Socio-Economic and Environmental Impact of Landslide: A Case Evidence from The Households of Kavala Para, Malappuram District, Kerala

[1]Anees Rehman A, [2]Jomy Cyriac, [3]Jancy Varghese

[1,2] Ph. D. Scholar, Department of Economics Bharathiar University, Coimbatore

[3] PG Student, Department of Economics Bharathiar University, Coimbatore

ABSTRACT

Landslide is movement of soil and rock under the direct influence of gravity, earthquake, shaking and other factors can also induce landslide underwater. The loss of property and damage to source of livelihood remain incalculable as the destruction has been widespread. The eco rich malappuram district, its proud residents believe, is rich with geographical diversities except for deserts. But monsoon after monsoon, the densely populated district has been proving that it's rich in natural disaster too. In recent times, there has not been a monsoon without a landslide. The casualty count tends to rise by the year. The life of people in the disaster area is pathetic. After the disaster the people come out from this help by the government and people of kerala state. The geological study says that the affected area is not habitable, so all the people should migrate from the place to another place. This study focused on the socio-economic and environmental impact of landslide with respect to Kavala Para.

Keywords: Landslide, Kavala Para, Cultivation, Reconstruction

INTRODUCTION

A landslide is defined as the movement of a mass of rock, debris towards down to earth surface. Landslide is movement of soil and rock under the direct influence of gravity, earthquake, shaking and other factors can also induce landslide underwater. The loss of property and damage to source of livelihood remain incalculable as the destruction has been widespread. The eco rich malappuram district, its proud residents believe, is rich with geographical diversities except for deserts. But monsoon after monsoon, the densely populated district has been proving that it's rich in natural disaster too. In recent times, there has not been a monsoon without a landslide. The casualty count tends to rise by the year.

The largest subaerial landslide in earth's recorded history was connected with the 1980 Eruption of Mount St. Helens Volcano in Washington State USA. In that landslide had a volume of 2.8 cubic kilometers   (0.67 cubic miles) of material and the landslide traveled about 22.5 kilometers (14miles) down the north Fork Toutle River. Landslide is more widespread than any other geological event, and can occur anywhere in the world. Between 1998 – 2017, landslide affected an estimated 4.8 million people and cause more than 18000 deaths. Climate change and rising temperatures are expected to trigger more landslides, especially in mountains areas with snow and ice. As permafort melts, rocky slopes can become more unstable resulting in a landslide.

Although monsoon rains cause landslide every year economic activities and the climate crisis are increasing the risk especially in the Himalaya and the Western Ghats. 264 people died in landslide as per the reported accidental death and suicides in 2019 by the National Crime Records Bureau. The 65% of these fatalities happened in the Himalayas and the Western Ghats. The natural disaster such as lightening, the effects of landslide, deforestation and damage of property, fields, roads, and water supplies, an cascading effect on the local economy. A study by the National Institute of Disaster Management (NIDM) in 2011 estimation suggested that India suffers Rs. 150 – 200 Crore of monetary loss every year from landslides. India was one of the countries most affected by human triggered fatal landslide in the 2004 – 16 period. The human activities like construction of roads, building, railway, mining and quarrying and hydropower projects also damage hilly slopes and impact natural drainage by removing soil and vegetation, loosening soil and gravel and making the hills more susceptible to landslides. Unpredictable weather events such as heavy, intense rainfall due to the climate crisis are adding another layer of complexity to landslide in the country.

In Kerala, most of the parts of Western Ghats region are expiring the climate change with intensive rain triggers, weakening of the grip of mountain soil. According to P.U.Das, "a soil conservation officer based in Wayanad, rainwater seeps into the subsoil during monsoons peak to loosen the firm grip between mud and rocks". As water bearing earth starts tumbling down along with rocks landslide occur. As many as 145 people died in landslides in the last two year in Kerala. The tragedy indicates that massive rains and major landslides would continue to be annual affairs. A policy for people living in ecological fragile areas prone to yearly landslides and floods is needed.

The 8th August 2019 Kavalapara landslides has been occurred in the western ghats of Kerala. Apparently nature has responded furiously to human vandalism. The district is now paying the price for mindless development carried out in recent decades by destroying hills, forests, water bodies and

wetlands. The number of deaths by drowning in flood water was, however, few mudslides turned out to be the real villian and it was not the rain alone the triggered such an mammoth mudslide as the one that took away many families of Kavalapara.

METHODOLOGY

In the 2019 August 8 the big landslide was held in kavalapara in Malappuram district. The district Malappuram the Nilambur taluk the disaster area is on Pothukal Panchayath the kavalapara disaster is selected on the basis of affected people. In order to realize the objective of kavalapara disaster in the Malappuram district of Kerala was choosen as a study area.

MATERIALS AND METHODS

The primary survey was conducted with the help of interview schedule containing all relevant queries. The simple and multistage random sampling method was used for sample selection of 46 households in the kavalapara, Pothukal Grama Panchayath of Nilambur block and Nilambur taluk, Malappuram districts.

RESULTS AND DISCUSSION

This segment of the paper aims at evaluation socio-economic and environmental impact of landslide. The primary data collected are analysed and presented here in order to arrive at valid conclusion.

Result of Calculation on Classification of Income and Loss on Total Agriculture

Classification of income	Total agriculture lost					Total
	No Loss	below 5000	5000-10000	10000-20000	above 30000	
Low Income	4	5	2	1	0	12
	33.3%	41.7%	16.7%	8.3%	0.0%	100.0%
	33.3%	29.4%	15.4%	50.0%	0.0%	26.1%
Moderate Income	4	10	6	1	2	23
	17.4%	43.5%	26.1%	4.3%	8.7%	100.0%
	33.3%	58.8%	46.2%	50.0%	100.0%	50.0%
High income	4	2	5	0	0	11
	36.4%	18.2%	45.5%	0.0%	0.0%	100.0%
	33.3%	11.8%	38.5%	0.0%	0.0%	23.9%
Total	12	17	13	2	2	46
	26.1%	37.0%	28.3%	4.3%	4.3%	100.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

This table explain the cross tabulation on classification of income and total agriculture lost. This table shows the income classified into low income, moderate income and high income. In low income the agriculture lost 41.7% in below 5000 and then followed by above 5000 respectively. In moderate income there is loss on below 5000 in percentage 43.5%, then 26.1% on 5000-10000 loss on agriculture and the remaining in above 10000. In high income 45.5% in 5000-10000 the remaining the above 10000.In the lost on agriculture the income below 5000 there is a moderate income people 58.8% and the high income in 5000-10000 respectively. the agriculture loss the government has given some compensation to the people.

Loss on Animal Husbandry

Loss on income from poultry	Loss damaged on poultry					Total
	Nil	below 7	7 to 14	14 to 21	above 21	
0	12	0	0	0	0	12
	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	100.0%	0.0%	0.0%	0.0%	0.0%	26.1%
below 3000	0	17	0	0	0	17
	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	0.0%	77.3%	0.0%	0.0%	0.0%	37.0%
3000 to 6000	0	4	4	0	0	8
	0.0%	50.0%	50.0%	0.0%	0.0%	100.0%
	0.0%	18.2%	66.7%	0.0%	0.0%	17.4%
6000 to 9000	0	1	2	5	0	8
	0.0%	12.5%	25.0%	62.5%	0.0%	100.0%
	0.0%	4.5%	33.3%	100.0%	0.0%	17.4%

above 9000	**0** **0.0%** **0.0%**	**0** **0.0%** **0.0%**	**0** **0.0%** **0.0%**	**0** **0.0%** **0.0%**	**1** **100.0%** **100.0%**	**1** **100.0%** **2.2%**
Total	**12** **26.1%** **100.0%**	**22** **47.8%** **100.0%**	**6** **13.0%** **100.0%**	**5** **10.9%** **100.0%**	**1** **2.2%** **100.0%**	**46** **100.0%** **100.0%**

This table shows that how much amount loss on poultry and number loss on poultry. This able make the cross tabulation with amount loss and number loss on poultry. Below 3000 there is 100% loss on the number at below 7. Then the amount of 3000 to 6000 there is 50% on below7 category and remaining 50% on 7 to 14 category respectively. in the 6000 to 9000 the loss on animal husbandry 62.5% in 14 to 21 category, then followed by 25% in 7 to 14 and 12.5% in below 7 respectively. Above there is only household loss above 21 poultry 100%. Many of the people in kavalapara have income from animal husbandry and they lost it. Some of the people were living in the income from the animal husbandry.

Details on Employment Loss

Loss on income	Days loss on employment				Total
	No Loss	**below 100**	**100-200**	**above 200**	
0	**3** **100.0%** **100.0%**	**0** **0.0%** **0.0%**	**0** **0.0%** **0.0%**	**0** **0.0%** **0.0%**	**3** **100.0%** **6.5%**
below 60000	**0** **0.0%** **0.0%**	**24** **85.7%** **88.9%**	**4** **14.3%** **40.0%**	**0** **0.0%** **0.0%**	**28** **100.0%** **60.9%**
60000 to 120000	**0** **0.0%** **0.0%**	**3** **23.1%** **11.1%**	**6** **46.2%** **60.0%**	**4** **30.8%** **66.7%**	**13** **100.0%** **28.3%**
above 120000	**0** **0.0%** **0.0%**	**0** **0.0%** **0.0%**	**0** **0.0%** **0.0%**	**2** **100.0%** **33.3%**	**2** **100.0%** **4.3%**
Total	**3** **6.5%** **100.0%**	**27** **58.7%** **100.0%**	**10** **21.7%** **100.0%**	**6** **13.0%** **100.0%**	**46** **100.0%** **100.0%**

This table says about the number of day's loss on employment after disaster and loss on income from employment. The income loss by loss on employment 85.7% under 60000 below category, the remaining 14.3% is on 100-200 days loss on employment.60000 to 120000 income loss 46.2% in 100-200 days and followed by 30.8% in above 200 days, 11.1% in below 100 days. Above 120000 there is 2 household 100% in above 200 days. Total days loss on employment due to the disaster below 100 days 88.9% and income loss below 60000. Then the 100-200 days 60.0% in the 60000 to 120000 income loss category. The 66.6% on the above 200 days of income loss in 60000 to 120000 category.

Respondents Willingness to Migrate to Settle Another Place After the Disaster

Valid	Frequency	Percent
Willing	**35**	**76.1**
not willing	**11**	**23.9**
Total	**46**	**100.0**

This table says that 76.1% of people were willing to migrate from the disaster area. Then the 23.9% are not willing to migrate from there place. The most of the people were willing to migrate from the disaster area because of the people were not happened to live there life in there. The people were says that they don't have house and land anything that they live before the landslide area and also the people have fear to live there because there family members, friends and neighbours died on the landslide.

Findings on Classification of Income and Classification on Reconstruction

Classification of income	classification on reconstruction			Total
	Nil	**600000 to 800000**	**above 800000**	

Low Income	1 8.3% 25.0%	8 66.7% 25.0%	3 25.0% 30.0%	12 100.0% 26.1%
Moderate Income	3 13.0% 75.0%	17 73.9% 53.1%	3 13.0% 30.0%	23 100.0% 50.0%
High income	0 0.0% 0.0%	7 63.6% 21.9%	4 36.4% 40.0%	11 100.0% 23.9%
Total	4 8.7% 100.0%	32 69.6% 100.0%	10 21.7% 100.0%	46 100.0% 100.0%

This table shows the classification of income on reconstruction. The reconstruction of house low income people 66.7% in 600000 t0 800000 category, the other remaining 25.0% is on above 800000 category and 8.3% on 0 category. In moderate income section is high on 600000 to 800000 category. High income the 63.6% of people reconstructed the house in 6 to 8 lakh category and 36.4% in above 8 lakh. The classification of reconstruction there is 0,600000 to 800000 and above 800000 categorised. 0 category 75% of moderate income people were not constructed the house they are in rental house. The reconstruction of house is mostly in the 6 to 8 lakh category it is 32 households. 4 households were in the rental house and 10 households constructed house in the above 8 lakh category.

Cross Tabulation on Classification of Income and the Details Government   Contribution to the House Reconstruction

Classification of income	Government contribution to house			Total
	Nil	400000 to 500000	above 500000	
Low Income	0 0.0% 0.0%	0 0.0% 0.0%	12 100.0% 27.9%	12 100.0% 26.1%
Moderate Income	1 4.3% 100.0%	1 4.3% 50.0%	21 91.3% 48.8%	23 100.0% 50.0%
High income	0 0.0% 0.0%	1 9.1% 50.0%	10 90.9% 23.3%	11 100.0% 23.9%
Total	1 2.2% 100.0%	2 4.3% 100.0%	43 93.5% 100.0%	46 100.0% 100.0%

In this table we can see that the government has given the cash for construction of house who lost the house on the landslide of kavalapara disaster. In this table explain the cross tabulation of classification of income and the cash provided by the government for affected people of kavalapara disaster. This table says that for low-income people that 12 households the government provided above 500000. Then in the moderate income 91.3% that is 21 household allotted above 500000 and 1 household 400000 to 500000 that is 4.3% the remaining 4.3%, 0 category.

Conclusion

Total households in the study area most of the respondents are daily wage workers and they were moderate income people. Now a days the people were have only income from the employment there is no agriculture, animal husbandry. In this socio economic study concern that the affected people can't leave the life as before the landslide. The 87% of were willing to migrate from the place. The people were aware about there life. There is an health issues for the people and the people were recovering from the disaster. In 2021 the 90% of people got the own houses in the 46 households and others were waiting for there houses. Some of the people now also leaving in the relief camps, many people have not satisfied with government assistance. During the landslide many people were helped the affected people giving foods, clothing and shelter. This study says that the 46 households taken as the sample size, out of 460 the 46 households taken. In this study concern about the affected people of kavalapara landslide, there life after the disaster and before the disaster. The life of people in the disaster area is pathetic. After the disaster the people come out from this help by the government and people of kerala state. The geological study says that the affected area is not habitable, so all the people should migrate from the place to another place.

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