



## IMPULSE EFFECT OF THE FLOOD ON THE LIVELIHOODS OF MARINE FISHERS IN KERALA

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### ABSTRACT

The devastated flood that ravaged Kerala had pegged the loss in the livelihood of fishermen incurring damage to craft, gear and other fishing accessories. The total loss due to damage or washing away of crafts, gear and engine was Rs 6.72 crores in inland and Rs 4.24 crores in the marine fisheries sector. Amidst the fishers lost considerable employment and unrealised wages due to flood and their involvement in the rescue operations. A study was conducted to assess the impulse effect of the flood on the livelihoods of marine fishers in Kerala with special focus on analysing the role played by the fishermen in the relief activities which could result in streamlining more policies and measures to enhance the livelihood of fisher community as well as mitigating flood in future. The results revealed that an average of 2- 4 week's employment days of the fishers have been lost due to flood and alternative livelihood options of the fishermen have also been affected with the highest average loss incurred for fish farming (45.45 per cent). The study suggested imparting training to fishers as one of the appropriate method for mitigating flood or other natural hazards in future owing to fisher's proximity to nature and their rich fishing experience. However, for confronting the impending disasters and to get rid of from the future havocs, appropriate proactive policies and action plans should be developed with the proactive participation of stakeholders.

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### INTRODUCTION

Disasters are another factor affecting the fishermen community of India (Sarkar and Sarma, 2006). National Disaster Management Act, 2005 defines disasters as events that cause substantial loss of life, property and environment. (Bhandari, 2006). It read, "Disaster means catastrophe, mishap, calamity or grave occurrence in any area, arising from nature or man-made causes, or by accident or negligence which result in substantial loss of life, of human suffering or damage to, and destruction of property, or damage to, or degradation of environment, and is of such nature or magnitude as to be beyond the coping capacity of the community of affected areas (Das, 2012). In the late 1960s, disasters and its impact and occurrences were recorded retrospectively.

However, off late, the disasters are frequently occurring in the recent times in comparison to the beginning of the centuries. But it is also evidential that the registration of the disastrous events partakes a steady increase over time, conversely. Over the years, the reports of disaster occurrence have increased fourfold in numbers. Proliferation of technological development, telecommunication, media, international co-operation and humanitarian funds are the major factors that tremendously encouraged the reporting of disasters in the recent years (Bich *et al.*, 2011). Disasters are prone to tropical belts affecting mostly the developing nations with relatively less economic growth. Since 1900s, occurrences of natural disasters have risen to about 300 every year and 250,000 human lives are lost and about 200 million people are affected victims. Globally,

90% of the natural disasters and 90% of the total disasters are reported from the developing countries (World Bank Annual Report, 2010; Toya and Skidmore, 2010).

Cyclones that occur along the tropical regions are termed as 'Tropical cyclones'. Bangladesh, India, Vietnam, China, Japan and Philippines are the top six cyclone-prone countries of the world. With reference to the world wide cyclones, the Indian Ocean is one of the major tropical cyclone-prone regions. (Purohit, and Suthar, 2012). Cyclones from Indian Ocean emerge between two inter-monsoon seasons: May to June and October to November; with a primary peak in November and a Secondary peak in May. Four States (Andhra Pradesh, Odisha, Tamil Nadu and West Bengal) and one Union territory (Pondicherry) on the East Coast and One State (Gujarat) on the West Coast are most vulnerable to cyclone disasters. (Mohapatra et al., 2012). In the recent year's cyclonic storms such as Thane (2011) in Tamil Nadu, HUD HUD (2014) in Odisha, Vardah (2016) in Tamil Nadu and Ockhi (2017) in Tamil Nadu, Kerala and Lakshadweep were developed as very severe and extreme cyclonic storms with varying intensities thereby causing deadliest and costliest damages to the people and their environment. (Rao et al., 2013; Vivek and Kumar, 2015)

Fishing continues as a mainstay for coastal and inland fishing communities in Kerala. It is the prime source of livelihood of more than 8 lakh marine fishermen and among this, more than two lakhs of fisher folk are actively engaged in fishing along the coastline inhabited across 222 marine fishing villages. The state exports fish products worth approximately Rs. 1200 crores (MPEDA, 2018), and has an average domestic sales worth Rs. 6000 crores annually (CMFRI, 2018), accounting for roughly three per cent of the state revenue. Amidst all these contributions the fisheries sector is grappled with innate problems like seasonality of landings and uncertainty of prices which often creates vulnerability among the fishers affecting their livelihood like seasonality of income, decreasing fish landings, social standards. The natural hazards, including the increasing problems of coastal erosion, high power tides, cyclones, climate change induced risks, especially, floods, tsunami, sea-wave formations, etc. seriously impact the livelihoods of the coastal communities in the state. The saga of the natural

hazards to fishermen can be clearly visible from 2004 to 2018. The devastated Tsunami on 26 December 2004 was the most remarkable calamities which left behind huge and widespread destruction in the coastal villages of Kerala. Kerala suffered substantial losses along around 250 km of coastline. In terms of economic loss, around 60 mechanized boats, 949 engine (OBM) fitted boats and 4,068 traditional crafts were lost/fully damaged with 336 mechanized boats, 571 engines fitted (IBM/OBM) boats and 4,898 traditional crafts were partially damaged. In addition, 915 MT of fishing nets and 349 fishing nets of various types were lost or fully damaged. Infrastructure losses include 8 fishing harbour and 15 fish landing centres which were affected. Besides overwhelming the hazards of Tsunami, fishers had been severely rubbed off by the Cyclone Ockhi that hit the states of Kerala and Tamil Nadu during 2 December 2017 which had also resulted in the loss of life of a large number of fishermen, destabilising their families and livelihoods. Media reports claim that more than 398 people (fishermen) were found missing and mostly dead. It was a line with recuperating the harsh effects of Ockhi the ruthless struck of the recent flood during 2018 August made fishers' life even more miserable. It is quite an inevitable fact that the community is always in some traumas of the devastating natural disasters (Shyam et al., 2019).

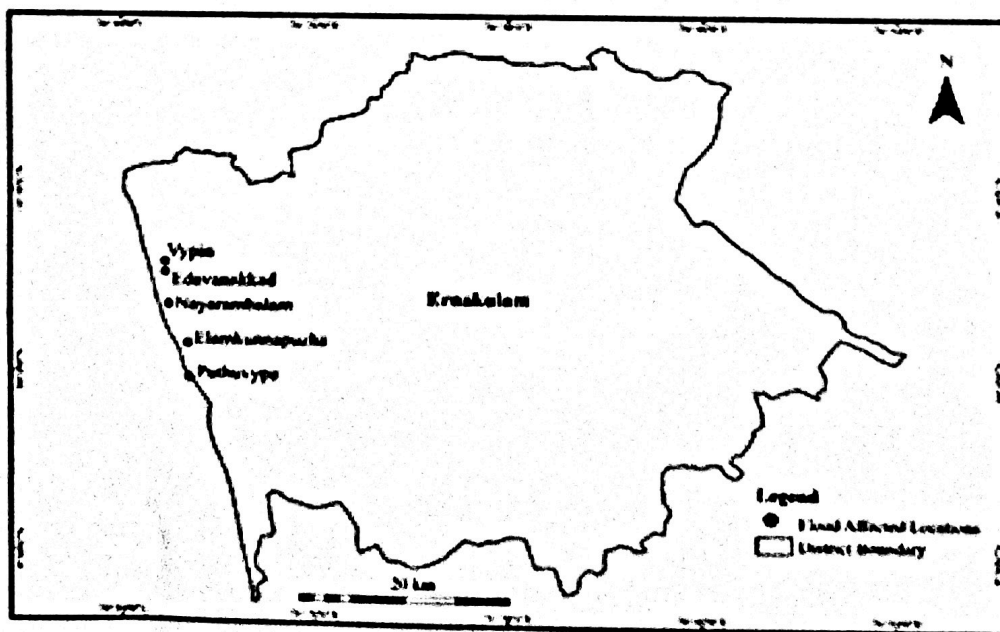
The devastated flood that ravaged Kerala had pegged the loss in the livelihood of fishermen involved in inland fishing at about Rs 93.72 crores. Losses incurred due to damage to craft and gear in inland and marine capture fisheries have been estimated at Rs 10.96 crores. Many of the fishing gear and accessories were washed away from the stacking sites. The loss in damage and craft includes total loss due to damage or washing away of crafts, gear and engine is about Rs 6.72 crores in inland fisheries and Rs 4.24 crores in the marine fisheries sector. The districts most affected by floods with inland fishing were Idukki, Alappuzha, Ernakulam, Kottayam and Thrissur districts whereas Malappuram and Kollam districts were more affected in marine fisheries sector. The reduction in fish catch during the floods and resulting employment losses in days and reduced wages was at its peak. Moreover, there has been extensive damage to aquatic environment such as a change in the course of rivers, siltation of water bodies, accumulation of debris and a gradual

decline in water level. There have also been significant changes in the type of fish being caught in major rivers post the floods. At the same time, it would not be possible to specify a time-frame by which the situation in the fisheries sector would normalise.

The fishers played an instrumental role as they helmed rescue operations in areas cut off by the flood. They travelled across the states with their boats, spending their own money to reach remote areas, rescued people from their inundated homes and saved hundreds of lives. They went in droves, sailing their boats into the rising waters to save lives, and at the risk of damaging their equipment their only source of income has tuned them to the real blue army of the state and rightly referred to as the Superheroes without capes. The fishers lost considerable employment and wage due to flood and involvement in the rescue operations (Imelda *et al.*, 2018). This necessitates the need for conducting a study to analyse the effect of flood of livelihood of the marine fishers in Kerala. Therefore, this study aims at assessing the impulse effect of flood in the marine fisheries sector of Kerala with special focus on its impacts in the livelihood of fishermen. The study also aims in analysing the role played by the fishermen in the relief activities due to drastic flood and to streamline more policies and measures to enhance the livelihood of fisher community as well as mitigating flood or any natural hazards in future.

## MATERIALS AND METHODS

Information was collected from the flood affected villages of Ernakulam district of Kerala by employing a multi-stage sampling method. In the first stage, from all the flood affected villages of Ernakulam were selected based on the quantum impact of flood and subsequently, the major flood affected villages with high fishermen population were selected, i.e., Puthuvype, Vypin Elamkunnapuzha, Nayarambalam and Edavanakkad and using a well-structured schedule (Fig. 1). Twenty households from each village were chosen randomly, which made a total sample of 100 respondents for the study. Secondary data from related publications and websites were also used in the study. The study analysed the socio economic status of the respondent's, awareness and perception regarding flood, loss incurred due to flood, damage assessment, constraints in relief camps, participation in rescue activities and the suggestions for mitigation of flood in future. The study also elicits the extent of government support to the refugees, relief and rescue operation done by the fishermen and the suggestions for mitigating flood in future. The study was conducted during August- September 2018 a week after post flood. Descriptive, econometric and content analysis were done to draw meaning interpretation from the data and to arrive at policy guidelines and concerted interventions from the government.



**Fig. 1: Study Locations**

**RESULT AND DISCUSSIONS**

**Socio-Economic Profile**

The demographic profile of the respondents reveals that the majority of the respondents (55%) belonged to the age group of more than 45 years and 35 per cent of respondents belonged to the age group of 35-45. The educational profiling indicated that 80 per cent of the respondents have their educational qualification up to primary level, 15 per cent with primary education and about only 5 per cent have acquired graduation.

**Fishing Experience**

The experience in fishing is an important attribute which measures the fisher tenacity to combat adverse climatic conditions. The results indicated that that, 73.24 per cent of the respondents have more than 25 years of experience 16.58 per cent with experience between 10-25 years and 10.18 per cent with less than 10 years (Fig. 2). The analysis on the dependency on fishing as a livelihood indicated that 86.15 per cent of respondents are engaged in daily fishing activities, 12.69 per cent gone for fishing on alternative days and only 1.16 per cent of the respondents undergo twice in a week for fishing activity (Fig. 3).

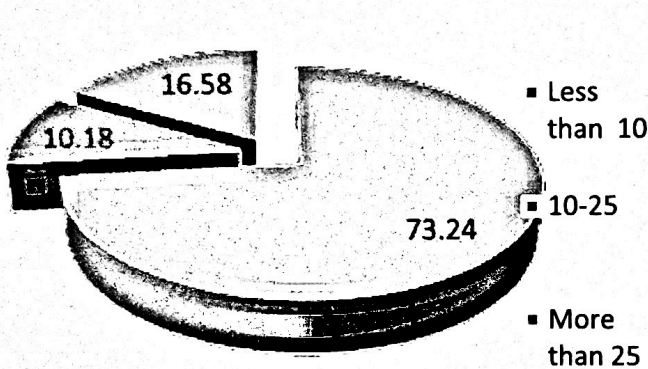


Fig. 2 Experience in fishing

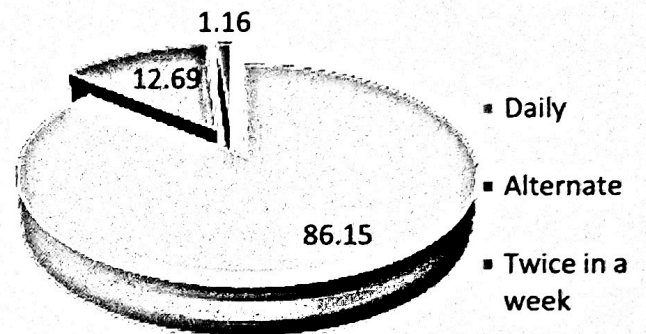


Fig. 3. Dependency on fishing

**Awareness on the occurrence of flood**

The awareness on the occurrence of flood is very important in adapting to the disaster management events thereby reducing the impact of the disaster. The results regarding different sources of information related to the awareness of flood are

depicted in Fig. 4. The study reveals that a majority of 55 percent of the respondents were aware of flood beforehand from the news followed by 15 percent of them from friends, 10 percent from the community groups and internet and only a 2 percent from other sources.

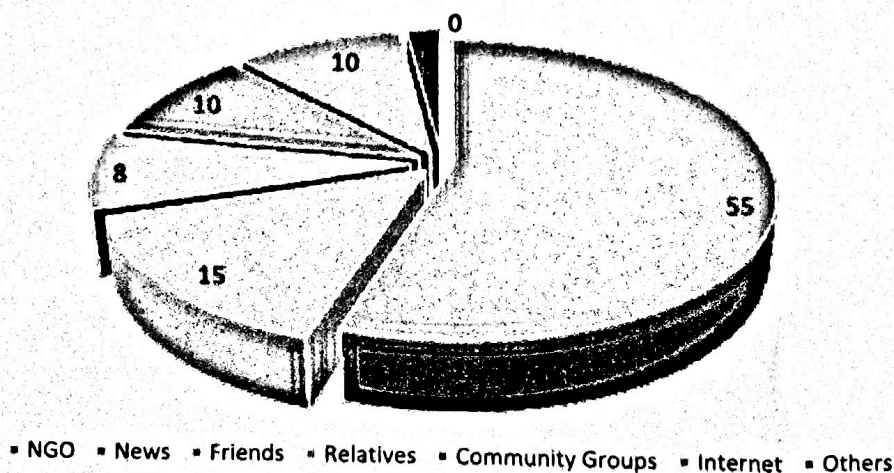


Fig. 4. Awareness and perception regarding flood

As Kerala battled flood, the role played by the social media is quite inevitable. The state government and residents had taken social media to help to the coordinate rescue efforts and offer support to those who need it. Social media users utilize the Twitter, Facebook etc. to provide information about those were stranded in different parts of Kerala who need access to relief. While the state was heading out rescue operations, many citizens had also attempted to use social media to share information and connect people to those who can help them. Users have posted messages with the hashtag #Kerala Floods to coordinate the rescue operations. Aside from attempting to coordinate rescue operations, citizens also used social media to provide instant updates to the people over the unaffected flood areas to confront the situation and also encouraged others to donate supplies or money to help those affected by the floods. A new rule of the state merged with the untiring support and timely intervention of the youngsters in lending their services to the flood affected victims

**Damage assessment and economic losses**

Rapid damage and economic loss assessment was

done across the study area and the extent of damage to the livelihood of fishermen has been derived. The assessment of physical damage and its cost estimation was done based on the perception from deluge affected fishermen. The affected fishers opined in terms of their loss incurred on assets, employment, valuables, alternative livelihood and the different cost incurred for rehabilitation activities, medical expenses, displacement etc (Vishnu *et al.*, 2019). The economic loss due to damage or loss of infrastructure was estimated based on partial or complete destruction of their boats/fishing equipments at its value prior to the disaster. This also includes the repair cost of boats/fishing equipments prior to its destruction (Sebastian and Sabhlok, 2019). The loss of stored inputs and accessories were also included under damages by valuing at market rates (Ali and George, 2021). The economic loss due to production loss was estimated based on the final fish catch prior to flood. The average yields and prices recorded in the previous fishing seasons were used for estimating the economic loss for different species of fishes. The different loss and cost estimated are pointed out under the following heads.

S N	Loss	Definition
(i).	Asset loss	Loss incurred on assets( partial/ complete)
(ii).	Employment loss	Loss due to insufficient employment days
(iii).	Alternative livelihood loss	Loss incurred on agriculture, livestock, SHG activities etc.
(iv).	Medical expenses	Loss due to improper treatment and hospital facilities
(v).	Displacement	Relocation constraints due to flood
(vi).	Valuables / Documents	Loss of individual /family documents

**Asset Loss**

Disaster often accompany huge property losses and destruction of inventories. The flood created havoc with most of the homes worst hit with damages to their durables: television, refrigerator, mixer-grinder, washing machine and other household items completely. About 55 percent of the respondents have opined that there is complete damage incurred to the household durables of about a loss of Rs. 0.75-3.00 lakhs whereas house amenities including, electricity, drinking water facilities, toilets and vehicles have incurred a partial damage about Rs.0.50-5.00 lakh.

The average losses incurred due to damage to fishing gear and boat were partial and are estimated to be Rs.2.00 lakh. The fishing crafts were washed away and damaged by hitting against obstacles. The value of household goods lost, including basic utensils, in flood-ravaged areas in the area is yet to be properly estimated in the official accounts of the loss. The damage is beyond estimation and proper measures have to be undertaken to overcome the loss incurred.

**Employment loss**

Fisheries sector place a significant role in food production of Kerala state contributes about 9.6%

of the total agricultural income of the state. Various activities of fishing and its value addition viz. fishing, fish culture, marketing and processing provides employment to more than 20 lakhs people (Ravi et al., 2018). The study shows that the flood has caused a complete destruction over the fishing employment sector. The results point out that an average of 2- 4 weeks employment days of the fishers have been lost due to flood. Since as a victim of flood, respondents couldn't go for fishing thereafter. Water get lodged in nearby areas and home made it difficult for going to work (Tripathi et al., 2020). Most of the respondents were relocated to nearby camps, engaged in rescue activities and some of them got diseased and hospitalized due to flood and hence made life more miserable without work. The immediate assistance of Rs.10, 000 for the flood victims by the government have been in certain cases denied/ delayed by the local bodies due to several reasons like political conflicts, religious considerations, and favouritism. The enquiry inspection by the local body officials for the disbursal of the flood relief kits to the fishers on the affected areas also attracted criticism due to nepotism and delay. Moreover, the active participation of the fishers in the relief activities had cause huge loss in their fishing equipments. The respondents alleged that the immediate assistance of Rs.10, 000 for the flood victims by the government have been in certain cases denied by the local bodies due to several reasons like political conflicts, religious considerations, and favouritism. Moreover, the active participation of

the fishers in the relief activities had cause huge loss in their fishing equipments.

### Alternative livelihood loss

The effect of flood caused immense damage to agriculture and livestock and is confined to an immediate vicinity of the coast, which includes loss of standing crops and death of livestock, which has significant impact on the livelihoods of the poor, especially women (Agarwal, 2018). In addition, disturbances caused by the disaster to soil fertility and water etc. will result long-term negative impact on agriculture, indirectly affecting those considered these as an alternative livelihood apart from fishing. Wage labourers and seasonal workers have also been affected tremendously by the flood. Disaster has added to the vulnerability of such sections due to loss of employment. According to Fisheries Department report, the aquaculture sector suffered a loss of Rs 174.80 crore. It is estimated that about 5.87 lakh fish from domestic farms were lost. Most of the aquaculture farms were washed away and aquatic livestock in private ponds were lost. During the flood, most of the farms and hatcheries were also submerged furnished heavy loss to the fisheries sector. The analysis on the incurred alternative loss (Fig. 5) have also proved that the average loss incurred for fish farming is the highest (45.45 per cent) followed by agriculture (18.18 per cent), other livelihood options (15.15 per cent), poultry (12.12 per cent) and animal husbandry (9.09 per cent).

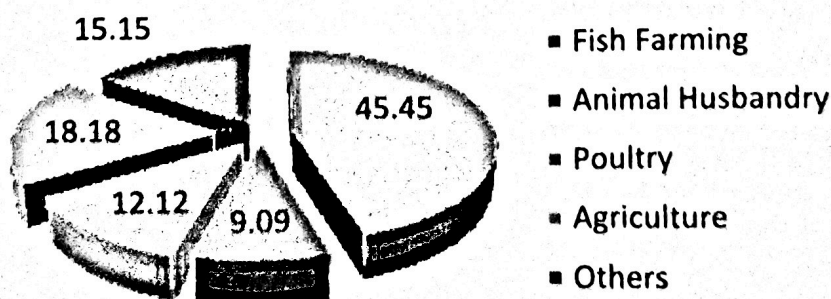


Fig. 5. Incurred alternative loss

### Medical expenses/mortality

The respondents had incurred severe health issues while residing in flood relief camps. Insufficient

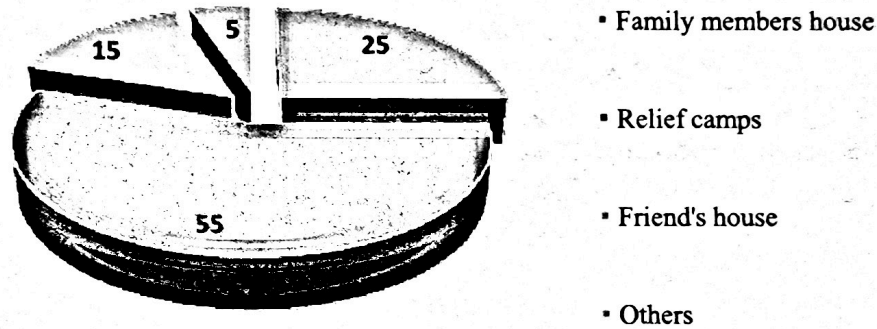
transportation facilities made the condition very worse and so that health issues have not get completely cured. Around an average of Rs. 3000-5000 has incurred to meet the medical expenses.

More than 250 refugees in relief camps have sought medical aid from hospitals (Singh *et al.*, 2018). Many hospitals have stopped routine surgeries in order to cope with a surge of patients from neighbouring hospitals. They are also suffered with dearth of medical team. Some of the residents in the relief camp have got chicken pox, diarrhoea etc. which worsened the health situation. The medicines and medical aids provided by different self-help and social groups have cured the condition to some extent. Besides these hiccups no human life loss has been reported any of these areas.

**Displacement**

The displacement of peoples to different safe places was the most terrific tasks done by the

fishermen. Following heavy rain and flooding, around 40,000 people were shifted to more than 250 temporary rehabilitation camps in Ernakulam district. Government schools, Colleges, NGO's etc. were the major relief camps during the havoc of flood (Cheriyam and Oommen, 2019). The study depicts that most of the people were relocated before flood and about 55 percent get relocated to the nearby relief camps at school, 25 per cent to the family members houses, about 15 percent to friend's house and 5 per cent get relocated to other places. The results of relocation places are indicated in Figure 6. The relief camps were brimmed with stories of shock, loss and love. Thrown together from circumstances beyond their control, men, women and children in the camp find hope and joy with their limited circumstances.

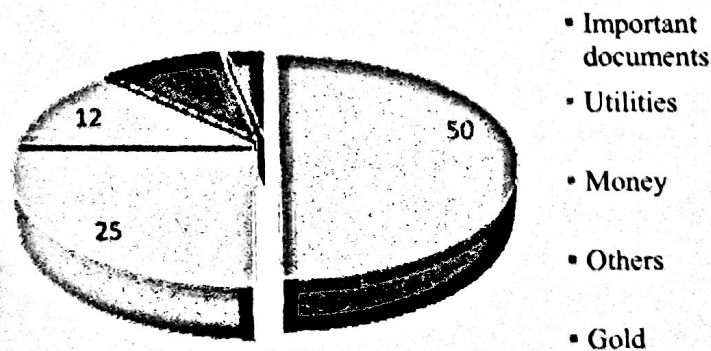


**Fig. 6.** Relocation places of displacement due to flood

**Valuables/documents**

The study shows that thousands of homes and buildings got demolished by the flood and along with it, important documents were also destroyed and lost. Almost 50 per cent of the respondents of the study have lost they valuable documents such as passport, aadhar card, voters ID, ration card, RC book, driver's license, etc. followed by 25 per cent have lost their utilities (households such as

vessels, plates, kitchen hold utilities etc.), 12 per cent have lost their money, 10 per cent have lost their other valuable savings and about 3 per cent have lost their gold ornaments and other jewellery. The Government of Kerala had made elaborate arrangements regarding the recovery of the important documents and measures to enhance the loss of other valuable savings. The results of the loss incurred on valuable savings is depicted in Fig 7.



**Fig. 7.** Loss incurred on valuable savings

### Constraints in relief camps

The relief camps were full-fledged with clothes and other relief materials. Within the limited space the volunteers were able to cook food at the camp for the refugees. Apart from these food items and water have been supplied by different personals

such as shop owners, members of social groups, SHG's etc. Beyond some political issues and internal conflicts, the refugees were very much satisfied with the arrangements of the relief camps. The constraints faced by the respondents in the relief camps were ranked by their order of preference (Table 2).

**Table 2.** Constraints in relief camps

Reason	Score	Rank
Insufficient food	3.43	IX
Lack of cleanliness	96.57	II
Faced Discrimination	10.06	VIII
Lack of proper sanitation	99.39	I
Over crowded	59.99	V
Internal conflicts	77.68	IV
Favouritism attributed to political lineage	89.94	III
Timely availability of medicines	40.01	VI
Shortage of medical support	22.32	VII
Others	0.61	X

The results show that lack of proper sanitation (99.39 per cent) was the major constraint faced by the respondents in the relief camps due to the over crowd of people and low sanitation facilities were the major reason behind this. It was followed by lack of cleanliness (96.57 per cent), Political Issues (89.94 per cent), Internal conflicts (77.68 per cent) Over crowdedness (59.99 per cent) Unavailability of medicines (40.01 per cent) Shortage of medical support (22.32 per cent) Faced Discrimination (10.06 per cent), Insufficient food (3.43 per cent) and others (0.61 per cent). Overall life of the relief camps was highly satisfied beyond all these constraints.

### Participation in relief activities

Fishers were indeed the real heroes of the almost all the rescue operations done in Kerala. Navy officials, the press, people on social media, politicians across party lines and thousands of local residents who were rescued by the fishermen have commended their efficient and selfless service especially in the worst-flooded districts of Pathanamthitta, Alappuzha, Ernakulam and Thrissur. The involvement of fisher folk in the

rescue effort is remarkable considering the fact that they belong to the lower rungs of Kerala's socio-economic ladder, are often invisible to other residents of the state, and at times neglected by the government. Despite this, they mobilized swiftly and efficiently to join the rescue efforts – often at their own cost – and utilized their skills and equipment to help save thousands of lives (Joseph et al., 2020). In Alappuzha alone, fishermen rescued 16,000 people using their boats, according to a statement from the some of the fishermen.

Fishers from Ernakulam have participated in majority of the relief activities undergone in – Alappuzha, Aluva, Chalakkudy, Chengannur, Vypin, and Paravur. Around 30-60 people have been saved per boat in different turns. Fishers doesn't receive any remuneration and government support for these relief activities. Many of them even brought their own initial stocks of fuel and paid for the costs of transporting their boats by truck to the flooded inland districts. Their unique assets – motorized boats and GPS – and their ability to navigate flood waters fearlessly proved to

be invaluable during the rescue efforts. The rescuers have also sustained damages and injuries. For instance, many of their boats were damaged by the debris concealed by the flood water, which are at risk when they face the sea.

**Suggestions for mitigating flood in future**

Imparting preventive measures before an impending flood could reduce the extent of damage to home property and other valuable losses. Rather than trying to prevent floods altogether, flood mitigation involves the management and control of flood water movement, such as redirecting flood run-off through the use of floodwalls and flood gates, and wet proofing properties. It also involves the management of people, through measures such as evacuation. The management and mitigation of flooding can be handled at three levels: on individual properties, small communities, and whole towns or cities. The costs of protection rise as more people and property are protected. It is estimated that for every rupee spent on mitigation, four rupees is saved. The different preventive

measures or suggestion for mitigating flood were analyzed and the study shows that imparting training to fishers can be one of the best method for mitigating flood or other natural hazards in future as the fishers are more close to nature and their movements. About 81.01 per cent have supported to consider imparting training to fishers for carrying rescue operations as the first suggestion for mitigating flood in future. Better weather information dissemination mechanisms hold the second (70.25 per cent) followed by engaging LSG in information sharing (63.49 per cent), strengthening the inter-governmental linkages (57.50 per cent), mapping of flood prone areas in advance (52.33 per cent), information sharing through mobile (47.00 per cent), better governmental support in rescue operations (32.50 per cent), awareness campaigns for confronting flood (29.56 per cent) and other measures (18.50 per cent). Beyond all the doubts, proper mechanization of all these suggestions will mitigate flood in future to a very great extent. The results of the study regarding the suggestions for mitigating flood in future are depicted in the fig. 8.

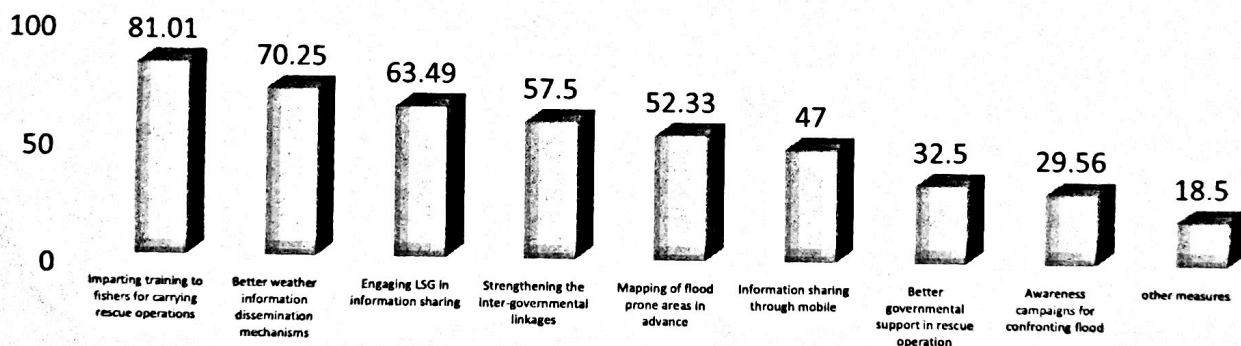


Figure 8. Suggestions for mitigating flood in future

**Conclusion**

The short impulse effect of flood assessment identified that the amidst of the huge losses incurred the fishermen in Kerala had done numerous extraordinary things during the havoc of unprecedented flood that had crippled many parts of the state. The youth of the state played a very crucial role in saving the people from the fury of the flood. The study suggests in initiating proper measures to avoid hazardous disasters in future by conducting campaigns and awareness programs among the youth and children regarding

protection and conservation of nature. Introducing climate change working groups among the villages could promote more education on climate change and thereby enhancing disaster management plans. Incorporating fishermen as the skilled cadre of permanent disaster response teams could be more effective in confronting the impending disasters and to get rid of from the future havocs. More policies and action plans should be developed inculcating at all the levels of the society for overcoming more natural hazards in future.

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**Conflict of interest:** I declare that authors do not have any conflict of interest.

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