



PARISTHITHIKAM

2021-22

MANIMALA RIVER: FLOOD DISASTER MANAGEMENT AND SUSTAINABLE LAND USAGE



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DIRECTORATE OF ENVIRONMENT AND CLIMATE CHANGE
പാരിസ്ഥിതി കാലാവസ്ഥ വ്യതിയാന ബഹ്യരക്ഷണം
GOVERNMENT OF KERALA

PARISTHITHIKAM 2021-22

MANIMALA RIVER: FLOOD DISASTER MANAGEMENT AND SUSTAINABLE LAND USAGE

FINAL REPORT



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PARISTHITHIKAM 2021-22

MANIMALA RIVER: FLOOD DISASTER MANAGEMENT AND SUSTAINABLE LAND USAGE

Report submitted to:
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Preface

With immense pleasure, I present this preface for the final report of the project titled "Manimala River: Flood Disaster Management and Sustainable Land Usage - Community Training Programmes." This project exemplified a perfect participatory educational environment, engaging both the general public and schoolchildren residing along the riverbanks.

Initiated with a preliminary survey conducted by schoolchildren within the watershed area, this endeavor illuminated insights into the river's dynamics and provided invaluable suggestions for a disaster management action plan tailored to the riverbank communities. Building upon this foundational data, a comprehensive community-level disaster management action plan was meticulously crafted and disseminated through various educational initiatives aimed at both schools and the local populace.

Furthermore, efforts towards riparian vegetation restoration were undertaken through extensive tree planting activities. These initiatives were diligently replicated across three distinct locations: Koottickal (Highland), Vaipur (Midland), and Kadapra (Lowland). Additionally, the establishment of a seed bank comprising native trees and plants at TIES formed an integral component of this project's implementation.

In reflection, it is evident that this project yielded specific, targeted outputs, and fostered a significant impact among stakeholders. Such success underscores the potential for replication in diverse regions across the state, signifying its scalability and adaptability.

Dr. Punnen Kurian



CHAPTER

1

INTRODUCTION

1 INTRODUCTION

The Manimalayar River, one of the most distinctive rivers in Kerala, originates in the Amruthamedu and Wagamon hills, spanning the districts of Idukki and Kottayam. The river flows for 92 km through Pathanamthitta and Alappuzha districts before reaching Vembanadu Lake. However, significant environmental damage is occurring at its source, a highland ecologically sensitive area. As the river reaches middle-class and coastal population centers, it faces issues such as pollution, encroachment, riverbank forest degradation, and loss of biodiversity.

The river's water is primarily used for drinking and irrigation. Although the riverbed has become rocky due to uncontrolled sand mining in the past, the deepening of the river has not caused major flooding issues. The floods of 2018 and 2019 did not result in significant damage to the river or its watershed. However, in October 2021, for the first time in the river's history, landslides in the Koottickal region caused extensive damage to the entire hilly area along the river. Studies indicate that this situation is a result of unscientific land use practices in the river basin and watershed over recent years, pollution from modern lifestyles, and natural disasters such as cloudbursts and climate change.

In response to these challenges, a sustainable plan for the conservation of the Manimalayar River and disaster management has been proposed as part of Paristhithikam 2021–2022, a project supported by the Department of Environment and Climate Change (DoECC), Government of Kerala. Data collection and tree planting in the riparian area have been primarily carried out by local schoolchildren. An agreement has been reached with schools, and the survey and other activities have been implemented with the active participation of both the schools and the local community.

Three schools were selected from designated localities—highland, midland, and lowland. J.J. Murphy School in Koottickal represents the highland area. The N.S.S. volunteer students from Devaswom Board Higher Secondary School in Kavumbhagam, Thiruvalla, actively participated in the project under the leadership of Principal Ms. Mariamma Thomas and NSS Program Officers Mr. Abilash P. Vettom and Ms. Elizabeth Sebastian. This school was chosen to represent the lowland area. Similarly, the National Service Scheme (NSS) unit of N.S.S Higher Secondary School in Vaipur played a key role in the project's implementation. Under the able guidance of NSS Program Officer Ms. Reshma S., who is also an HSS teacher, this school was selected to represent the highland area.

Furthermore, the Higher Secondary students from both schools demonstrated active involvement in the project. At Devaswom Board Higher Secondary School, they were led by Principal Ms. Jayasree and HSS Teacher Mr. Sreeraj, while at N.S.S Higher Secondary School in Vaipur, they were guided by their respective school leaders. The project has generated valuable data, leading to the development of a comprehensive disaster management plan.

1.1 AIM

The aim of the project is to document community knowledge about the river and their perceptions of disaster management by involving schoolchildren and the local community. A disaster management plan for the river will be formulated using the collected information, incorporating scientific inputs. This project also aims to enhance riparian vegetation by planting native riparian trees, thereby increasing environmental awareness among the communities.

1.2 OBJECTIVES

- Preparing an implementation plan for river conservation, a roadmap for land conservation, and an environmentally friendly lifestyle by locally studying the ecological land-use, social changes, and climate changes in the Manimala River watershed.
- Organizing awareness programs through participatory programs based on the guidelines.
- Organizing disaster management training programs and prepare a disaster response team.
- Empowering local people to adopt scientific methods in land use practices (seed bank, riparian forest construction)
- Ensuring participatory conservation by increasing riverside community involvement and creating a sense of ownership.

1.3 MAJOR ACTIVITIES PROPOSED

- Participatory survey: conducting a detailed survey that focuses on selected panchayats, examining land tenure, natural disaster history, climate changes in the area, socio-economic status of the people, and lifestyle information.
- Awareness programs: publishing a roadmap based on survey data and scientific studies, and organizing necessary awareness programs to empower the people.
- Seed bank: implementing a local seed bank to convert mono-crop plantations and homesteads into multi-crop plantations as much as possible.
- Rejuvenation of riparian forest: planting saplings of bamboo, aattuvanchi, etc., for the protection of riparian forest with public participation.
- Make the river garbage-free: organizing river conservation activities with the participation of school and college students, Kudumbashree and Thozhiluruppu activists, and managing waste disposal scientifically.
- Solid and liquid waste management: creating proactive awareness to make it a way of life, and implementing the necessary infrastructure within the budget of local self-government bodies.
- Implement model projects to connect the river with people's daily lives: launching locally responsible riverside recreation centers and organizing programs to increase the use of boats, etc.
- Disaster management training: providing necessary training at the school, college, and panchayat levels, and preparing a disaster response team.





CHAPTER

2

METHODOLOGY

2 METHODOLOGY

To represent diverse geographical areas, three schools were carefully selected: J.J. Murphy School in Koottickal for the highland location, Devaswom Board Higher Secondary School in Kavumbhagam, Thiruvalla, for the lowland region, and N.S.S Higher Secondary School in Vaipur for the midland area. Students from all three schools received training in community survey techniques. The active involvement of these schools and the residents of Koottickal Panchayat, Kottangal Panchayat, and Kadapra Grama Panchayat was integral to the success of these activities.

A community survey training session was conducted for students from J.J. Murphy Memorial Higher Secondary School, Yendar, on January 9, 2023. The study area encompassed the river basins within Koottickal and Kokkayar Panchayats. A total of 50 selected NSS volunteers participated in the session. Subsequently, 250 survey sheets were distributed to the principal. The students were divided into two groups, with each student responsible for conducting five surveys. The deadline for collecting the survey sheets was January 27, 2023.

On July 4, 2023, a training session was held for students at Devaswom Board Higher Secondary School in Kavumbhagam, Thiruvalla. The study area encompassed the river basins under Kadapra and Nedumpuram Panchayats. A group of 50 selected NSS volunteers actively participated in both the training session and the subsequent survey program. In total, 216 households were surveyed using structured survey sheets during the first and second weeks of September 2023.

On the same day, July 4, 2023, a training session was conducted for students at N.S.S Higher Secondary School in Vaipur. The study area included the river basins within Kottangal Panchayat. A cohort of 50 selected NSS volunteers actively participated in both the training session and the subsequent survey program. In total, 216 households were surveyed using structured survey sheets during the first and second weeks of September 2023. This session focused on teaching students how to conduct surveys within the community.

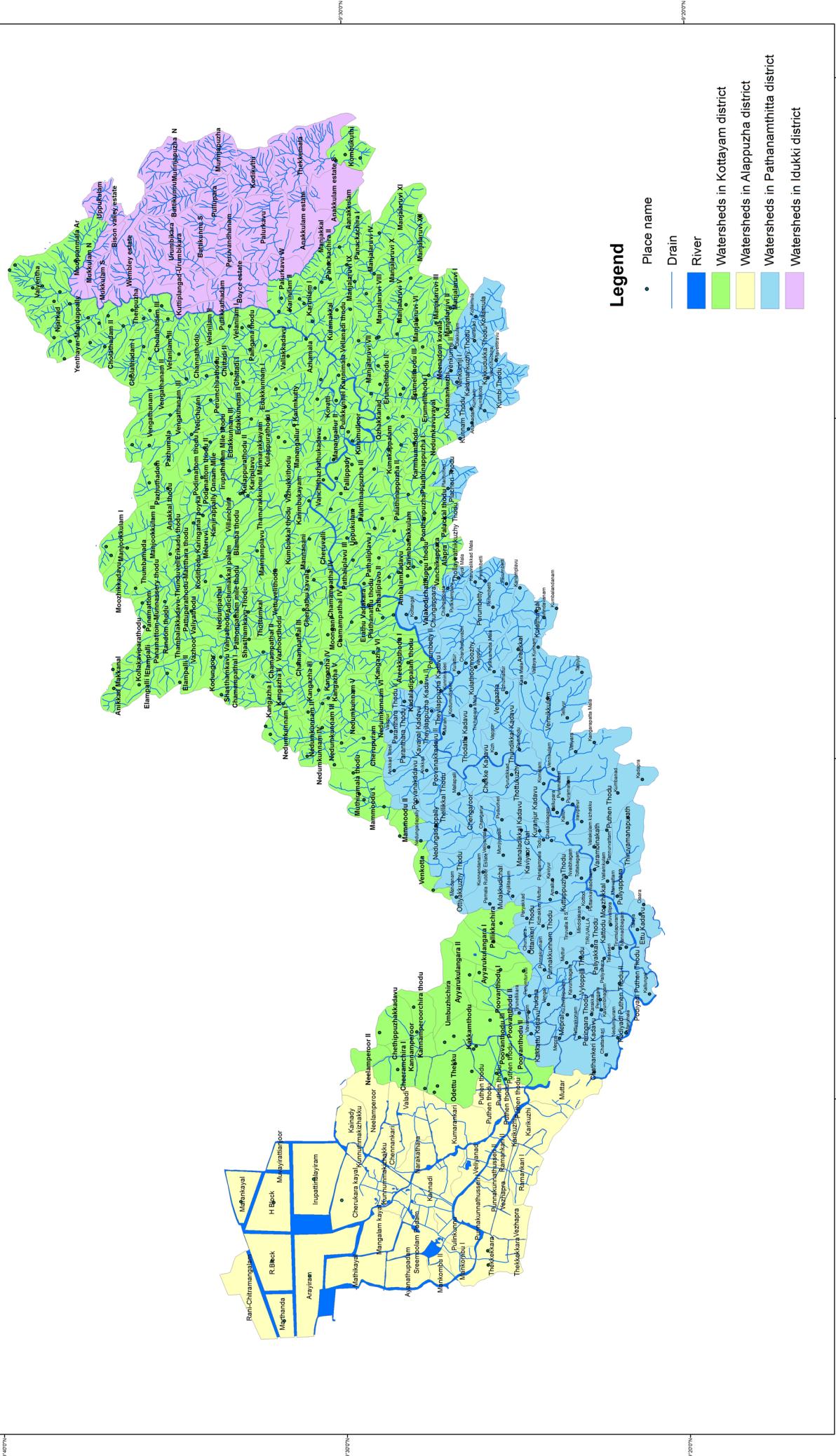
Structured survey sheets were employed to gather comprehensive information, including traditional knowledge, practices, and community experiences associated with the Manimala River. The collected data was tabulated and analysed using simple statistical tools. A disaster management plan has been developed based on the analysed data and incorporating scientific facts.

Along with community meetings were conducted at selected locations through which the disaster management plan developed were discussed and trainings were given. Experts shared their views and elaborated guidelines. Tree planting drives were conducted at river banks spearheaded by the school community with the active participation of local community. These programmes were truly participatory and helped to sensitise the stakeholders.

Disaster Management plan was developed incorporating survey inputs and scientific data. Training sessions were conducted at schools and for the community. School authorities and local Panchayath members were entrusted with constituting respective committees and implementing the plan in respective areas.

MANIMALA RIVER BASIN

Districts : Kottayam, Pathanamthitta, Idukki, Alappuzha





CHAPTER

3

REPORTS

3.1 REPORT OF THE COMMUNITY SURVEY CONDUCTED IN HIGH LAND, MID LAND AND LOW LAND

3.1.1 REPORT OF THE COMMUNITY SURVEY IN HIGHLAND

KOOTTICKAL GP & JOHN JOSEPH MURPHY MEMORIAL HIGHER SECONDARY SCHOOL, YENDAYAR

The survey was conducted in 250 households using a structured survey sheet. 19 percent of surveyed households are located at an aerial distance from the river, between 50 and 100 meters; 37 percent of households are at a distance of less than 50 meters; and just 23 percent of surveyed households are located between 200 and 250 meters (Fig. 3.1). The majority of households are located at an aerial distance from the river of less than 50.

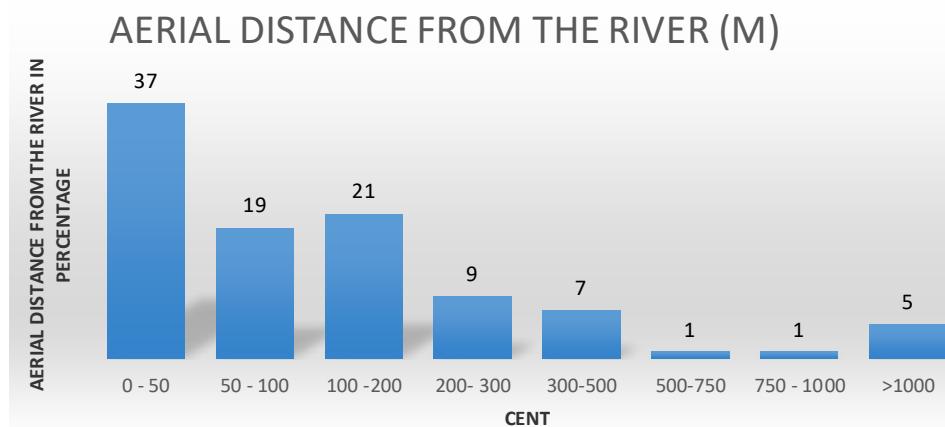


Fig. 3.1 Aerial distance of surveyed households from the river (M) (n=250)

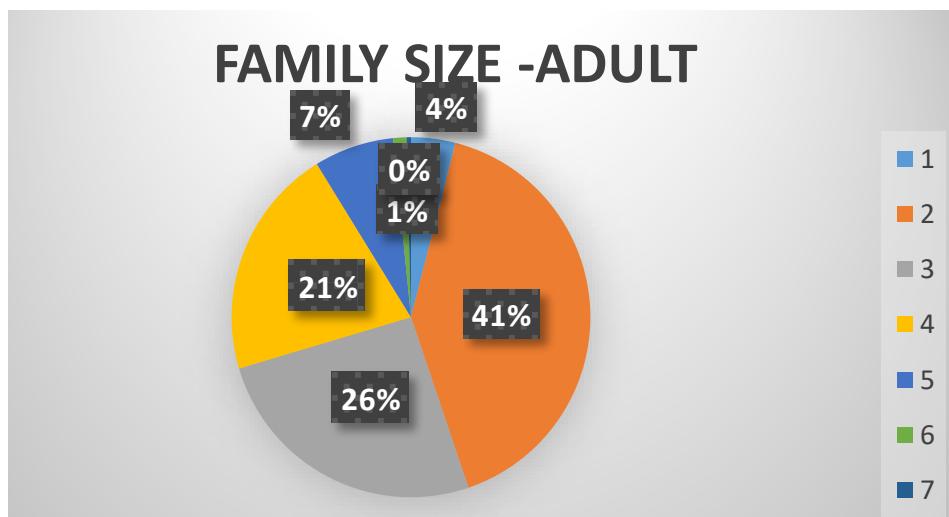


Fig.3.2 Number of adults per family (n = 250)

Among the surveyed households, about 41 percent have two adult members, 26 percent have three members, and 21 percent have four members. This graph shows that the majority of the family has two adult members. (Fig.3.2).

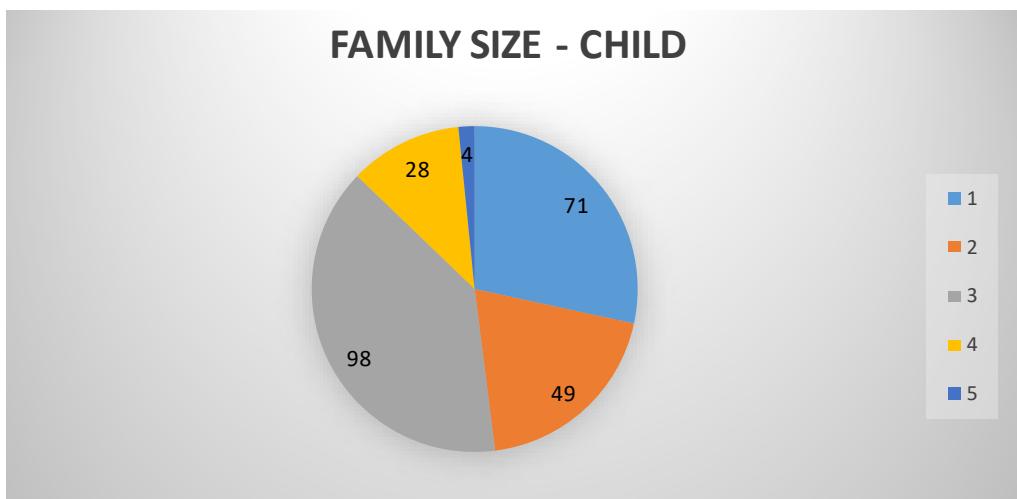


Fig. 3.3 Average number of children among surveyed households (n=250)

The analysis of data on the average number of children among the surveyed households revealed that 39% of households have three children, while 28% have two children (Fig. 3.3). This is consistent with the state average, where the majority of families now have two children.

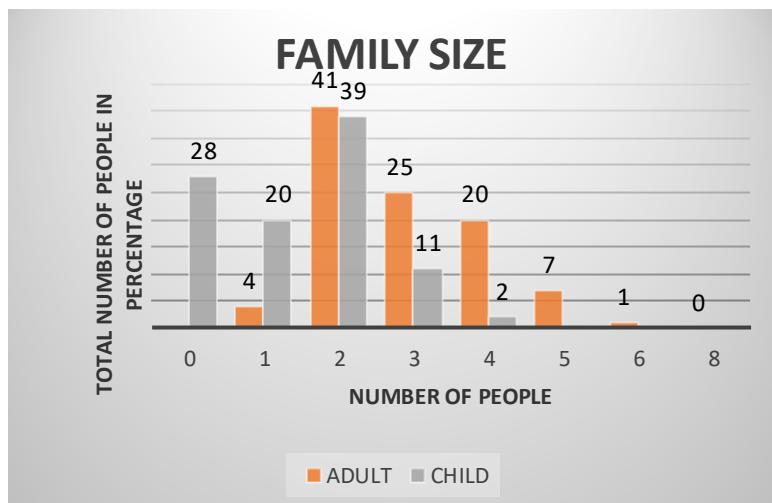


Fig. 3.4 Family size of the surveyed households (n=250)

Among the respondents, 41% have a family of two adults, and 39% have two children. Then 28% of households have only adult members. 25% of individual households in Koottikal panchayat have 3 adults, 11% have 3 children, 20% have 4 adults, and 2% have 4 children. The average family size of Kootickal Gram Panchayat is 4 (2 adults and 2 children), which is in line with the state average (Fig.3.4.)

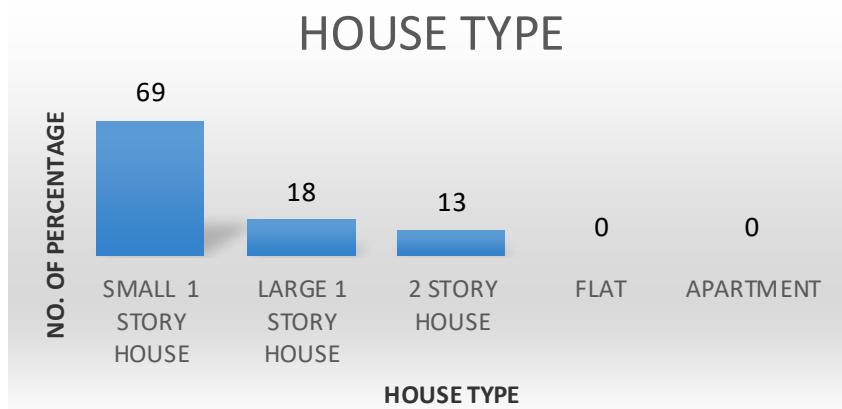


Fig. 3.5 House types of surveyed households (n=250)

About 69 percent of households have a small one-story house, and 18 percent have a large one-story house. About 13 percent have two-story houses. Only 0 and a percentage of them have flats or apartments. Most of the family has a small, one-story house. (Fig.3.5.)

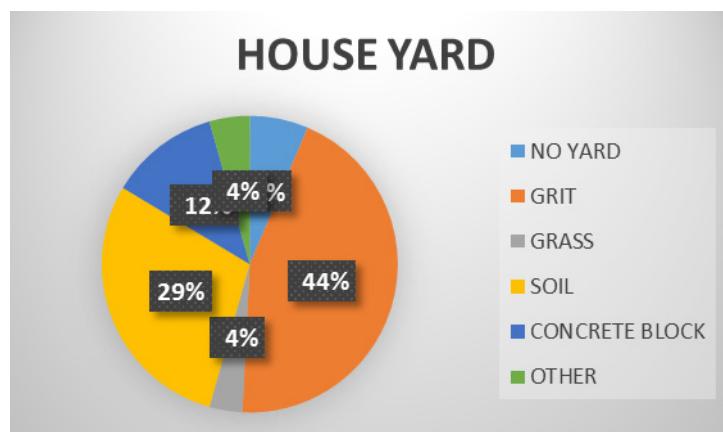


Fig.3.6 House yards of surveyed households (n=250)

About 4 percent of households have grass in their courtyard. Another 12 percent of households are using concrete blocks in their courtyards. Another 4 percent are using other methods in their courtyard. 6 percent of them had no courtyard. 44 percent of the households are using grit in their courtyard, and 29 percent of the households are using soil in their courtyard. Most of the homes have grit and soil. (Fig.3.6.)

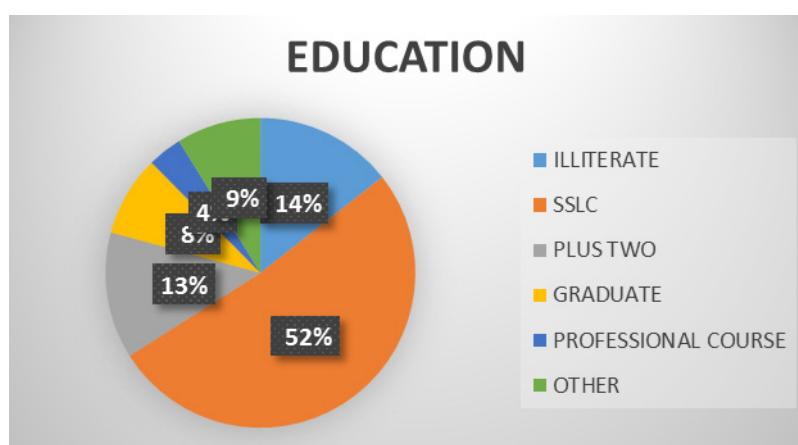


Fig. 3.7 Educational status of the surveyed community (n=250)

Out of 250 surveyed households, about 52 percent of family heads passed SSLC. 8 percent have graduated. Another 13 percent of households secured higher secondary education. 4 percent of households secured professional course graduation, and 14 percent of households are illiterate. (Fig.3.7.)

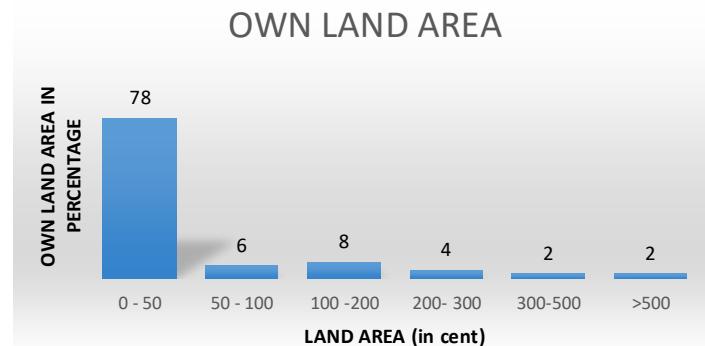


Fig. 3.8 Area of land owned by the surveyed community (n=250)

Approximately 78% of the riverbank community owns 0-50 cents of land. Only 6% own 50-100 cents of land (Fig. 3.8).

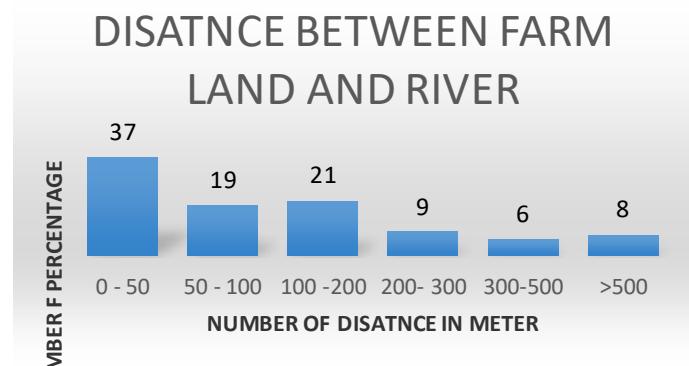


Fig. 3.9 Distance between farmland and river (n=250)

37 percentage of farmlands area at a distance of 50m. About 21 households have distance between farmland and river is in between 100 and 200 (Fig.3.9).

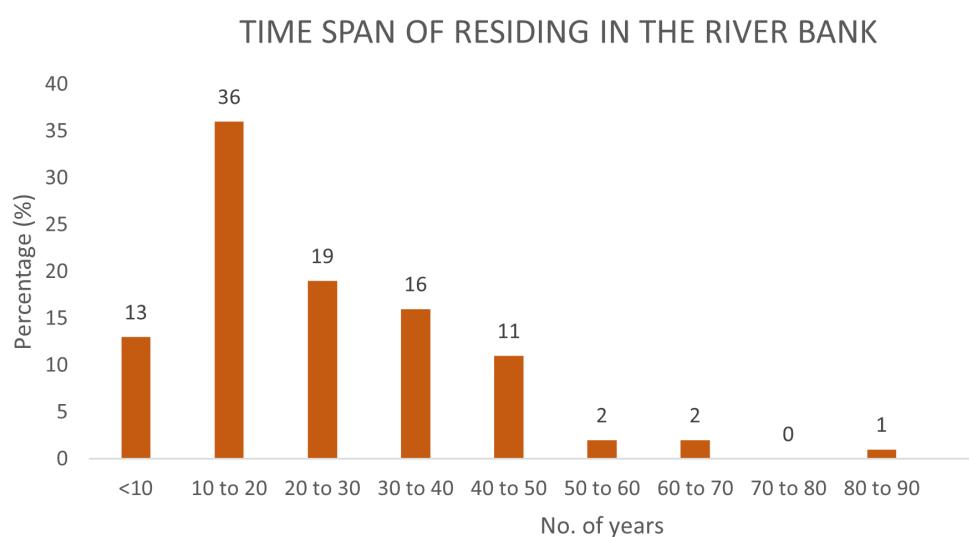


Fig. 3.10. Time span of residing at the location (n=250)

Forty-six percent of households have resided in the location for about 20-50 years. Interestingly, 16 percent of households have been living in this location for 50-100 years (Fig. 3.10).

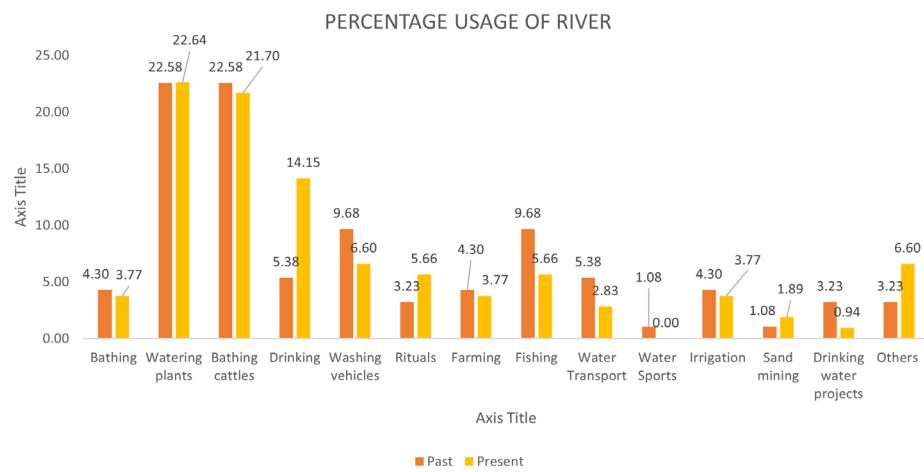


Fig. 3.11. Usage of river in the past and present (n=250)

The primary use of the river by the riverbank community, both in the past and present, has been for watering plants and bathing cattle's. Certain kind of usages like water sports and drinking water projects has been declined during the course of time. Overall, the usage of river by the river bank community has been decreased (Fig.3.11).

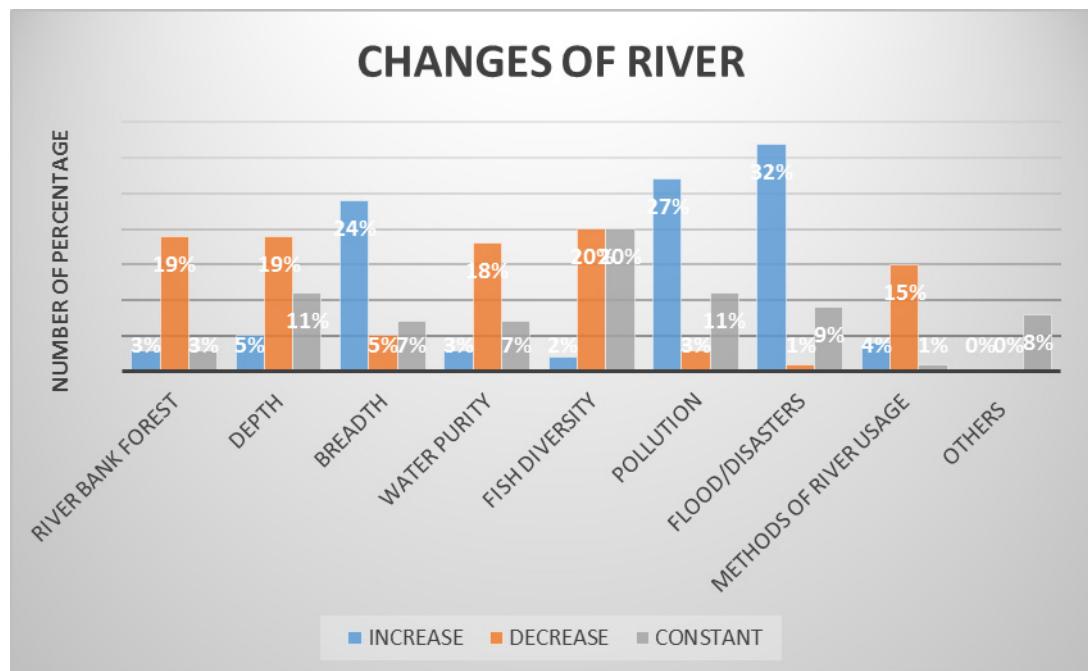


Fig. 3.12 Changes of river

According to the river bank community, the extent of riparian forest, depth, width, and water quality have been decreasing, year by year. This is because of increasing pollution, natural and man made disasters.

The major change that happened in the river after the flood is the loss of riparian forest, deposition of silt, boulders and waste in several locations and thereby the changes in the depth of the river (Fig.3.12). This has significantly affected the river flow too.

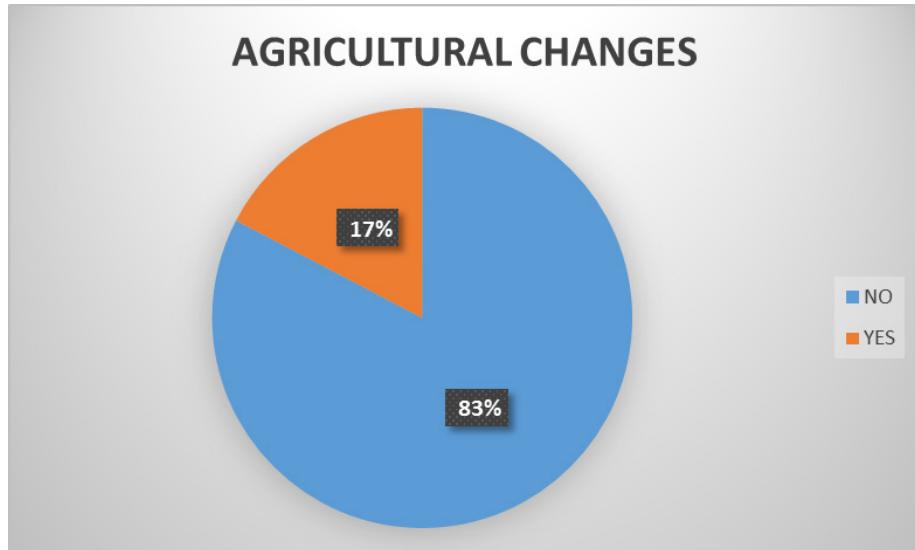


Fig. 3.13. Agriculture changes (n=250)

About 83 percent of households experience serious damages and changes in their farm lands near to river bank (Fig.3.13).



Fig.3.14 Management of waste (n=250)

The community survey exposed the absence of proper and scientific waste management system among the river bank community, both liquid and solid wastes. River is widely used as a dumping point predominantly for organic wastes in several locations. Wastes dumped in river bank area also reaches the river while flooding (Fig.3.14).

Existing kitchen waste management practices

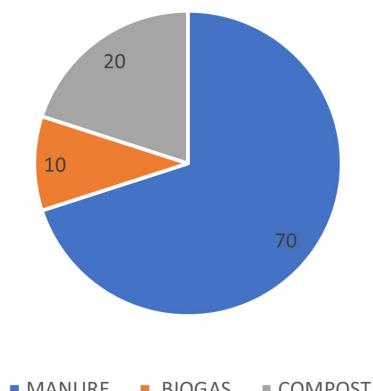


Fig. 3.14.1 Management of kitchen waste

The majority of households (70%) use kitchen waste as manure for garden plants and vegetables. Very few houses have biogas plants and composting facilities (Fig. 3.14.1).

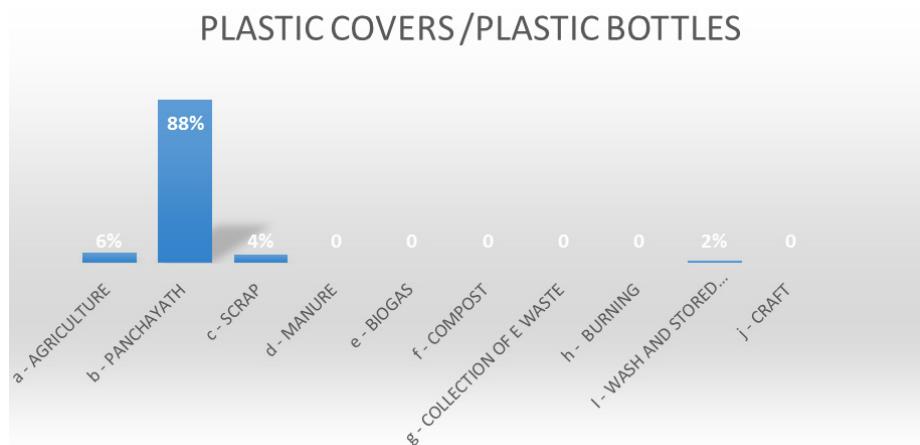


Fig. 3.14.2 Plastic waste management strategies in High land area

Because of the active involvement of Harithakarmasena in the post flood scenario, 88% of plastic waste from households and commercials are collected to the Panchayath and taken for proper scientific management. However, open dumping by tourists and commuters still continuing in several parts of the river.

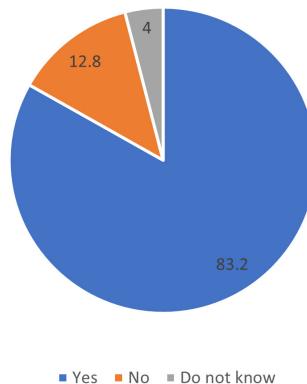


Fig. 3.15 Deposition of household waste in river (n=250)

The knowledge of the community on, whether any increase in the release of sewage as well as dumping of solid waste into the river over the years were surveyed. Majority of the community (83%) supported the notion that waste dumping is increasing year by year (Fig. 3.15).

REASONS FOR RIVER POLLUTION

- Throwing of plastic and bio waste
- Solid waste disposal from households and commercial centers.
- Septic waste
- Panchayat/Municipality Waste Disposal
- Agricultural waste
- Industrial Waste
- Others

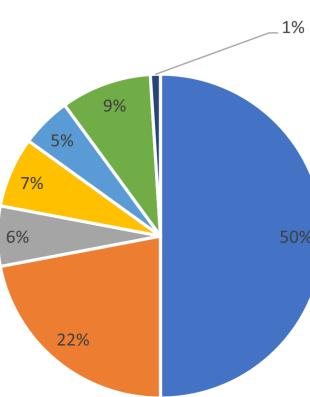


Fig.3.16 Reason for river pollution (n=250)

According to the community survey data, 50% of people endorse the dumping of organic and plastic waste as the primary cause of river pollution, followed by liquid waste disposal from households and small and medium factories. Additionally, municipal and Panchayat waste dumping accounts for a significant proportion, alongside septic wastes and agricultural waste, mentioned by 22% of the respondents (Fig. 3.16).

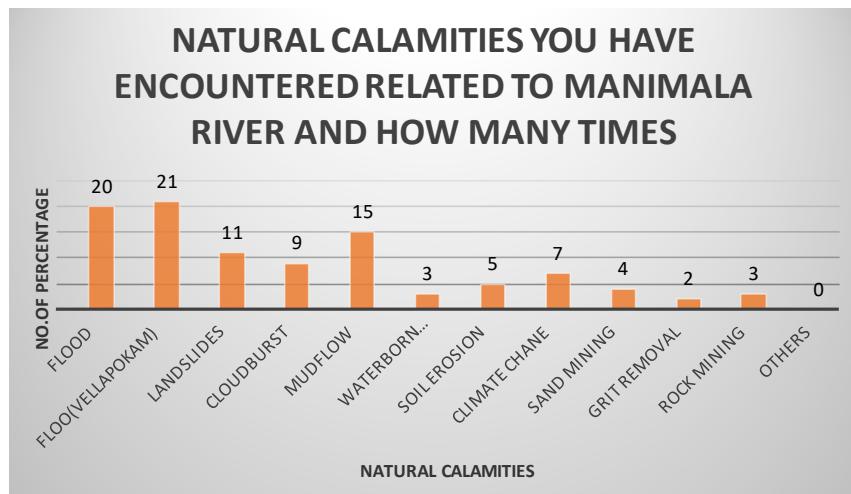


Fig.3.17 Occurrences of Natural Calamities Associated with the Manimala River: Frequency and Impact (n=250)

Community members were enquired with their experiences of disasters related to river and 20 percent of households encountered floods; 21 percent experienced '*Vellappokkam*' (low intensive flood); and 11 percent of households had experiences with landslides. Very few residents have experiences with mudflows and waterborne disease outbreaks (Fig. 3.17).

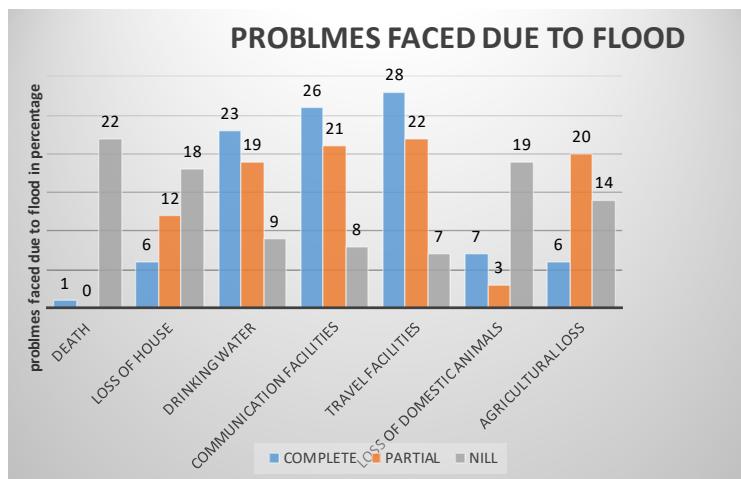


Fig.3. 18 Problem faced due to flood (n=250)

The graph depicts the issues arising during the flood. According to survey respondents, approximately 1% of deaths were attributed to flooding. Regarding home losses, 18% of people reported no loss of homes along the river bank, whereas 12% stated partial impact on their residences. Additionally, 23% mentioned the complete disruption of drinking water facilities due to the flood. Regarding communication and travel facilities, a majority of individuals reported total loss due to flooding. Approximately 20% of respondents noted agricultural losses due to the flood (Fig.3.18).

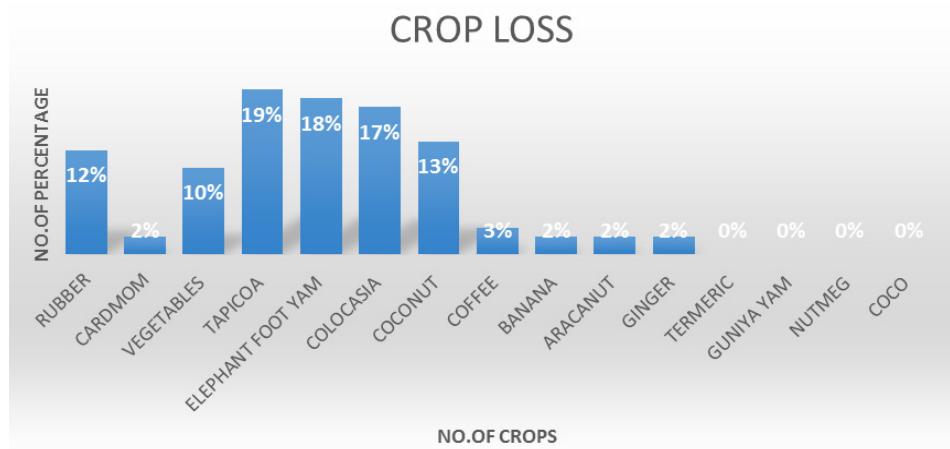


Fig.3.19. Crop loss due to flood (n=250)

Flood mainly affected crops like cassava (19%), elephant foot yam (18%), and Colocasia (17%). Additionally, crops such as coconut, rubber, and various vegetables suffered substantial damage during the cropping season. Conversely, crops like coffee, banana, groundnut, ginger, turmeric, and guinea yam were the least affected (Fig. 3.19).

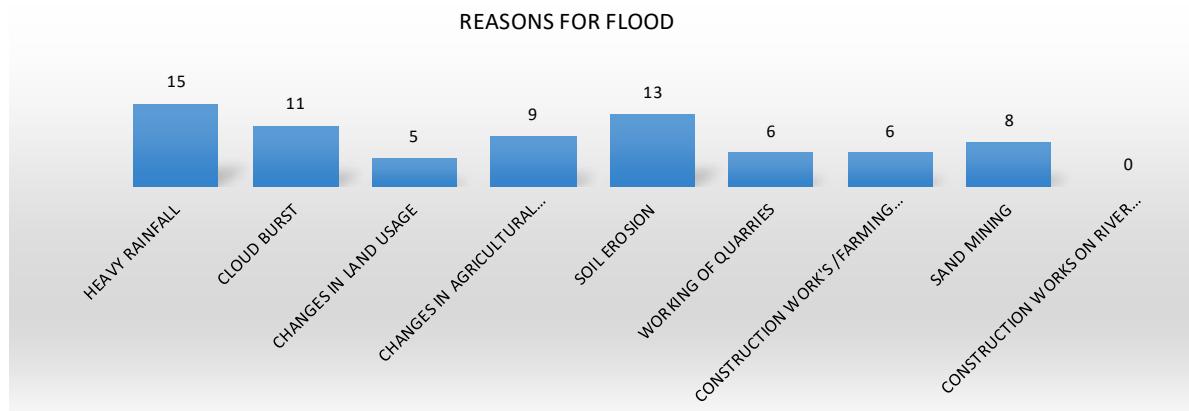


Fig. 3. 20 Reasons for flood (n=250)

According to the community perception (15%), flood become a disaster whenever heavy rainfall occurs just after a minor flood in the locality (Fig. 3.20). 11% of the community mentioned cloudburst as another contributing cause, while 13% identified soil erosion and 5% cited changes in land use as factors.

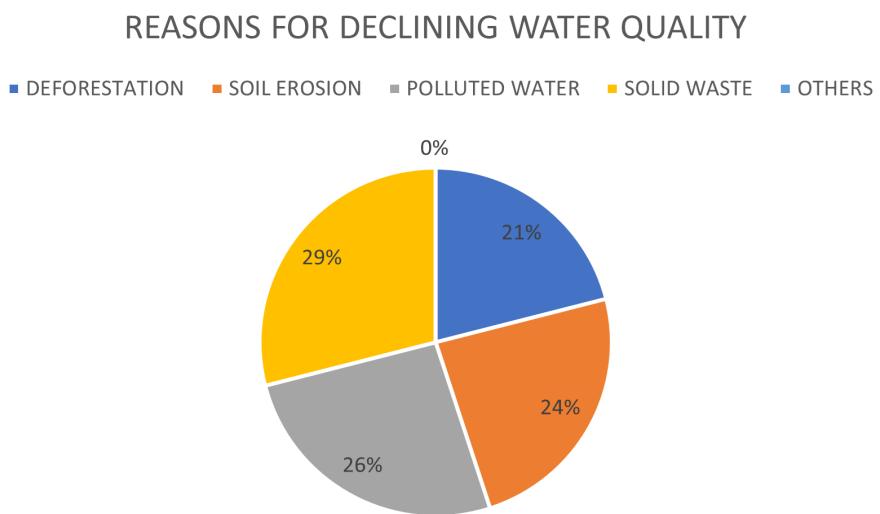


Fig. 3.21 Reason for declining water quality (n=250)

Water quality of the locality has been decreasing drastically and stakeholders opined that the major reasons are grey water, pollution (26%), solid waste dumping (29%) and soil erosion. Other reasons include construction activities, sand mining, especially along river banks etc. Majority agreed that the primary cause of water quality degradation, is solid waste dumping rather than grey water !! (Fig. 3.21).

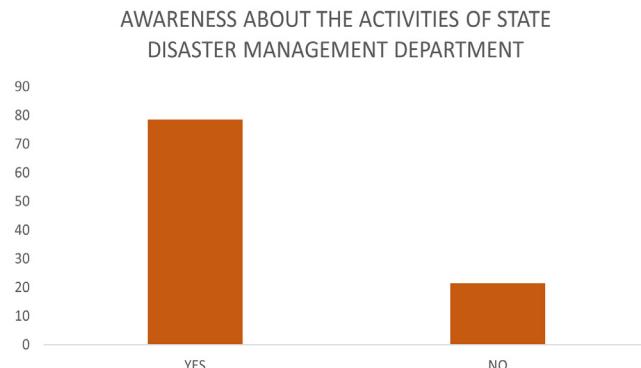


Fig. 3.22 Awareness about the activities of state disaster management department, (n=250)

The graph (Fig. 3.22) displays the level of awareness among the residents of Koottickal Panchayat regarding the activities of the State Disaster Management Department. A significant majority, comprising 75% of the respondents, have some knowledge about the state's disaster preparedness programs. Conversely, only 20% stated that they haven't any knowledge on the state's disaster preparedness activities.

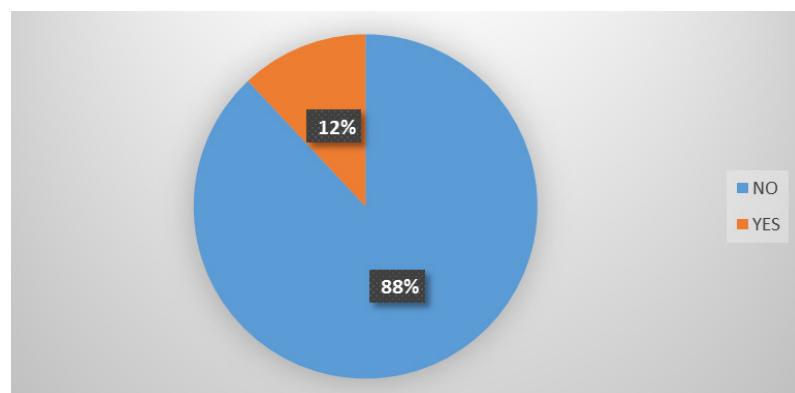


Fig.3.23 Traditional knowledge on prevention of disasters (n=250)

Traditionally every communities have certain knowledge regarding prediction of disasters and preparation activities. 88% are not familiar with traditional knowledge related to disaster prevention, while 12% are aware of such traditional practices (Fig. 3.23).

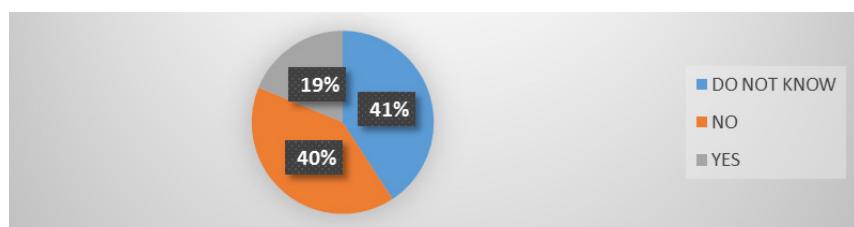


Fig.3.24 Traditional knowledge on any chance of preventing natural disasters in present situation (n=250)

The graph (Fig. 3.24) indicates that 19% of the surveyed community believes that traditional knowledge holds potential in averting natural calamities even in the current context. About 41% expressed unawareness regarding the possibility of traditional knowledge being effective in preventing natural calamities in the current situation.

METHODS TO DEAL WITH NATURAL DISASTERS

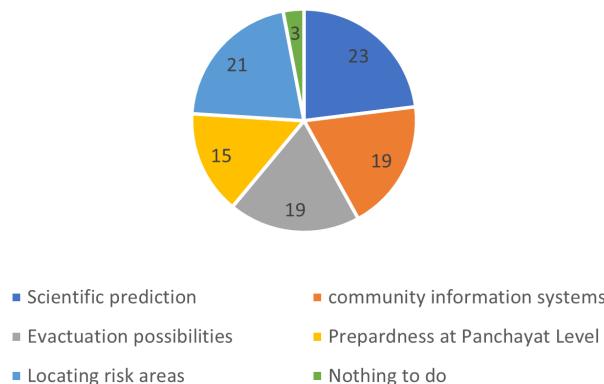


Fig.3.25 Methods to deal with natural disasters (n=250)

23% of the surveyed community suggested that prediction of disasters using all kinds of scientific tools and related preparedness is the primary requirement (Fig.3.25). 21% of respondents suggested that locating risk areas is the primary preparedness for a disaster. Additionally, 19% suggested to utilize these systems to identify and evacuate disaster-prone areas.

THE RELEVANT AREAS IN WHICH LOCAL VILLAGERS CAN PARTICIPATE IN DISASTER MANAGEMENT ACTIVITIES

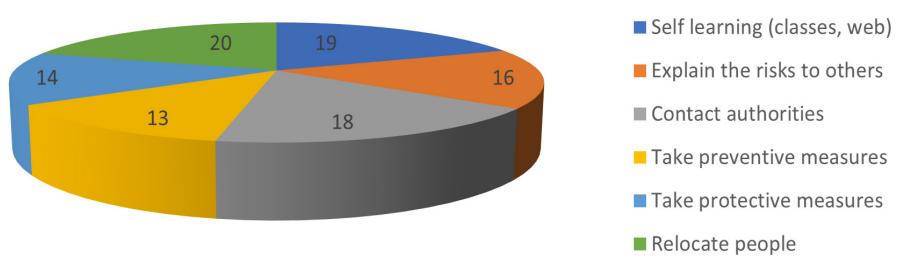


Fig.3.26 Relevant areas in which local villagers can participate in disaster management (n=250)

Respondents suggested the scope of local communities' involvement in disaster management and given in Fig. 3.26. 20% of respondents said that primarily local people can participate in relocating people to safer areas. Self learning through media and other sources on disaster preparedness is very important (19%).

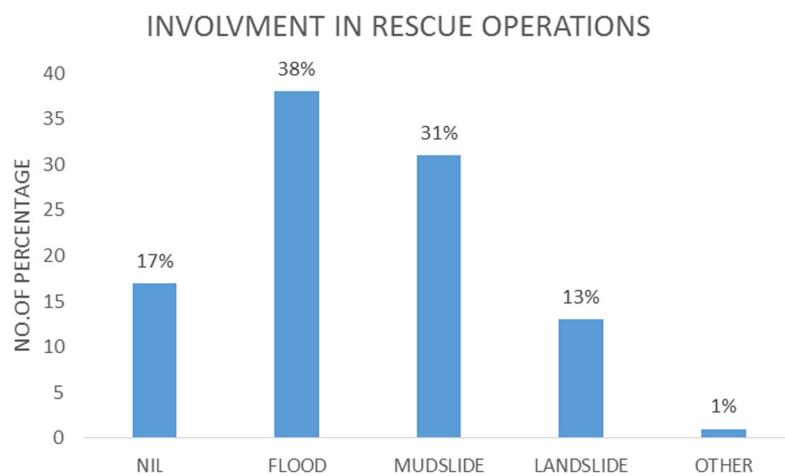


Fig. 3.27. Involvement in rescue operations (n=250)

The community response towards their involvement in rescue operations was surveyed (Fig. 3.27). 38% of respondents expressed that they have involved in rescue operations during flood time followed by mudslide (31%). And there are people who have neither participated in any of the rescue operations (17%).

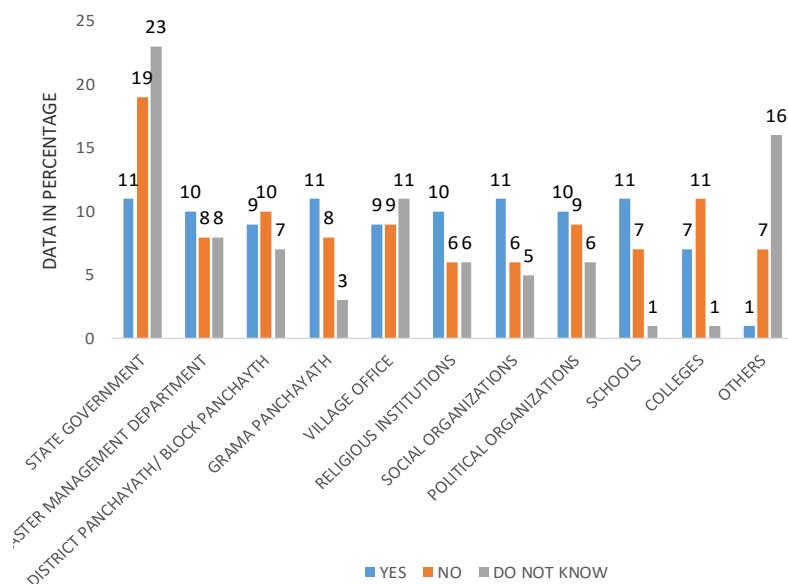


Fig.3.28 Stakeholders who acted appropriately during the time and after the disaster (n=216)

The response of public authorities and social organizations during the time of a disaster was also surveyed. 23% of the respondents suggested that the response of state government was the most appropriate during the time of flood disaster (Fig. 3.28). Local authorities and social organizations had involved in rescue operations but the coordination lacks. Once the coordination by the state got established then everything was streamlined, in 2020 cloudburst related flood disaster.

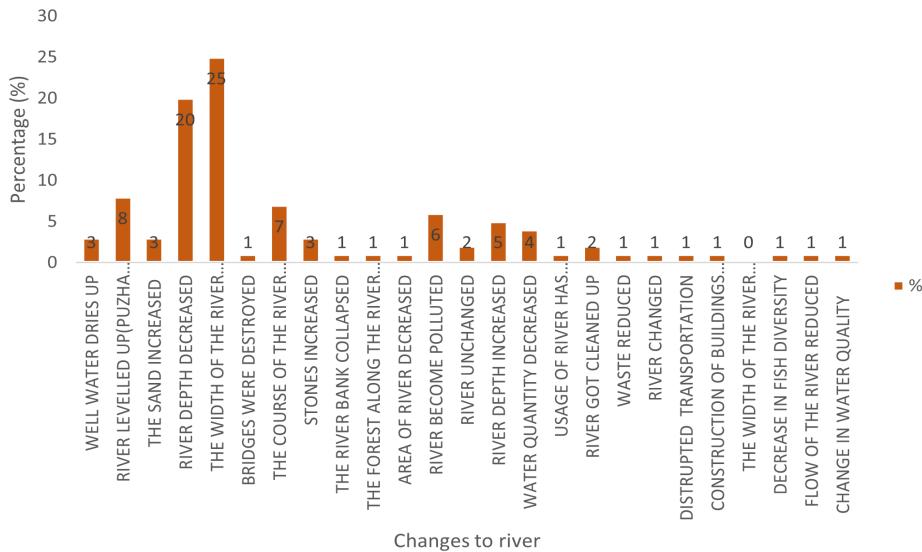


Fig. 3.29 Changes of river after flood (n=250)

(Well Water dries up, river levels up, sand increased, river depth decreased, width of the river increased, bridges were destroyed, course of the river changed, stones increased, riverbank collapsed, forest along the river was destroyed, area of the river decreased, river became polluted, river unchanged, river depth increased, water quantity decreased, usage of the river decreased, river got cleaned up, waste reduced, river changed, transportation disrupted, construction of buildings on riverbanks, width of the river decreased, decrease in fish diversity, flow of the river reduced, change in water quality.)

Fig. 3.29 illustrates alterations in the river during flood in 2020. According to 25 % of respondents, the river width increased in many locations due to the collapse and washed away of river banks. Minor changes reported after the flood encompassed weather pattern changes, loss of road and pathways and loss of water quality.

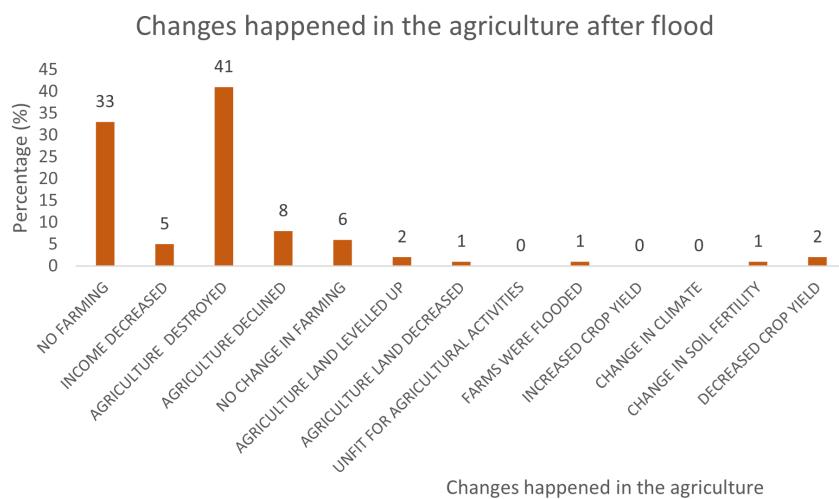


Fig.3.30 Changes happened in the agriculture after flood (n=250)

The chart illustrates the various impacts on agriculture following a flood, highlighting significant disruptions. The most common consequence was the destruction of agricultural land, affecting 41% of respondents, followed by 33% who reported a complete cessation of farming activities. Additionally, 8% experienced a decline in agricultural productivity, while 6% saw no change in their farming practices. A small percentage noted other effects, such as decreased agricultural land (1%), leveled-up land (2%), and decreased income (5%). Minimal impacts were observed in areas like soil fertility, crop yield, and climate change, each accounting for 1% or less of the reported changes. Overall, the data shows that floods primarily led to the destruction and decline of agricultural activities, with fewer cases of minor or positive effects (Fig 3.30)

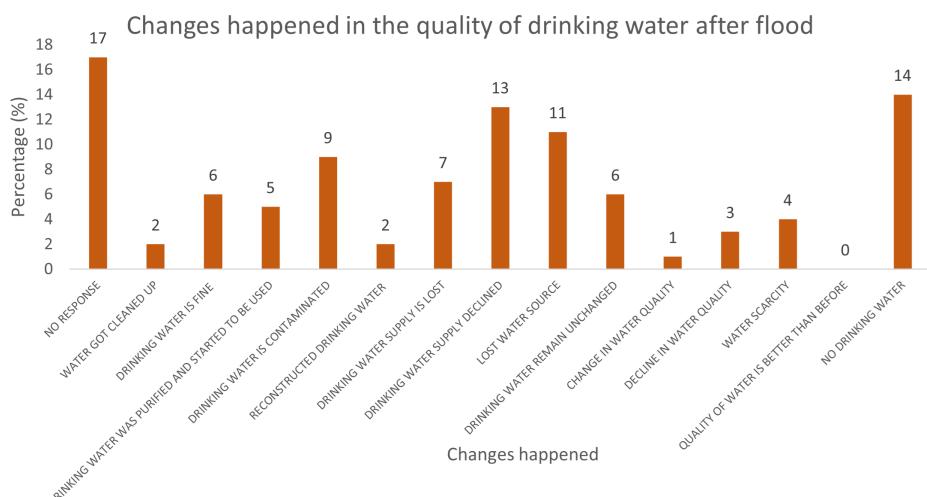


Fig. 3.31 Changes happened in the quality of drinking water after flood (n=250)

17% of the respondents have no idea about water quality, as they didn't know any kind of test or made valid observations (Fig. 3.31). 14% reported lack of drinking water, due to the heavy pollution during the time of flood.

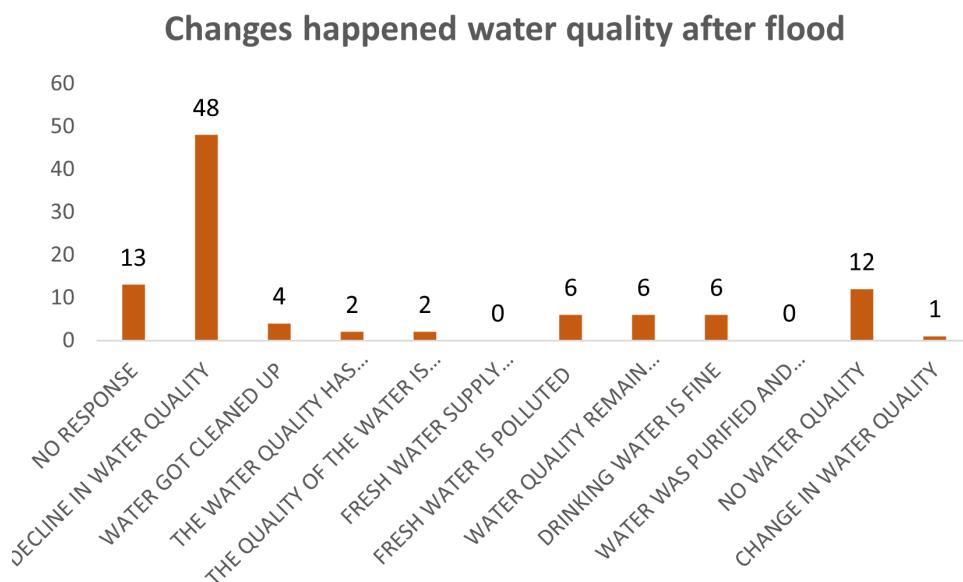


Fig.3.32 Changes happened in the river water quality after flood (n=250)

(Decline in water quality, Water got cleaned up, The water quality has improved, The quality of the water is getting better than before, Fresh water supply decreased, Fresh water is polluted, Water quality remained unchanged, Drinking water is fine, Water was purified and started to be used, No water quality, Change in water quality)

The graph (Fig. 3.32) shows changes in the river water quality after the flood. The most significant observation is that water quality has been heavily decreased. Interestingly, few respondents, said that there were no changes in the water quality.

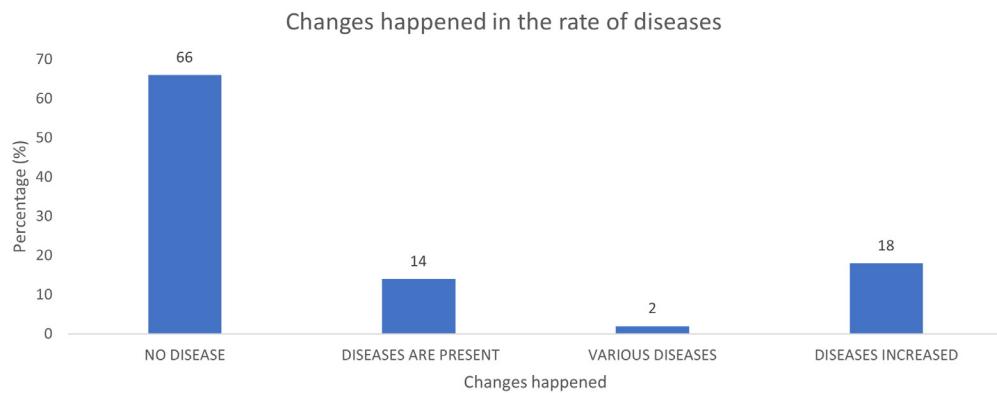


Fig.33 Changes happened in the rate of diseases/epidemics after flood (n=250)

The graph (Fig. 3.33) depicts the changes in disease prevalence following the flood. It reveals that about 66% of respondents reported no new instances of disease in the aftermath of the flood, indicating a relatively stable health situation for the majority. On the other hand, 18% of the population noted an increase in the frequency of diseases, though these cases were sporadic rather than widespread.

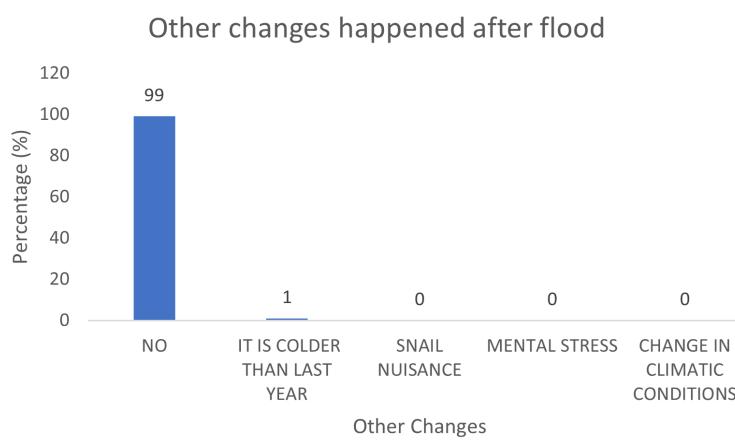


Fig. 34 Other changes happened after flood (n=250)

Surveyed respondents reported that no significant changes in the environment occurred after the flood. However, 1% of the surveyed community felt a colder weather during the post flood days (Figure 3. 34).

Awareness of the potential natural disasters in the area

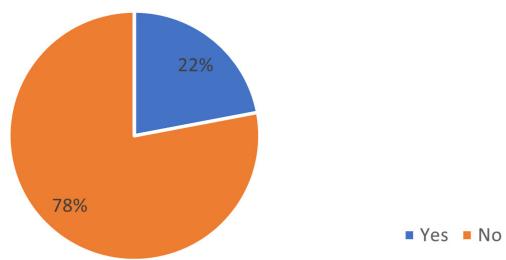


Fig.3. 35 Awareness of the potential natural disasters in the area

The graph (Fig. 3.35) indicates the response of the surveyed community on the possible risk factors of their locality in terms of potential disasters. 78% of respondents are unaware of potential natural disasters in their area. Conversely, 22% are knowledgeable about the natural disasters occurring in that area, and they got such information from social media and local authorities.

3.1.2 REPORT OF THE COMMUNITY SURVEY IN MIDLAND

KOTTANGAL GRAMAPANCHAYAT & DEWASOMBOARD
HIGHER SECONDARY SCHOOL, KAVUMBHAGOM

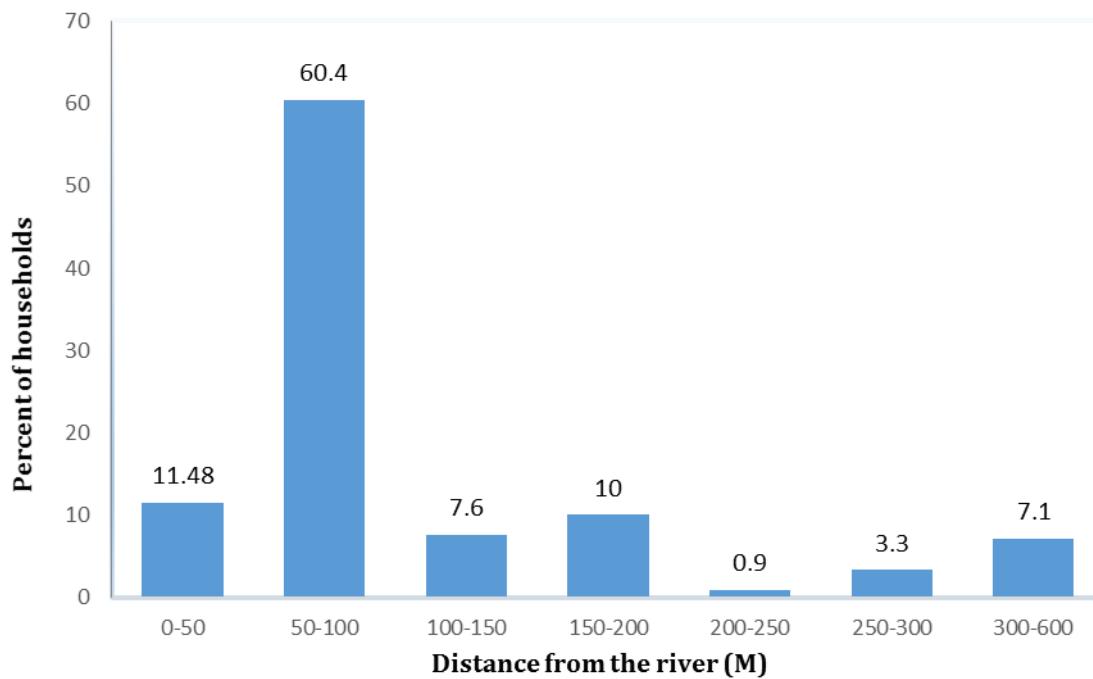


Fig. 3.36 Aerial distance of surveyed households from the river (M) (n=216)

A standardized survey form was used to survey 216 households. Sixty percent of the surveyed households are located at an aerial distance from the river, between 50 and 100 meters; 11 percent of households are at a distance of less than 50 meters (Fig. 3.36).

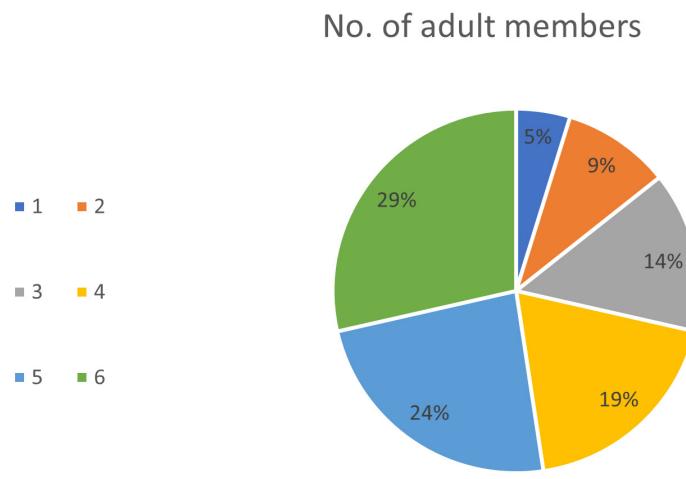


Fig.3.37 Number of adults per family (n = 216)

Among the surveyed households, approximately 29% have six adult members, 24% have five adult members, and 19% have four adult members. The graph (Fig. 3.36) illustrates that the most common household size includes six adult members, while the smallest proportion of households, at 5%, consists of just one adult member. a relatively, higher average adult family size was observed.

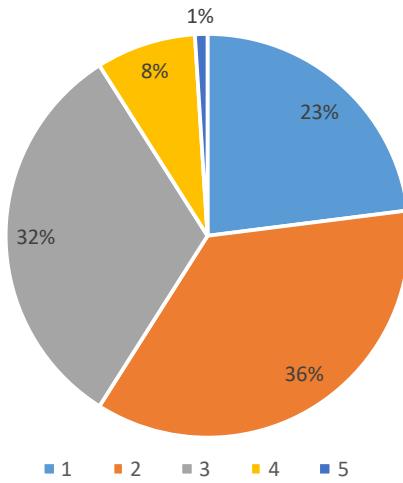


Fig. 3.38. Average number of children among surveyed households (n=216)

It is found that 23 percent of surveyed households have only one child, 36 percent have two children, and 32 percent have three children (Fig. 3.38).

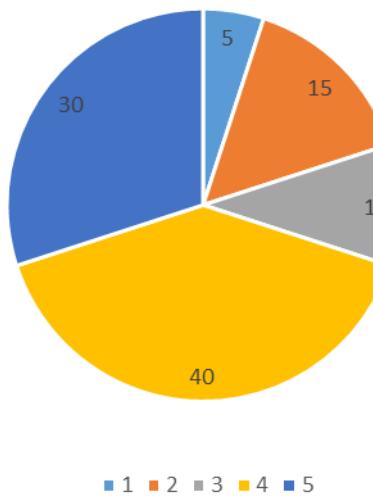


Fig. 3.39. Family size of the surveyed households (n=216)

It was found that among the surveyed households, 40 percent consist of a four-member family size, while 30 percent have a five-member family size (Fig.3.39).

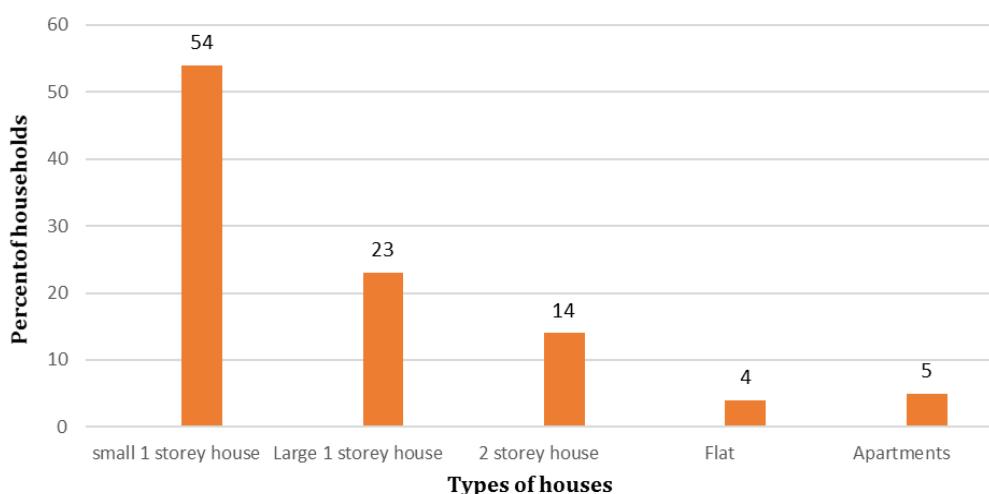


Fig. 3.40. House types of surveyed households (n=216)

Approximately 54 percent of households are small one-storied house, while 23 percent have a large one-story house. About 14 percent have two-story houses, and only 4 and 5 percent, respectively, have flats or apartments (Fig. 3.40).

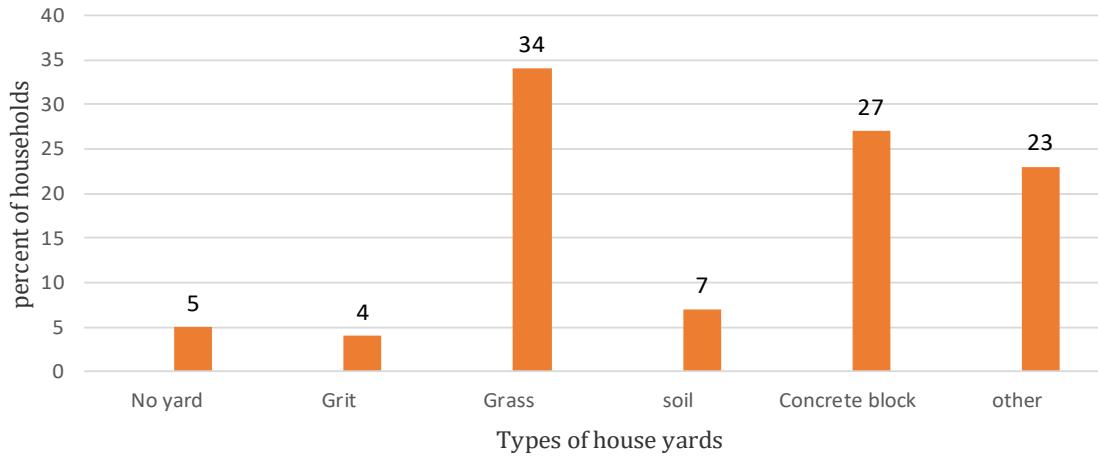


Fig. 3.41. House yards of surveyed households (n=216)

34 percent of households feature grass in their courtyards, while another 27 percent utilize concrete blocks. An additional 23 percent employ alternative methods in their courtyard spaces, and 5 percent lack a designated courtyard area. Four percent of households use grit, while 7 percent opt for soil in their courtyards (Fig. 3.41). Even in a rural set-up urban landscaping is becoming popular.

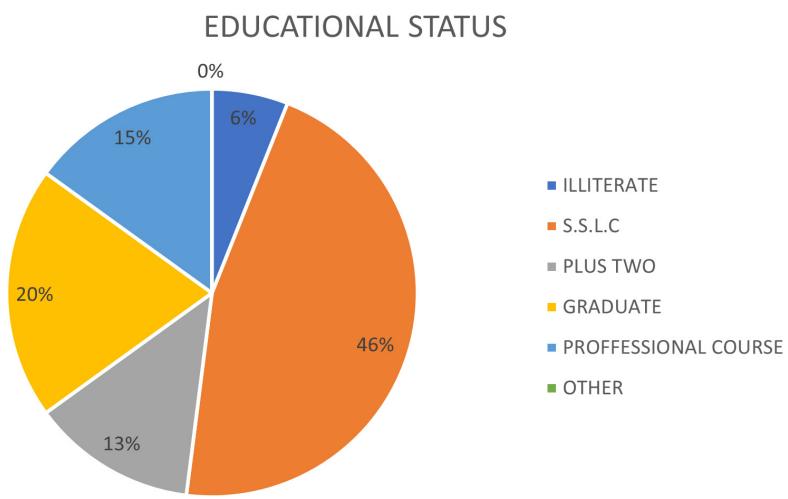


Fig. 3.42. Educational status of the surveyed community (n=216)

Out of the 216 individuals surveyed, around 46 percent hold an SSLC qualification. Additionally, 20 percent of the respondents are graduates, 15 percent have completed a professional course, and only 6 percent are illiterate (Fig. 3.42).

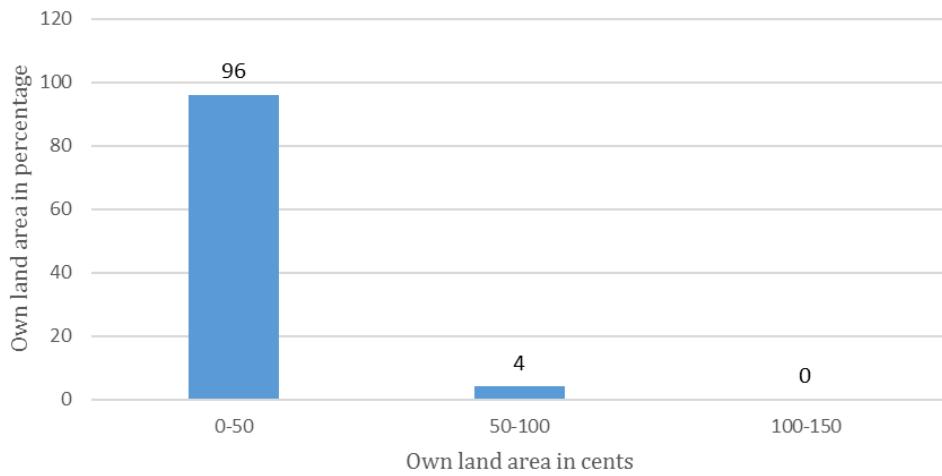


Fig.3.43 Area of land owned by the surveyed community (n=216)

About 96 percent of surveyed households have own land of 0-50 cents. Only 4 percent have own land of 50-100 cents (Fig. 3.43). Small holder are the predominant community.

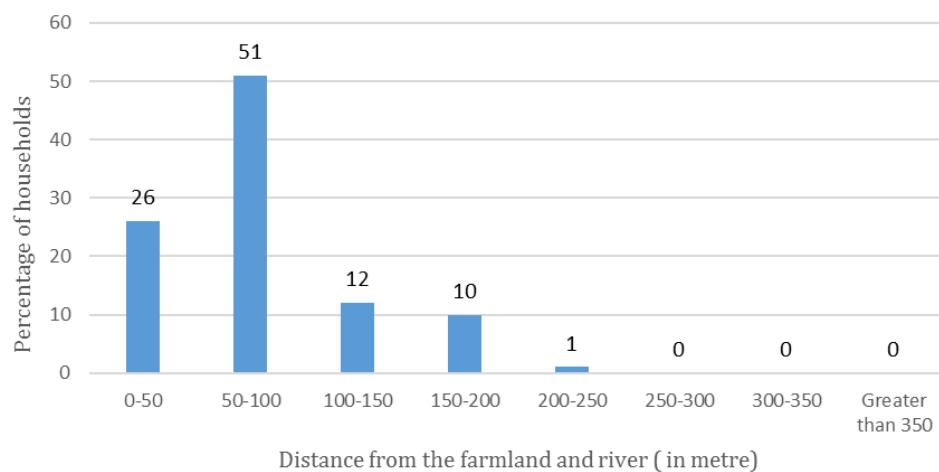


Fig .3.44. Distance between farmland and river (n=216)

Out of the 216 surveyed households, 51 percent have their farm land at a distance of 50 to 100 meters from the river. 26 percent of farm lands are located at a distance of 0 to 50m. (Fig. 3.44)..

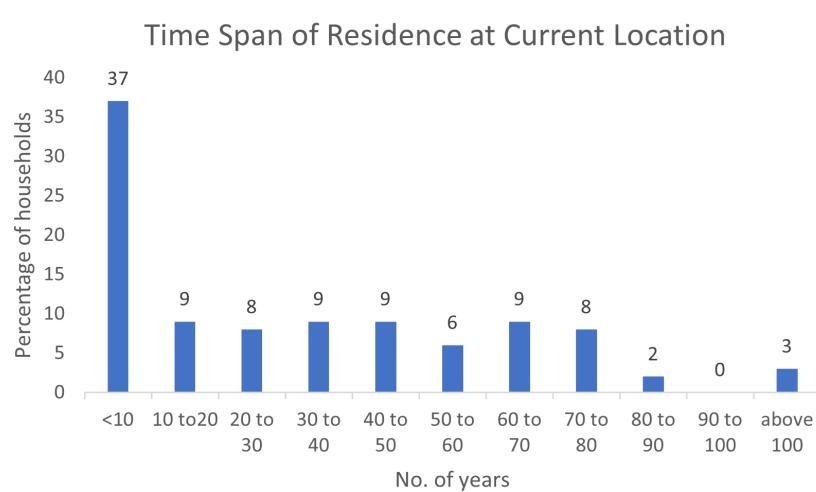


Fig. 3.45 Time span as a resident at the location (n=216)

Around 37 percent of the households have settled in this location within the past 10 years, indicating a relatively recent influx of residents. An additional 9 percent of the households have been established for a longer period, having constructed their homes between 10 and 20 years ago. In contrast, a very small fraction, only 3 percent, have been residing in the area for over 100 years, representing a much older, longstanding presence in the community (Fig.3.45).

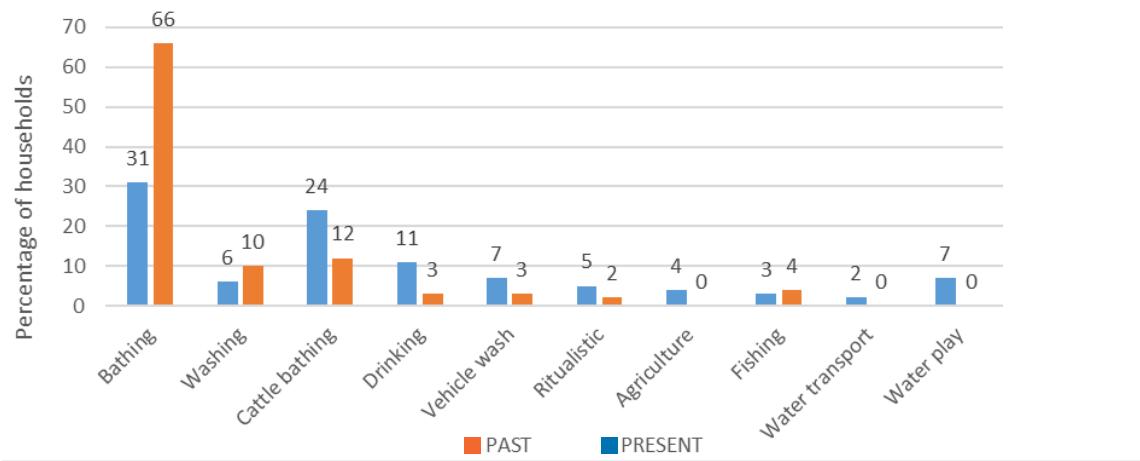


Fig. 3.46 Usage of river in the past and present (n=216)

In the past, about 66 percent of households used the river for bathing, whereas currently, only 31 percent of households use the river for this purpose. For washing, approximately 10 percent of households used the river in the past, but now, only 6 percent continue to do so. About 24 percent of households previously used the river for cattle bathing; now, only 12 percent use it for this purpose. It is well evident that the usage of river by the river bank community has been significantly reduced over the years (Fig. 3.46).

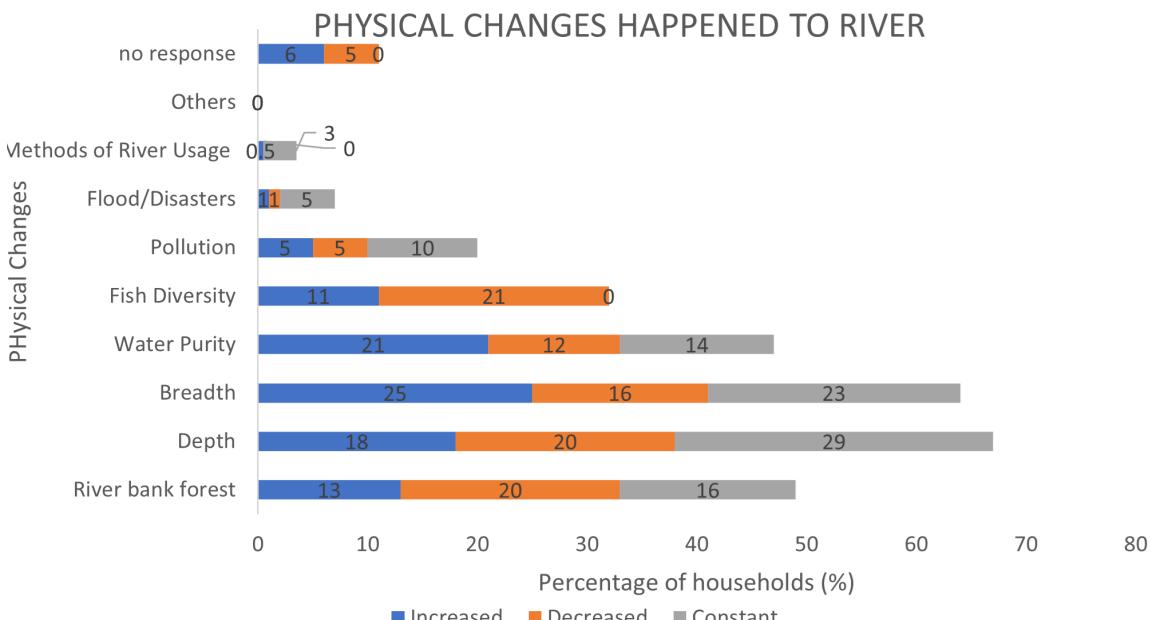


Fig.3.47 Physical changes of the river over the years (n=216)

Fig. 47. captioned "Physical Changes Happened to River" illustrates households' perceptions on changes in various physical aspects of the river. A small portion of households (0-5%) noticed slight changes in river usage, with some reporting increases. Regarding flood or disaster occurrences, 1% observed an increase, while 5% believed it remained as regular. In terms of pollution, 5% noted an increase and another 5% a decrease, with 10% seeing no change. Fish diversity saw 11% of households reporting an increase, but 21% believed it had declined. Concerning water purity, 21% perceived an improvement, 12% noticed a decline, and 14% felt it remained unchanged. The river's breadth saw 25% of house-

holds noting an increase, 16% seeing a decrease, and 23% observing no change. As for the river's depth, 18% reported an increase, 20% a decrease, and 29% felt it had stayed constant. Lastly, 13% of households observed an increase in the riverbank forest, while 20% felt it had decreased, and 16% believed it remained the same. Overall, the chart reflects varied perceptions, with some households noting improvements in aspects such as water purity and river breadth, while others reported declines in fish diversity and riverbank forest coverage. (Fig.3.47).

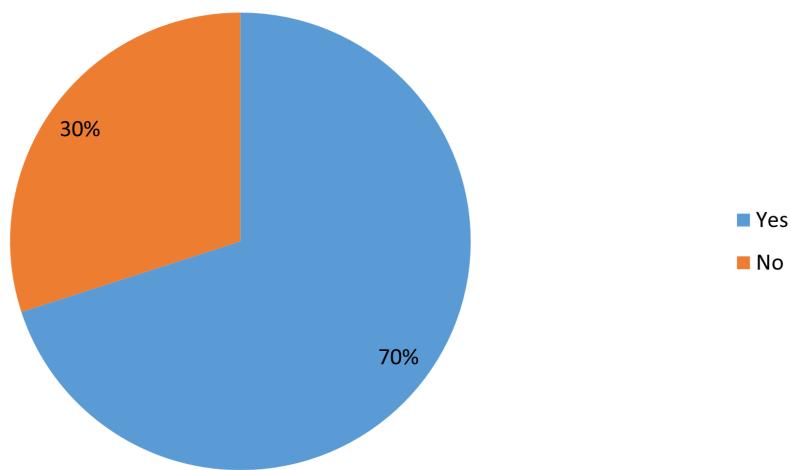


Fig.3.48. Changes in agriculture sector (n=216)

Around 70 percent of the surveyed community reported drastic changes in agricultural practices along the riverbank after recent floods. These changes likely include shifts in crop selection, soil quality, and farming techniques due to erosion, nutrient loss, and damage to irrigation systems. Farmers may have adapted by planting flood-resistant crops or altering planting schedules, highlighting the floods' lasting impact on traditional agriculture (Fig.3.48).

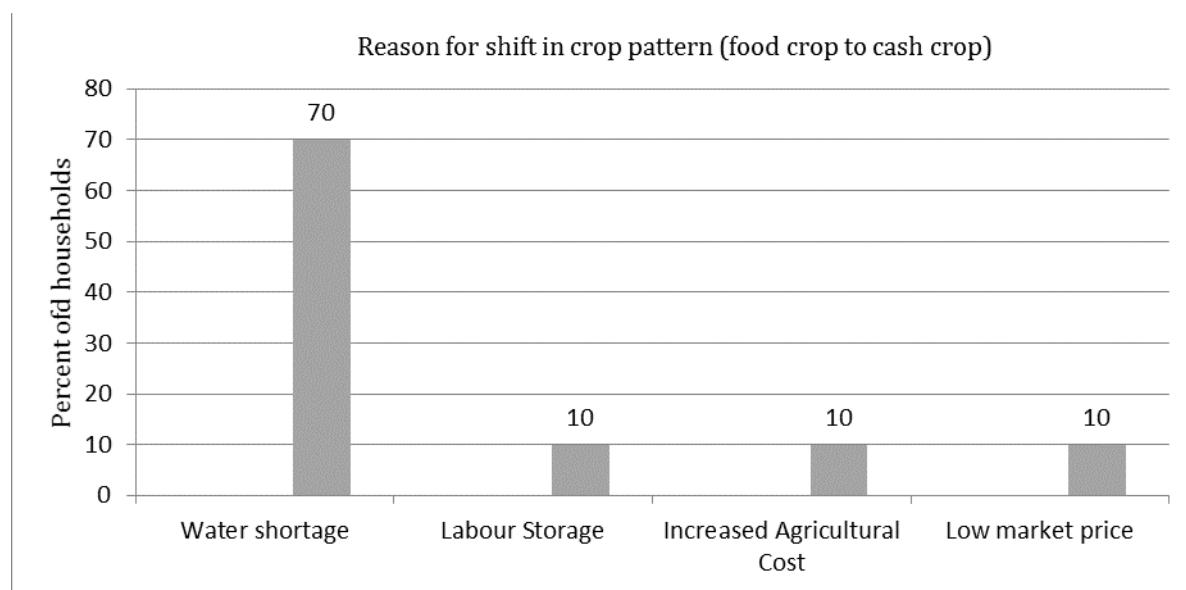


Fig.3.49. Reasons for shift in crop pattern (food crop to cash crop) (n=216)

The major reason for the changes in the pattern of agriculture or even abandoning was stated as water shortage (70%) followed by labor problems, rise in agricultural cost and lower market price (10%) (Fig. 3.49).

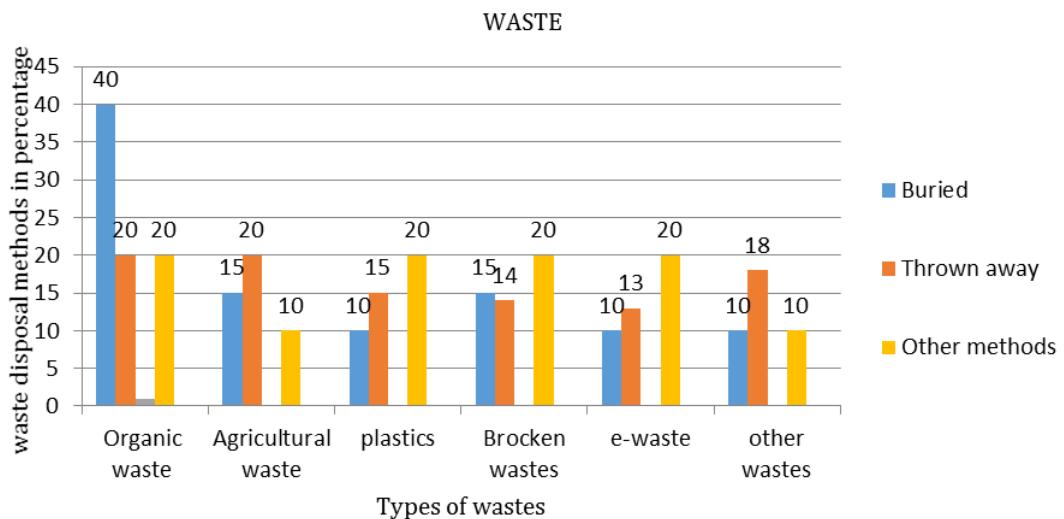


Fig.3.50. Waste management practices of the river bank community (n=216)

About 40 percent of households bury their organic waste, while 20 percent throw away into wild areas nearby to their houses (mostly to riverside). 15 percent of surveyed households bury agricultural wastes too, while 20 percent dump in the farm land itself. It was evident from the survey that 10% of the community bury plastic and e-waste, which has detrimental effects. 20% of the community deploy other methods to manage all categories of waste (Fig. 3.50).

DEPOSITION OF HOUSEHOLD WASTE INTO RIVER

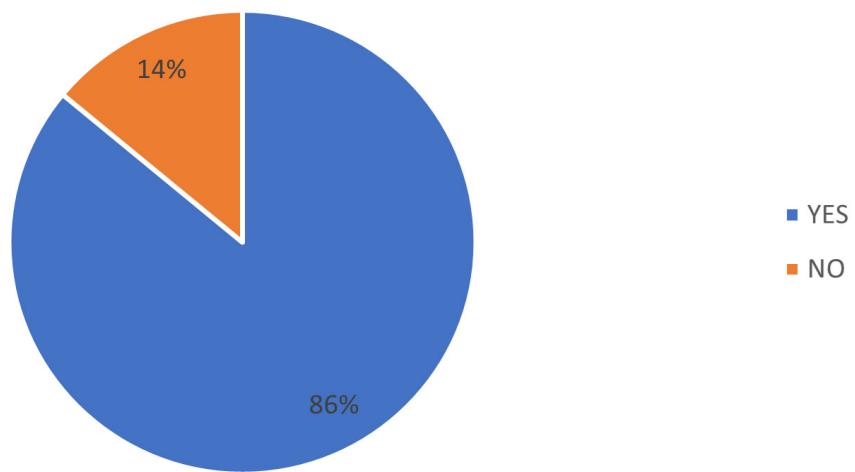


Fig.3.51. Deposition of household waste in river (n=216)

Eighty-six percent of the surveyed community admitted to dumping household waste along the riversides on their land, while only fourteen percent reported that they do not engage in this practice (Fig. 3.51)

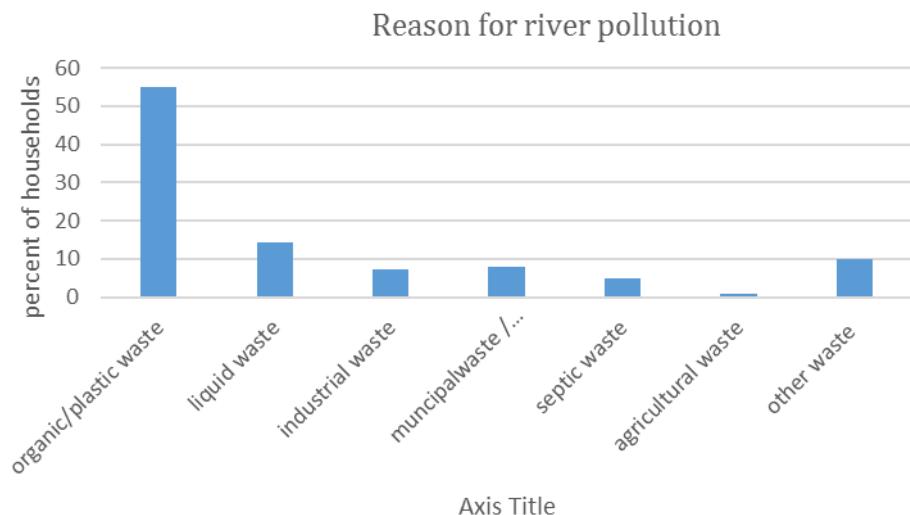


Fig. 3.52. Reasons of river pollution (n=216)

About 55 percent surveyed community opined that organic and plastic wastes are the major reason for river pollution. 14.3 percent observed the grey water (liquid waste) as the major reason. (Fig.3.52.)

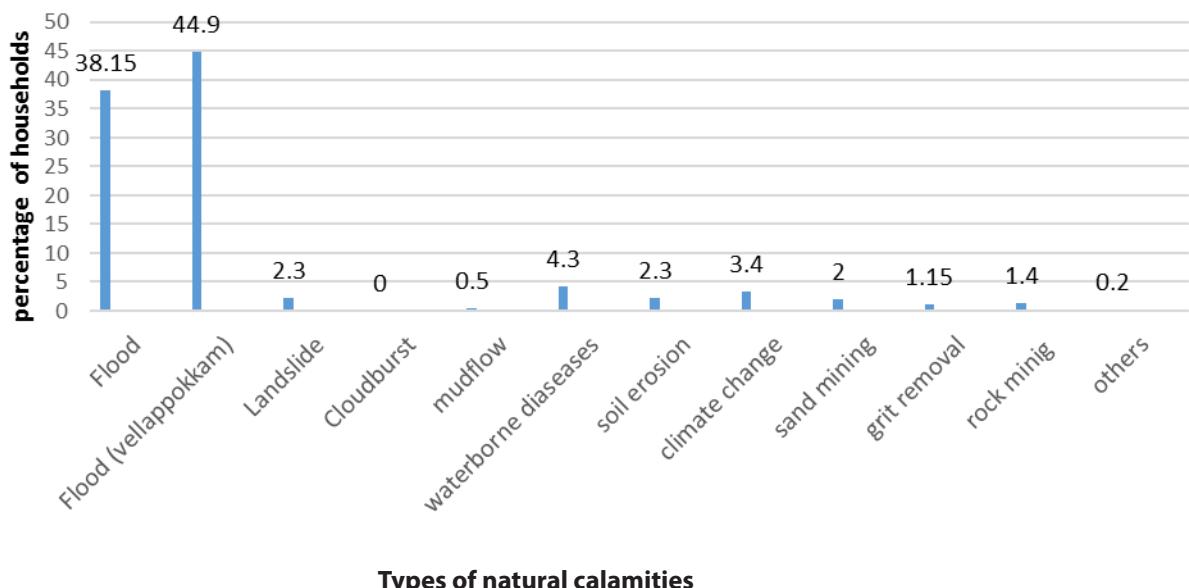


Fig.3.53. Frequency of natural calamities related to Manimala River (n=216)

Among the surveyed community 38.15 percent have encountered flood several times, whereas 44.9 percent experienced low intensity flood every year (Fig. 3.53)

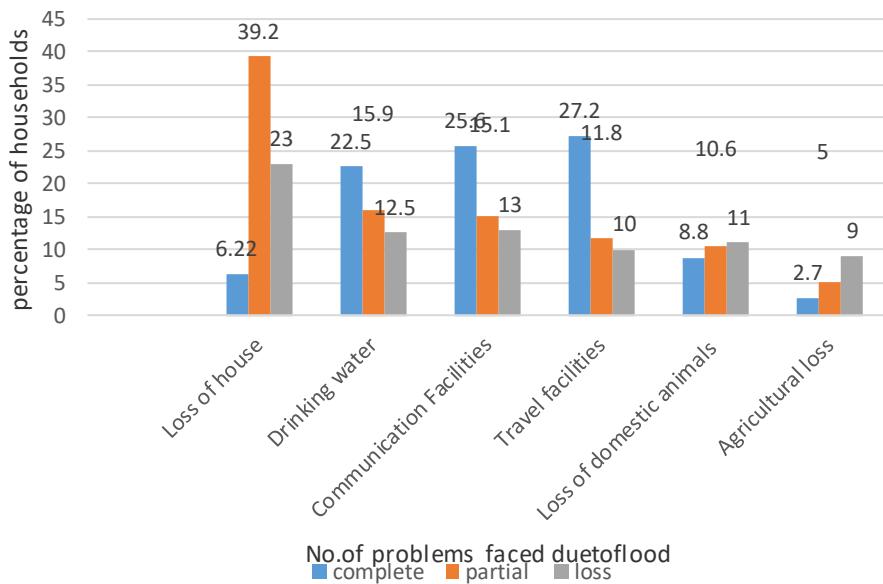


Fig. 3.54. Flood related problems encountered (n=216)

About 39 percent of households have partial loss of their houses due to the flood, whereas 23 percent have complete damage. 22.5 percent of households experienced severe shortage of drinking water during and after flood. Other major issues due to flood are recorded as complete loss of communication facilities; loss of roads and loss of crops (Fig.3.54).

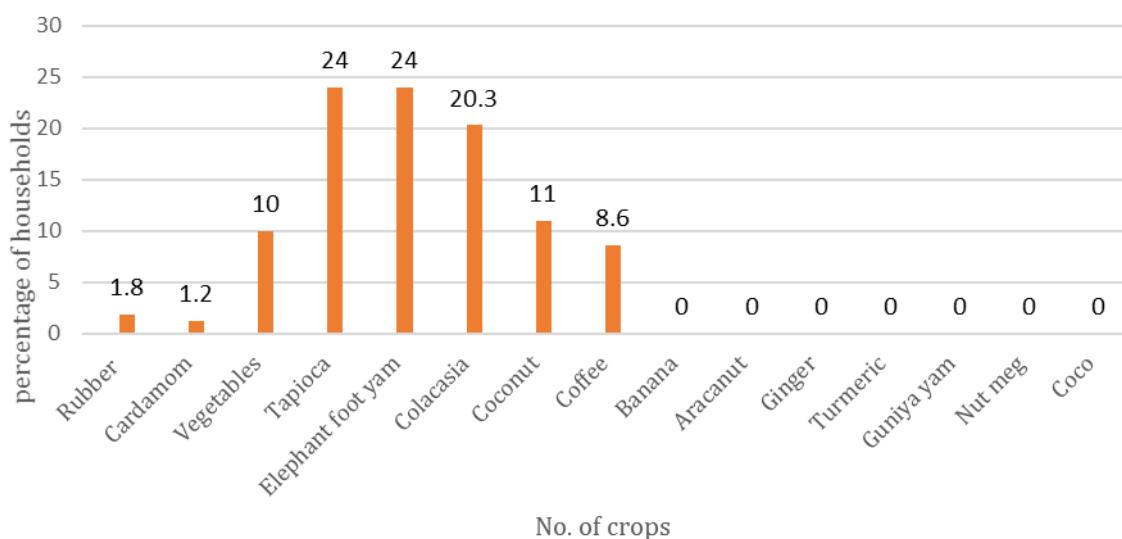


Fig.3.55. Extent of Crop loss due to flood (n=216)

The principal crops heavily damaged or lost due to flood are tapioca, elephant foot yam (24% each), Colocasia, young coconut saplings, and young coffee plants (Fig. 3.55).

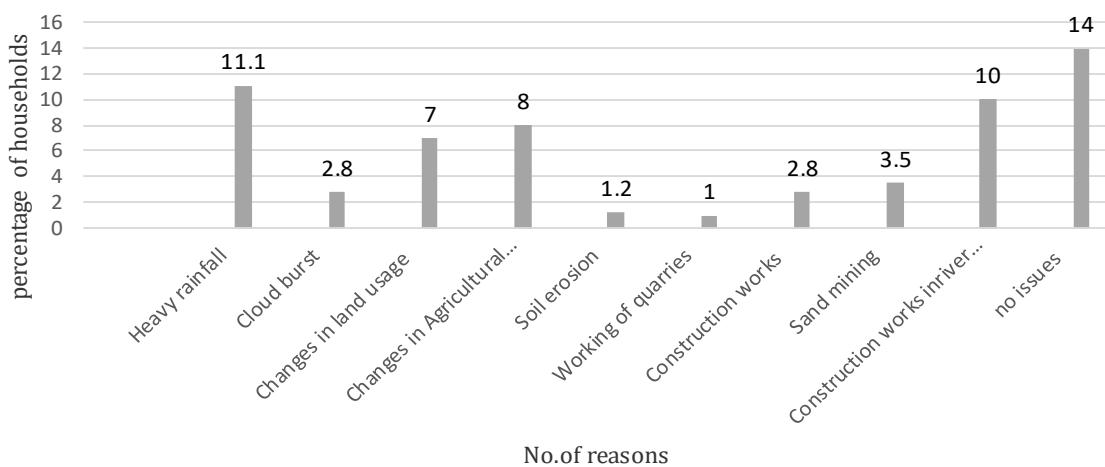


Fig.3.55.1. Major reasons for flood (n=216)

According to 39 percent of the surveyed community, said that heavy rainfall in short duration is the major reason for the floods occurred in recent years. The havoc caused by flood aggravates due to the changes in land use pattern, cropping pattern, wrong farm practices, soil erosion, sand mining, construction work on the river bank etc. (Fig.3.55.1)

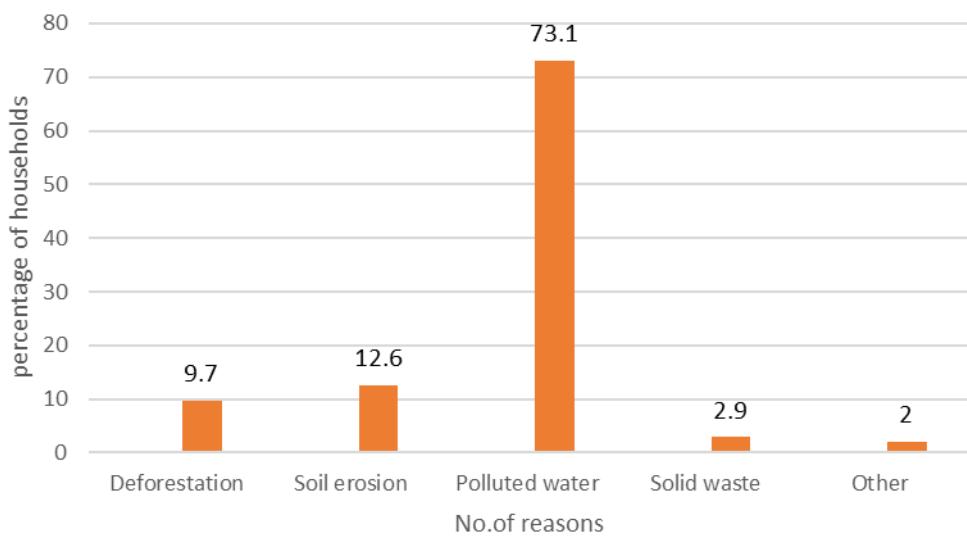


Fig.3.56 Reason for declining water quality (n=216)

Among the surveyed community 73.1 percent of the surveyed community observed that pollution from households, shops and establishments and of wastes thrown by commuters is the principal cause of declining water quality. River water is now unusable for drinking or even bathing. Septic waste is dumped at certain locations (Fig.3.56).

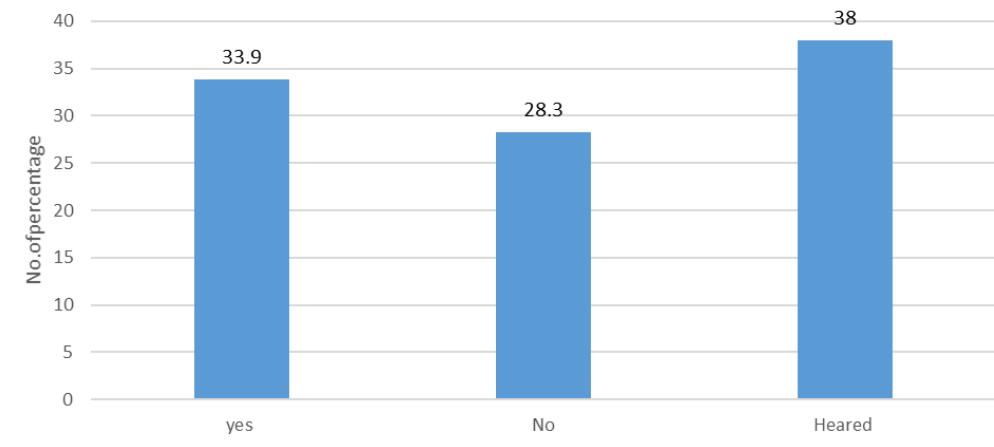


Fig. 3.57. Awareness about the activities of state disaster management department,

The activities of state disaster management department is known to 33% of the surveyed community, while 38 percent have just heard about it and there are people who still have no knowledge about the activities of state disaster management department (Fig.3.57).

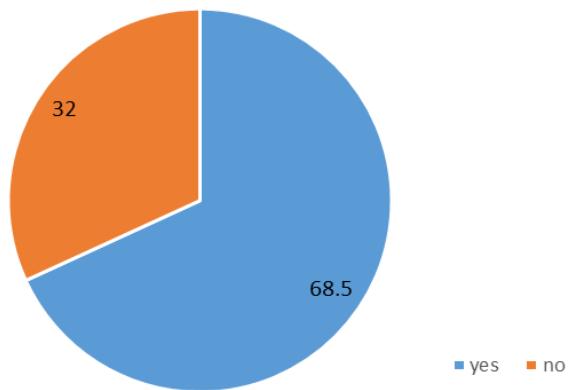


Fig.3.58. Traditional knowledge on prevention of disasters (n=216)

About 68 percent of households have some kind of traditional knowledge on prevention of disasters (Fig.3.58)

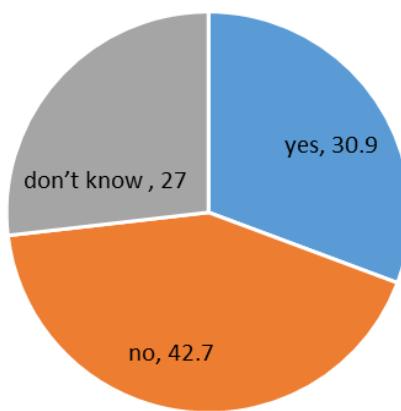


Fig.3.59. Traditional knowledge has any chance of preventing natural disasters in present situation (n=216)

About 30.9 percent of surveyed community believe that traditional knowledge have sure chance of preventing natural disasters, even in this scientifically developed situation. (Fig.3.59).

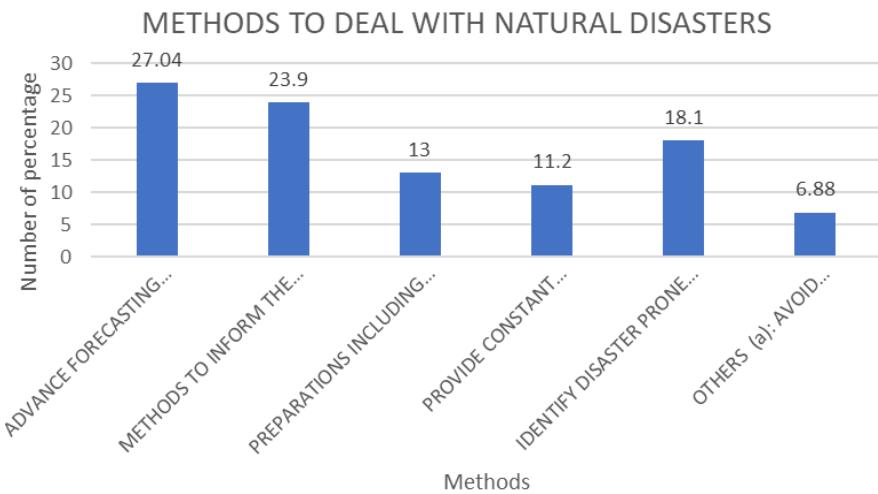


Fig. 3.60. Methods to deal with natural disasters (n=216)

27 percent of surveyed community suggested advance forecasting system with the help of science and technology must be used to deal with natural disasters. 23 percent highlighted the importance of proper and timely communication systems (Fig.3.60).

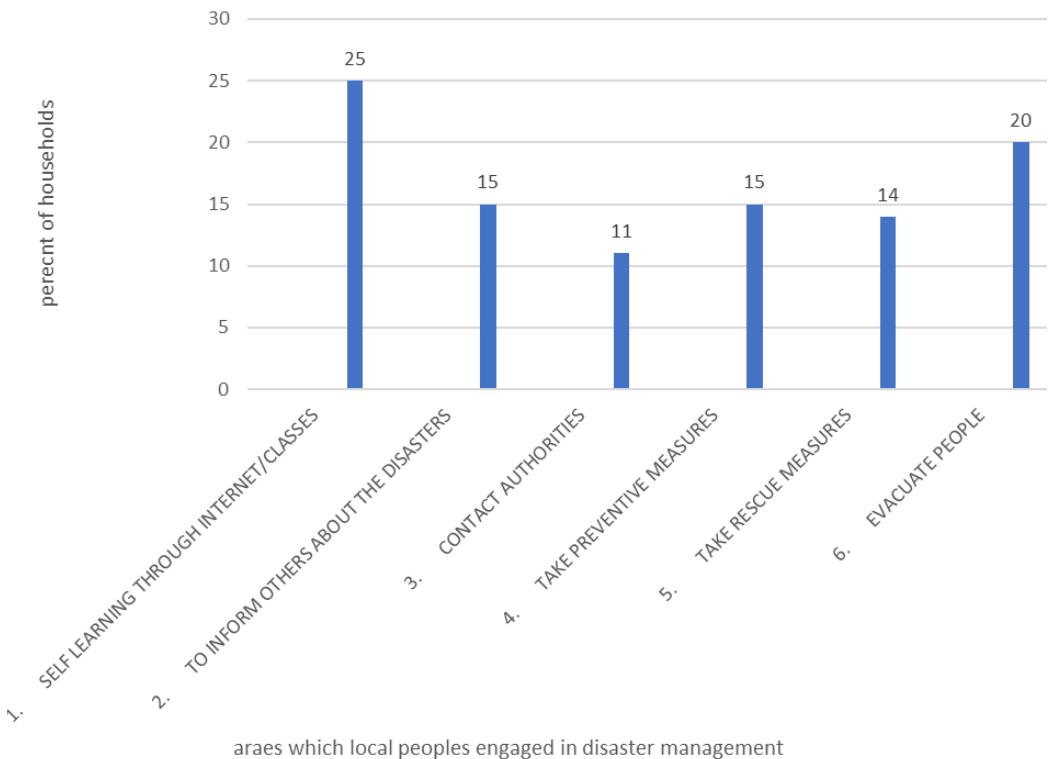


Fig. 3.61. Relevant areas in which local villagers can participate in disaster management (n=216)

About 25 percent of surveyed community suggested to adopt self-learning through internet on disaster management and there by disaster preparedness. 20 percent people offered their services to evacuate people during disasters (Fig. 3.61)

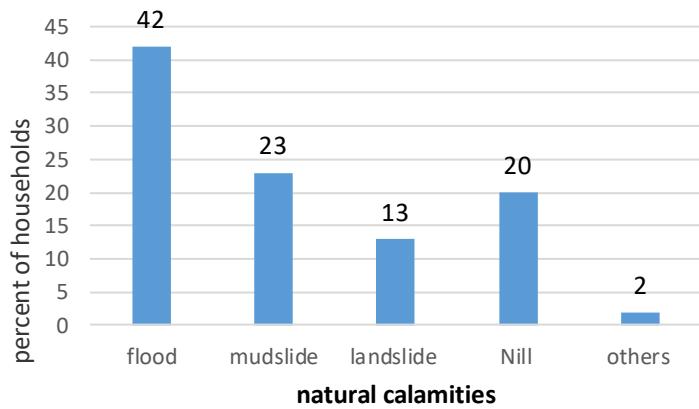


Fig. 3.62. Past experience in rescue operations (n=216)

About 42 percent of surveyed community have the experience in involving rescue operation during flood disasters while 23 percent have involvement in mudslide rescue operations (Fig. 3.62).

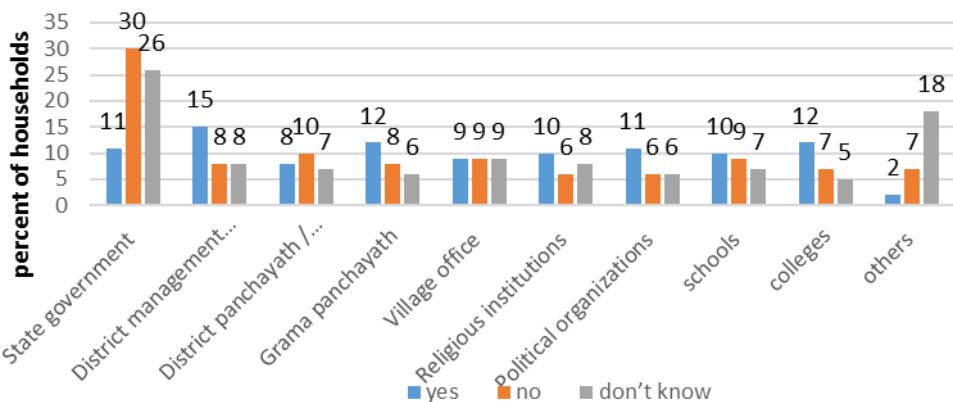


Fig. 3.62.1. Response pattern of various stake holders during natural disasters (n=216)

The response of various stake holders during flood disaster was reviewed and 30% of the community responded that state government, local bodies and village office are not involved in rescue or rehabilitation as it demands (Fig.3.62.1.). However, 15% of the surveyed community opined that district authorities have involved positively.

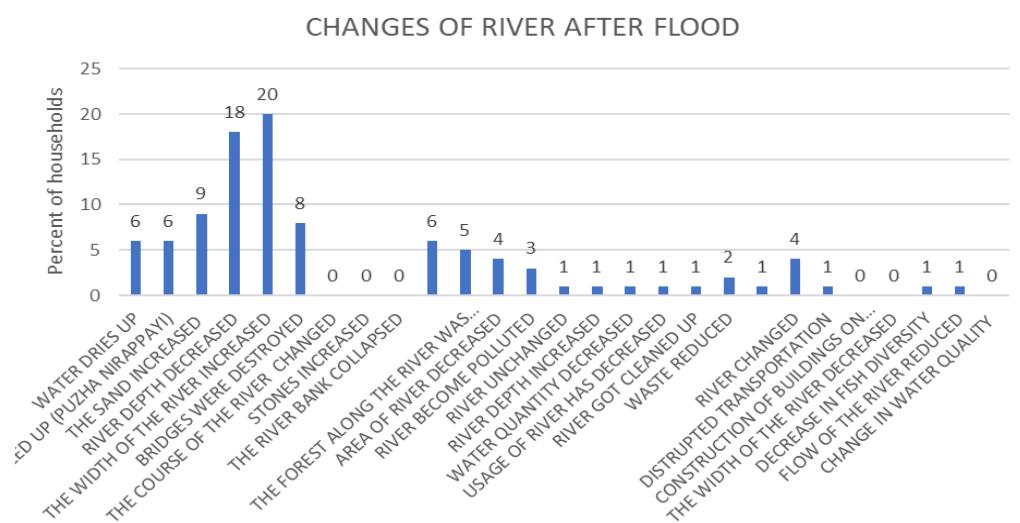


Fig.3.63. Changes of river after flood (n=216)

According to 20% of the surveyed community, river depth decreased and 18 percent noted the decrease in width. Due to the deposition of silt and boulders during the flood, drought is regular during summer season (Fig.3.63).

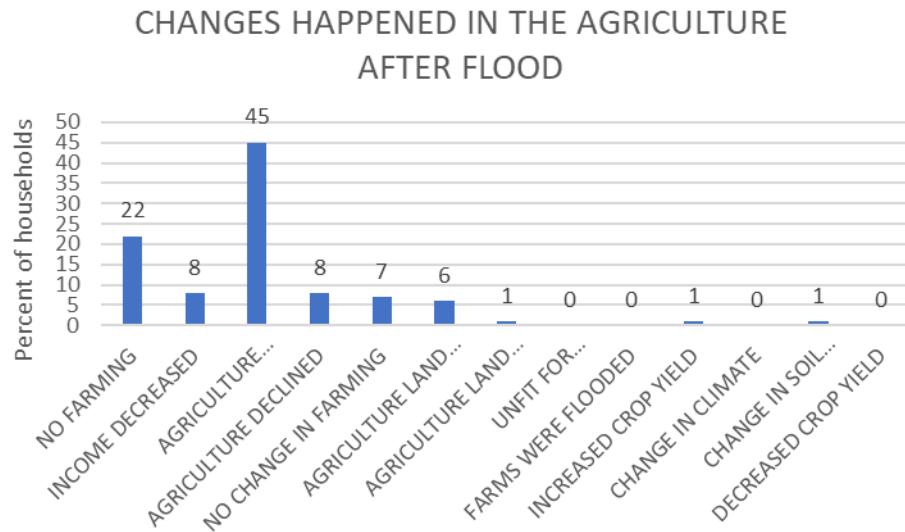


Fig.3.64. Changes happened in the agriculture after flood (n=216)

According to 45 percent of households, they have lost or damaged heavily their crops. Eight percent of households had diminished income especially due to the crop loss (Fig.3.64).

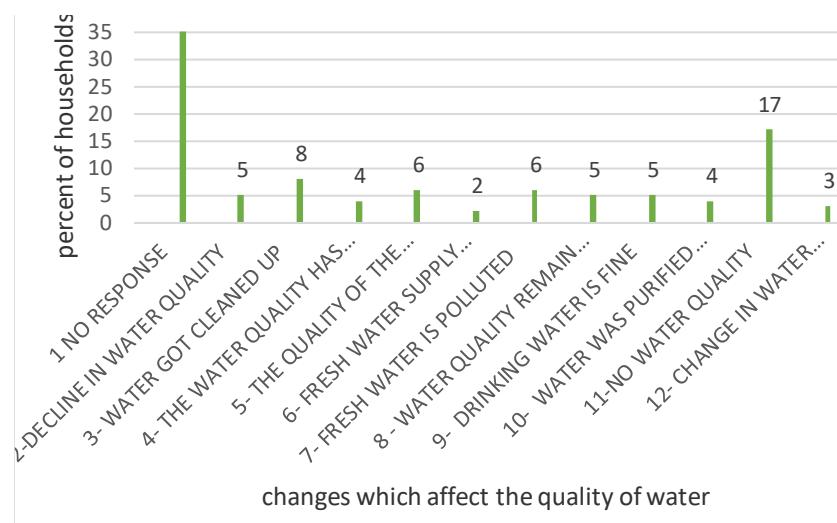


Fig.3.65. Changes happened in the quality of drinking water after flood (n=216)

Only 5% of the respondents recorded a decline in water quality after the disaster. Majority have no much specific problems to remember during or after the disaster (Fig.3.65).

CHANGES HAPPENED IN THE RATE OF DISEASES AFTER FLOOD

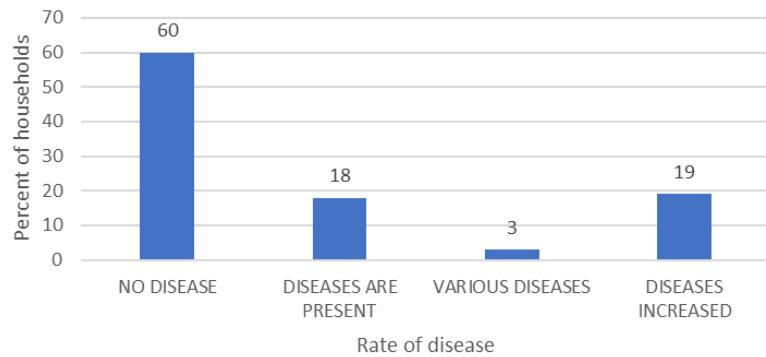


Fig.3.66 Changes happened in the rate of diseases after flood (n=216)

60 percent of household have there was no disease incidence after flood. Only 19 percent of households had got diseases after flood (Fig. 3.66).

OTHER CHANGES HAPPENED AFTER FLOOD

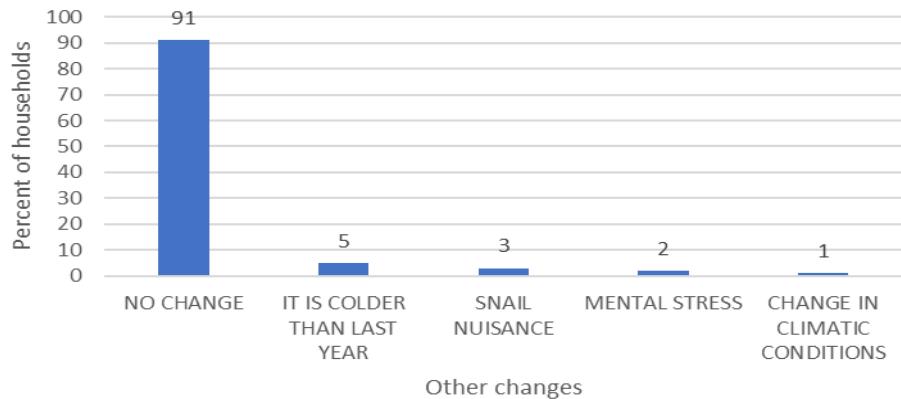


Fig.3.67 Other changes happened after flood (n=216)

Very minor changes like snail outbreak, change in local weather pattern etc. are suggested by the very few persons during the survey (Fig.3.67).

Chart Title

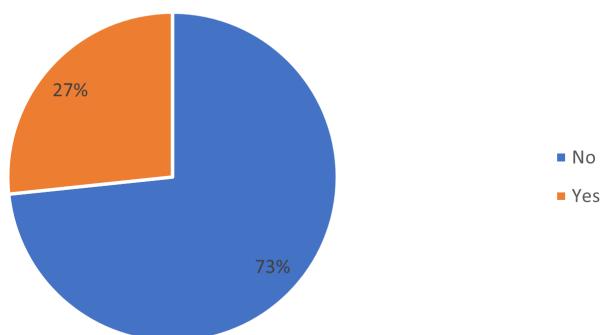


Fig.3.68. Awareness of the potential natural disasters in the area

About 73 percent of household are unaware of the potential natural disasters in the area (Fig.3.68).

3.1.3 REPORT OF THE COMMUNITY SURVEY IN LOWLAND

KADAPRA GRAMAPANCHAYAT & NSS HIGHER SECONDARY SCHOOL, VAIPUR

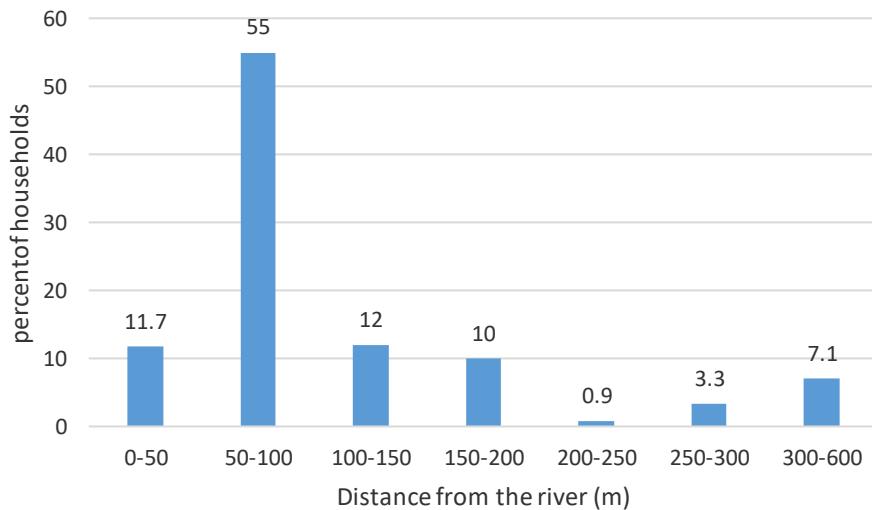


Fig. 3.69. Areal distance of surveyed households from the river (M) (n=145)

A standardized survey form was used to survey 145 homes in Kadapra GP. 55 percent of surveyed households are located at an aerial distance from the river, within 50 to 100 meters; 11.7 percent of households are at a distance of less than 50 meters, and just 0.9 percent of surveyed households are located between 200-to-250-meter distances (Fig. 3.69).

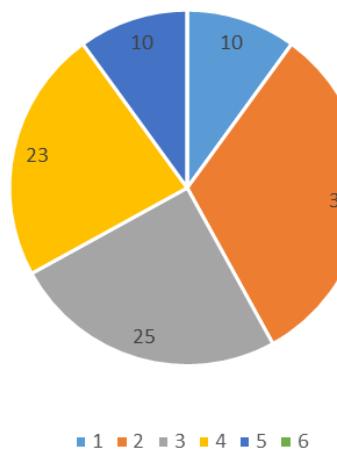


Fig. 3.70. Number of adults per family (n = 145)

Among the surveyed households about 32 percentage of households have 2 adult members, 25 percentage have 3 members and 23 percentage have 4 members (Fig.3.70).

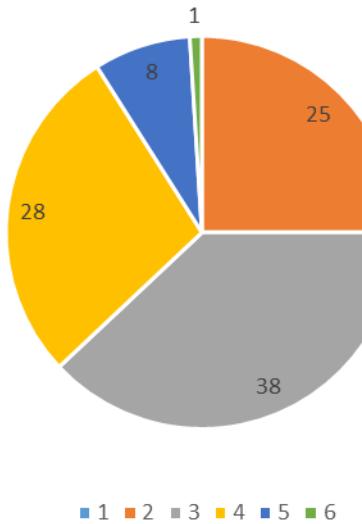


Fig. 3.71. Average number of children among surveyed households (n=145)

It is found that 25 percentage of surveyed households have only one child, 38 percentage of households have 2 children, and 28 percentage have 3 children (Fig. 3.71). This is at par with state average that majority of the families have two children nowadays.

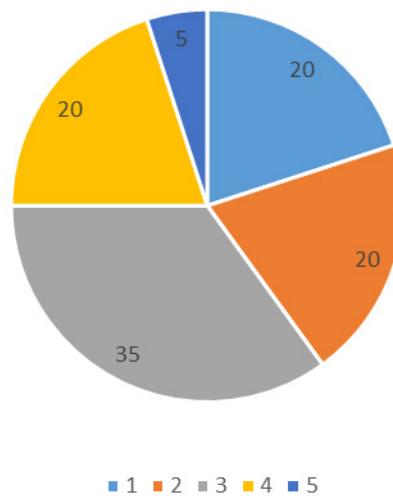


Fig.3.72. Family size of the surveyed households (n=145)

It is found out that surveyed households 20 percentage of households have 4 members and 5 percentage of households have 5 members. The majority of households have a family size of four (Fig.3.72)

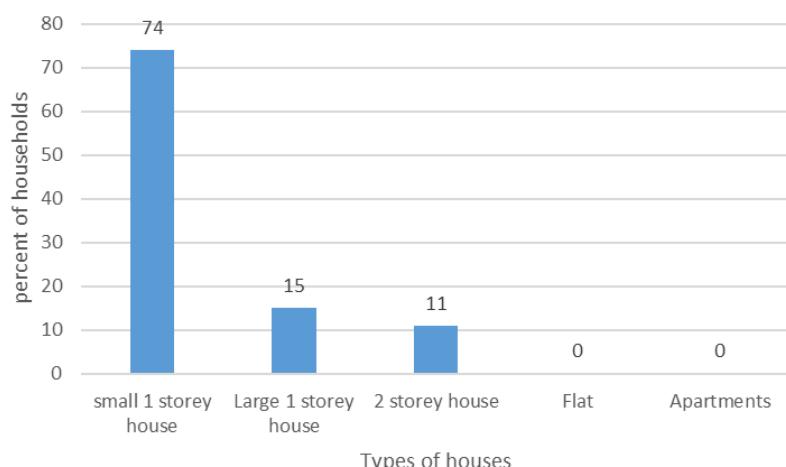


Fig. 3.73. House types of surveyed households (n=145)

About 74 percent of households have a small one-story house, while 15 percent have a large one-story house. About 11 percent have two-story houses. Only 0 percent have flats and apartments (Fig. 3.73).

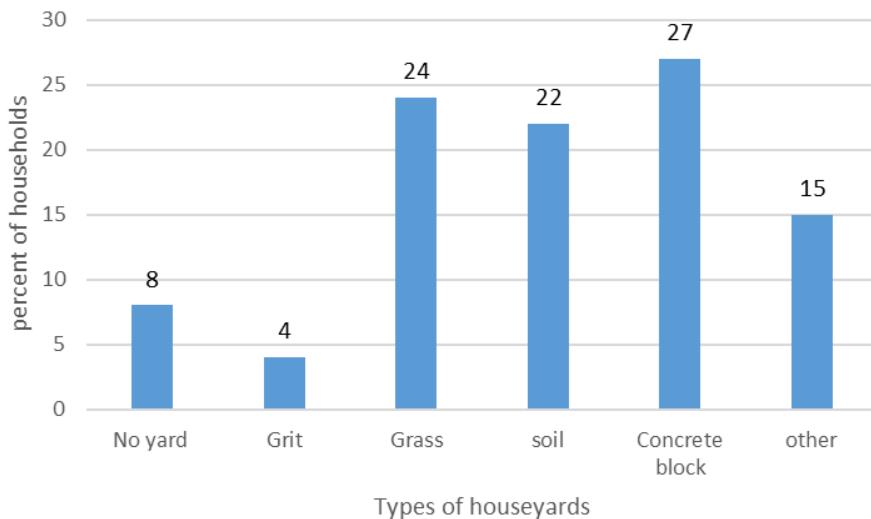


Fig. 3.74. House yards of surveyed households (n=145)

Most of the court yards (27%) are paved with concrete blocks, followed by grasses (24%). 8 percent of households have no courtyard (Fig.3.74). The urbanized landscaping trends are prevailing here also.

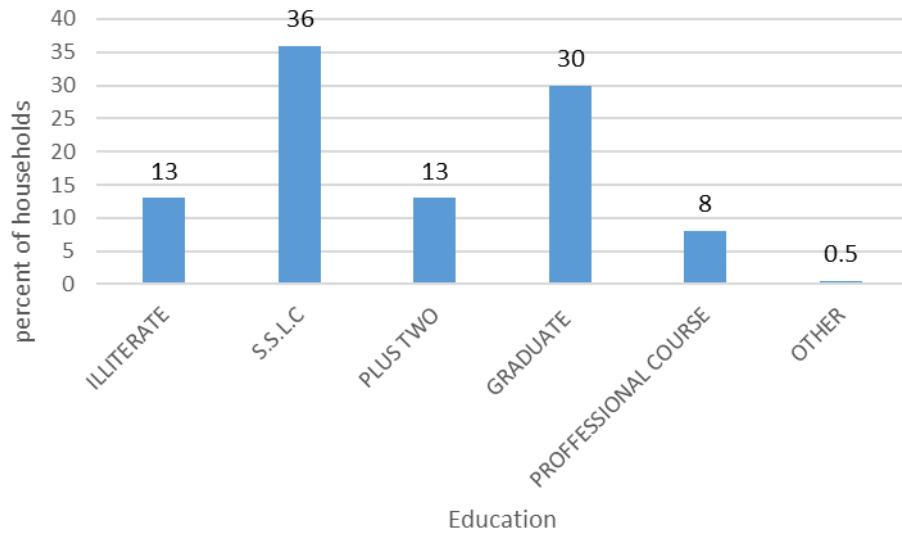


Fig.3.75. Educational status of the surveyed community (n=145)

The educational status of the surveyed individuals analyzed and 36 percentage have secondary education, 30 percentage are graduates and 13 percentage have higher secondary education (Fig.3.75)

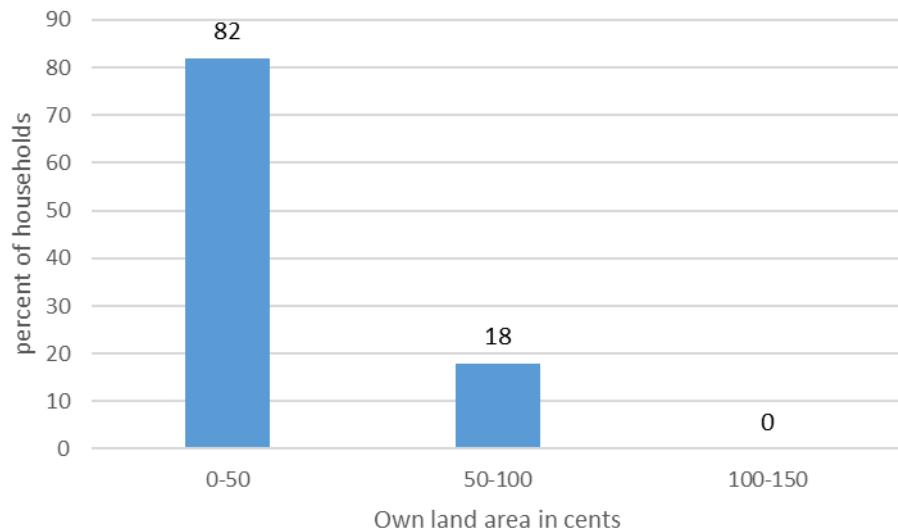


Fig. 3.76 Area of land owned by the surveyed community (n=145)

A significant majority of households have (82%) 0-50 cent own land (Fig.3.76). It is well clear that small holders are prominent in even village areas nowadays.

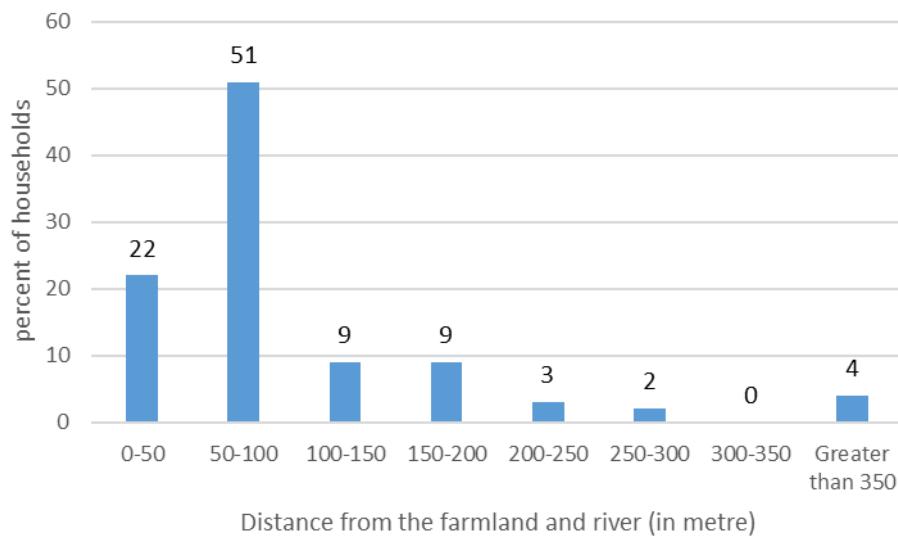


Fig .3.77. Distance between farmland and river (n=145)

On an average more than half of the surveyed community resides at a distance of 50-100 meter away from the river bank. 22% of houses are located within 50 meters from the river bank (Fig.3.77).

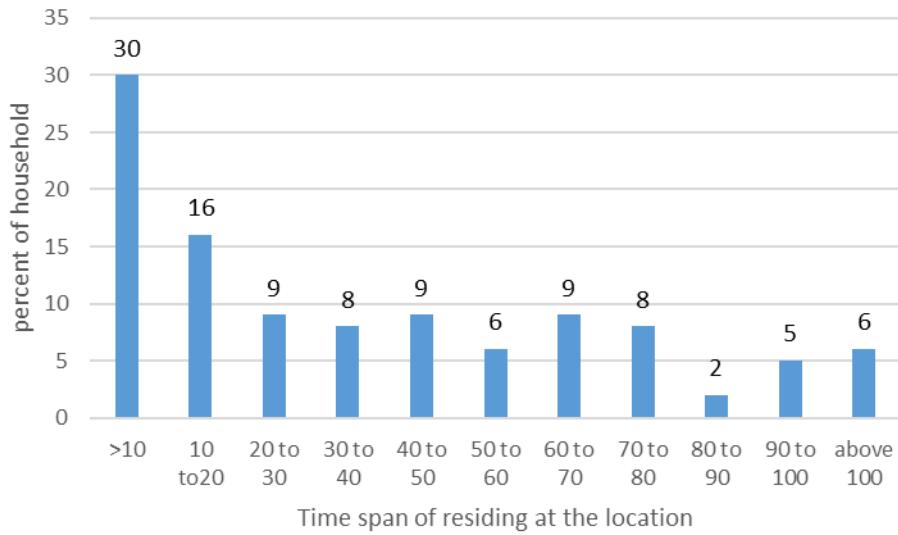


Fig.3.78. Time span of residing at the location (n=145)

One third of the surveyed community resides in the same location for more than 10 years. 6% of households are residing there for more than 100 years (Fig. 3.78).

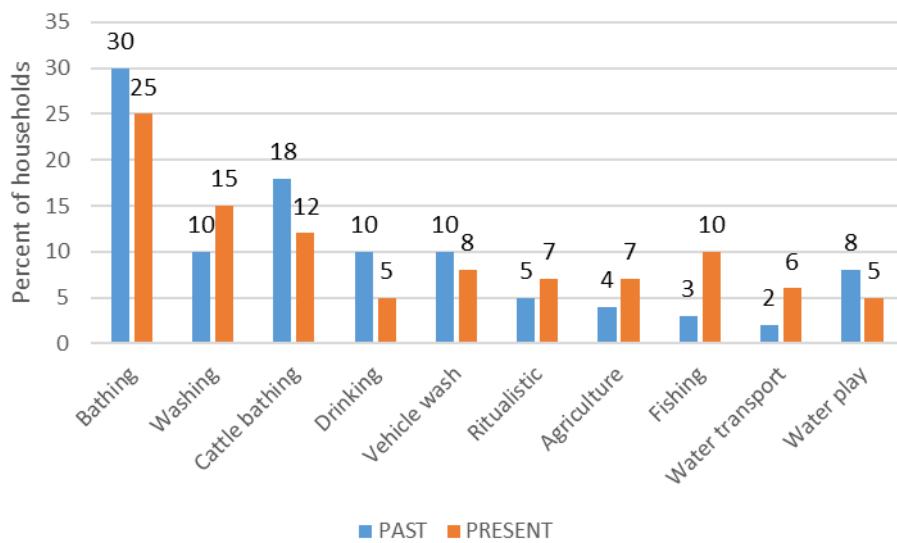


Fig.3.79. Usage of river in the past and present (n=145)

It is found that the major use of river is for bathing, washing and cattle bathing during the past and present. But a drastic reduction is such usage reported for all kinds of usages (Fig. 3.79).

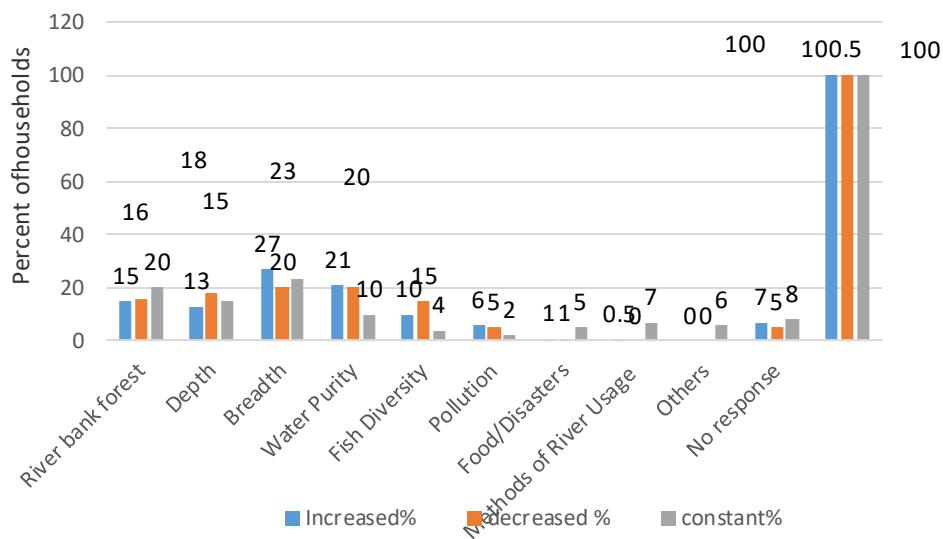


Fig .3.80. Changes of river (n=145)

16-23 % of the surveyed community strongly believe that the width, depth and riparian forest has been decreased over the years especially after the flood disaster in 2020. Majority of the surveyed people have no idea regarding such issues as they have very no direct interactions with river (Fig.3.80).

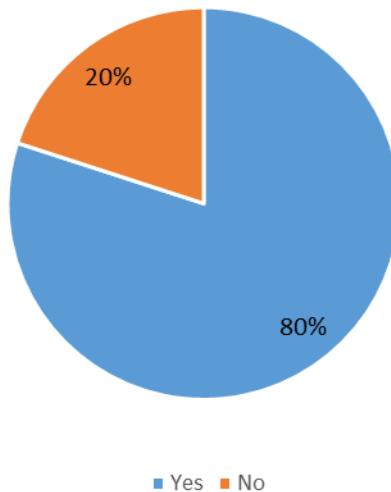


Fig.3.81. Agriculture changes over the years (n=145)

About 80 percent of households said that significant changes have been happened in the farming scenario, especially in river bank areas. Farming and crop pattern has been changed and severe drop in area under cultivation has been reported year by year (fig.3.81).

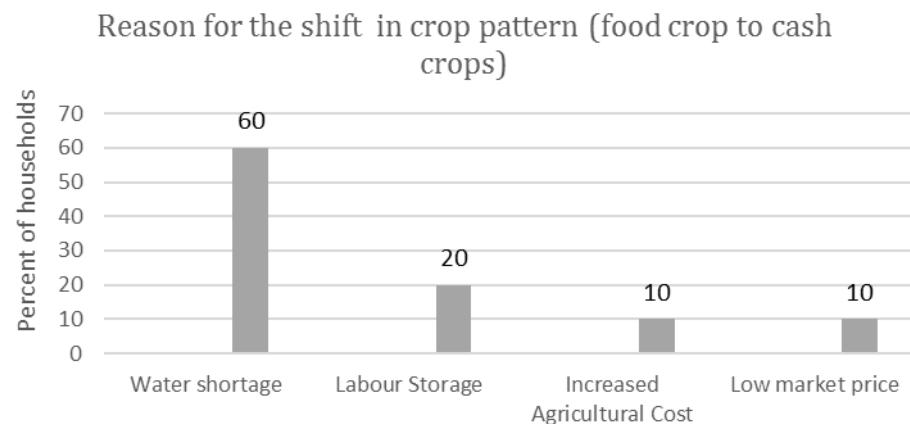


Fig. 3.82. Reason for shift in crop pattern

A major shift from food crops to cash crops has been reported in the area. This is mainly due to the water shortage (60%), labor issues (20%) and increased agricultural cost and low market price (Fig. 3.82).

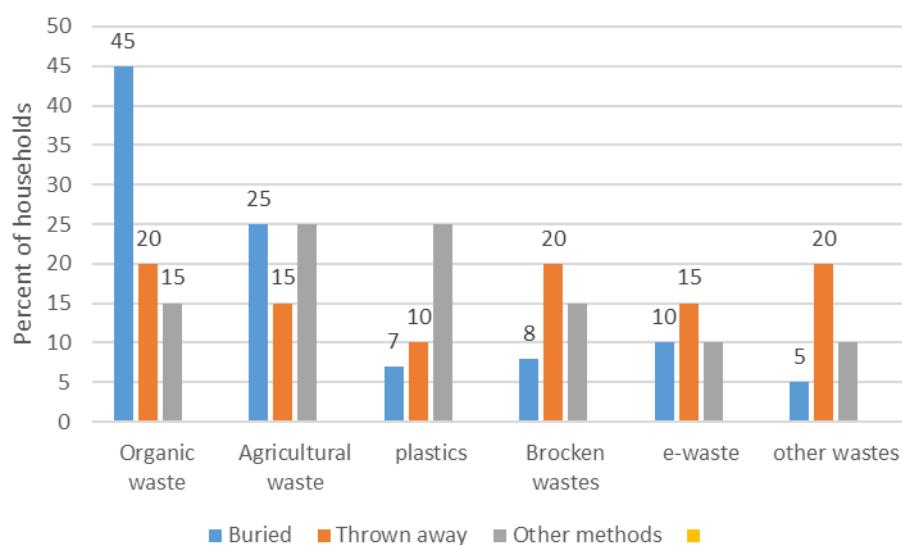


Fig.3.83 Waste management scenario in the river bank area (n=145)

Significant percent of major wastes are managed improperly by the river bank community. 45% of households just throw away the organic wastes or buried (Fig.3.83). Proper management practices are almost absent in the area.

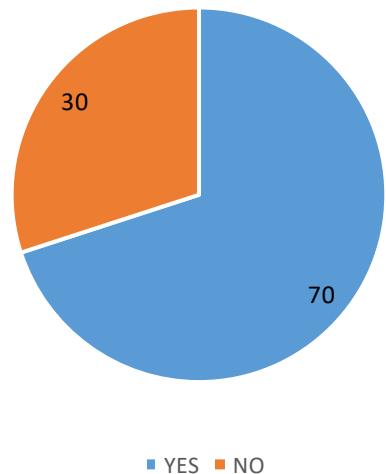


Fig.3.84. Deposition of household waste in river (n=145)

70 percent of households located in the river bank have been throwing the wastes into the river or dumping on the river side. It is a habitual practice developed during the last decade, simultaneously with the decreasing usage of river (Fig.3.84).

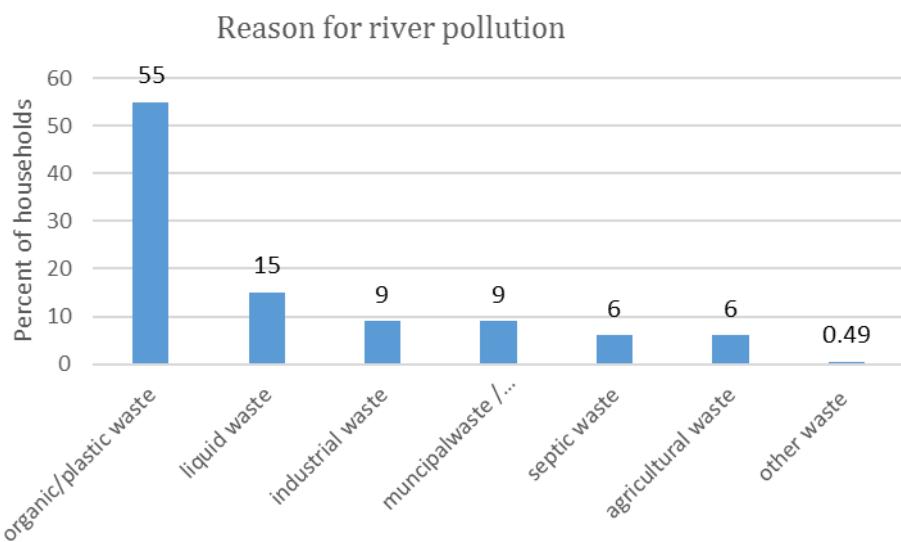


Fig.3.85. Reason for river pollution (n=145)

Organic or biodegradable wastes and plastic wastes are the major cause of pollution, according to the surveyed community (55%). Grey water (liquid waste) is ranked as the second one. This kind of wastes ultimately reaches the rivers, either directly or while floods or rains (3.85).

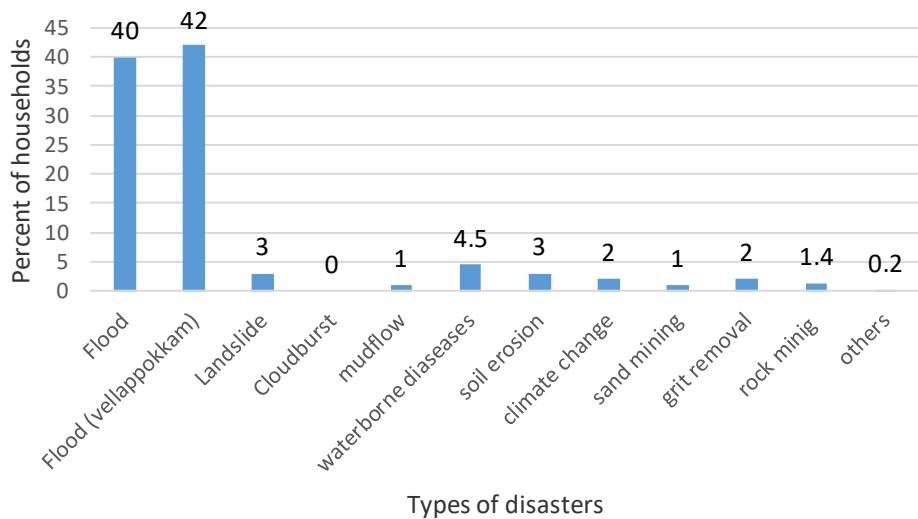


Fig.3.86. Disasters you have encountered related to Manimala River and how many times (n=145)

Flood is recorded as the foremost disaster or natural calamity which encountered by the river bank community. Usually, every year minor floods have been reported but the 2020 flash flood, following cloud burst is almost a rare event (Fig.3.86).

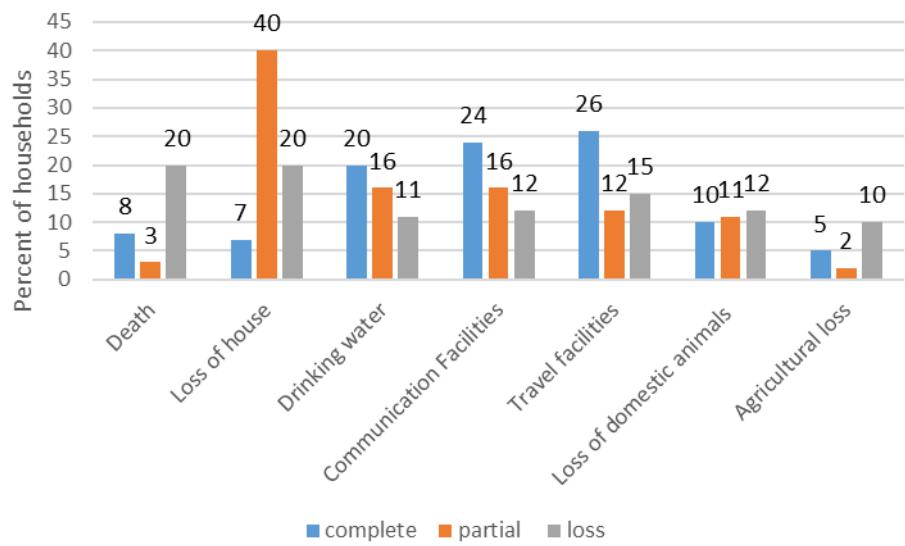


Fig.3.87. Problems faced due to flood (n=145)

The major loss due to flood disaster is recorded as the partial or complete loss of residential buildings. Those houses with weak structures, especially of socio economically poor owners, got damaged or sometimes total loss reported (Fig.3.87).

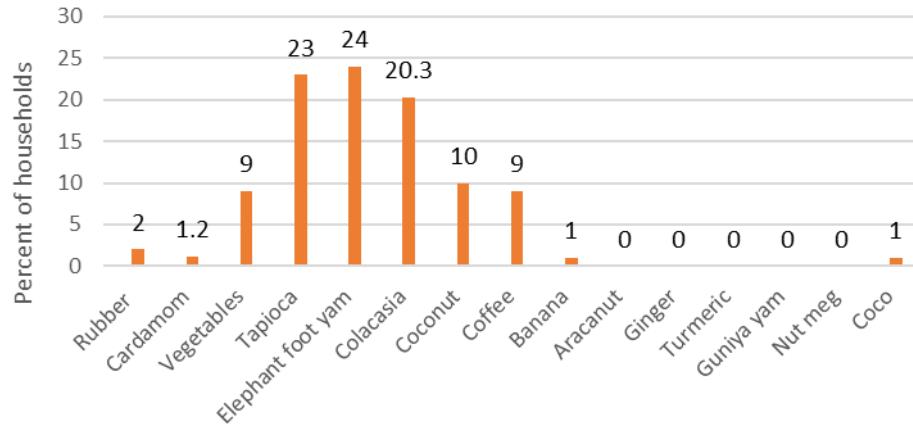


Fig.3.88. Crop loss due to flood (n=145)

According to the surveyed community the principal damages due to the flood were occurred to crops like elephant yam, tapioca, Colocasia, coconut trees etc. Branches of rubber trees were slipped off and uproot of trees also reported (Fig.3.88).

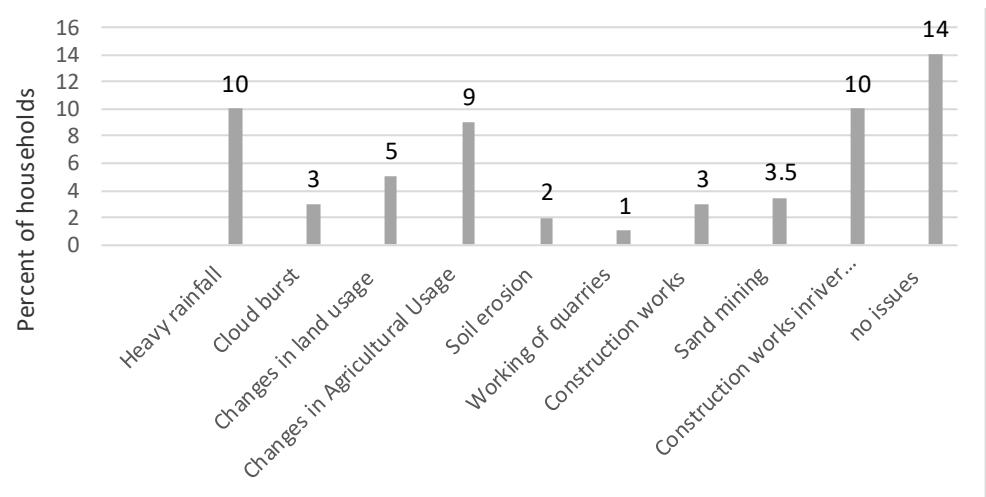


Fig. 3.89. Reason for flood (n=216)

Majority of the surveyed community has no knowledge regarding the reasons of flood disasters. However, 10% of them suggested that heavy rainfall may be the principal reason; only 3% of the respondents found cloud burst, the scientific phenomena, as the major reason (Fig.3.89).

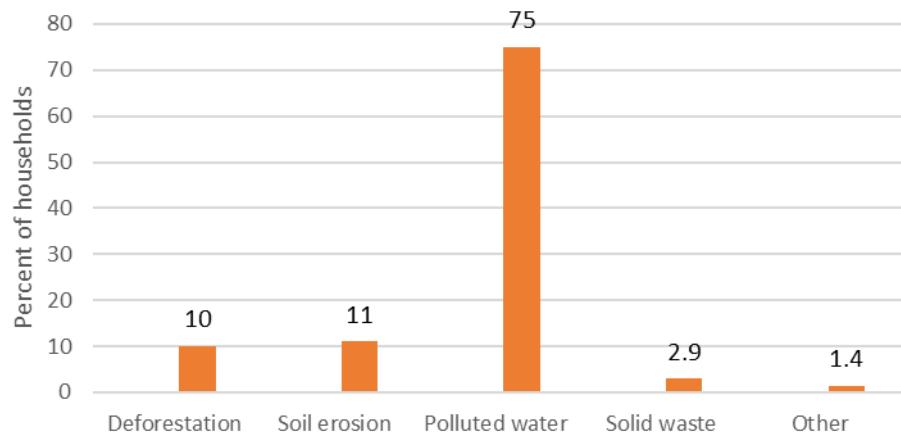


Fig.3.90. Reason for declining water quality (n=216)

Pollution from diverse sources is primarily responsible for the deteriorating quality of river water. 75% of the surveyed community has expressed this reason (Fig. 3.90).

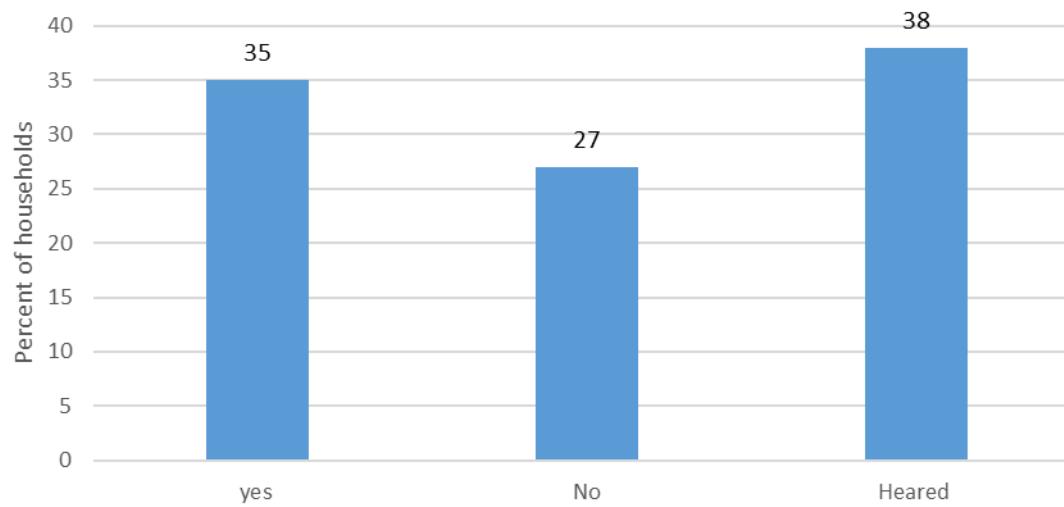


Fig.3.91. Awareness about the activities of state disaster management department

About 38 percent of households are only heard about the activities of state disaster management department. 35 percent of households know about the activities of state disaster management department. About 27 percent of household that don't know about the activities of state disaster management department (Fig.3.91).

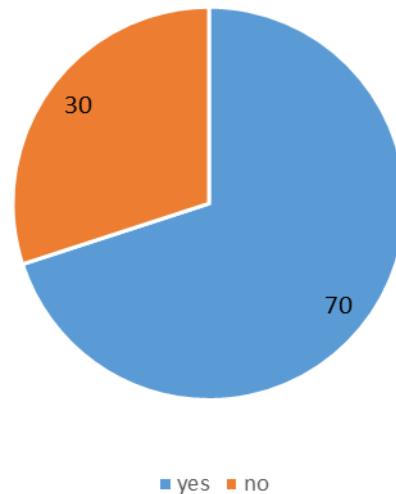


Fig. 3.92. Traditional knowledge on prevention of disasters (n=145)

About 70 percent of households have traditional knowledge on prevention on disasters. However, most of them have an information regarding such ideas only; they don't have any experience regarding such knowledges (Fig.3.92).

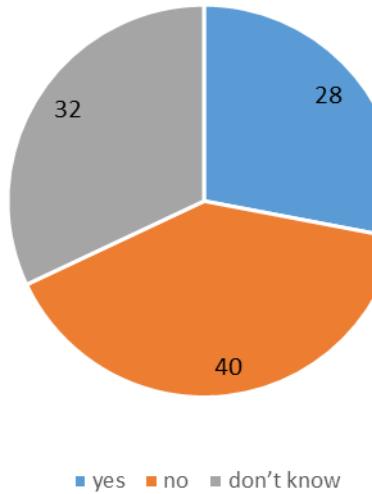


Fig. 3.93. Probability of using traditional knowledge preventing natural disasters in present situation (n=145)

About 40 percentage of surveyed community believed that traditional knowledge has due importance in disaster management (Fig.3.93). Because, TK is not just myth, they are life tested by generations. However, such knowledges are applicable in specific context only (Fig.3.93).

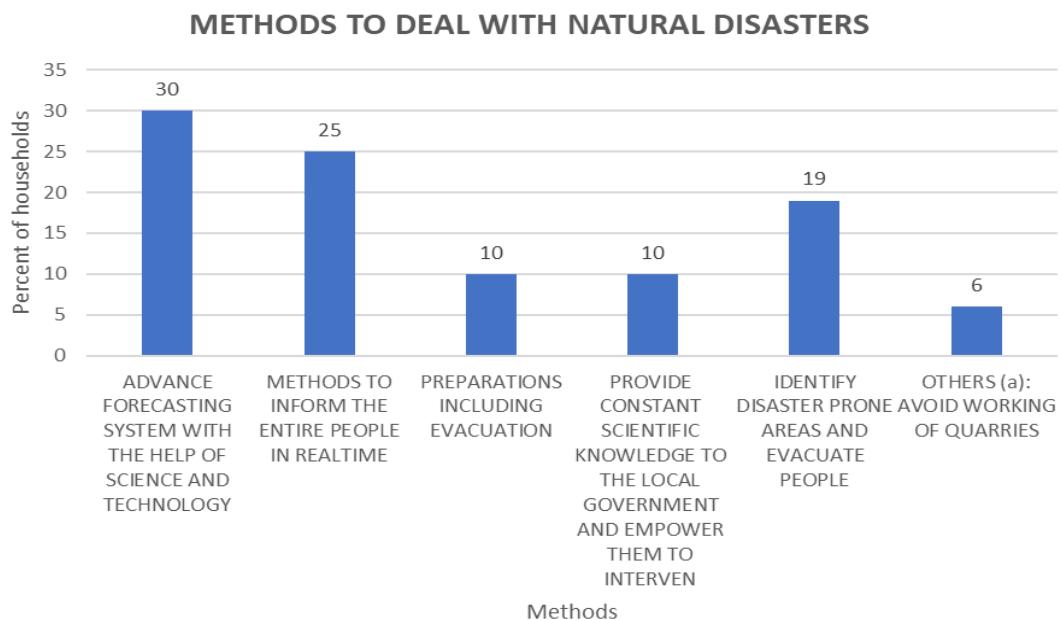


Fig. 3.94. Methods to deal with natural disasters (n=216)

About 30 percent of households suggested the use of advance forecasting system with the help of science and technology, to deal with natural disasters. About 27 percent of household opted the methods to inform the entire people in at the time of disasters itself (Fig. 3.94).

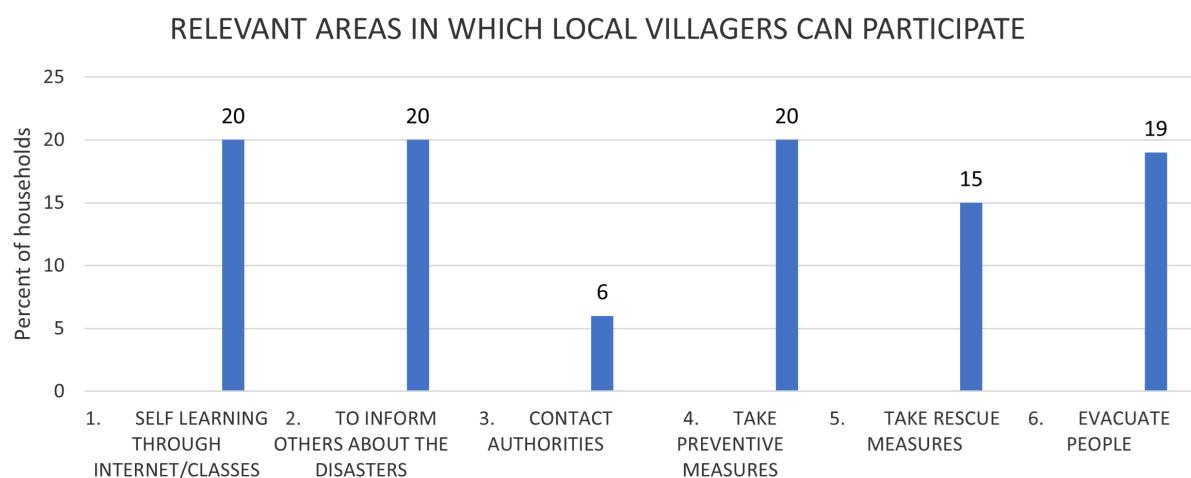


Fig. 3.95. Relevant areas in which local villagers can participate in disaster management (n=145)

The surveyed community has suggested that almost in all activities including rescue operations, the active participation of all survivors shall be provided (Fig.3.95). Self-learning and subsequent co-learning on disaster management may be effective way to minimize the damages or havoc caused by disasters (Fig. 3.95).

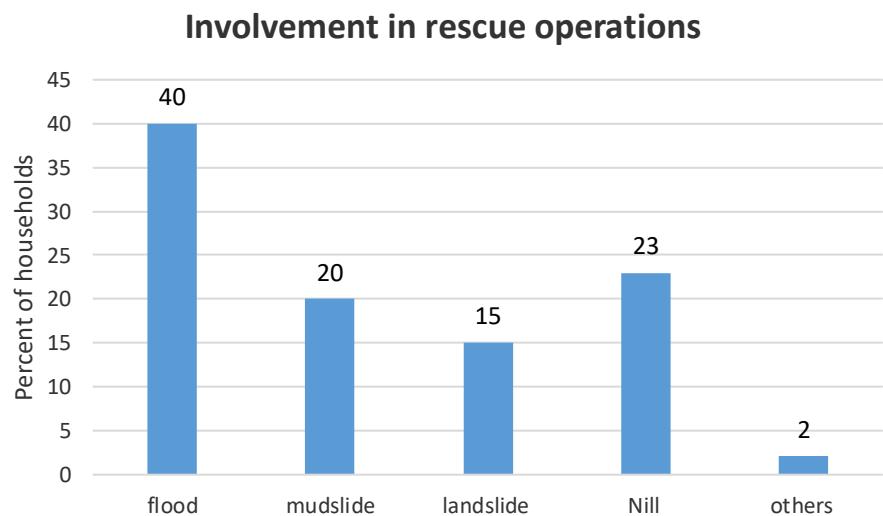


Fig. 3.96. Involvement in rescue operations (n=216)

Respondents in the survey commented their involvement in previous disasters and 40 percentage have involved in the flood rescue operations. About 20 percent of had experiences in mudslide rescue operations (Fig. 3.96).

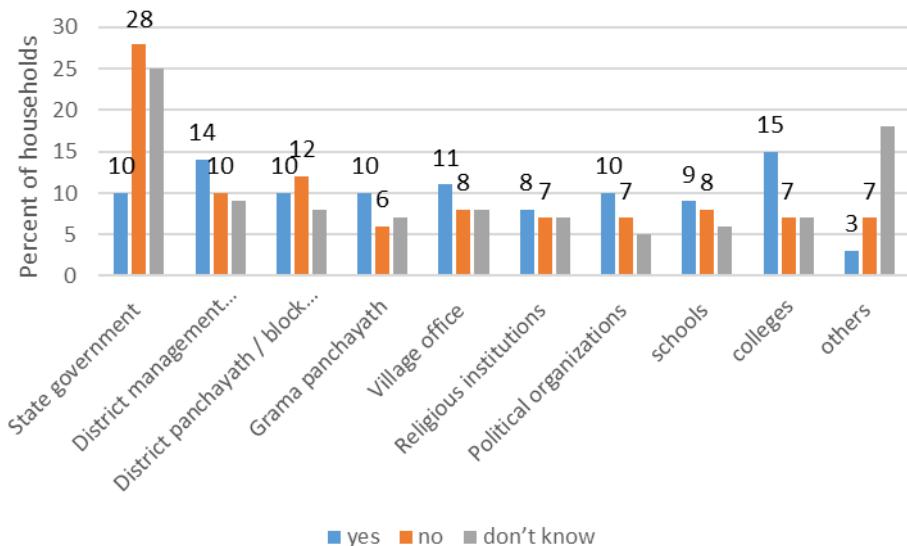


Fig. 3.97. Stakeholders acting appropriately during natural disasters (n=216)

The experience of stakeholder participation in disaster management during the past disasters were enquired. On an average 10 percent of the surveyed community appreciated the role played by State Government, local bodies, village office, religious institutions and other social organizations (Fig.3.97).

CHANGES OF RIVER AFTER FLOOD

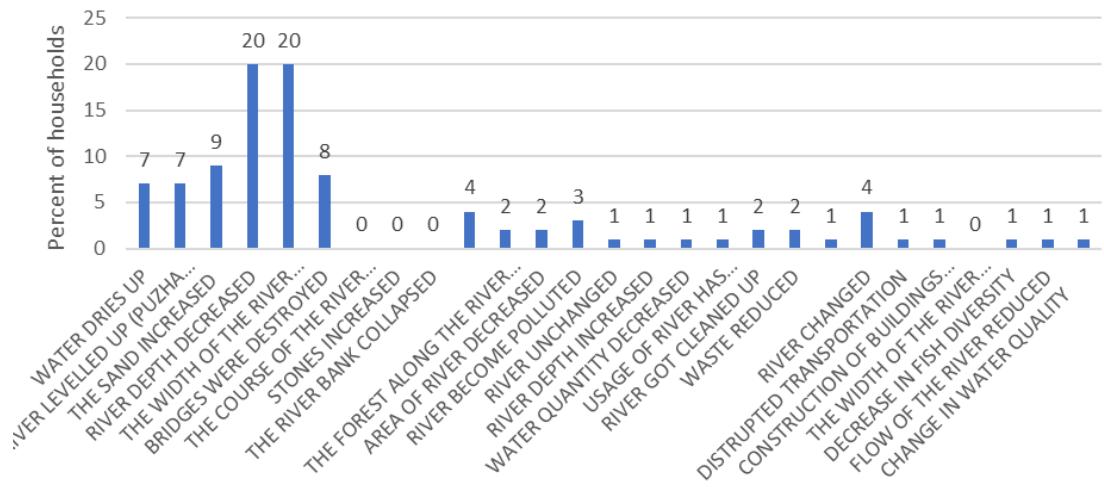


Fig. 3.98. Changes of river after flood (n=145)

(Well Water dries up, river levels up, sand increased, river depth decreased, width of the river increased, bridges were destroyed, course of the river changed, stones increased, riverbank collapsed, forest along the river was destroyed, area of the river decreased, river became polluted, river unchanged, river depth increased, water quantity decreased, usage of the river decreased, river got cleaned up, waste reduced, river changed, transportation disrupted, construction of buildings on riverbanks, width of the river decreased, decrease in fish diversity, flow of the river reduced, change in water quality.)

According to the surveyed community during the post flood scenario sand deposits, boulders, and width of the river due to the collapse of the river bank has been increased whereas water level and its quality has decreased significantly (Fig.3.98).

CHANGES HAPPENED IN THE AGRICULTURE AFTER FLOOD

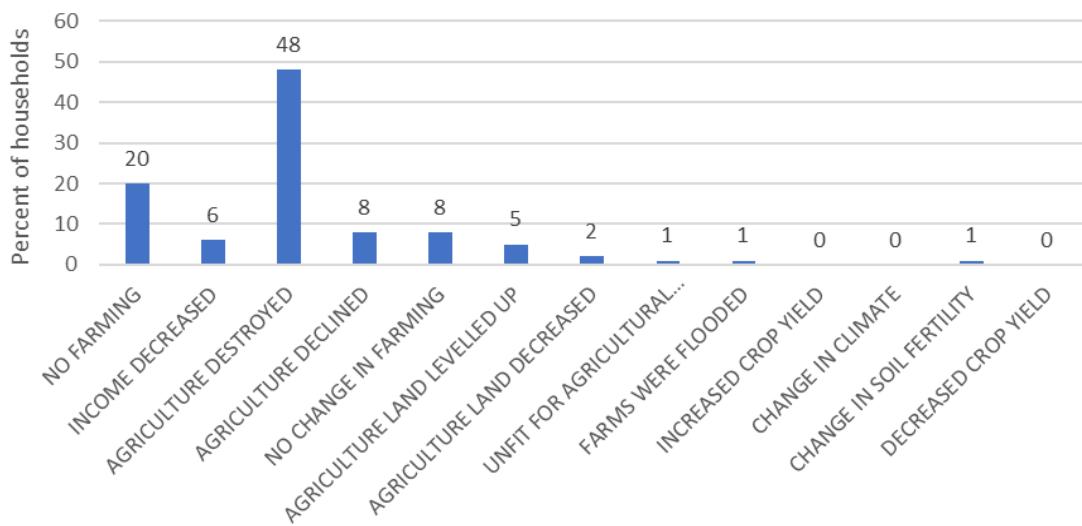


Fig.3.99. Changes happened in the agriculture after flood (n=145)

Crop loss was reported to 48% of the surveyed community. For about 2% of the surveyed community, even the farm land completely transformed into a boulder and debris filled area, thus totally unusable for farming practices (Fig. 3.99).

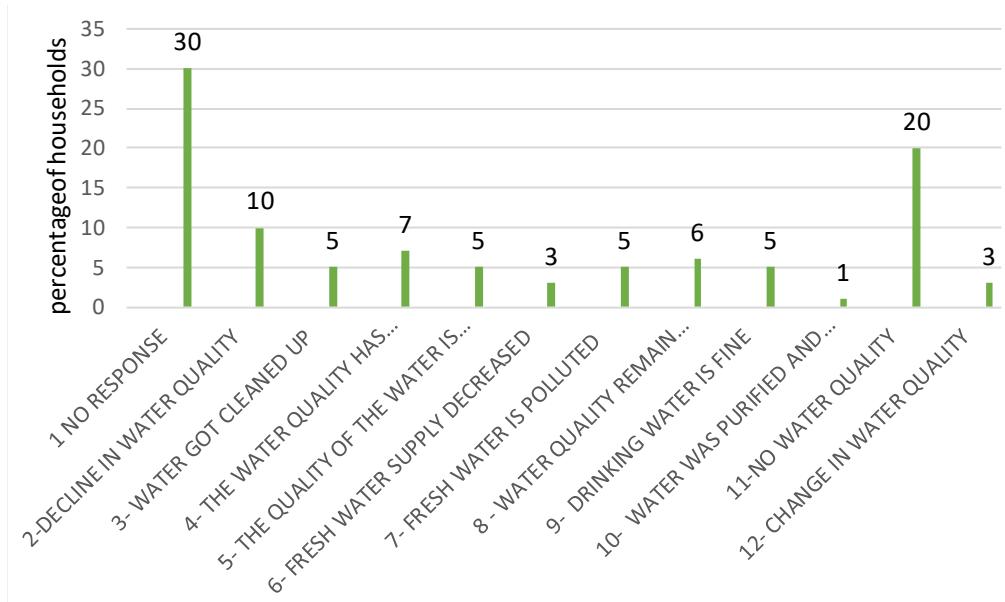


Fig.3.100. Changes happened in the quality of drinking water after flood (n=145)

Only 10 percent of households reported decline in water quality after flood. Such knowledge has not been existing because most of the community members are usually not testing the water quality (Fig. 3.100).

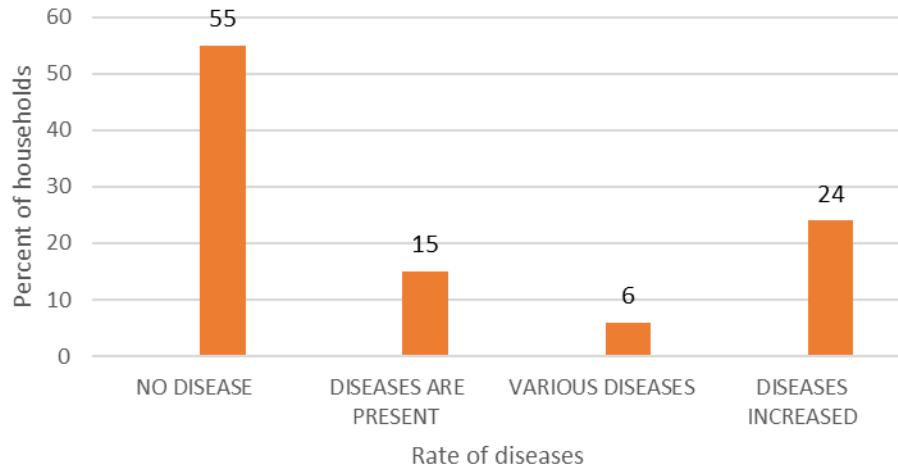


Fig.3.101. Changes happened in the rate of diseases after flood (n=145)

About 24 percent of household have greater incidences of the diseases after flood. Six percent of the households experienced with various diseases after flood (Fig.33).

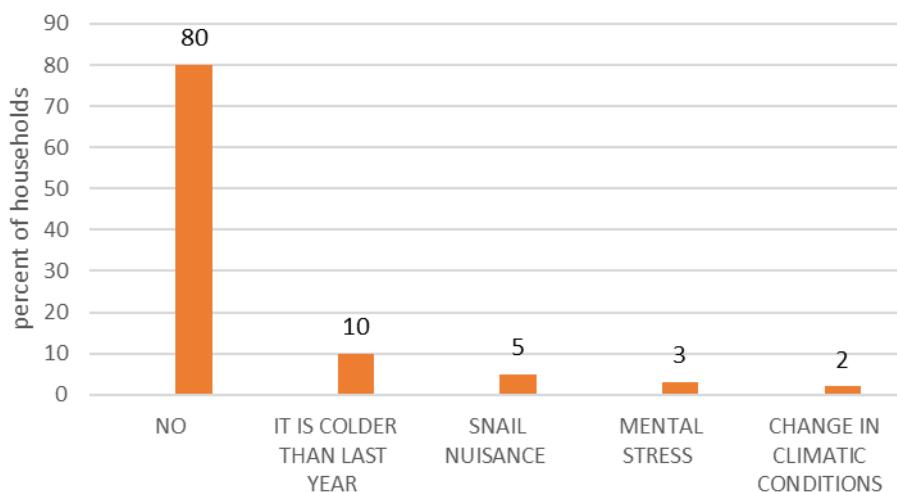


Fig.3.102. Other changes happened after flood (n=145)

About 80 percent of respondents had noted no changes after flood. About 10 percent of surveyed community recorded that it is colder than previous year (Fig.3.102).

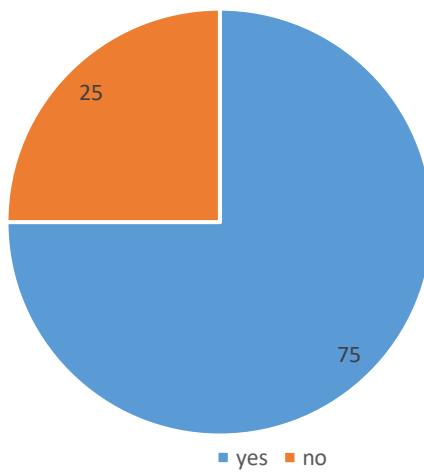


Fig.3.103. Awareness on potential natural disasters in the area among the community

Almost 75% of the respondents have an idea about the potential disasters in their locality, at least after the 2020 flash flood disaster (Fig.3.103). However, it is not a concrete understanding, as most of such information has got from social and mainstream media. The accuracy of such information is also doubtful.

3.2 COMMUNITY SURVEY - MAJOR FINDINGS

The surveys conducted by students from JJ Murphy School, Koottickal, NSS Higher Secondary School in Vaipur, and Dewasom Board Higher Secondary School in Kavumbhagom collectively offer comprehensive insights into the interplay between households and their surrounding environments, particularly rivers.

In Koottickal Panchayat, the housing landscape is predominantly small, single-storey houses, characteristic of a rural setting, with varied educational qualifications among residents. Land ownership is widespread, and a significant proportion of households reside in close proximity to the river. The findings reveal a decline in the use of river water for various activities and indicate heightened river pollution and decreased water levels post-flood. Waste management practices involve a mix of agriculture, composting, and dumping, with a notable percentage using plastic covers and disposing of plastic bottles. River pollution is attributed to sewage accumulation and waste dumping from households and factories. Concerning natural calamities, floods are identified as a primary threat, impacting agriculture and prompting changes in drinking water supply. Furthermore, limited awareness of traditional disaster prevention methods alongside active community involvement in flood response efforts highlights the need for targeted interventions and improved disaster preparedness initiatives. Active community involvement, particularly by social and religious institutions, is noted in responding to floods. The post-flood scenario reveals significant agricultural damage and concerns about drinking water quality. A noteworthy percentage of respondents lack awareness of potential natural disasters in their area.

Similarly, in Kavumbhagom, households display spatial proximity to rivers, diverse compositions, and housing patterns. Concerns about river pollution, agricultural shifts, and the impact of natural disasters are evident, emphasizing the importance of community involvement, traditional knowledge, and technological advancements in addressing these challenges.

Moreover, in Vaipur, households exhibit geographical proximity to rivers and diverse housing characteristics, with varying levels of land ownership. Historical river usage patterns reveal a shift over time, with past activities such as washing, bathing, and cattle bathing decreasing in the face of pollution and increased human activities. Post-flood river transformations, including changes in forest cover, depth, and breadth, further highlight the dynamic nature of the river environment. Government responses during natural disasters elicit varied opinions among surveyed households, indicating the complexity of disaster management and community resilience. Concerning river dimensions, fluctuations in depth and width are noted, reflecting the dynamic nature of river morphology. The aftermath of floods presents a mixed picture, with a significant proportion reporting no post-flood diseases, yet a notable portion experiencing increased health concerns and agricultural losses.

Overall, these surveys underscore the multifaceted dynamics between households and river environments, highlighting the need for holistic approaches, collaborative efforts, and targeted interventions to ensure sustainable development and resilience in riverine areas.



**CHAPTER
4**

**RIPARIAN SEED BANK:
COMMUNITY-DRIVEN CONSERVATION**



COMMUNITY SEED BANK

Mono-cropping not only depletes soil fertility and increases vulnerability to pests and diseases but also contributes to the loss of biodiversity and threatens the resilience of food systems in the face of climate variability. Addressing this critical demand, the Tropical Institute of Ecological Sciences in Kottayam has introduced the Seed Bank initiative, a fresh approach designed to convert single-crop farms and residential areas into dynamic multi-crop environments. The Riparian Seed Bank seeks to address these challenges by promoting the establishment of local seed banks that serve as repositories of diverse plant genetic resources. By harnessing the inherent adaptability of riparian ecosystems, the initiative aims to foster the regeneration of degraded lands, enhance ecosystem services, and empower local communities at the Manimala River bank to cultivate diverse and resilient agricultural landscapes.

Central to the Riparian Seed Bank approach is the principle of participatory and community-driven conservation. By engaging local farmers, gardeners, and land stewards in the collection, preservation, and exchange of locally adapted seeds, the initiative seeks to revitalize traditional knowledge systems and foster a culture of seed sovereignty and resilience. Through collaborative seed-saving networks and educational outreach programs, Tropical Institute of Ecological Sciences aims to empower individuals and communities to reclaim agency over their food systems and chart a course towards a more sustainable and equitable future. TIES possesses the following seed varieties in its seed repository.

SL. NO.	SCIENTIFIC NAME	MALAYALAM NAME	COMMON NAME
1	<i>Bambusa bambos</i>	ഇല്ലി	THORNY BAMBOO
2	<i>Crateva religiosa</i>	നീർമാത്രം	SACRED GARLIC PEAR
3	<i>Dalbergia latifolia</i>	ഇംട്ടി	INDIAN ROSEWOOD
4	<i>Dendrocalamus strictus</i>	കല്ലൻമുള	BAMBOO
5	<i>Ficus racemosa</i>	അത്തി	CLUSTER FIG TREE
6	<i>Hopea parviflora</i>	തമ്പകം	MALABAR IRON WOOD
7	<i>Hydnocarpus pentandrus</i>	മരോട്ടി	HYDNOCARPUS
8	<i>Mangifera indica</i>	മാവ്	MANGO TREE
9	<i>Phyllanthus emblica</i>	കൊല്ലി	INDIAN GOOSEBERRY
10	<i>Pongamia pinnata</i>	ഉണ്ട്	INDIAN BEECH
11	<i>Pterocarpus marsupium</i>	വേണ്ട	INDIAN KINO
12	<i>Syzygium caryophyllum</i>	ശാട	WILD BLACK PLUM
13	<i>Tamarindus indica</i>	വാളുൻ പുളി	TAMARIND
14	<i>Terminalia arjuna</i>	നീർമരുത്	ARJUN TREE
15	<i>Terminalia paniculata</i>	പുല്ലുമരുത്	FLOWERING MURDAH
16	<i>Thespesia populnea</i>	പുവലഞ്ച	SEA HIBISCUS





CHAPTER

5

RIPARAIN FOREST RESTORATION & RIVER CONSERVATION

5.1 RIPARIAN FOREST RESTORATION AND RIVER CONSERVATION AT MAMMALA RIVER



Students from J.J. Murphy MHSS, affiliated with the National Service Scheme, collaborated with local residents to conduct a cleanup and tree-planting initiative along the riverbanks extending from Yendar to the Koottickal region. Saplings belonging to six riparian species such as *Crateva magna*, *Chrysopogon zizanioides*, *Terminalia arjuna*, *Bambusa bambos*, *Humboldtia vahliana*, *Ochreinauclea missionis* saplings were planted. Tree guards for protection were provided for all the saplings planted. The programme was led by Ms Maryamma Thomas (Principal J.J Murphy MHSS, Yendar) and Mr. Abhilash P Vettom (Programme officer), Ms. Jaya Thomas (Assistant programme officer), and NSS volunteers under the leadership of Parthan R and Dayana George. Dr. Punnen Kurian, Principal Investigator to the project, Mr. Sarath Babu (NEO), Ms. Noufiya. N (Programme coordinator), and Mr. Jijo Mon (Visual media manager) from the Tropical Institute of Ecological Sciences have given support and Guidance to the programme. Students and teachers shared their experiences as a conclusion to the programme. The NSS volunteer secretary assured that the school unit will ensure proper maintenance and growth of the saplings.



5.2. RIPARIAN FOREST RESTORATION AND RIVER CONSERVATION AT MANIMALA-PAMBA CONFLUENCE POINT



The students of the National Service Scheme from Devaswom Board Higher Secondary School, Kavumbhagom, Thiruvalla, worked in tandem with local community members to clean and collectively plant riparian trees along the river stretch near the Keecherivalkadavu bridge. This specific area marks the confluence of the Manimala River with the Pamba through Puthenthodu. Sapling belonging to six riparian species such as *Crateva magna*, *Chrysopogon zizanioides*, *Terminalia arjuna*, *Bambusa bambos*, *Humboldita vahliana*, *Ochreinauclea* missions are planted. Trees guards made by students provided for each sapling ensuring protection were provided for all the saplings planted.

The programme was led by Reshma S (NSS programme officer), Lekha. P (Teacher) and NSS volunteers, Dr. Punnen Kurian Principal Investigator to the project, Mr. Sarath Babu (NEO), Ms. Nowfiya. N (Programme coordinator), Mr. Jijomon (Visual media manager), Mr. Augustine Joseph (Project Assistant, Bees for life) from Tropical Institute of Ecological Sciences have given assistance to the programme. Students and teachers shared their debut experience with river conservation activities as a conclusion to the programme. Mr. Akhil M Nair NSS volunteer secretary assured that the school unit will ensure proper maintenance and growth of the saplings.



5.3. RIPARIAN FOREST RESTORATION AND RIVER CONSERVATION AT VAIPUR-SASTHAMKOICKAL



The higher secondary students from NSS Higher Secondary School, Vaipur, joined forces with local community members to kickstart a cleanup and tree-planting effort along the riverbanks in the Sasthamkoickal region. This event aimed at promoting the conservation of riparian ecosystems by planting saplings belonging to six different riparian species, including *Crateva magna*, *Chrysopogon zizanioides*, *Terminalia arjuna*, *Bambusa bambos*, *Humboldita vahliana*, and *Ochroma pyramidalis*.

To ensure the safety and growth of these saplings, tree guards were provided for each sapling. The programme was led by Mr. Sreejith (HSS teacher), Ms. Jayasree. G (Principal NSS HSS), Preetha (HSS teacher), Dr. Punnen Kurian Principal Investigator to the project, Mr. Sarah Babu (NEO), Ms. Nowfiya. N (Programme coordinator), Mr. Jijo Mon (Visual media manager), and Mr. Augustine Joseph (Project Assistant, Bees for life) from Tropical Institute of Ecological Sciences have given assistance to the programme.

Upon the completion of the tree-planting event, both students and teachers shared their experiences and insights regarding river conservation activities. Notably, members of the local community, including Hassain, Shefeek, and others from the Sasthamkoickal region, shared their own valuable experiences.

Student representatives, Ganga and Amrutha, also provided insights into their experiences related to the Manimala River and the tree planting programme. This collaborative effort served as a testament to the importance of community engagement in environmental conservation, specifically in the protection and preservation of riparian ecosystems.



5.4. NEERETTUPURAM BOAT RACE: A PARTICIPATORY RIVER MANAGEMENT PROGRAMME

The 'Nerettupuram Boat Race', uniquely conducted on the auspicious day of Thiruvonam, stands out as the sole event of its kind. Inaugurated in 1957 by a group of young individuals in collaboration with the Nerettupuram Library and Union Library, this boat race is also referred to as Jalamel. Taking place at the Manimala River, the racecourse spans nearly 1 km. Positioned to the east and north is the Pathanamthitta district, while the south and west are bordered by the Alappuzha district.

As part of the present project, a team of researchers from TIES, Dr. Punnen Kurian, the principal investigator of the project, Ms. Nowfiya N (Programme Coordinator), and Mr. Jijo Mon (Visual Media Manager), were visited the location several times and on the day of boat race in order to explore the participatory Nature of the event. Ms. Susamma Paulose, the ward member of Valanjavattom, provided required facilitation for the team.

The Nerettupuram Boat Race serves as a commendable initiative that establishes a significant link between the Manimala River and the daily lives of the local community. Conducting such events offers several advantages:

1. Sense of ownership: Local residents develop a sense of ownership as the boat race becomes an annual tradition organized by the local community. This fosters a stronger connection between the people and the event.
2. Environmental Protection: The local population is motivated to safeguard the surroundings and the river itself, leading to a reduction in waste deposition and contamination. This collective effort contributes to the preservation of the river's health and ecosystem.
3. Engaging the Youth: Involving the younger generation in such activities instills a sense of ownership and responsibility in them. By participating in the boat race, the youth become the future custodians of the river, ensuring its well-being for generations to come.
4. Educational Involvement: Future plans include incorporating school students into these activities, transforming them into active caretakers of the river. This educational involvement not only enhances their understanding of environmental conservation but also empowers them to play a role in preserving their local water resources

Overall, the Nerettupuram Boat Race emerges as a catalyst for community engagement, environmental consciousness, and the cultivation of a sense of responsibility among the younger generation towards the well-being of the Manimala River.





**CHAPTER
6**

**COMPREHENSIVE DISASTER MANAGEMENT PLAN
FOR THE MANIMALA RIVER**

DISASTER MANAGEMENT PLAN FOR MANIMALA RIVER

Creating a comprehensive disaster management plan for the Manimalayar River, specifically addressing the potential for flash floods due to cloudbursts, involves a multi-layered approach. This plan will emphasize the roles and responsibilities of the riverbank community while integrating broader strategies for preparedness, response, recovery, and mitigation.

6.1. Introduction

The Manimalayar River, located in Kerala, has experienced severe flooding events, including a devastating flash flood in 2020 due to a cloudburst. Given the increasing frequency of extreme weather events, it is crucial to establish a detailed disaster management plan that leverages local community involvement, along with support from government agencies and NGOs.

6.2. Objective

To establish a detailed disaster management plan for the communities living along the Manimala River, focusing on preparedness, response, recovery, and mitigation. This plan emphasizes the roles and responsibilities of the riverbank communities, ensuring they are equipped and empowered to protect lives, property, and the environment in the event of a disaster, particularly floods.

6.3. Risk Assessment

6.3.1 Hydrological and Meteorological Analysis

- Cloudburst Likelihood: Analyze historical weather patterns and use satellite data to identify areas prone to cloudbursts.
- Flood Mapping: Develop detailed flood maps indicating high-risk zones along the riverbanks based on past flood events and topographical data.

6.3.2 Vulnerability Assessment

- Community Profiling: Identify vulnerable populations (e.g., elderly, children, disabled) and essential infrastructures (schools, hospitals, etc.) along the riverbank.
- Critical Infrastructure: Assess the vulnerability of bridges, roads, and communication networks.

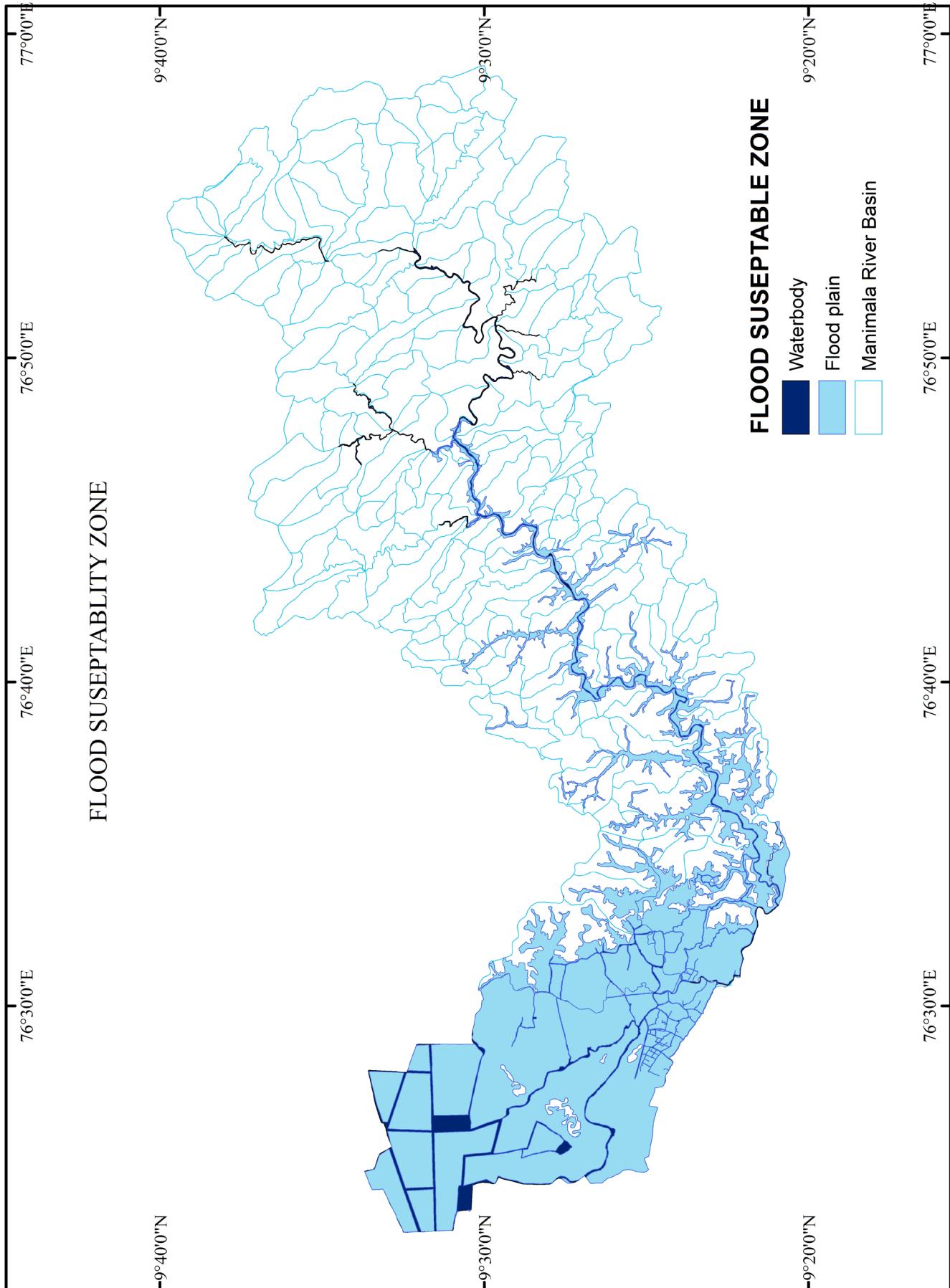
6.4. Preparedness

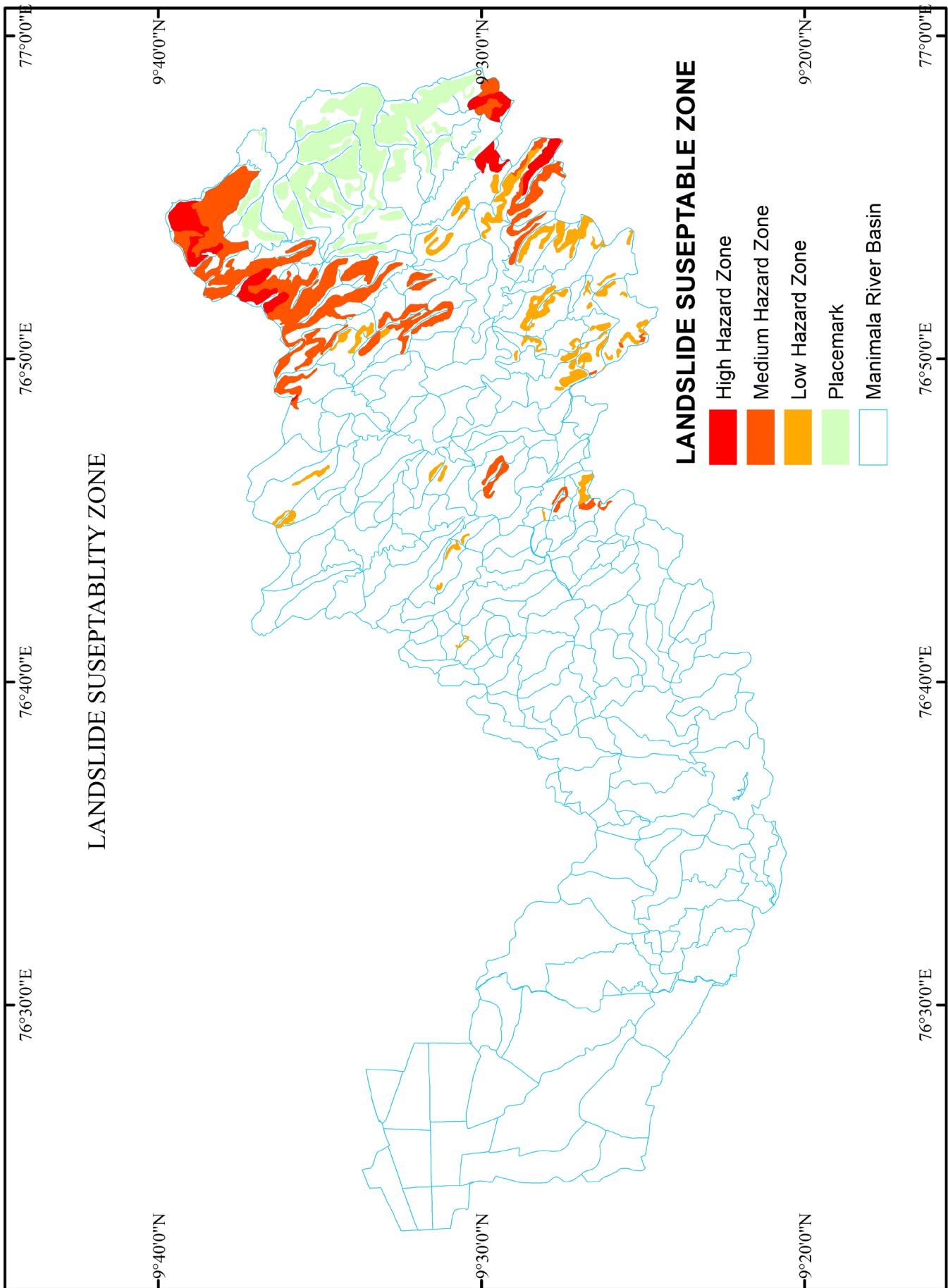
6.4.1 Community Awareness and Education

- Disaster Preparedness Workshops: Conduct regular workshops for the community on flood risks, disaster preparedness, and response strategies.
- School Programs: Integrate disaster preparedness into the school curriculum, involving students in drills and educational activities.
- Awareness Campaigns: Utilize local media, social networks, and community meetings to raise awareness about the importance of disaster preparedness.

6.4.2 Early Warning Systems

- Local Monitoring Teams: Form community-based teams responsible for monitoring weather conditions and river water levels. These teams should be trained in using basic meteorological equipment and in interpreting weather forecasts.
- Warning Dissemination: Establish a robust communication network within the community, including SMS alerts, public address systems, and designated warning coordinators who can quickly disseminate information.





6.4.3 Capacity Building and Training

- First Aid Training: Offer first aid training to community members, focusing on flood-related injuries and common health issues that arise during and after floods.
- Search and Rescue Training: Train volunteer teams in basic search and rescue operations, including the use of boats and rescue equipment.
- Evacuation Drills: Organize regular evacuation drills, ensuring that all community members, including those with special needs, are familiar with evacuation routes and procedures.

6.4.4 Resource Mobilization

- Emergency Supplies: Pre-position essential supplies such as food, water, medical kits, and life jackets in easily accessible locations within the community.
- Community Emergency Fund: Establish a community-managed emergency fund to cover immediate expenses related to disaster response and recovery.

6.5. Response

6.5.1 Activation of the Community Disaster Management Plan

- Early Action: Upon receiving a flood warning, the community monitoring teams should immediately activate the disaster management plan, coordinating with local authorities and disseminating alerts to all households.
- Evacuation: Implement pre-planned evacuation procedures, prioritizing vulnerable individuals. Community volunteers should assist with the transportation of these individuals to designated safe zones.
- Communication: The Village Disaster Management Committee (VDMC) should maintain open lines of communication with district disaster management authorities, ensuring that the community receives timely updates and that any needs for external assistance are promptly communicated.

6.5.2 Community Roles and Responsibilities

- Village Disaster Management Committee (VDMC):
 - o Coordination: Lead the community's disaster response efforts, coordinating with local government agencies, NGOs, and other stakeholders.
 - o Resource Management: Oversee the distribution of emergency supplies and manage the community emergency fund.
 - o Communication: Ensure that all community members are informed about the status of the disaster and the response efforts.
- Emergency Response Teams:
 - o Search and Rescue Team: Comprised of trained volunteers, responsible for rescuing trapped individuals, especially in areas difficult to access.
 - o Medical Response Team: Provides first aid and basic medical care to injured individuals until professional medical help arrives.
 - o Logistics Team: Manages the distribution of food, water, and other supplies, ensuring equitable distribution and prioritizing the most vulnerable.
- Community Members:
 - o Participation in Drills: Every community member is expected to participate in regular evacuation drills and to familiarize themselves with the disaster management plan.
 - o Neighbour Support: Encourage a culture of mutual support, where neighbours look out for each other, particularly the vulnerable.

6.6. Recovery

6.6.1 Damage Assessment

- Post-Flood Surveys: Conduct detailed assessments of damage to homes, infrastructure, and agricultural lands, led by the VDMC in collaboration with local authorities.
- Community Reporting: Encourage residents to report damages to a central hub to streamline the aid distribution process.

6.6.2 Rehabilitation and Reconstruction

- Housing Assistance: Provide financial aid or materials for the repair and rebuilding of homes, prioritizing low-income families and the most vulnerable.
- Infrastructure Repair: Work with local authorities to restore damaged infrastructure, including roads, bridges, and public facilities.
- Livelihood Support: Implement programs to restore livelihoods, such as agricultural aid packages, microfinance loans, and vocational training for those who lost jobs or businesses due to the flood.

6.7. Mitigation

6.7.1 Riverbank Stabilization

- Afforestation: Launch community-driven tree planting initiatives along the riverbanks to reduce soil erosion and improve water absorption, decreasing flood risk.
- Bioengineering Techniques: Use bioengineering methods like vetiver grass planting and building check dams to stabilize the riverbanks and reduce the speed of floodwaters.

6.7.2 Sustainable Land Use Planning

- Zoning Regulations: Work with local governments to enforce zoning laws that prevent construction in high-risk flood zones.
- Community Involvement in Planning: Engage the community in land-use planning discussions to ensure that new developments do not exacerbate flood risks.

6.7.3 Long-Term Infrastructure Development

- Flood Defences: Construct levees, embankments, and retention basins in consultation with experts to protect critical areas from flooding.
- Drainage System Improvement: Upgrade drainage systems in riverbank communities to handle high volumes of water during heavy rainfall.

6.8. Monitoring and Evaluation

- Regular Drills: Conduct annual flood drills involving the entire community to test the effectiveness of the disaster management plan.
- Plan Review and Updates: Review and update the disaster management plan annually based on lessons learned from drills and any actual flood events.

6.9. Conclusion

The success of this disaster management plan relies heavily on the active participation of the riverbank community, supported by government agencies and other stakeholders. By fostering a culture of preparedness, resilience, and mutual support, the Manimalayar River communities can better protect themselves against the devastating impacts of future flash floods.



CHAPTER 7

ROLES AND RESPONSIBILITIES OF STAKEHOLDERS IN HIGHLAND, MIDLAND AND LOWLAND AREAS OF MANIMALA RIVER IN THE DISASTER MANAGEMENT

Roles and Responsibilities of Stakeholders of Highland, Midland and Low-land geography of the river

Introduction

This Disaster Management Plan for the Manimala River addresses the unique challenges faced by the highland, midland, and lowland communities along the river. The plan defines the roles and responsibilities of different stakeholders, including local communities, schools, Grama Panchayat authorities, government agencies, and NGOs. It also provides a structured approach to disaster response, preparedness, and recovery.

7.1. GEOGRAPHIC OVERVIEW AND COMMUNITY RESPONSIBILITIES

7.1.1. Highland (e.g., Koottickal)

- **Primary Risks:** Landslides, flash floods, riverbank erosion, water scarcity, reduced river flow, impact on agriculture, and riparian ecosystem degradation.
- **Community Responsibilities:**
 - **Early Warning and Evacuation:**
Community Role: Establish a local early warning system, using both traditional knowledge and modern technologies like weather apps and river gauges. Encourage households to reduce water use, implement rainwater harvesting systems, and adopt drip irrigation for agriculture.
Schools: Conduct regular disaster drills and include disaster preparedness in the curriculum. Lead water conservation campaigns and encourage students to practice water-saving habits.
Grama Panchayat Authorities: Coordinate with the District Disaster Management Authority (DDMA) of the respective district to disseminate warnings and organize evacuations. Enforce water conservation measures and support the development of rainwater harvesting systems.
 - **Riparian Vegetation Conservation:**
Community Role: Participate in reforestation programs and maintain buffer zones along the river. Engage in efforts to maintain riparian vegetation, which helps retain soil moisture and regulates the microclimate.
Schools: Engage students in tree-planting drives and environmental education. Promote water conservation practices among the community through water recharging and rain water harvesting.
NGOs & Forest Department: Provide technical support and resources for vegetation restoration.
 - **Disaster Preparedness:**
Community Role: Stockpile essential supplies in accessible locations.
Schools: Designate schools as emergency shelters with necessary supplies.
Grama Panchayat Authorities: Develop and distribute disaster preparedness manuals. Make arrangement to provide quality drinking water during and after disasters.
 - **Post-Disaster Assessment:**
Community Role: Assist in rapid damage assessment and reporting.
Government Agencies: Conduct detailed damage assessments and coordinate relief efforts.
 - **Monitoring Groundwater Levels:**
Community Role: Participate in groundwater monitoring and report changes.
Water Authority: Monitor groundwater levels and restrict over-extraction.

7.1.2. Midland (e.g., Vaipur)

- **Primary Risks:** Flooding, riverbank erosion, reduced river and groundwater levels, agricultural losses, and economic impact on farmers.
- **Community Responsibilities:**
 - **Floodplain Management:**
 - Community Role:** Implement soil conservation techniques and avoid activities that exacerbate flooding. Promote waste management practices and prevent open dumping or release of untreated waste water into rivers. Implement community-wide rainwater harvesting and recharge of groundwater through traditional techniques such as percolation tanks or well recharge.
 - Schools:** Educate students on sustainable farming, waste management, healthy lifestyle, and flood management. Create water-saving awareness programs and involve students in rainwater harvesting projects.
 - Agricultural Department:** Provide guidance on flood-resistant crops and soil conservation methods.
 - Grama Panchayath:** Develop water conservation policies and regulate water use during drought periods.
 - **Public Awareness and Education:**
 - Community Role:** Participate in disaster preparedness workshops. Follow and practice guidelines.
 - Schools:** Integrate disaster education into school programs. Conduct mock drills for the students and other stakeholders.
 - Grama Panchayat Authorities:** Organize regular community meetings on disaster preparedness.
 - **Water Resource Management:**
 - Community Role:** Adopt water conservation practices. Establish water-sharing practices between communities for equitable access.
 - Schools:** Lead rainwater harvesting projects.
 - Water Authority:** Monitor water quality and supply during emergencies.
 - NGOs:** Assist in organizing community water-sharing programs and ensure fair distribution.
 - **Agricultural Adaptation:**
 - Community Role:** Transition to drought-resistant crops and adjust planting schedules to suit reduced water availability.
 - Agricultural Department:** Conduct training for farmers on water-efficient farming and provide drought-resistant seeds.
 - **Drought Monitoring and Forecasting:**
 - Community Role:** Participate in collecting and reporting data on rainfall and soil moisture levels.
 - Meteorological Department:** Provide regular drought forecasts to assist in preparedness efforts.
 - Schools:** Implement Local River and rain monitoring programme. Support weather data.
 - **Community Response Coordination:**
 - Community Role:** Establish a communication network with clear roles for each member.
 - Schools:** Act as communication hubs during emergencies.
 - Grama Panchayat Authorities:** Ensure information flow between communities and higher authorities.

7.1.3. Lowland (e.g., Kadapra)

- **Primary Risks:** Severe flooding, waterborne diseases, extreme water shortages, impact on local tourism, increased pollution due to reduced river flow, and health issues due to poor sanitation.
- **Community Responsibilities:**
 - **Water Allocation and Rationing:**
 - Community Role:** Participate in water rationing and ensure that local water resources are shared equitably.
 - Grama Panchayat Authorities:** Implement water rationing plans during periods of drought.
 - NGOs:** Facilitate equitable access to water resources and assist with the distribution of clean drinking water.
 - **Water Quality Management:**
 - Community Role:** Prevent pollution and ensure sanitation practices are followed to maintain water quality during low-flow periods.
 - Schools:** Conduct hygiene and water conservation awareness programs.
 - Health Department:** Monitor and prevent waterborne diseases, and distribute clean drinking water if needed.
 - **Flood Monitoring and Control:**
 - Community Role:** Regularly monitor water levels and report anomalies.
 - Schools:** Educate students on the importance of flood monitoring.
 - Irrigation Department:** Maintain and inspect flood control structures.
 - **Health and Sanitation:**
 - Community Role:** Participate in sanitation drives to prevent waterborne diseases.
 - Schools:** Promote hygiene and sanitation practices among students.
 - Health Department:** Conduct health camps and distribute preventive medicines during floods.
 - **Tourism and Recreation Management:**
 - Community Role:** Ensure responsible tourism practices to minimize environmental impact. Engage with local authorities to mitigate the economic impacts on tourism by promoting off-season tourism activities.
 - Schools:** Raise awareness about the ecological impact of tourism.
 - Tourism Department:** Regulate activities and ensure safety standards are met. Develop alternative eco-tourism activities that are less dependent on river water.
 - **Drought Impact on Health:**
 - Community Role:** Ensure proper sanitation and hygiene to prevent the outbreak of diseases during water scarcity.
 - Health Department:** Conduct health camps to educate on the prevention of drought-related health issues.
 - **Emergency Shelter Management:**
 - Community Role:** Prepare to use schools and community centers as emergency shelters.
 - Schools:** Ensure facilities are equipped and ready for emergencies.
 - Grama Panchayat Authorities:** Oversee shelter management and coordinate with relief agencies.

7.2. DISASTER RESPONSE TEAM STRUCTURE

7.2.1. Highland Area (e.g., Koottickal)

- **Disaster Response Coordinator:** Local Grama Panchayat President
- **Team Members:**
 - **Early Warning Officer:** School Headmaster/Principal

- **Evacuation Leader:** Village Ward Member
- **Medical and First Aid Coordinator:** Local Primary Health Center (PHC) staff
- **Riparian Vegetation Coordinator:** Environmental Club or NGO representative
- **Logistics and Supply Officer:** Local merchant or trader
- **Supporting Agencies:**
 - **DDMA:** Provide technical support and coordinate with state-level agencies.
 - **Police and Fire Services:** Assist in evacuation and rescue operations.
 - **Forest Department:** Support in riparian vegetation restoration and monitoring.

7.2.2. Midland Area (e.g., Vaipur)

- **Disaster Response Coordinator:** Local Grama Panchayat President
- **Team Members:**
 - **Floodplain Management Officer:** Agricultural Officer or local farmer leader
 - **Public Awareness Officer:** School Principal or teacher in charge of disaster education
 - **Water Resource Management Officer:** Local Water Authority representative
 - **Community Communication Officer:** Local ASHA worker or Ward Member
 - **Health and Sanitation Coordinator:** Local health worker or NGO
- **Supporting Agencies:**
 - **Agriculture Department:** Provide advice on soil conservation and crop management.
 - **Health Department:** Conduct health inspections and provide medical aid.
 - **Local NGOs:** Assist in community awareness and mobilization.

7.2.3. Lowland Area (e.g., Kadapra)

- **Disaster Response Coordinator:** Local Grama Panchayat President
- **Team Members:**
 - **Flood Monitoring and Control Officer:** Irrigation Department official
 - **Health and Sanitation Officer:** Local PHC doctor or nurse
 - **Tourism and Recreation Management Officer:** Representative from the local tourism board
 - **Emergency Shelter Manager:** School Headmaster/Principal
 - **Community Liaison Officer:** Local Kudumbashree group leader or NGO worker
- **Supporting Agencies:**
 - **Tourism Department:** Monitor and regulate tourism activities during emergencies.
 - **Public Works Department:** Ensure the maintenance of roads and infrastructure.
 - **NGOs:** Provide support in managing shelters and distributing relief materials.

7.3. Communication and Coordination

- **Inter-Regional Coordination:**
 - **Central Communication Hub:** Managed by the DDMA of one of the districts (Manimala River flows through four districts- Idukki, Kottayam, Pathanamthitta and Alappuzha; hub may be better in Pathanamthitta district- the middle of the river), this hub will connect all disaster response teams from the highland, midland, and lowland regions. It will be responsible for coordinating communication, sharing information, and mobilizing resources during a disaster.
 - **Roles of Stakeholders:**
 - **DDMA:** Coordinate between local, state, and national agencies.
 - **Telecom Providers:** Ensure communication lines remain open during emergencies.
 - **Media:** Disseminate accurate information to the public.
- **Training and Capacity Building:**
 - **Joint Training Sessions:** Regular sessions involving all disaster response teams across regions,

- focusing on skills like first aid, search and rescue, and communication strategies.
- o **Stakeholder Involvement:**
 - Government Agencies:** Provide trainers and resources for capacity-building activities.
 - Schools:** Incorporate disaster management modules into the curriculum and conduct drills.
 - NGOs:** Support in organizing and facilitating training programs.
- **Public Awareness Campaigns:**
 - o **Region-Specific Campaigns:** Tailored awareness programs for each region, focusing on their unique risks and challenges.
 - o **Roles of Stakeholders:**
 - Grama Panchayat Authorities:** Lead awareness campaigns at the community level.
 - Schools:** Host events and workshops to educate students and parents.
 - Local Media:** Broadcast programs and publish materials on disaster preparedness.
 - NGOs:** Develop and distribute educational materials, and organize community events.

7.4. Preparedness and Mitigation Measures

- **Infrastructure Development:**
 - o **Highland:** Construct check dams and retaining walls to prevent landslides and control river flow.
 - o **Midland:** Improve drainage systems to manage excess water during floods.
 - o **Lowland:** Strengthen embankments and create flood bypass channels.
 - o **Stakeholders Involved:**
 - Public Works Department:** Oversee construction and maintenance.
 - Irrigation Department:** Design and implement water management structures.
 - Forest Department:** Support afforestation and reforestation initiatives.
- **Environmental Conservation:**
 - o **Reforestation:** Plant native trees along the riverbanks to stabilize soil and reduce erosion.
 - o **Waste Management:** Implement waste segregation and disposal systems to prevent pollution of the river.
 - o **Stakeholders Involved:**
 - Forest Department:** Lead reforestation efforts.
 - NGOs:** Provide support and resources for community-led conservation projects.
 - Community:** Participate in clean-up drives and maintain cleanliness around the river.

7.5. Response and Recovery

- **Emergency Response:**
 - o **Search and Rescue:** Conduct swift search and rescue operations in affected areas, prioritizing vulnerable populations.
 - o **Medical Aid:** Provide immediate medical assistance and set up temporary health camps in shelters.
 - o **Stakeholders Involved:**
 - Police and Fire Services:** Lead search and rescue operations.
 - Health Department:** Deploy medical teams and resources.
 - Local Volunteers:** Assist in rescue operations and provide first aid.
- **Recovery and Rehabilitation:**
 - o **Damage Assessment:** Conduct detailed assessments to determine the extent of damage to infrastructure, homes, and livelihoods.
 - o **Reconstruction:** Prioritize the rebuilding of critical infrastructure like roads, bridges, and schools.
 - o **Stakeholders Involved:**
 - Public Works Department:** Lead reconstruction efforts.
 - Grama Panchayat Authorities:** Facilitate community involvement in rebuilding.
 - Government and NGOs:** Provide financial and material support for rehabilitation.

7.6. Conclusion

The Disaster Management Plan for the Manimala River aims to create a resilient and well-prepared community by clearly defining the roles and responsibilities of all stakeholders. Through coordinated efforts in preparedness, response, recovery, and mitigation, this plan seeks to minimize the impact of disasters on the Manimala River and its surrounding regions, ensuring the safety and well-being of all residents.





CHAPTER

8

TRAINING SESSIONS

8.1. MANIMALA RIVER: FLOOD DISASTER MANAGEMENT AND SUSTAINABLE LAND USAGE - TRAINING FOR STUDENTS & COMMUNITY

8.1.1 J.J MURPHY MEMORIAL HIGHER SECONDARY SCHOOL, YENDAYAR

As part of Parishthithikam 2021-2022 a training session for students of J.J Murphy Memorial Higher Secondary School, Yendar was conducted on 9th January, 2023. The training was on conducting surveys among the community. The project is aimed at studying the impact of flood disasters in Manimala River basin and developing a disaster management plan based on sustainable land use practices. Structured survey sheets explore the knowledge including traditional knowledge, practices, and community experiences connected with the Manimala River. The study area includes the river basins coming under Kootickal and Kokkayar Panchayaths. Ms. Mariamma Varghese, Principal, J.J.M.M.H.S.S; Dr Punnen Kurian, Secretary, TIES and Diana George, spoke during the session. Mr. Sebin Joseph, Ms. Reshma Raju from TIES, and Ms. Elizabeth, Asst. Programme co-ordinator was present and 50 selected students participated.



Disaster Management Plan Training

As part of the training session, the disaster management plan for Manimala River was presented and discussed. School principal accepted the proposal for conducting regular mock drill in the school. She offered such programmes will be extended to the local community too. The meeting decided to coordinate with Grama Panchayath and district administration for implementing the comprehensive plan as early as possible. A few students shared their knowledge regarding disaster preparedness and it was decided to incorporate their suggestions also in the disaster management programmes.



8.1.2. Devaswom Board Higher Secondary School, (DBHS), Kavumbhagam, Thiruvalla

As part of Paristhithikam 2021-2022 a training session for students of Devaswom Board Higher Secondary School, Kavumbhagam, and Thiruvalla was conducted on 4th July 2023. The training was on conducting surveys among the community. The project is aimed at studying the impact of flood disasters in Manimala River basin and developing a disaster management plan based on sustainable land use practices, structured survey sheets explore the knowledge including traditional knowledge, practices, and community experiences connected with the Manimala River. The study area includes the river basins coming under Kadapra and Mannar regions. Now a days these regions lead to severe flood alert due to overflow of Manimala River. We are selected 50 NSS volunteers for the survey. Ms. Reshma. S (N.S.S P. O), Dr. Punnen Kurian, Secretary, TIES spoke during the session. Mr. Febin Babu Kuriakose and Ms. Noufiya. N programme coordinator TIES was present.



Disaster Management Plan Training

During the second session of the programme Dr. Punnen Kurian and Noufiya presented the disaster management plan for Manimala River. Detailed discussions were held on roles and responsibilities of various community stakeholders, especially of great role of schools. It is decided to conduct regular mock drill in the school. A special time table will be set with permission of school authorities and such kind of activities will be regularly conducted.



8.1.3. N.S.S HIGHER SECONDARY SCHOOL, VAIPUR

As part of Paristhithikam 2021-2022 a training session for students of N.S.S Higher Secondary School, Vaipur was conducted on 4th July 2023. The training was on conducting surveys among the community. The project is aimed at studying the impact of flood disasters in Manimala River basin and developing a disaster management plan based on sustainable land use practices, structured survey sheets explore the knowledge including traditional knowledge, practices, and community experiences connected with the Manimala River. The study area includes the river basins coming under near Manimala River. Now a days these regions led to severe flood alert due to overflow of Manimala River. 50 higher secondary students were selected for the survey. Ms. Jayasree, Principal of N.S.S. Higher secondary School, Vayipur. Dr. Punnen Kurian, Secretary, TIES spoke during the session. Mr. Febin Babu Kuriakose and Ms. Nowfiya. N, programme coordinator was participated.



Disaster Management Plan Training

The Disaster Management Plan prepared for Manimala river based on inputs from the student survey and scientific data was presented and detailed discussion was conducted. The roles and responsibilities of school community in disaster management plan was discussed and decided to form required committees. The NSS volunteer secretary demonstrated the steps of mock drill. Principal of the school suggested to conduct a training for mock drill at school with experts. It is decided to conduct training programmes for parents too. NSS unit of the school will submit a copy of the disaster management plan to the Grama Panchayath President and urge him to adopt for the Panchayath.



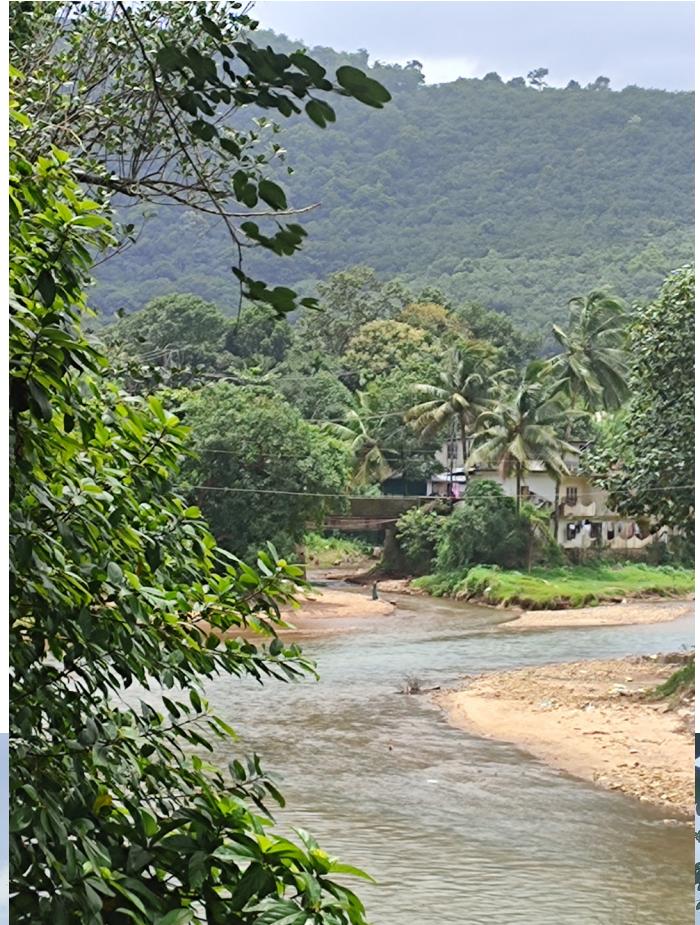
8.1.4. Stakeholder discussion meeting at J J Murphy School, Yendaray

As part of Paristhithikam 2021-2022 a stakeholder discussion meeting was held at J J Murphy School, Yendaray. The meeting also discussed the survey results. Further project activities will be implemented on the basis of the data collected. The meeting was attended by 50 NSS volunteers. Dr. Punnen Kuriyen, Secretary, TIES spoke during the session. Ms. Noufiya. N and Ms. Reshma Raju programme coordinator of TIES was present.



Disaster Management Plan Training

The meeting again discussed the implementation of disaster management plan in the school. It was decided to assign roles and responsibilities to teachers and students to lead the programmes. School principal informed the gathering that she had the opportunity to present the plan in few community meetings and also parents meeting. Students shared their experiences too.



8.2. COMMUNITY TRAINING SESSIONS

8.2.1. KOOTTICKAL PANCHAYAT PARTICIPATORY RURAL APPRAISAL MEETING

As part of Paristhithikam 2021-2022 a community meeting for the people of Koottickal Panchayat was conducted at Library Hall on 22nd January 2023 from 3:30-4:30 pm at Triveni Library and Reading Room, Koottickal. The meeting was hosted for sharing the live experiences of the community with the Manimala River. The meeting was begun with the introduction of the project "Manimala River flood disaster management and sustainable land usage" by Dr. Punnen Kuri-an, Secretary, Tropical Institute of Ecological Sciences. A total of 11 participants took part in the meeting, which includes Mr. Sajimon, Koottickal Panchayat President; Mr. K. S Mohanan, Vikasana Samithi Chairperson; Mr. Jacob George, Library Council Chairperson; Former Panchayat President Mr. P. K Sunny, and few senior citizens from the locality. All participants shared their valuable experiences and also mentioned about the present situation of Manimala River. They gave suggestions for the disaster management too.

After the introductory session, Mr. Sajimon, Koottickal Panchayat President, has shared his childhood experiences with Manimala River. He said that the river bank had Aattuvanchi (Ochreinauclea missionis), Neervanchi (Homonoia riparia) trees, forming a riparian forest and the water was clean and clear on those days. Now the condition has changed a lot. Developmental activities has degraded the river. The sand deposits formed after the flash flood in 2021, has changed the course of the river, so that the sand should be mined away, otherwise it can lead to floods again. The joint effort by the local community during the 2021 flood had a huge impact on saving the lives of many people. The water holding capacity of the river should be increased in the coming years, so that flood can be controlled to an extent. Mr. K. S Mohanan shared his thoughts about the changing climatic conditions in the past and present years. The rich floral water mosses and Aattuvanchi (Ochreinauclea missionis), Neervanchi (Homonoia riparia) trees has declined over the years. He said that land degradation has increased in the past few years, such as improper road construction, increased land usage for constructional activities, etc. The former Panchayat president shared the same thoughts on the issue, appropriate measures should be taken by the authorities. The major reason for the drying up of the Aattuvanchi (Ochreinauclea missionis), Neervanchi (Homonoia riparia) trees, is the clogged plastic waste accumulated during rainy seasons every year, said Mr. Jacob George. The meeting suggested measures to overcome these problems such as increasing the depth of the river, planting the Aattuvanchi (Ochreinauclea missionis), Neervanchi (Homonoia riparia) trees on the river banks, reinstalling the siren system, and also to introduce rain gauges to measure the rainfall.



Disaster Management Plan Training

The Disaster Management Plan for Manimala river was then discussed. Dr. Punnen Kurian presented the roles and responsibilities of various stakeholders in detail. Panchayat President and Standing committee chairman, agreed to adopt the plan for the Panchayath area with a formal approval of the Grama Panchayth Committee. Besides, community members offered to conduct a mock drill related top flood disaster.



8.2.2. KOTTANGAL PANCHAYATH PARTICIPATORY RURAL APPRAISAL MEETING



As part of Paristhithikam 2021-2022 a community meeting for the people of Kottangal Panchayat was conducted in Subash colony (7th ward) on 15th February 2023 from 10:30- 11:30 am. The meeting was hosted for sharing the live experiences of the community with the Manimala River. The meeting was begun with the introduction of the project "Manimala River flood disaster management and sustainable land usage" by Dr. Punnen Kurian, Secretary, Tropical Institute of Ecological Sciences. A total of 11 participants took part in the meeting, which includes Mrs. Neena Mathew Ward Member, and a few people from the surrounding region. All participants shared their experiences of the flood of 2021. They also shared the reminiscence of their childhood river experiences.

After the introductory session, Mrs. Neena Mathew, Ward member Kottangal Panchayat to welcome the people and shared her experience as a ward member during the time of the flood. Ms. Seenath Beevi said that the flood affected her in many ways like the destruction of the house and loss of home appliances, furniture's, etc. and she opined that the main cause of the flood was due to the sand and silt deposition after the prohibition of mining. The construction of the check dam also increased the problem. After the construction of the check dam, there were no facilities for removing the impurities and waste from the water and it became stagnant. Earlier times, people used to dig water by constructing springs (Oaly) in the river. But people don't do it currently.

Shahitha shared same experience regarding the flood. Water entered the house all of a sudden. The entire house was under the water and they were not even able to take the basic items and she lost all her belongings. Senior citizen Mr. Thankappan Achary said that in his childhood, the Manimala River was very pure and clean so people used rivers for bathing and even drinking, directly. But nowadays the river become polluted and people are not using it, as that in earlier times.

Sujamol complained that after the flood, even now her house has wet walls and floor and stink inside the rooms. Even the cold atmosphere prevails even now. The rate of transmittable disease has surged after the flood. The spread of corona pandemic made the situation worse. Due to such conditions, they couldn't go outside home during post flood days, hence many of the compensations have not been received. Ms. Radamani said that she had heavy losses (including the loss of necessary items) during the flood and her house was destroyed partially. Financial aid received from the government was meagre compared to her actual loss.

In conclusion, heavy physical and economic loss were reported and post flood problems are still continuing. Even though the government authorities helped the people in many ways the financial aid received from the government was comparatively less. The meeting suggested measures to overcome these problems such as increasing the depth of the river, removing the impurities and waste from the Manimala River etc.

Disaster Management Plan Training

At the end of the meeting, the disaster management plan prepared for the Manimala River, was presented. Ward member, Ms. Neena Mathew assured that the plan will be presented in the Panchayath committee and follow up action will be undertaken. Community members expressed appreciation on implementing such a plan, which will enable them to manage future disasters more better.



8.2.3 KADAPRA GRAMA PANCHAYAT PARTICIPATORY RURAL APPRAISAL MEETING

As part of Paristhithikam 2021-22, a community gathering was conducted at KVVUPS, Valanjavattom, Kadapra Grama Panchayat, Thiruvalla on 5th august 2023. The meeting was conducted to collect the public opinion regarding the disasters related to the Manimala River. 17 persons from the locality including ward member and CDS chairperson were participated in the meeting. Dr. Punnen Kurian, Principal investigator to the project explained the purpose of the meeting. He urged the participants to share their memory on the experiences with the river. Ms. Susamma Paulose, member, Kadapra grama Panchayat representative, ward 1, has given an overall picture of the situation.



She said that all the participants are experiencing flood every year, since 2018. Earlier, during which rivulets and other natural channels were alive, flooding was never reported in the area. She is living at this place for a period of 38 years. The main reason for the flooding is the clay, sand and waste deposits in the river and rivulets. Encroachments resulted in narrowing of the river and total disappearance of the rivulets. Mr. Soman M.V, a resident described the loss of farming in the area. Due to the untimely flooding which repeats many times a year, has been compelled farmers to abandon farming. Mr. Blessen Mathews, Mr. Yamuna john and few others expressed their opinion and suggestions. CDS chairperson, Ms. Valsala Gopalakrishnan proposed vote of thanks. The summary of the exercise is given below:

Major Issues

- In previous times, trees were planted near the river, forming riparian vegetation. The ward member stated that in the past, when sand removal and cleaning practices were active, they encountered no problems. However, with the cessation of these activities, the river's depth has diminished, leading to the accumulation of clay and silt, which obstructs water flow.
- Encroachment to the river and rivulets resulted in narrowing of the river and total disappearance of several rivulets.
- Since 2018, just after 2-3 rains, the entire area will be flooded.
- The cotton tree (*Hibiscus tiliaceus*) that has been grown alongside the river has branches that slant in its direction, preventing water flow. As a result, clay and silt accumulated and became land.
- The main reason for flooding is the silt and clay deposits, encroachment, and the dumping of waste.
- It is specifically mentioned by the participants on the blockade in Kottachal, one of the main tributaries to the Manimala River that flows through the area. A box type culvert at the mouth of the rivulet have created a permanent blockade. Later dumping of wastes and encroachment contributed to the loss of the rivulet.
- Because of the lack of flow and stagnation, together with pollution cause degradation of water quality and led to the invasion of pond and land leeches.
- Farming has been lost almost from the area. Untimely flooding, recurring several times in a year is the major reason for the abandonment of agriculture.
- Earlier, people used the river for swimming, bathing, washing animals etc. but currently almost no use has reported.
- Due to the annual flooding, recurring damages to the buildings, home appliances, and furniture have been reported.
- Post flood diseases and minor epidemics are regular in the area

Solutions

- Trim and remove tree branches from the area at the river's edge periodically.
- Periodic cleaning of all rivulets and other channels in the water shed.
- Sand, slit, and clay shall be removed from the river and may be used for roads and public construction.
- Farming may be restored if the channels and water flows made functional throughout the year.

Disaster Management Plan Training

During the second session the disaster management plan for Manimala River was presented and the opinion of the participants sought. All the participants unanimously agreed that such a comprehensive plan is necessary for address various disasters. It was decided to conduct mock drills in the Panchayath ground on a regular basis with the support of the local schools. Participants shared their experiences during the time of flood disaster and they demanded the implementation of the plan urgently. Member of Grama Panchayath assured the gathering that the Plan will be presented in their committee and try to get implemented. She offered her service for providing the disaster management plan to all neighbouring grama Panchayaths.





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മന്ത്രിമലയാർ പ്രജയദുരന്ത തിവാരണവും സുസ്ഥിര ഭൂവിനിയോഗ
സാമൂഹിക പരിശീലനവും

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പരിസ്ഥിതി കാലാവസ്ഥ വ്യതിയാന യന്ത്രക്രാംതി, കേരള സർക്കാർ

വിവരഭരണ ഫോം

കാര്യത്വപ്രക്രിയ

I. കൂടുംബ വിവരം

1. ഗൃഹനാമര്ഥ പേര് / ഗൃഹനാമയുടെ പേര് :
 2. വീടുപേര് :
 3. താമസസ്ഥലം :
 4. പോല്ല് ഓഫീസ് :
 5. നദിയിൽ നിന്നുള്ള ആകാശദുരം :
 6. മൊബൈൽ നമ്പർ :
 7. കൂടുംബത്തിലെ അംഗങ്ങളുടെ എണ്ണം : മുതിർന്നവൽ 1 2 3 4 5
കൂടികൾ 1 2 3 4 5

8. വീടിന്റെ സ്വഭാവം : ചെറിയ ഒരു നില / വലിയ ഒരു നില / ഇരുനില / പ്ലാറ്റ് / അപ്പാർട്ട്മെന്റ്
 9. വീടിന്റെ മുറം എങ്ങിനെ? : മുറിമില്ല / ചരൽ / പൂല്ല് / മണ്ണ് / തിരയോട് / മറ്റൊന്തകിലും
 10. വിദ്യാഭ്യാസം : നിരക്കരത / എൻ.എസ്.എൽ.സി./സുന്ദരം /ബിരുദം/പ്രൊഫഷണൽ /മറുള്ളവ
 11. സന്തമായി കൈകാര്യം ചെയ്യാൻ എത്ര സ്ഥലം ലഭ്യമാണ് : എന്ത്
 12. കൂഷിയിടവും പുശ്രയും തമ്മിലുള്ള ഭൂരി : മീറ്റർ
 13. നിങ്ങളുടെ ഭൂമിയിൽ എത്താക്കണ കൂഷികളാണ് ചെയ്യുന്നത് :

വിജ	വിസ്തൃതി	
	മുൻ (20-50 വർഷം)	ഇപ്പോൾ (2022)
കുപ്പ്		
ചേന		
ചേന്യ്		
വാഴ		
തെങ്ങ്		
എലം		
മറുള്ളവ		

II. പുശ്രയുമായുള്ള ബന്ധം

1. എത്ര കാലമായി പുശ്രയോരത്ത് താമസിക്കുന്നു ? : വർഷം

2. പുശ്രയുടെ ഉപയോഗം ?	മുൻപ് (20-50 വർഷം)	ഇപ്പോൾ (2022)
കുളിക്കുക		
നന്നയ്ക്കുക		
കനുകാലിക്കുളെ കുളിപ്പിക്കുക		
കുടിവെള്ളം		
വാഹനങ്ങൾ കൂടുകുക		
ആചാരാനുഷ്ഠാനങ്ങൾക്ക്		
കൂഷി		
മത്സ്യബന്ധന		
ജലധാര		

ജലക്കേളി		
ജലസേചനം		
മനൽ വാരൽ		
കുടിവെള്ള പദ്ധതി		
മറ്റൊളവ്		

3. താങ്കളുടെ നിരീക്ഷണത്തിൽ പുഴയ്ക്കും പരിസരങ്ങളിലും ഇന്ന് കാണുന്ന മാറ്റങ്ങൾ എന്തൊക്കെ?

	കുടി	കുറഞ്ഞു	മാറ്റമില്ല
പുഴയോര വന്ന്			
ആഴം			
വീതി			
വെള്ളത്തിന്റെ ശുദ്ധത			
മത്സ്യസ്വന്ത്			
മലിനീകരണം			
വെള്ളപ്പോക്കവും / ദുരന്തങ്ങളും			
പുഴയുടെ ഉപയോഗ രീതി			
മറ്റൊന്തകളിലും			

4. മിശ്രവിള കുഷിയിൽനിന്നും നാണ്യവിള കുഷിയിലേക്ക് നിങ്ങളുടെ കുഷിരീതി മാറ്റിട്ടുണ്ടോ?

ഉണ്ട് ഇല്ല

ഉണ്ടെങ്കിൽ കാരണങ്ങൾ?

ജലദാർലഡ്യം തൊഴിലാളി ക്ഷാമം വർദ്ധിച്ച കുഷിച്ചെലവ്

ഉൽപ്പന്നങ്ങൾക്ക് വിപണിയിൽ വില ലഭ്യമാകാത്തത് മറ്റു കാരണങ്ങൾ :

5. പുഴയുമായി ബന്ധപ്പെട്ട സംഭവങ്ങൾ / നാട്ടിവുകൾ / ചതിത്രം അറിയാമോ?

III. മാലിന്യനിർമ്മാർജ്ജനം

1. നിങ്ങളുടെ വീടിലെ മാലിന്യങ്ങൾ ഏതൊക്കെ? അവ സംസ്കരിക്കുന്ന മാർഗ്ഗങ്ങൾ?

മാലിന്യം	സംസ്കരണ രീതി
1. ജൈവമാലിന്യം (മുഖ്യമായും അടുക്കളെ മാലിന്യങ്ങൾ)	കുഴിച്ചു മുടുന്നു <input type="checkbox"/> വലിച്ചറിയുന്നു <input type="checkbox"/> മറ്റ് രീതീകൾ <input type="checkbox"/>
2. കാർഷിക മാലിന്യങ്ങൾ (കുഷി അവസ്ഥിഷ്ടങ്ങൾ, ചാണകം, കോഴി, പനി, ആട്ടിൻകാഷ്ടങ്ങൾ)	കുഴിച്ചു മുടുന്നു <input type="checkbox"/> വലിച്ചറിയുന്നു <input type="checkbox"/> മറ്റ് രീതീകൾ <input type="checkbox"/>
3 ഫ്ലാസ്റ്റിക് കുടുകൾ / ഫ്ലാസ്റ്റിക് കൂപ്പികൾ	കുഴിച്ചു മുടുന്നു <input type="checkbox"/> വലിച്ചറിയുന്നു <input type="checkbox"/> മറ്റ് രീതീകൾ <input type="checkbox"/>
4 പൊട്ടുന്ന ഫ്ലാസ്റ്റ്, കൂപ്പി, ട്യൂബ് ലൈറ്റ്, എൽ ഇ ഡി ബെർബ്, പൊട്ടിയ പിന്തുംഖങ്ങൾ തുടങ്ങിയവ	കുഴിച്ചു മുടുന്നു <input type="checkbox"/> വലിച്ചറിയുന്നു <input type="checkbox"/> മറ്റ് രീതീകൾ <input type="checkbox"/>
5 ഇ വേസ്റ്റ് (സി ഡി, മെബെബെൽ പോണ്ട്, ഇലാക്രോൺിക് ഉപകരണങ്ങൾ)	കുഴിച്ചു മുടുന്നു <input type="checkbox"/> വലിച്ചറിയുന്നു <input type="checkbox"/> മറ്റ് രീതീകൾ <input type="checkbox"/>
6 മറ്റു മാലിന്യങ്ങൾ (പഴയ ചെരുപ്പ്, ബാർ) തുടങ്ങിയവ	കുഴിച്ചു മുടുന്നു <input type="checkbox"/> വലിച്ചറിയുന്നു <input type="checkbox"/> മറ്റ് രീതീകൾ <input type="checkbox"/>

2. പുഴയിലേക്ക് മാലിന്യങ്ങൾ അടുത്തിടയായി കൂടുന്നുണ്ടോ?

ഉണ്ട് ഇല്ല അറിയില്ല

3. പുഴയെ മലിനീകരിക്കുന്നതിൽ പ്രധാന കാരണങ്ങൾ എവ?

പൂംസറ്റിക് /ജൈവ മാലിന്യങ്ങൾ വലിച്ചെറിയുന്നത് ദ്രവ മാലിന്യങ്ങൾ വീടുകളിൽ നിന്നും വാനിജ്യ വ്യാപാര സ്ഥാപനങ്ങളിൽ നിന്നും ഷുക്കുന്നത് സെപ്റ്റിക് മാലിന്യങ്ങൾ പഞ്ചായത്ത് / മുനിസിപ്പൽ മാലിന്യങ്ങൾ നിശ്ചേപിക്കുന്നത് കാർഷിക മാലിന്യങ്ങൾ വ്യവസായ മാലിന്യങ്ങൾ മറ്റൊക്കെല്ലും :

IV. പ്രളയവും ആരന്തനിവാരണവും

1. മനിമലയാറുമായി ബന്ധപ്പെട്ട നിങ്ങൾ നേരിട്ടിട്ടുള്ള പ്രക്രതിഭുരുന്നങ്ങൾ താഴെപ്പറയുന്നവയിൽ എത്രയോ കെയ്യാണ്? എത്ര തവണ ഇരു പ്രക്രതി ആരന്തങ്ങൾ നേരിട്ടേണ്ടി വന്നിട്ടുണ്ട്?

പ്രളയം വെള്ളപ്പൊക്കം മണ്ണിട്ടിച്ചിൽ മേലവിസ്ഫോടനം ഉരുൾപെട്ടൽ

ജലജന്യരോഗങ്ങൾ (പകർച്ചവ്യാധി) മണ്ണാലിപ്പ് കാലാവസ്ഥാമാറ്റം

മനൽ വാരൽ ചരൽ നീക്കം കല്ലു പൊട്ടിക്കൽ മറ്റൊക്കെല്ലും :

2. പ്രളയം /വെള്ളപ്പൊക്കം മുലം താങ്കൾക്ക് ഉണ്ടായിട്ടുള്ള പ്രശ്നങ്ങൾ?

ആരിതം	പുർണ്ണം	ഭാഗികം	ഇല്ല
ജീവഹാനി			
വീട് നഷ്ടമായി			
കൂടിവെള്ളം			
വാർത്താവിനിമയ സാക്ഷ്യം			
യാത്രാസൗകര്യങ്ങൾ			
വളർത്തുമുഖങ്ങളുടെ നാശം			
കുഷിനാശം (ഉണ്ടെങ്കിൽ എത്രതാക്കേ വിളകൾ)			

വിളകൾ	എക്കേ നഷ്ടം (എണ്ണം / വിസ്തൃതി)
രഖ്യർ	
എലം	
പച്ചക്കരി	
കുപ്പ്	
ചേന	
ചേന്ന്	
തെങ്ങ്	
മറുള്ളവ	

3. താങ്കളുടെ അഭിപ്രായത്തിൽ പ്രളയം /വെള്ളപ്പൊക്കം, ജല ഗുണനിലവാര ശോഷണം, എന്നിവ ഉണ്ടാകുന്നതി രേഖ കാരണങ്ങൾ?

പ്രളയം / വെള്ളപ്പൊക്കം : അതിതീവ്രമശ മേലവിസ്ഫോടനം (കാലാവസ്ഥാമാറ്റം)

ഭൂവിനിയോഗ രീതിയിലുള്ള മാറ്റം കുഷിരിതികളിലെ മാറ്റം മണ്ണാലിപ്പ് കാരികളുടെ

പ്രവർത്തനം ചെരിവ് കൂടിയ മലനിരകളിലുള്ള നിർമ്മാണപ്രവർത്തനങ്ങൾ / കുഷി

മനൽ വാരൽ പുഴയോര നിർമ്മാണപ്രവർത്തനങ്ങൾ മറുള്ളവ :

ജലശുശ്രാവനിലവാര ശോഷണം : വനനഗ്രീകരണം മണ്ണാലിപ്പ് അഴുകൾ ജലം

വരമാലിന്യങ്ങൾ മറ്റൊക്കെല്ലും :

4. സാമ്പ്രദായിക ആരന്തനിവാരണ വകുപ്പ് പ്രവർത്തിക്കുന്നതായി നിങ്ങൾക്ക് അറിവുണ്ടോ? ഉണ്ടെങ്കിൽ എത്ര പ്രവർത്തനം?

അറിയാം അറിയില്ല കേട്ടിട്ടുണ്ട്

5. മെൽ വിവരിച്ച ആരന്തങ്ങൾ നേരിട്ടുന്നതിന് താങ്കൾക്കോ താങ്കളുടെ പുർവ്വീകർക്കോ എത്രൊക്കെല്ലും പാരമ്പര്യ അറിവുകൾ (നാട്ടിവുകൾ) ലഭിച്ചിട്ടുണ്ടോ ഉണ്ടെങ്കിൽ എവ?

6. പ്രക്രതി ആരന്തങ്ങൾ തടയുന്നതിന് പാരമ്പര്യ അറിവുകൾക്ക് (നാട്ടിവുകൾക്ക്) ഇപ്പോൾ സാധ്യതയുണ്ടോ?

ഉണ്ട് ഇല്ല അറിയില്ല

7. പ്രകൃതിഭൂരതങ്ങൾ നേരിട്ടുന്നതിന് എന്തുതരം സാധ്യതകളാണ് താകൾക്ക് നിർദ്ദേശിക്കാനുള്ളത്?

ശാസ്ത്ര സാങ്കേതിക വിദ്യകളുടെ സഹായത്തോടെ മുൻകൂട്ടിയുള്ള പ്രവചനം
 പ്രവേശനത്തെ മുഴുവൻ ജനങ്ങളെയും തൽസമയം അറിയിക്കാൻ വേണ്ട സംവിധാനങ്ങൾ

 ഒഴിപ്പിക്കൽ ഉൾപ്പെടെയുള്ള മുന്നോറുകളും
 പ്രാദേശിക ഭരണകൂടത്തിന് ഇത്തരം കാര്യങ്ങളിൽ നിരന്തരം ശാസ്ത്രീയ അറിവ് നൽകുകയും ഉടനടി ഇടപെടാൻ ശാക്തീകരിക്കുകയും ചെയ്യുക
 ദുരന്തസാധ്യത പ്രവേശനങ്ങൾ കണ്ണഭത്തുകയും ആളുകളെ മാറ്റി പാർപ്പിക്കുകയും ചെയ്യുക
 ഒന്നും ചെയ്യാനില്ല
 മറ്റൊന്തക്കില്ലോ :

8. ദുരന്തനിവാരണ പ്രവർത്തനങ്ങളിൽ പ്രവേശനത്തെ ശ്രാമവാസികൾക്ക് പകാളികളാകാമെന്ന് നിങ്ങൾ കരുതുന്ന പ്രസക്തമായ മേഖലകൾ എത്രാക്കേയാണ്?

സയം വിവരങ്ങൾ ആർജിക്കുക (ക്രാസുകൾ; ഇൻഡിനെറ്റ്) മറുള്ളവരെ അപകടസാധ്യതകൾ പറഞ്ഞു മനസ്സിലാക്കുക അധികാരികളെ ബന്ധപ്പെടുക പ്രതിരോധ നടപടികൾ സൈക്രിക്കുക രക്ഷാ നടപടികൾ സൈക്രിക്കുക ആളുകളെ മാറ്റി പാർപ്പിക്കുക

9. താഴെപ്പറയുന്ന ദുരന്തങ്ങൾ നിങ്ങളുടെ പ്രവേശനത്ത് ഉണ്ടായപ്പോൾ നിങ്ങൾ സയം (വ്യക്തിപരമായി) അല്ലെങ്കിൽ മറുള്ളവരുമായി (സമൂഹം) രക്ഷാപ്രവർത്തനങ്ങളിൽ എൽപ്പെട്ടിട്ടുണ്ടോ?

വെള്ളപ്പുറകം ഉറുൾപ്പെടുൽ മണ്ണിടിച്ചിൽ മറുള്ളവ :

10. പ്രകൃതി ദുരന്ത വേളയിൽ താഴെ പറയുന്നവരുടെ ശരിയായ ഇടപെടൽ ഉണ്ടായിട്ടുണ്ടോ ?

സംസ്ഥാന സർക്കാർ	ഉണ്ട്	ഇല്ല	അറിയില്ല
ദുരന്തനിവാരണ വകുപ്പ്			
ജില്ലാ പഞ്ചായത്ത് / ബ്ലോക്ക് പഞ്ചായത്ത്			
ശ്രാമപഞ്ചായത്ത്			
വിദ്യുത്ത് ഓഫീസ്			
പ്രവേശനത്തെ മതസ്ഥാപനങ്ങൾ			
സാമൂഹ്യ സംഘടനകൾ			
രാഷ്ട്രീയ പ്രസ്താവനങ്ങൾ			
സ്കൂളുകൾ			
കോളേജുകൾ			
മറുള്ളവ			

11. പ്രളയം /മേഖലവിസ്ഥോടനും ഇവ ദുരന്തങ്ങൾക്ക് ശേഷം എന്തൊക്കെ മാറ്റങ്ങളാണ് നിങ്ങളുടെ പ്രവേശനത്തു ഉണ്ടായിട്ടുള്ളത്?

പുണ്ണി	
കുടിവെള്ളം	
വെള്ളത്തിന്റെ ഗുണനിലവാരം	
രോഗങ്ങൾ	
മറുള്ളവ	

12. നിങ്ങളുടെ പ്രവേശനത്ത് ഉണ്ടാകാനിടയുള്ള പ്രകൃതിഭൂരതങ്ങളെ കുറിച്ച് ഇപ്പോൾ അറിവുണ്ടോ? ഉണ്ടെങ്കിൽ ഇവിടെ നിന്ന് ലഭിച്ചു/ എങ്ങനെ ലഭിച്ചു?

ഉണ്ട് ഇല്ല

13. പ്രകൃതി ദുരന്തങ്ങൾ നേരിട്ടാൻ താകളുടെ അഭിപ്രായത്തിൽ എന്തൊക്കെ ചെയ്യാം?



PARISTHITHIKAM

2021-22

**MANIMALA RIVER:
FLOOD DISASTER MANAGEMENT AND
SUSTAINABLE LAND USAGE**

TROPICAL INSTITUTE OF ECOLOGICAL SCIENCES
DIRECTORATE OF ENVIRONMENT AND CLIMATE CHANGE