Impact Assessment of Kerala Flood 2018 and Adaptive Measures of Paddy Farmers in Elavanchery Panchayat, Palakkad

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Abstract

The study entitled "Impact assessment of Kerala flood 2018 and adaptive measures of paddy farmers in Elavanchery Panchayat, Palakkad" has been carried out with the objectives of assessing the impact of flood on paddy farmers in Elavanchery Panchayat, analysing the extent of use of adaptive measures available to paddy farmers and identify the constraints faced by the farmers in availing and using these measures. The study was conducted using primary data collected from 60 paddy farmers affected by flood in the Panchayat. From the study it was found that Elavanchery Panchayat was badly hit by flood in terms of its agriculture and the reason for flood in the area was landslide from Neliyambathi hills. After hit of flood there is a significant decrease in production and also the net income received by the farmers. The average income reduced from Rs.134413.93 to Rs.79140.81. 10.. Most of the farmers have taken agriculture credit and crop insurance as an adaptive measure before flood. But after flood they only received government assistance for agriculture (Rs.13500 per ha) as an adaptive measure. Constraints in availing adaptive measures before flood is less probability of risk occurrence in the area and after flood is lack of awareness as said by the farmers. All the farmers are of the opinion that the assistance should be made timely and it should be adequate for the loss. Government should try to provide timely and adequate assistance to the farmers. Also measures should be taken to increase the awareness of farmers about the assistance provided by the government.

Introduction

Natural disaster is a major concern for all, because it causes death, injuries, destruction and displacement. Above all it is a major challenge in the achievement of development goals of the government. Flood is a major natural disaster since it affects large regions and causes huge damages. Agriculture is one of the sectors which are highly vulnerable to flood. Kerala is a state in the south western, Malabar Coast of India. The state is experiencing humid tropical wet since it lies in the tropical region. The state of Kerala receives some of India's highest rainfall during the monsoon season. It has the 13th largest population in India. Half of the population in Kerala live in rural areas and are dependent on rural livelihoods such as farming. However, during 2018 the state experienced its highest level of monsoon rainfall in decades. According to the India Meteorological Department (IMD), there was 2346.3 mm of rainfall, instead of the average 1649.55 mm. Kerala received more than two and half times rainfall over the average during August. Between August 1 and

19, the state received 758.6 mm of rainfall, compared to the average of 287.6 mm, or 164% more. This was 42% more than during the entire monsoon season. In some areas of Kerala, flood water was between 3-4.5m deep. Flood in Kerala killed more than 410 people since June 2018 and it is said as the worst flooding in 100 years. Many of those who died had been crushed under debris caused by landslides. More than 1 million people were left homeless in the 3,200 emergency relief camps set up in the area. Parts of Kerala's commercial capital, Cochin, were under water, congesting roads and leaving railways across the state impassable. The state's airport, which is used by domestic and overseas tourists, was closed causing major disruption. Local plantations were also affected by flood endangering the local rubber, tea, coffee and spice industries. Schools in all 14 districts of Kerala were closed and some districts have banned tourists because of safety concerns. Challenge was maintaining sanitation and preventing disease in relief camps which was housing more than 800,000 people. Authorities also had to restore regular supplies of clean drinking water and electricity to the state's 33 million residents. Officials have estimated more than 83,000 km of roads will need to be repaired. The geographical features of Kerala including its abundant water availability make it suitable for cultivation of different crops. But unexpected change occurring in climate is a threat to agriculture. Due to the flooding, major crop systems in the state have been negatively impacted, with the plantation industry at risk of losing up to EUR 88 million and 40% of the current crops.

According to reports over 56439 ha is the estimated loss in agriculture (The Malayala Manorama, 2018) and farmers also suffered with heavy damages. Palakkad also known as rice bowl of Kerala had a loss of 8484 ha and the major crop affected is paddy, since Palakkad district comes in first position regarding area under cultivation of paddy according to Agricultural statistics, 2017. Government is undertaking continuous rescue and relief measures for the rehabitalisation and rebuilding of Kerala. Any study conducted in this context, is helpful for the state government for carrying out the relief measures effectively and efficiently. The real situation of affected farmers can also be traced out through studies. This study has been conducted with the objectives of assessing the impact of flood on paddy farmers in Elavanchery Panchayat, analysing the extent of use of adaptive measures available to paddy farmers and identify the constraints faced by the farmers in availing and using these measures.

Materials and Methods

The study was conducted in Elavanchery Panchayat in Palakkad district since it is one of the affected Panchayats as per government statistics. Out of total 2000 farmers, 1872 farmers (about 94%) were affected by flood in this Panchayat. Hence the Panchayat is selected for the study. The study was mainly based on primary data. For the purpose of achieving the objectives of the study, primary data on variables such as socio economic profile of the paddy farmers, distinctive agricultural operations, extent of use of adaptive measures and the constraints in availing and using these measures have been collected from the respondent farmers through structured interview schedule. Secondary data was also made use for the study from newspapers, articles, published materials, websites etc. Palakkad district is the rice bowl of Kerala, hence paddy farmers are taken for the study. The list of affected paddy farmers was collected from Elavanchery Krishibhavan. Out of total 358 paddy farmers affected by flood in the Elavanchery Panchayat, a sample of 60 was selected for the study which is more than 10% of the population.

The collected data were analysed using descriptive statistics, index and paired t test.

Results and Discussions

Socio economic profile of the paddy farmers

Age is an important socio economic parameter which is related to the experience of the farmers in farming. The more experience the farmers have, the more knowledge they have, to reduce the impact of flood and to adapt the suitable measures to reduce the loss. From the table 1 it can be seen that majority of the respondents (93.34%) are above the age of 40 years with an average age of 54 years. This indicates that most of the farmers belong to middle aged and old aged category (above 40 years). There are only four farmers who belong to the age category of less than 40 years which implied that youth are not interested in taking up agriculture as an attractive profession. It could also imply that majority of farmers have enough experience in farming. Gender - wise breakup of the respondents reveals that overwhelming majority (86.67%) of them are male. As seen generally in Kerala, men are dominating in the agricultural sector in the study area. Education levels of respondents determine farmer's ability to process information and take decision accordingly. It is also an important factor that might influences the level of awareness and usage of

adaptive measures by the farmers. Table 1 shows that most of the farmers have primary and secondary education (78.34%). It has to be noted that illiterate farmers are less (3.33%). and only 10% of farmers are in the category of graduation and above. It implies the reluctance of educated youth to take up agriculture. Family classification shows that following the general trend in Kerala, most of the farmers (88.33%) belong to nuclear family. Agriculture itself is the primary occupation for 90% of farmers and all of them are not involved in any secondary occupation. This indicates their sole dependency on agriculture as source of income. Annual family income of more than half of farmers (73.33%) falls in the category of below Rs.1 lakh. So it indicates that impact of flood cannot be reduced by the farmer alone. Since their financial backup is not that strong. They will need the support from government so that rebuilding is possible.

Distinctive features of agriculture operation

Experience in paddy cultivation: From the table 2 it can be observed that 98.3% of farmers have more than 5 years of experience on paddy cultivation and it is clear that reason for the long year of experience is that they have undertaking paddy cultivation as a tradition practice for a long period and derived from their family itself. Since it is the staple food of Kerala, its cultivation need to be done. Here the farmers believe in doing it by themselves as they mastered this skill.

System of paddy cultivation: Among the respondent farmers majority (51.67 %) of farmers are cultivating paddy alone and other 48.33% are engaged in other crops along with paddy. The major crop cultivated along with paddy is vegetables. It is to be noted that no farmer is being engaged in integrated farming. Integrated farming can be considered as a risk management technique. Here since no farmers were engaged in integrated farming, their exposure to natural calamity risk is more.

Classification of farmers based on land holding: While classifying farmers based on their land holding it can be seen that most of them fall in to the category of marginal and small farmers (73.33%). Large farmers are less in the study area. It has to be noted that farmers having occupational income above 1 lakh is 26.67% which is same as that of large farmers

Land utilization pattern: season wise: Virippu season in the study area is from April-May to Sept-Oct and Mundakan from Sep-Oct to Dec-Jan. No paddy cultivation is undertaken during Punja season due to lack of water in the area. It could be observed from table 3 that out of the total farmer's majority of the farmers (80%) are cultivating paddy in their own land in both Virippu and Mundakan season and most of them are marginal (83.33%) and small farmers (100%). It is noteworthy that large farmers have more dependency to leased land as compared to small and marginal farmers.

Variety of paddy used by farmers: Most used variety is Jyothi (67.14%) followed by Uma (27.14%), since these are the two widely cultivated rice varieties in Kerala due to its nutritional value and acceptability among people. Jyothi is most preferred during Virippu season as it has high demand even in open market. Uma is preferred along with Jyothi in Mundakan season as it is having high yield. Uma take 130 days for harvest where as Jyothi take only 110 days. So it is the reason why Jyothi is most preferred during Virippu season.

Sources of water for cultivation: Source of water for cultivation is through irrigation for most of the respondent farmers (93.33%). Only 6.67% of farmers solely depend on rain for cultivation and because of that reason they have fewer yields during Mundakan season. And sometimes they don't even get yield. Rainfed farmers are also affected since there was unusual rainfall which was more than expected.   For the farmers, for irrigating their fields the major source of irrigation is canal water (50%) followed by bore well (30.30%). Canal water is from Chulliyar dam and the rivers flowing in the area are Ikshunadi and Gayathripuzha which are mainly used for irrigation purpose. Since most of the paddy fields are located near to water sources, flood completely submerged paddy fields in the area.

Season wise production of paddy: It is observed from Table 4 that 70% of the farmers have production in the range of 1000-2000 kg during Virippu season and 68.52% have production in the range of 1000-2000 kg during Mundakan season. It is also seen that there is only one farmer getting production above 3000 kg. During Mundakan season, the number of farmers getting yield is only 54. This is because six farmers having no yield from the paddy cultivation due to lack of water.

Cost of paddy cultivation: Cost of cultivation of paddy is the sum total of cost of field preparation, cost of inputs, cost of fertilizers and manures, labour cost and all other cost involved with respect to cultivation. It can be observed that 13.33% of farmers incur cost of cultivation above Rs.30000 per acre and majority of farmers

(86.67%) incur cost below Rs.30000. Average cost per farmer is Rs.71746.17. It should be noticed that cost of cultivation is same for both seasons.

Season wise net income from paddy cultivation: Net income is the product of the sales volume and price. And this price varies according to their marketing channel. From the Table 5 it can be observed that majority of farmers during Virippu (55%) and Mundakan (56.6%) have net income in the range of Rs.20000-Rs.40000 and Number of farmers who sold paddy in the market (both SUPPLYCO and open market) in the last year in Mundakan season is 53.The reduction in number of farmers who sold paddy in the market in Mundakan season is due to unavailability of adequate quantity of water in the study area during the said season. Through SUPPLYCO paddy farmers are getting a price of Rs. 25.30 per kg. The open market price varies between Rs.17-20 per kg. Average net income per farmer is Rs.134413 and Rs.133969.71 during Virippu and Mundakan season respectively.

Sources of agricultural credit availed by farmers: It can be observed from Table 6 that eight farmers have not taken any agriculture credit from institutional and non-institutional sources and majority among them are marginal farmers. It is due to loan unavailability on rented land and also farmers averse to indebtedness. Most favourite sources of credit of the respondent farmers are public sector banks and cooperative banks. Public sector banks are preferred by farmers due to nearness of public sector banks like Canara bank and Punjab National Bank. Also accounts are opened by the farmers in the public sector banks for getting subsidy and amount from SUPPLYCO. Interest free loan from cooperative banks also attracts farmers to it. Non institutional sources are completely avoided by farmers. Private sector banks are less approached due to the high rate of interest.

Institutional support of farmers: It can be observed from Table 7 that all farmers are having high level of contact with Padashekarasamithi. Since it is the major source of information for the farmers who cannot go to Krishibhavan every time. Krishibhavan is also contacted often for agriculture needs. Panchayat is approached for tax related matters. Since SUPPLYCO deposits the amount of paddy procured, in bank account, banks are also often contacted. Paddy Research Station and KAU are least contacted. And some of them have visited KAU only through the tour arranged from the samithis

Impact assessment of flood on paddy cultivation

Reason for flood: Reason for flood is natural factor in the study area. Since the area is low land, landslides from Neliyambathi hills caused water enter into the area. Chulliyar dam was also opened at that time. Continuous heavy rainfall and overflowing rivers made the condition worse. Result was fields merged in water.

Severity of flood: From the Table 8 it can be observed that only one farmer among the respondents had flood affected on both cultivation and property. And he incurred a loss of Rs 10000. Remaining farmers had flood impact only on cultivation. But none of them moved to relief camp instead they stayed in their relatives' house. As a result, they didn't avail any non agricultural assistance from government

Effect of flood on crop: It can be observed that out of the total farmers 16.67% of farmers had complete crop failure following which they had no yield for the first season. Other 83.33% of farmers had partial crop failure but still harvest was obtained. Some of their paddy had a black colour due to which marketing became difficult at that time. SUPPLYCO also refused to take produce of some farmers and if taken weight was accordingly reduced.

Field condition after flood: Table 9 shows that 98.33% of farmer's field condition is not affected by flood. And 1.67% of farmer's field is not fertile as there is pest attack after flood. Most of the farmers have not yet tested the soil after flood, so their opinion on fertility is only based on the behaviour of crops in the newly sown land.

Pest/ disease occurrence: After flood there was pest and disease occurrence on the crops of majority (78.33%) of farmers. No pest and disease occurrence was felt among 21.67% of farmers. The major disease affected was Bacterial Leaf Blight. Paddy had also significant black colour due to which there was problem while selling the produce.

Losses: Table 10 reveals that 25% of farmers had lost input due to flood. Most of them had a loss of amount up to Rs.10000. Main loss was with motor as it was kept in the field, so its repair required certain amount. 75% of farmers had no loss on input as they had kept the motors safe from the field and there was no stocking of inputs in the field.

Production after flood: Table 11 shows that 55% farmers had production below 1000 kg after flood. 16.67% of farmers had no yield due to complete failure of crop. No farmers had production above 3000 kg after flood where it was 1.67% before flood. It shows that there was considerable decrease in production after flood hit when compared to before flood scenario. Paired t test is found to be significant at one percent level which implies that there is significant difference in paddy production before and after flood.

Table.1 Socio economic profile of the farmers

Particulars	Number of farmers	Percentage (%)
Age		
Less than 40	4	6.66
40-60	34	56.67
Above 60	22	36.67
Average age (years)	54	
Gender		
Male	52	86.67
Female	8	13.33
Education		
Illiterate	2	3.33
Primary	22	36.67
SSLC	25	41.67
HSS	5	8.33
UG	5	8.33
PG	1	1.67
Type of family		
Nuclear (<=4)	53	88.33
Joint (>4)	7	11.67
Occupation category		
Agriculture	54	90
Government employee	2	3.33
Private job	3	5
Others	1	1.67
Annual income		
<Rs.50000	26	43.33
Rs.50000-Rs.75000	17	28.33
Rs.75000-Rs.100000	1	1.67
>Rs.100000	16	26.67

Source: compiled from primary data

Table.2 Experience in paddy cultivation

Particulars	Number of farmers	Percentage (%)
Years on paddy cultivation		
1-3 years	0	0
3-5 years	1	1.67
>5 years	59	98.33
Reasons for continuing paddy		
Tradition	57	95
Geographical feature	1	1.67
High market value	2	3.33
Low cost	0	0

Table.3 Land utilization pattern: season wise

Category of farmers	Virippu				Mundakan			
	Own	Own & lease	Lease	Total	Own	Own & lease	Lease	Total
Marginal	20 (83.33)	2 (8.33)	2 (8.33)	24 (40)	20 (83.33)	2 (8.33)	2 (8.33)	24 (40)
Small	20 (100)	0 (0.00)	0 (0.00)	20 (33.33)	20 (100)	0 (0.00)	0 (0.00)	20 (33.33)
Large	8 (50)	6 (37.5)	2 (12.5)	16 (26.67)	8 (50)	6 (37.5)	2 (12.5)	16 (26.67)
Total	48 [80]	8 [13.33]	4 [6.67]	60 [100]	48 [80]	8 [13.33]	4 [6.67]	60 [100]

Source: compiled from primary data
Note: (i) Figures in simple bracket represent percentage share of each to farmer category total
(ii) Figures in square bracket represent percentage share of each to total farmers

Table.4 Season wise production of paddy

Production per acre (kg)	Virippu	Mundakan
Less than 1000	5(8.33)	9(16.67)
1000-2000	42(70)	37(68.52)
2000-3000	12(20)	7(12.96)
More than 3000	1(1.67)	1(1.85)
Total	60 (100)	54 (100)

Source: compiled from primary data
Note: Figures in simple bracket represent percentage share of each to column total

Table.5 Season wise net income from paddy cultivation

Net income per acre	Virippu	Mundakan
< Rs.20000	3(5)	7(13.21)
Rs.20000-Rs.40000	33(55)	30(56.6)
Rs.40000-Rs.60000	23(38.33)	14(26.42)
Rs.60000-Rs.80000	0	1(1.89)
>Rs.80000	1(1.67)	1(1.89)
Total	60 (100)	53 (100)
Average income (Rs.)	134413.93	133969.71

Source: compiled from primary data
Note: Figures in simple bracket represent percentage share of each to column total

Table.6 Sources of agricultural credit availed by farmers

Farmers	No access	Have access (Number of farmers)					Grand total
		Public sector banks	Private sector banks	Cooperative bank	Non institutional	Total	
Marginal	5	15	0	14	**0**	29 (33.33)	34
Small	2	16	1	19	**0**	36 (41.38)	38
Large	1	12	0	10	**0**	22 (25.29)	23
Total	8 (8.42)	43 (45.26)	1 (1.05)	43 (45.26)	**0 (0.00)**	87 (91.58)	95

Source: compiled from primary data
Note: (i) Figures in simple bracket represent percentage share of each to row total
(ii) Figures in bold bracket represent percentage share of each to column total

Table.7 Institutional support of farmers

Institutions	Strength of contact			Score	Index	Rank
	H	M	L/nil			
Krishibhavan	47	8	5	162	90	2
Panchayat	32	7	21	131	72.78	4
Paddy Research Station	0	1	59	61	33.89	5
KAU	0	0	60	60	33.33	6
Bank	33	19	8	145	80.56	3
Padashekarasamithi	60	0	0	180	100	1

Source: compiled from primary data

Table.8 Severity of flood

Category	Number of farmers	Percentage (%)
Affected cultivation only	59	98.33
Affected both cultivation and property	1	1.67
Total	60	100

Source: compiled from primary data

Table.9 Field condition after flood

Category	Number of farmers	Percentage (%)
Not fertile	1	1.67
Not affected	59	98.33
Total	60	100

Source: compiled from primary data

Table.10 Losses

Category	Number of farmers	Percentage (%)
Loss		
Up to Rs.10000	11	18.33
Rs.10000-Rs.20000	2	3.33
Above Rs.20000	2	3.33
No loss	45	75

Source: compiled from primary data

Table.11 Production after flood

Production per acre (kg)	Before flood	After flood
No yield	0(0.00)	10(16.67)
Less than 1000	5(8.33)	33(55)
1000-2000	42(70)	16(26.67)
2000-3000	12(20)	1(1.67)
More than 3000	1(1.67)	0
Total	60(100)	60(100)
Paired t test: Sig.0.001*		

Significant at 1 %
Source: compiled from primary data
Note: Figures in parenthesis represent percentage share of each to total

Table.12 Marketing channel after flood

Channels	Before	After
SUPPLYCO	55 (91.67)	40 (81.63)
Open market	5 (8.33)	6 (12.24)
Mill	0	2 (4.08)
Seed corporation	0	1 (2.04)
Total	60(100)	49(100)

Source: compiled from primary data
Note: Figures in parenthesis represent percentage share of each to total

Net income after flood: Most of the farmers (97.96%) got net income below Rs.40000 due to decrease in yield. Even though they got yield the produce had a black colour which reduced its weight while selling and thus

reduced the net income of farmers. There is also decrease in the number of farmers having net income more than Rs.40000 after flood. Average income after flood is Rs.79140 per farmer which was Rs.134413 before flood. Paired t test is found to be significant at one per cent level which implies that there is significant difference in net income before and after flood.

Marketing channel after flood: Table 12 shows that there is change in the marketing channel after flood. Farmers who sold their produce through SUPPLYCO became 81.63% which was 91.66% before flood. And there aroused two new marketing channels which are mill and seed corporation due to its unacceptability from SUPPLYCO.

From the study it was concluded that most of the respondents were marginal farmers and 90% of them are doing agriculture alone. So the income received most of them are below Rs.50000. After hit of flood there is a significant decrease in production and also the net income received by the farmers. There aroused the situation of selling produces through other channels instead of the usual ones. 10 farmers were affected by complete crop failure following they had no income for that season. The reason for flood in the area was landslide from Neliyambathi hills and since the area is low land water rushed in to the fields. Most of the farmers have taken agriculture credit and crop insurance as an adaptive measure before flood. But after flood they only received government assistance for agriculture (Rs. 1500 per ha) as an adaptive measure. Constraints in availing adaptive measures before flood is less probability of risk occurrence in the area and after flood is lack of awareness as said by the farmers. All the farmers are of the opinion that the assistance should be made timely and it should be adequate for the loss. Government should try to provide timely and adequate assistance to the farmers. Also measures should be taken to increase the awareness of farmers about the assistance provided by the government.

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