TV channels or in any other media.

Like the transformation of summer and winter seasons, we have been experiencing a flood season in Kuttanad.

The recurring floods and waterlogging in Kuttanad is not considered as a disaster. Like the changing nature of seasons, the flood comes in Kuttanad. There is no loss of human life during such floods. Therefore, it is not declared as a mass destruction for humankind. Moreover, it became routine for the Kuttanad villagers and they all are adaptable to the changing climate changes and the environment. But at the same time, the leaders and the concerned authorities have such an attitude that nothing more is needed for them. No more precautions and assistance have not been received from the authorities. As part of the Kuttanad package project, the construction for bunds and embankments are started. But it is only in the starting phase. Community is most responsible for building resilience for the recurring floods and waterlogging. Therefore, community participation is the key factor for surviving every flood in Kuttanad.

Disaster management committee is working under the local-self government department. But, after 2020, there were no serious floods. The holding capacity of the lakes, rivers and canals have to be enhanced, which has not been done properly in Kuttanad. If it has done so, the natural flow of water can be retained which reduces the chances for waterlogging.

During our childhood we were happy. We used to play in water using boats. But as I grew up, I realized the impact of such flood in Kuttanad's economy; concluded by the respondent.

CHAPTER 5

DISCUSSION AND

THEMATIC

ANALYSIS

5.1 Introduction

Flooding is a significant challenge for the Kuttanad region, a low-lying and flood-prone region in Kerala, India. The recurring nature of these floods has a profound impact on the lives and livelihoods of local communities living in this unique geographical setting. In recent years, the importance of community involvement in disaster management has been recognized and there is a growing emphasis on the role of communities in addressing the challenges posed by recurrent floods and waterlogging.

This research aims to explore the dynamics of community participation in response to recurring floods in Kuttanad. By conducting a thematic analysis of qualitative data, this study seeks to gain insight into various aspects of community engagement, the role of local institutions, and the challenges and opportunities that arise in the context of flood management.

Thematic data analysis followed a systematic process involving identification of key themes, organization and coding of data, and interpretation of findings. The themes identified revolve around different dimensions of community participation, including community knowledge and awareness, decision-making processes, collaboration with external stakeholders, community-led initiatives and challenges faced by communities in flood management.

By examining these themes, this research aims to provide a comprehensive understanding of the role of community participation in addressing recurring floods in Kuttanad.

5.2 THEME 1: Varying impact across Kuttanad

The Kuttanad region is divided into:

- Lower Kuttanad
- Upper Kuttanad
- North Kuttanad

Lower Kuttanad includes Ambalapuzha, Nedumudy, Kuttanad taluks (except Edathua, Thalavada, Kidangara and Muttar) and the northern half of Karthikapally taluk in Alappuzha district.

Upper Kuttanad includes Veeyapuram and Pallippad in Karthikapally taluk, Edathua, Thalavady, Kidangara and Muttar in Kuttanad taluk; Chennithala and Thripperumthura villages in Mavelikkara taluk; Mannar, Kurattissery, Budhanoor, Ennakkad villages in Chengannur taluk of Alappuzha district; and Parumala, Kadapra, Niranam, Pulikeezhu, Nedumpuram, Chathenkary, Peringara and Kavumbhagam villages in Pathanamthitta district.

North Kuttanad includes Vaikom taluk, western part of Kottayam taluk and western part of Changanacherry taluk in Kottayam district.

Therefore, the impact of the recurrent floods and waterlogging varies according to the division of the land area that depends on the topography of the Kuttanad Taluk.

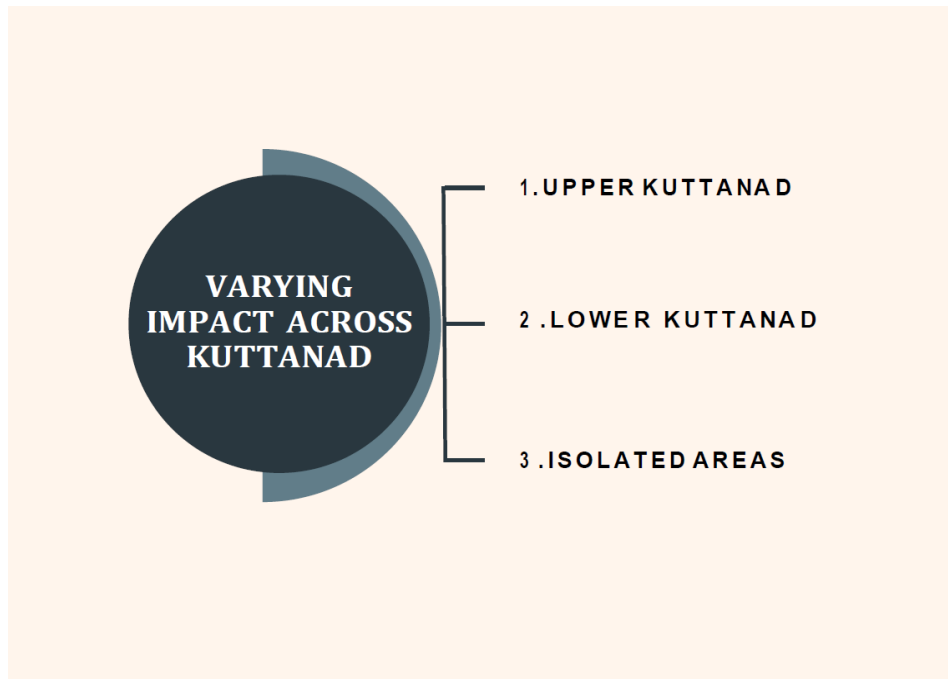


Fig 5.1 Varying Impact Across Kuttanad

Subtheme 1.1: Upper Kuttanad

The upper Kuttanad portion is the least affected portion in the Kuttanad. The people of the upper Kuttanad had faced the most challenging experiences during the 2018 flood. But the recurrent floods and waterlogging in the upper Kuttanad had less impact. Due to the topography of the land, the upper Kuttanad people face the issue of waterlogging as a normal experience. Land is the major means of transportation for them, therefore if they had to face a heavy flood the availability of the boats is less for the immediate response and recovery. At that time, the villagers shared their resources and they are less adaptable to the recurrent floods and waterlogging.

Subtheme 1.2: Lower Kuttanad

The lower Kuttanad portion of the Kuttanad taluk is prone to the frequent floods and waterlogging. They have to face the recurring floods and waterlogging two to three

times in a year, most probably during the months of June, July and August that varies according to the intensity of the rainfall received during the monsoon seasons and the varying climatic changes. The lower Kuttanad people experience and overcome the most challenging and the unpredicted floods in their lives. Even though it became normal for the villagers in the lower Kuttanad, they have been facing problems to withstand the situation.

Subtheme 1.3: Isolated areas

In Kuttanad, there are isolated areas in which only one or two houses are residing in the middle of large paddy fields. Those are more vulnerable to the unpredicted floods and the waterlogging. Therefore, the isolated areas are significantly affected by the floods. The low-lying region characterized by the network of rivers, canals and backwaters offers agricultural advantages, but it also makes the region vulnerable to flooding and waterlogging. Residents in isolated areas often face greater challenges in accessing rescue and relief services compared to those in more accessible regions. Floods and waterlogging inundate farmland, resulting in crop loss and destruction of livestock. This has serious implications for the livelihoods of farmers and agricultural workers in isolated areas who are heavily dependent on these activities.

THEME 2: Impact of recurrent floods

The idyllic landscape of Kuttanad also hides an inexorable challenge that threatens the lives and livelihoods of its inhabitants: recurring floods. Characterized by low-lying areas and an intricate network of rivers, canals and backwaters, Kuttanad's unique geography makes it highly prone to flooding and subjects its communities to a cycle of

destruction and renewal. Deep impact of recurring floods on Kuttanad creates numerous challenges for the residents. The recurring nature of these floods compounds the difficulties, leaving isolated areas and lower divisions within Kuttanad particularly vulnerable to the effects of rising water. From displacement and infrastructure damage to agricultural losses and environmental degradation, the consequences are far-reaching and require urgent attention.

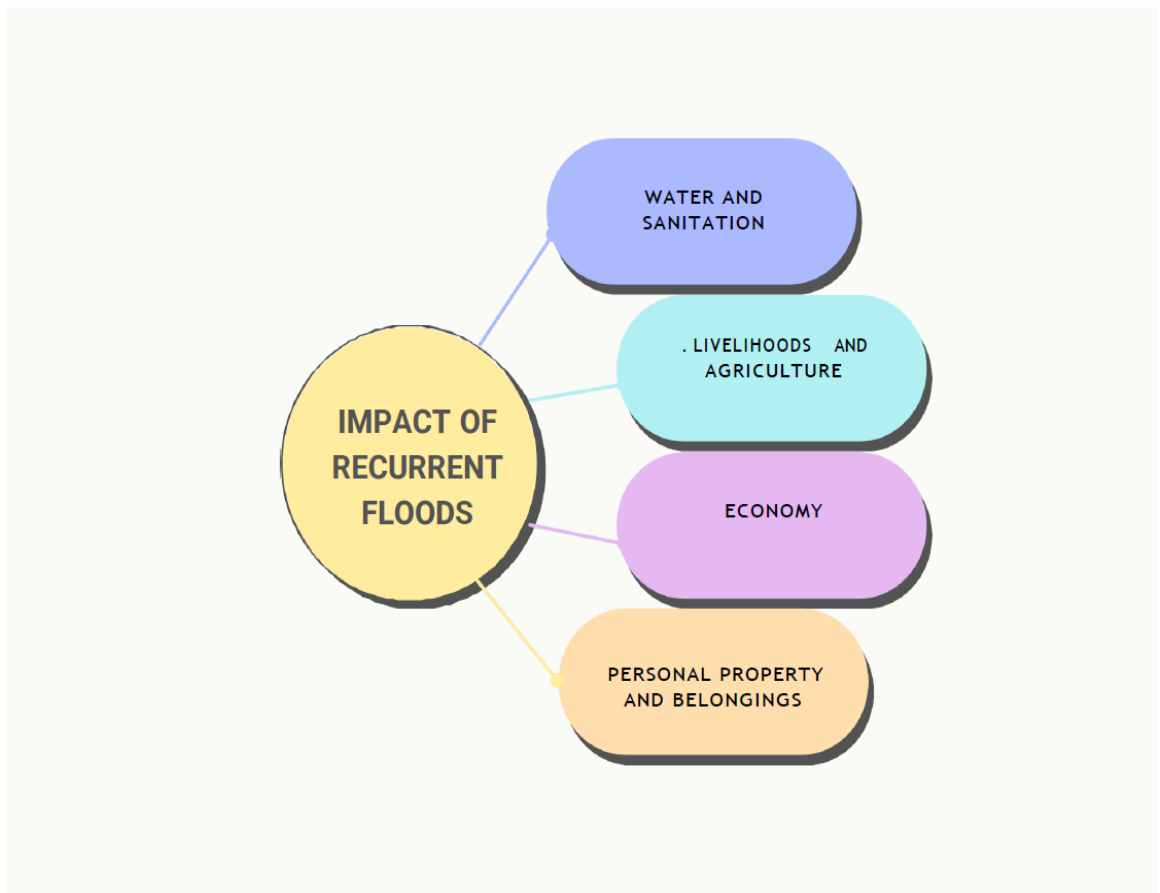


Fig 5.2 Impact of Recurrent Floods

Subtheme 2.1: Water and Sanitation

The villagers of Kuttanad, face several water and sanitation problems during recurrent floods and waterlogging. During these days, the availability of drinking water and sanitation facilities becomes a significant challenge. ‘Water, water everywhere, but not

a drop of water to drink'. Is the most suitable line to portray the situation of Kuttanad lives. Flood water contaminates the existing water sources with pollutants, sewage and other harmful substances. This results in a risk to the health of the affected population when they consume the water. Floods and waterlogging damage the sanitation infrastructure including toilets, septic tanks and sewage systems or the use of such facilities during the flood times is impossible. This lack of proper sanitation facilities leads to unhygienic conditions and increasing risk of water borne diseases. Difficulties in maintaining proper menstrual hygiene practices is also an important challenge faced by the women in Kuttanad during the floods.

Subtheme 2.2: Livelihoods and Agriculture

Kuttanad due to its unique features and traditional practices in agricultural activities is often referred to as the 'Rice Bowl of Kerala'. The Kuttanad region is characterized by its own system of farming known as paddy cultivation, which involves growing rice in the fields that are below the sea level. Kuttanad's agricultural practices and people's livelihood revolve primarily around rice cultivation and fishing. Recurrent floods and waterlogging have a significant impact on livelihoods and agricultural activities. Crop damage particularly for the paddy fields due to changing environment and climatic conditions. Disruption of farming activities due to the floods and waterlogging make it difficult to carry out the regular farming activities. Farmers have to postpone or abandon their agricultural activities due to unfavourable conditions. The farming activities are restored back only after the completion of the reconstruction of bunds and embankments. Live-stock rearing is also one of the major livelihood activities for the Kuttanad villagers. Animals such as cows, goats and poultry have to be displaced from their usual grazing areas or get separated from their owners. This makes difficult for farmers to find and retrieve animals, leading to further losses and difficulties.

Subtheme 2.3: Economy

Kuttanad is primarily an agricultural area, with rice cultivation being the main economic activity. Flooding and waterlogging cause extensive damage to crops, leading to significant losses for farmers. Submerged fields can result in standing crop loss and prevent farmers from planting or harvesting their produce. The agricultural sector, including farmers and laborers, bears the brunt of these natural disasters, affecting their livelihoods and incomes. The loss of livestock due to flooding has significant economic consequences for farmers. Livestock are often considered a valuable asset and source of income. The loss of animals can lead to financial instability, indebtedness and a decrease in the overall income of livestock farmers. After the floods, considerable effort and investment is needed for reconstruction and recovery. This includes repairing damaged infrastructure, restoring agricultural fields. These activities affect the overall economic growth of the region.

Subtheme 2.4: Personal property and belongings

Floods cause severe damage to houses and buildings in Kuttanad. Water seeps into houses, leading to destruction of walls, floors and foundations. Furniture, appliances and personal belongings inside homes become submerged or damaged by water. In some cases, houses may even collapse or become uninhabitable, resulting in the loss of shelter and displacement of villagers. The personal possessions such as electronics, documents, photographs and sentimental items were destroyed by the floods if they were not properly placed during the flooding and waterlogging.

THEME 3: Community engagement and Participation

Community engagement and participation plays a vital role in managing and responding to recurring floods and waterlogging in Kuttanad. The local community is

involved in disseminating early warning information to the villagers. Community members, especially elders, provide valuable insights into local flooding and help with preparedness. They play an active role in spreading warnings within the community and making sure everyone is aware of the risks involved. Community involvement in flood preparedness and response helps to reduce risk factors. Community members contribute their knowledge of local resources, capacities and communication networks to the development of effective strategies for evacuation, shelter and emergency supplies. Supporting community adaptation measures enables local communities to build resilience to floods and waterlogging. It involves the reconstruction of bunds with the active participation of villagers and adopting durable housing designs. Community participation in the reconstruction process is essential. Community members provide valuable insights into flood patterns and the effectiveness of previous barriers. Their participation in maintenance also ensured the longevity of the structures. The active engagement and participation of the youth and elders helps to strive to overcome the challenges of the recurring floods and waterlogging. In the case of Kuttanad, community involvement fosters a sense of ownership, builds trust and empowers individuals to actively contribute to reducing the impacts of recurrent flooding and waterlogging.

THEME 4: Community resilience and coping mechanisms

The villagers of Kuttanad have developed community resilience and coping mechanisms for flooding and waterlogging, which are recurring problems in their region. Drawing on their collective strength, traditional knowledge and community support systems, the villagers of Kuttanad demonstrate remarkable resilience and

adaptability in coping with floods and waterlogging. These coping mechanisms contribute to their ability to recover, rebuild and move on with life after such phenomena.



Fig 5.3 Community Resilience and Coping Mechanisms

Subtheme 4.1: Traditional knowledge and Awareness

Villagers in Kuttanad have accumulated traditional knowledge and awareness to help them cope with floods. They have knowledge of local topography, water flow patterns and flood prone areas. This knowledge enables them to take preventive measures such as raising the plinth level of houses, building raised platforms to store essentials, and

adapting agricultural practices to suit flood-prone environments and to make them more resilient to recurring floods and waterlogging.

Subtheme 4.2: Long term Adaptation

Kuttanad villagers have demonstrated long-term adaptability in dealing with recurrent flooding and waterlogging. Over the years, they have developed strategies and practices to mitigate the effects of these natural phenomena. By equipping themselves with knowledge and skills, they increased their ability to adapt to changing floods and mitigate their impacts effectively. The long-term adaptability of the Kuttanad villagers demonstrates their resilience, innovation and determination to protect their livelihoods in the face of recurrent flooding and waterlogging. These adjustments not only help them mitigate immediate risks, but also contribute to build a resilient community.

Subtheme 4.3: Resilient housing construction

Sustainable housing development in Kuttanad is an ongoing process that involves the incorporation of local knowledge, traditional practices and innovative techniques. By integrating these elements, the goal is to create homes that better withstand the challenges posed by recurring floods and waterlogging and ensure the safety and well-being of residents. Resilient housing development in Kuttanad aims to minimize the impact of floods and waterlogging on houses and increase their ability to withstand such phenomena. Resilient houses in Kuttanad are often built on raised platforms or plinths to raise living spaces above flood level. This design helps to protect the structure from direct water ingress and reduces the risk of damage to the house and its contents during floods. The use of raised foundations provides an additional layer of protection against a rising flood. The foundations are constructed with materials that resist water damage and are moisture resistant to prevent water from seeping into the structure.

Subtheme 4.4: Reconstruction of bunds and embankments

Reconstruction of bunds and embankments is a vital measure against floods and waterlogging in low-lying areas like Kuttanad. Bunds are earthen or concrete barriers built along the edges of water bodies such as rivers, canals and lakes to prevent water from spilling into surrounding areas during floods. Villagers have built embankments and canal systems to regulate water flow and prevent excessive flooding. These structures help to divert water away from populated areas, reducing the risk of flooding. The construction and maintenance of bunds and canals reflects their long-term commitment to managing water levels and minimizing flood-related damage. The reconstruction process includes strengthening and reinforcing the existing bunds and embankments with available suitable materials. This helps increase their stability and ability to withstand the force of floodwaters. Reconstruction of bunds and embankments is an essential part of flood management and prevention of waterlogging in Kuttanad. These structures play a vital role in protecting lives, property and livelihoods in flood-prone areas and contribute to the overall resilience of the community against recurring floods.

THEME 5: Institutional support and collaborations

The role of institutional support and collaborations is essential for effective flood management by enhancing the community participation and building resilience in Kuttanad. By bringing together government agencies, NGOs, educational institutions and local communities, these partnerships will strengthen the region's ability to cope with recurring floods and waterlogging, develop sustainable solutions and improve the overall well-being of villagers.

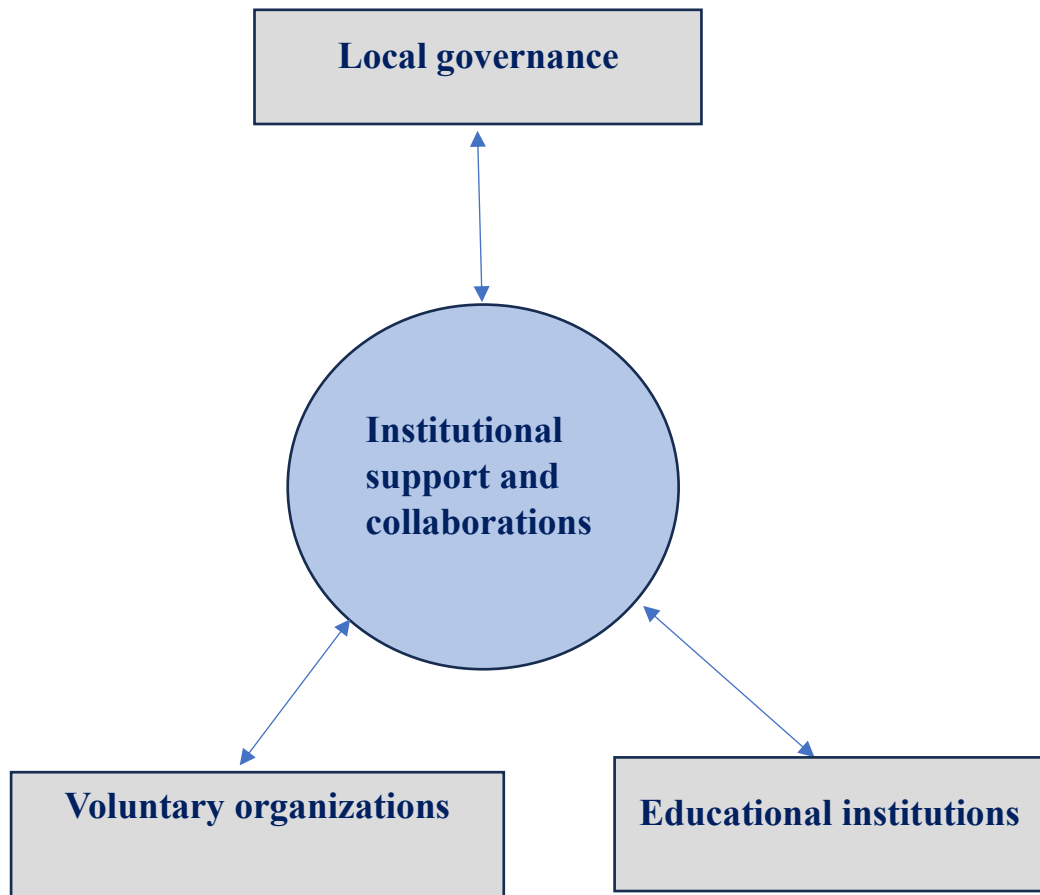


Fig 5.4 Institutional Support and Collaborations

Subtheme 5.1: Local governance

The local self-government in Kuttanad organizes camps in the schools for the community during floods and water logging. They also provide food kits and arrange the facility of mobile dispensaries at the flood affected areas. With the assistance of government funds the construction of embankments and bunds are taking place for the protection of the agricultural fields, livelihood and to reduce the impact of the risk of the factors of the recurring floods and waterlogging on the Kuttanad villagers.

Subtheme 5.2: Voluntary organizations

The voluntary organization provides the essential materials such as food, clothes, sanitary napkins and other essentials during the time of extensive floods and water logging in Kuttanad. But, most probably the floods and waterlogging are normal for the Kuttanad villagers. Therefore, they don't get such assistance in every flooding situation.

Subtheme 5.3: Educational institutions

Sometimes, the educational institutions within the district or outside the district provide assistance and first aid for the Kuttanad villagers. As in the case of the voluntary organizations the villagers don't get support in the recurring floods and waterlogging.

THEME 6: Post- flood recovery

The recovery phase after the Kuttanad floods is a critical period during which communities and authorities work together to restore and rebuild the affected areas. By addressing immediate needs, rebuilding infrastructure, reviving livelihoods and supporting resilience building, the recovery phase aims to return affected areas to normal. In the flood affected areas, the community of Kuttanad is undergoing various challenges and adopting convenient measures.

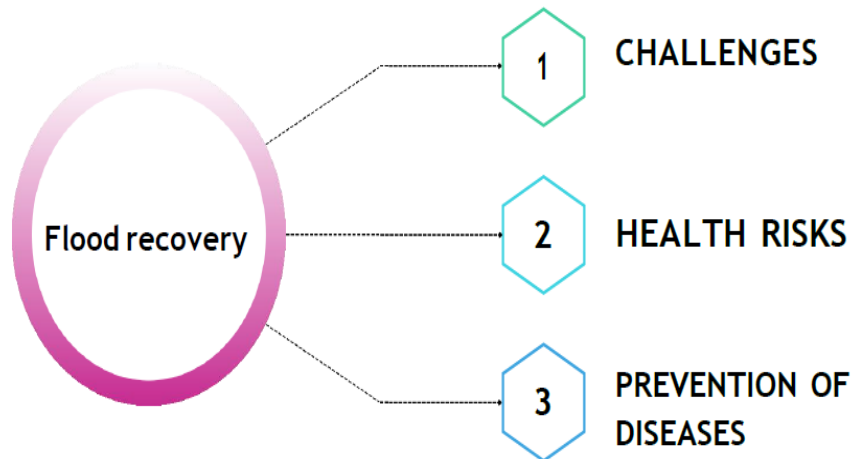


Fig 5.5 Flood Recovery

Subtheme 6.1: Challenges

The recovery phase after the flood in Kuttanad is often accompanied by several problems that hamper the process. Flooding in Kuttanad caused significant damage to infrastructure, including houses, bunds, embankments and water systems. The extent of the damage may be massive and require significant resources and time to recover. The agricultural sector is a key component of Kuttanad's economy and floods have a serious impact on agricultural land and crops. Resuming agricultural activities and providing support to farmers in terms of seeds, fertilizers and technical assistance can be challenging. Balancing community needs with the environment can be a challenge given limited resources. Apart from these, the contamination of the flooded water is a threat to the villagers. The cleaning of houses and surroundings is a herculean task for them. The chances for the spread of waterborne diseases, Athlete's foot diseases and other fungal infections are higher.

Subtheme 6.2: Health risks

During floods in Kuttanad, there are several health hazards that arise due to changing environmental conditions, water contamination and spread of water-borne diseases. Flooding contaminates water sources, leading to the spread of water-borne diseases such as cholera, typhoid, etc. Contaminated water comes into contact with open wounds and increases the risk of infection. Insufficient access to clean water and proper sanitation facilities worsens the situation. Flood waters create favorable breeding conditions for mosquitoes and other disease vectors. The increased presence of mosquitoes can lead to the transmission of diseases such as dengue fever, malaria and other such diseases. Standing water and poor drainage contribute to the spread of these disease vectors. Contact with flood water, which contains pollutants, sewage and harmful chemicals, leads to skin infections and irritation. Skin conditions such as inflammation, fungal infections, and open wounds contaminated with bacteria occur more frequently during floods.

Subtheme 6.3: Prevention of diseases

The spread of waterborne and vector borne diseases are very high after the post flood recovery phase in Kuttanad as it is surrounded by water. Apart from this, chances for getting skin infections are also at a high level. To overcome such situations, the panchayat is providing free medicines and taking precautions to avoid the spread of mosquitoes and other diseases causing bacteria and viruses.

THEME 7: Sustainable flood management strategies

The researcher has identified several sustainable flood management strategies from the responses of the community and these strategies will help to mitigate consequences of the recurring floods and water logging in Kuttanad. Flood management strategies in

Kuttanad include a combination of structural and non-structural measures aimed at reducing flood risks and impacts.

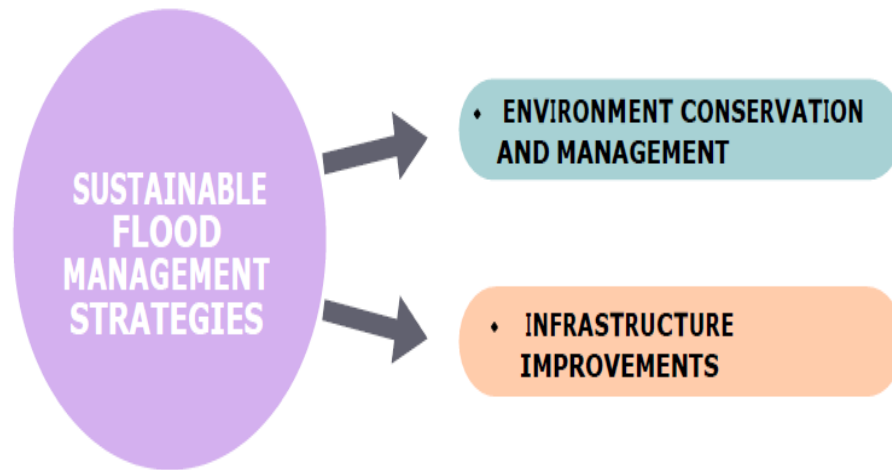


Fig 5.6 Sustainable flood Management Strategies

Subtheme 7.1: Environment conservation and management

As Kuttanad is surrounded with different water bodies including the lakes, rivers and canals proper environment conservation and their management is needed to reduce the consequences of the recurring floods and waterlogging. Proper construction and reconstruction of the bunds and embankments, proper cleaning of the water bodies and the removal of weeds at particular intervals to maintain the natural flow of water have to be carried out.

Subtheme 7.2: Infrastructure improvements

The use of inflatable boats can be used to enter into the isolated areas where the normal boats weren't able to enter such regions of Kuttanad. In order to find a solution for the

proper access to pure drinking water during the time of floods and waterlogging, mobile water tanks and the establishment of a common rainwater harvest for the villagers could help to reduce the drinking water scarcity.

CHAPTER 6

CONCLUSION

6.1 Introduction

The conclusion chapter of this research study presents a comprehensive analysis of social work implications and provides a summary of key findings. Throughout this research effort, the researcher has explored the multifaceted nature of social work and its profound impact on individuals, families, communities, and society as a whole. By examining various aspects and dimensions of social work practice, gained valuable insights into its meaning, challenges and potential for transformational change for the effective community participation in disaster management. In this final chapter, researcher has synthesized findings and drawn conclusions that highlight broader implications for the field of social work.

6.2 Implications for professional social work practice

The implications for professional social work practice in community participation in disaster management are significant. Social workers play a key role in disaster response, recovery and preparedness efforts, particularly in promoting community participation.

1. Empowerment and capacity building: Social workers can empower individuals and communities by encouraging their active involvement in disaster management processes. This includes building their capacity to understand and respond to disasters, providing them with relevant knowledge and skills, and facilitating their participation in decision-making and planning.

2. Community Engagement: Social workers can facilitate meaningful engagement with diverse community members, including vulnerable populations, to ensure that their voices are heard and that their unique needs and perspectives are considered in

disaster management strategies. This includes building partnerships, conducting community assessments and facilitating community meetings and forums.

3. Collaboration and coordination: Social workers can serve as intermediaries between community members and various stakeholders involved in disaster management, including government agencies, non-governmental organizations and other service providers. They can promote cooperation and coordination between these entities to ensure a comprehensive and integrated response.

4. Advocacy and Social Justice: Social workers have a responsibility to advocate for social justice and the equitable distribution of resources and services in disaster management. They can advocate for policies and practices that address the underlying vulnerabilities and systemic problems that exacerbate the impact of disasters on marginalized and vulnerable populations.

5. Trauma-informed practice: Social workers must adopt a trauma-informed approach when working with individuals and communities affected by disasters. This includes recognizing the psychological and emotional impact of disasters, providing appropriate support and interventions, and promoting resilience and recovery.

6. Preparedness and Education: Social workers can contribute to disaster preparedness efforts by providing education and training on disaster response and mitigation strategies. They can work with community members to develop emergency plans, conduct drills, and ensure that vulnerable populations are adequately prepared for future disasters.

Therefore, professional social work practice for ensuring community participation in disaster management emphasizes the importance of empowering communities, promoting inclusivity and equity, and fostering collaboration and coordination among

stakeholders. By actively engaging community members and addressing their unique needs, social workers can contribute to more effective and resilient disaster management efforts.

6.3 Conclusion

1. Summary of Findings

The objective of this research was to examine the impacts of recurrent floods on various aspects of life in Kuttanad and to examine the role of community participation in disaster management. The study explored themes of varying impact in Kuttanad, impact of recurrent floods on water and sanitation, livelihoods and agriculture, economy, community engagement and participation, community resilience and coping mechanisms, institutional support and cooperation, and post-flood recovery and sustainable flood management strategy.

The findings of this research explored the multifaceted consequences of recurring floods in Kuttanad and the key role of community participation in addressing and mitigating these impacts.

2. Differential impact across Kuttanad

Research has shown that the impact of recurring floods is not evenly distributed across Kuttanad. Geographical location, proximity to water bodies and infrastructure development influence the severity of the impact. Low-lying areas and isolated areas tend to face the brunt of flooding, with significant damage to their homes, loss of livelihoods and disruption of basic services.

3. Impact of recurring floods on water and sanitation

The study revealed that recurring floods in Kuttanad are severely affecting water and sanitation infrastructure. Contamination of water sources, damage to sanitation facilities, and disruption of water systems pose significant health risks to affected

communities. The lack of adequate sanitation facilities exacerbates the vulnerability of the population, leading to the spread of water-borne diseases.

4. Impact on Livelihoods and Agriculture

Recurring floods have a detrimental impact on livelihoods and agriculture in Kuttanad. Flooding of fields, destruction of crops and loss of livestock leads to economic losses. Farmers and agricultural workers face significant challenges in recovering from flood damage and rebuilding their livelihoods.

5. Effect on Economy, Personal Property and Property

The results of the research showed that the economy of Kuttanad is adversely affected by recurring floods. It creates significant losses, leading to a decline in economic growth and job opportunities. In addition, there is destruction or damage to the personal property and possessions of individuals, causing a financial burden on the affected population.

6. Community Engagement and Participation

Research has highlighted the critical role of community engagement and participation in disaster management. Active community involvement in decision-making, planning and implementation of mitigation and preparedness measures increases the effectiveness and sustainability of disaster management efforts. Community participation fosters a sense of ownership, empowers the local population and promotes innovative solutions tailored to the specific needs of Kuttanad.

7. Community resilience and coping mechanisms

The study revealed the resilience and coping mechanisms exhibited by communities in Kuttanad. Despite repeated flooding, the community demonstrates a remarkable

capacity to adapt, recover and restore. Traditional knowledge, social networks and community solidarity contribute to resilience and enable affected populations to overcome challenges and bounce back stronger.

8. Institutional support and cooperation

The research highlighted the importance of institutional support and cooperation in dealing with the impacts of recurring floods. Effective coordination between government agencies, NGOs, community organizations and other stakeholders is essential to provide timely assistance, resources and expertise to affected communities. Strengthening institutional frameworks and fostering cooperation are critical to improving disaster preparedness and response.

9. Flood recovery and sustainable flood management strategies

The study highlighted the importance of flood recovery and implementation of sustainable flood management strategies in Kuttanad. Research findings have highlighted the need for comprehensive and integrated approaches that go beyond immediate relief and reconstruction. Long-term recovery efforts should focus on building resilience, improving infrastructure, improving spatial planning and implementing sustainable flood management practices. This includes measures such as flood-resistant housing, infrastructure improvements, ecosystem conservation, restoration and management.

10. Conclusion

In conclusion, this research has provided valuable insights into the impact of recurring floods in Kuttanad and the role of community participation in disaster management. The findings highlight the need for a holistic and community-based approach to

addressing the challenges posed by flooding. It is essential to prioritize the protection of water and sanitation infrastructure, support sustainable livelihoods and agriculture, support economic recovery and protect personal property and belongings.

Community engagement and participation should be at the core of disaster management strategies, enabling local communities to actively contribute to decision-making, preparedness, response and recovery efforts. Strengthening institutional support and cooperation is essential to ensure effective coordination, resource allocation and capacity building.

In addition, post-flood recovery efforts should focus on sustainable flood management strategies with an emphasis on long-term resilience, ecosystem protection and adaptive measures. By integrating these approaches, Kuttanad can increase its capacity to mitigate the impacts of recurring floods and build a more resilient and sustainable future.

However, it is important to note that this research is not exhaustive and that there are some limitations that must be taken into account. Further research is needed to delve deeper into specific aspects such as social vulnerability, gender dynamics and the role of technology in disaster management. In addition, ongoing monitoring and evaluation of implemented strategies is essential to assess their effectiveness and identify areas for improvement.

Overall, this research contributes to the existing body of knowledge on disaster management in Kuttanad and provides recommendations for policymakers, practitioners and communities to strengthen their efforts in mitigating the impacts of recurrent floods and strengthening long-term resilience.

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APPENDIX

Interview Guide

Demographic Information:

- a. Age:
- b. Gender:
- c. Occupation:
- d. Educational Background:

Awareness and Preparedness:

- a. Were you aware of the potential disasters in the Kuttanad region?
- b. How did you receive information about the disasters?
- c. Did you have any prior knowledge about disaster preparedness?
- d. What measures did you take to prepare yourself or your community for disasters?

Response and Recovery:

- a. Were you personally affected by any of the disasters in Kuttanad?
- b. Did you participate in any community response activities during the disasters?

- c. If yes, what specific actions did you take to help the community?
- d. How effective do you think the community response was in mitigating the impact of disasters?
- e. Did you receive any assistance or support from external organizations or government agencies during the recovery phase?

Community Participation:

- a. Were you involved in any community organizations or groups related to disaster management or resilience?
- b. If yes, please provide details about your involvement and the activities carried out by the organization/group.
- c. What challenges or barriers did you encounter in participating actively in disaster-related activities?
- d. What suggestions do you have to enhance community participation in disaster management and resilience efforts in Kuttanad?

Information Dissemination:

- a. How effective do you think the communication channels were in providing timely and accurate information during the disasters?

b. Did you have access to reliable sources of information during the disasters?

c. What improvements can be made in terms of information dissemination to ensure better community preparedness?

Overall Perception:

a. How would you rate the overall response of the community to the disasters in Kuttanad?

b. In your opinion, what were the strengths and weaknesses of the community's response?

c. Do you think community participation played a significant role in the disaster management process?

d. What lessons can be learned from the disasters in Kuttanad to improve future disaster management efforts?