



The Impact of Floods on Livelihoods of Farmers in Bagalkot District of Karnataka, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aim: The study investigates the impact of floods on farm income and livelihoods of farmers in Bagalkot district of Karnataka, focusing on the years 2019 and 2020.

Study Design: Multi stage purposive sampling technique was adopted to collect the data.

Place and Duration of Study: Bagalkot district of Northern Karnataka was selected for the study.

Methodology: The study is based on primary data collected from 90 respondents belonging to Ghataprabha and Krishna river basin in Mudhol (45) and Jamakhandi (45) taluks. Descriptive statistics is used to analyses the data.

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Results: The results revealed substantial losses in farm infrastructure, including residences, farm buildings, pump houses, and cattle sheds, with significant financial implications. During 2019, the average loss incurred by the sample households from all the sources was Rs. 8,55,540 against which Rs. 99,222 was paid as compensation by the Government which accounts for 11.59 per cent of the total loss. Similarly, during 2020, the average loss incurred by the respondents was Rs. 4,05,373 against which only Rs. 41,277 was paid as compensation from the state Government which accounts for 10.18 per cent of the total loss. Moreover, floods led to on-farm and off-farm income losses, with severe implications for livelihoods. Coping mechanisms employed by farmers included selling farm produce, livestock, and valuable assets, as well as borrowing credit from various sources.

Conclusion: The compensation given by the government is very less as compared to loss incurred. On time release of compensation is required to coping with disaster. The persistent challenges faced by farmers in mitigating the impacts of floods on their livelihoods. Therefore, there is need for a separate disaster management policy especially for northern districts of Karnataka which faces severe flooding during monsoon period.

Keywords: Climate change; disasters; floods; livelihood; income and loss of assets.

1. INTRODUCTION

Floods are a persistent challenge in India, inflicting substantial harm to lives, assets, livelihoods, infrastructure, and public services. Floods represent a significant natural hazard with far-reaching socioeconomic implications, particularly for agrarian communities reliant on farming for sustenance and livelihoods [1]. The floods have emerged as a recurrent phenomenon, exerting substantial pressure on the agricultural sector and the well-being of farmers. The effects of these floods extend beyond immediate damage to crops and infrastructure, impacting the very livelihoods and incomes of farmers in the region [2,3]. The accumulation of heavy sediment from catchments by rivers, combined with their limited carrying capacity, often leads to flooding. Among the primary consequences of flooding in river basins is the extensive damage inflicted on agricultural lands, farm assets, farm buildings and crops [4]. These inundations frequently result in significant decreases in agricultural output, subsequently exerting a detrimental impact on the economy (Rajendra *et al.*, 2016), [5]. Instances of natural hazards are on the rise globally. A flood occurs when the volume of water in a river surpasses its capacity, breaching levees and inundating surrounding areas [6].

Various factors contribute to the severity of flood impacts, including the intensity and duration of rainfall, local topography, river dynamics, land use patterns, and human interventions such as deforestation and urbanization [7,8]. In the case of Bagalkot district, situated along the banks of the Krishna River, these factors converge to

exacerbate the vulnerability of farmers to flooding events.

The consequences of floods on farm income and livelihoods are multifaceted. Direct losses stem from crop damage, soil erosion, and destruction of infrastructure such as irrigation systems and farm equipment. Indirect impacts include disruptions to market access, reduced agricultural productivity in subsequent seasons due to soil degradation, and increased indebtedness as farmers struggle to recover from losses [2,9]. Rural livelihoods are not limited just to income generated from farming, it is a comprehensive approach to understanding livelihood strategies. According to Scoones, [10] and Ellis, [11] have identified agricultural intensification, livelihood diversification, and migration as key strategies. Furthermore, rural populations may engage in multiple employments when farm income alone cannot sustain their families [12,13,14].

Water is an essential natural resource for all living things. When there is an adequate supply and quality of water, it is an economic good and a productive resource; when there is an excess, it brings about disaster and financial loss. [15,16,17] One natural calamity that has devastated arable land is flooding. Any disturbance of the arable fields may have a profound effect on the farming community. Bagalkot's plentiful water supply from the Ghataprabha, Malaprabha, and Krishna Rivers makes it a promising farming district. Villages on the riverbanks have been washed away in recent years owing to excessive rains followed by flooding. Farmers in this region face a slew of issues, including medical emergencies, crop

losses, loss of assets and livestock contribute to a drop in employment and farm income. Our economy suffers from floods, which is made worse by the extreme poverty that the Planning Commission of India reports. The situation of poor farmers is getting worse, and it's getting harder for them to meet their basic needs [18,19].

Particularly, flood hazards have an impact on a variety of human endeavours, namely two areas: agriculture and the socioeconomic standing of society. The main repercussions of flooding are that millions of people become homeless each year, needing numerous days of refuge and having to sleep outside. Many of the millions of destroyed homes and villages collapsed. A comparable number of people perished from diseases or food shortages, while hundreds of people perished in the flooding [20,21]. Millions of hectares of agricultural land have also been flooded by flooding, making them unsuitable for further agriculture. Millions of tonnes of rich topsoil were lost to erosion by the nation's major rivers and their tributaries, ending up in the ocean. Water logging, salinity and alkalinity problems, and waste land have resulted from the conversion of thousands of hectares of land. Many agricultural crops, particularly cash crops, are produced at a far lower rate or with worse quality and quantity [22].

Bagalkot is the city which is surrounded by water all over. The major flood prone areas of Bagalkot district include Badami, Bagalkot, Hunagund, and Jamkhandi taluk. Villages such as Shiraguppi, Muttur, Kankanawadi, Kadakola, Sanal, Alagur, Shurapali, Tunachi, Jambagi K.D, Jambagi B.K, Hirepadasalagi, Naganur, Kavatagi are severely affected by flooding. The Bagalkot district of Karnataka faces recurring flood events during the rainy season, primarily triggered by the swelling of the Krishna, Ghataprabha, and Malaprabha rivers along with their tributaries. These floods have profound impacts on crop production and pose significant health risks due to waterborne illnesses. The devastation caused by floods and landslides results in loss of lives and extensive damage to crops and critical infrastructure.

In August 2019, floods and landslides claimed 91 lives, with numerous villages flattened and approximately 2.47 lakh houses damaged, leading to a staggering loss of shelter. Agricultural lands covering about 9.70 lakh hectares suffered damage, with extensive siltation and destruction in multiple locations. The financial tax on agriculture and horticulture

sectors amounted to Rs. 15,230.00 crores, alongside severe damage to roads, bridges, electrical infrastructure, and educational and healthcare facilities [23]. Similarly, in August 2020, the region witnessed further devastation, with 42 lives lost and significant damage to houses and agricultural lands. The crop loss due to floods and landslides during this period amounted to Rs. 5,510 Crores. Critical infrastructure, including roads, bridges, and power supply networks, also faced severe impacts [23]. Subsequent spells of heavy rainfall and landslides from September to October 2020 exacerbated the situation, resulting in extensive damage to agriculture, horticulture, and plantation crops. The cumulative crop loss during these periods reached Rs. 12,178.96 Crores, accompanied by widespread damage to infrastructure, including roads, bridges, electrical networks, and government buildings. Despite efforts to mitigate flood risks through infrastructure development and early warning systems, the effectiveness of these measures remains limited, particularly in the context of changing climate patterns and rapid urbanization. Understanding the nuanced impacts of floods on farm income and livelihoods in Bagalkot district is crucial for devising targeted interventions to enhance resilience and sustainable development in the region [24,25].

In light of the foregoing facts and information, a study of the impact of floods on livelihoods of farmer in Bagalkot district of Karnataka, India with this background the current study was undertaken with aim of analyzing the nature and extent of floods damage on household and other assets, the income loss due to floods, and the coping mechanism adapted by the farmers in the study area.

2. METHODOLOGY

2.1 Sampling Design

Bagalkot district of northern Karnataka was purposively selected for the study as district is highly prone to flood in view of Krishna and Ghataprabha basin belongs to said district of Karnataka. Flood affected households were randomly selected which falls under severely affected villages of Krishna and Ghataprabha basin in the district. Further, in river banks of Mudhol taluk (Fig. 1) 45 affected households and another 45 affected households in Jamakhandi taluk (Fig. 1) were selected randomly. Thus, total size of the sample of 90 households selected for

the study. The necessary data were collected from the respondents by personal interview method using pre-tested structured schedule. Majority of the respondents did not maintain records with regard loss incurred by them. Hence, data collected were based on the memory of respondents. At the time of interview, personal bias of the sample farmers was minimized by convincing them about the purpose for which the data were collected. Each one of them was interviewed separately to collect the necessary information. The primary data pertaining to nature and extent of floods damage on household and other assets, the income loss due to floods, and the coping mechanism adapted by the farmers, and the extent of compensation received by farmers due to damage of household and other assets were elicited from the farmers.

The extent of compensation given to the farmers due to damage of household and loss on other

assets were elicited from State Natural Disaster Monitoring Centre, National Disaster Management Authority, etc. The rainfall data were obtained from Indian Meteorological Department to access the extent of flood damages on crops and other assets.

2.2 Tabular Presentation and Descriptive Statistics

The data collected were presented in tabular form to facilitate easy comparison. Number of the farmers affected due to floods and total area covered were analysed using tabular analysis. The data pertains to nature and extent of damage on household and other assets, the income loss due to floods, and the coping mechanism adapted by the farmers were analyzed using simple percentages and averages. Descriptive statistics like averages and percentages were used to compare, contrast and interpret results.

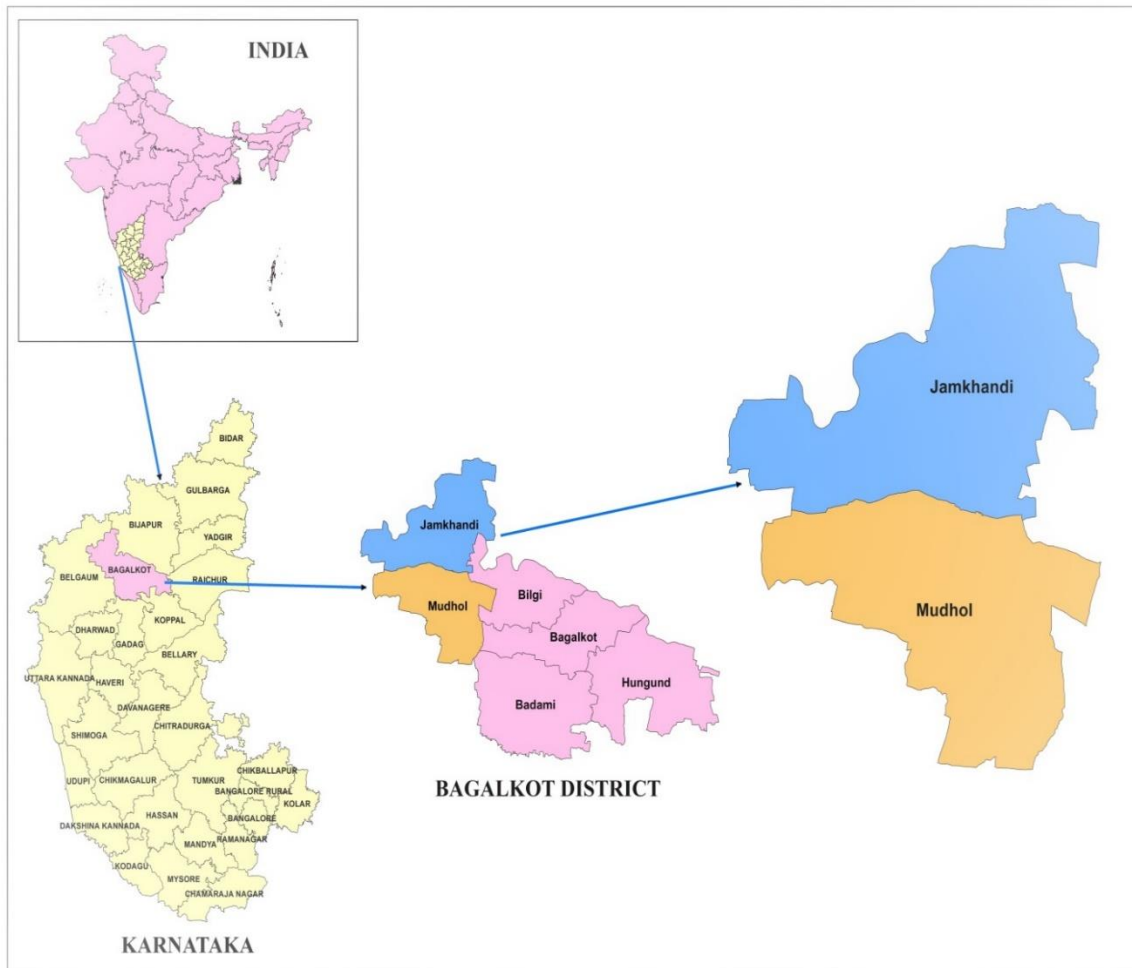


Fig. 1. Map of Karnataka state showing the study area

3. RESULTS AND DISCUSSION

3.1 Loss of Farm Buildings Due to Floods during 2019 and 2020

The results a loss of farm buildings and value lost by the farmers during 2019 and 2020 presented in Table 1. During 2019, eight farmers reported loss to their residence. Out of eight, four farmers reported partially loss to their residence and four farmers complete loss to their residence with an average loss of Rs. 6,75,000 and Rs. 15,00,000, respectively. Seven farmers reported the loss of farm buildings. Out of seven, three farmers partially lost their farm buildings and four farmers completely lost their farm buildings an average loss of Rs. 5,50,000 and Rs. 7,50,000, respectively. Four farmers reported the loss to their pump house with an average loss of Rs. 44,000. Nine farmers reported loss of their cattle shed. Out of nine farmers, three farmers reported partial damage to the cattle shed while six farmers reported complete damage to the shed with an average loss of Rs. 92,000 and Rs. 2,95,000, respectively.

In total 28 farmers reported the loss of farm buildings. Total 1 farmers reported the partial damage to the buildings with an total loss of Rs. 13,17,000 while 18 farmers reported the complete damage to the farm buildings with an average loss to the buildings of Rs. 25,89,000.

During 2020, five farmers reported loss to their residence. out of five farmers, two farmers incurred to partial loss to their residence and three farmers completely lost their residence with an average loss of Rs. 2,00,000 and Rs. 2,58,333, respectively. Seven farmers reported loss to their farm buildings. Out of seven, four farmers reported partial loss to their farm buildings while three farmers completely lost their farm buildings with an average loss of Rs. 1,75,000 and Rs. 3,33,333, respectively. Three farmers reported the loss of their pump houses. Out of three farmers, one farmer incurred partial loss to their farm buildings and two farmers incurred complete loss to their farm buildings with an average loss of Rs. 10,000 and Rs. 27,500, respectively. Three farmers reported loss to their cattle shed. Out of three, one farmer reported the partial damage to the cattle shed while two farmers reported complete damage to the shed with an average loss of Rs. 10,000 and Rs. 25,000, respectively.

During 2020 farmers reported the damage to their farm buildings due to floods. In total 18, Out of 18, eight farmers reported the partial damage to the farm buildings while 10 farmers reported the complete damage to their buildings with an of total loss of Rs. 3,95,000 towards the partial damage and Rs. 6,44,166 towards complete loss to their buildings during the year 2020. The effect of flooding on farm building was much more severe during 2019 in comparison with 2020 resulted in huge loss to the farmers which can be visualised from the results of Table 1.

3.2 Loss of Farm Machinery/Equipment and Irrigation Structure Due to Floods during 2019 and 2020

Table 2 presents the loss incurred to farm machinery, equipment's and irrigation structures due to floods during 2019 and 2020. During 2019, three households reported damage to their bullock carts due to floods with an average loss of Rs. 11,333. The households numbering 14 reported loss incurred to wooden or MB ploughs with an average loss of Rs. 34,393. The sample households numbering four reported loss to power tiller to the tune of Rs. 68,750. The households numbering 59 reported damage to tractor and its accessories to the extent of Rs. 10,424. The sample households numbering 23 reported loss incurred to sprayers due to floods with an average loss of Rs. 1861. Similarly, loss incurred to the irrigation pump as reported by 22 households with an average loss of Rs. 19,682. Loss incurred to pipelines, sprinkler and drip irrigation unit as reported by 35 respondents was Rs. 21,457. The Loss to electric motor as reported by nine respondents was Rs. 20,333 and 18 respondents reported damage to their tube well / open well with an average loss of 1,16,667.

During 2020, the sample households numbering 10 reported loss of wooden/MB ploughs with an average damage of Rs. 9,750. The households numbering eight reported loss to sprayers due to floods with an average loss of Rs.1,875. The sample households numbering 14 reported the loss to irrigation pumps with an average loss of Rs. 11,571. Similarly, there are 10 households reported loss to pipeline, sprinklers and drip irrigation structures with an average loss of Rs. 22,500. Finally 10 respondents reported loss to tube well/open with an average loss of loss of Rs. 1,20,000.

Table 1. Loss of farm buildings due to floods during 2019 and 2020

2019						
Sl. No.	Particulars	No. of farmers	Nature of damage			
			Partially	Average loss (Rs./structure)	Fully	Average loss(Rs./structure)
1	Residence	8	4	6,75,000	4	15,00,000
2	Farm building	7	3	5,50,000	4	7,50,000
3	Pump house	4	0	0	4	44,000
4	Cattle shed	9	3	92,000	6	2,95,000
Total		28	10	13,17,000	18	25,89,000
2020						
Sl. No.	Particulars	No. of farmers reported	Nature of damage			
			Partially	Loss (Rs./structure)	Fully	Loss(Rs./structure)
1	Residence	5	2	2,00,000	3	2,58,333
2	Farm building	7	4	1,75,000	3	3,33,333
3	Pump house	3	1	10,000	2	27,500
4	Cattle shed	3	1	10,000	2	25,000
Total		18	8	3,95,000	10	6,44,166

Table 2. Loss of farm machinery/equipment and irrigation structure due to floods during 2019 and 2020

(n=90)

2019					
Sl. No.	Particulars	Number	Market price (Rs.)	Average value lost due to floods(Rs.)	Per cent value lost
1	Bullock cart	3	53,000	11,333.34	21.38
2	Seed drill	0	0	0	0
3	Ploughing equipment's	14	5,59,500	34,392.86	6.14
4	Power tiller	4	3,70,000	68,750	18.58
5	Tractor & accessories	59	11,20,000	10,423.73	0.93
6	Sprayers	23	42,800	1,860.87	4.35
7	Irrigation pump	22	7,63,000	19,681.82	2.58
8	Pipeline, sprinklers, drip	35	8,16,000	21,457.14	2.63
9	Electric motor	9	2,16,000	20,333.34	9.41
10	Tube well/open well	18	31,65,000	1,16,666.67	3.69
	Average		37,996	3,387.77	
2020					
Sl. No.	Particulars	Number	Market price (Rs.)	Average value lost due to floods(Rs.)	Per cent lost
1	Bullock cart	0	0	0	0
2	Seed drill	0	0	0	0
3	Ploughing equipment's	10	1,02,500	9,750	9.51
4	Power tiller	0	0	0	0
5	Tractor & accessories	0	0	0	0
6	Sprayers	8	15,000	1,875	12.5
7	Irrigation pump	14	4,53,000	11,571	2.55
8	Pipeline, sprinklers, drip	10	3,09,000	22,500	7.28
9	Tube well/open well	10	21,15,000	1,20,000	5.67
	Average		57,586.54	1,841.06	

Table 3. Loss of farm produce and other household assets due to floods during 2019 and 2020

2019					
Sl. No.	Particulars	Number	Total value (Rs.)	Average Loss incurred (Rs.)	Per cent value lost
1	Grains	5	1,07,000	19,400	18.13
2	Fodder	3	21,500	7,166	33.34
3	Farm implements	2	13,000	4,250	32.69
4	Fodder cutter	3	1,05,000	35,000	33.34
5	Transformer	4	4,75,000	41,250	8.68
6	Household vessels	4	55,000	13,750	25
7	Television	3	35,000	11,666	33.33
8	Bicycle	8	37,500	4,688	8.67
9	Pump set floating structure	2	90,000	45,000	44.44
	Average		27617.65	5357.94	
2020					
Sl. No.	Particulars	Number	Total value (Rs.)	Average Loss incurred (Rs.)	Per cent value lost
1	Grains	3	40,000	13,333	33.34
2	Fodder	2	11,000	5,500	50
3	Fodder cutter	1	35,000	35,000	100
4	Transformer	2	2,75,000	37,500	13.64
5	Household vessels	6	30,000	5,000	16.67
6	Television	2	20,000	10,000	50
7	Bicycle	1	5,000	3,000	60
8	Pump set floating structure	4	1,10,000	27,500	25
	Average		25047.62	6515.86	

Table 4. On and off-farm employment loss due to floods during 2019 and 2020

2019				
On farm				
Sl. No.	Particulars	Number	Loss of employment (man days)	Income lost (Rs.)
1	Agricultural labour	60	3,650	11,24,200
Off farm				
Sl. No.	Particulars	Number	Loss of employment (man days)	Income lost (Rs.)
1	Agricultural labour	46	3,140	9,67,900
2	Trading of agricultural produce	9	415	1,82,250
	Total	55	3,555	11,50,150
2020				
On farm				
Sl. No.	Particulars	Number	Loss of employment (man days)	Income lost (Rs.)
1	Agricultural labour	45	1,430	4,40,440
Off farm				
Sl. No.	Particulars	Number	Loss of employment (man days)	Income lost (Rs.)
1	Agricultural labour	29	1,225	3,60,050
2	Trading of agricultural produce	8	116	45,900
	Total	37	1,341	4,05,950

Table 5. Loss of Non-farm employment and income due to floods during 2019 and 2020

2019					
Sl. No.	Particulars	Number	Loss of employment (man days)	Income lost (Rs.)	Average income lost (Rs.)
1	Non-agricultural labour	6	190	62,600	10,433
2	Business	12	585	2,73,000	22,750
3	Regular jobs	18	860	3,45,350	19,186
4	Petty shop	3	115	53,000	17,667
	Total	39	1,750	7,33,950	70,036
2020					
Sl. No.	Particulars	Number	Loss of employment (man days)	Income lost (Rs.)	Average income lost (Rs.)
1	Non-agricultural labour	5	160	52,950	10,590
2	Business	9	200	93,750	10,417
3	Regular jobs	16	540	2,21,500	13,844
4	Petty shop	3	80	45,000	15,000
	Total	33	980	4,13,200	49,851

Table 6. Coping mechanism adapted by the farmers during 2019

Sl. No.	Particulars	2019		
		Number	Total Value (Rs.)	Average value (Rs.)
1	Stored produce sold	14	2,15,000	15,357 (7.59)
2	Livestock sold	12	4,65,000	38,750 (19.16)
3	Farm machineries sold	10	1,90,000	19,000 (9.40)
4	Valuable assets sold	7	2,90,000	41,428 (20.49)
5	Credit	15	4,28,000	87,667 (43.36)
	Total	58	15,88,000	2,02,202 (100)

Table 7. Source of credit borrowed to meet consumption expenditure during 2019

(n=90)

Sl. No.	Source	2019		
		Number	Total amount borrowed (Rs.)	Average
1	Institutional	5	1,45,000	29,000 (33.08)
2	Non-institutional			
a)	Traders and commission agents	6	1,45,000	24,167 (27.57)
b)	Family and friends	4	1,38,000	34,500 (39.35)
	Total	15	4,28,000	87,667 (100.00)

Table 8. Average loss vs. Average compensation received during 2019 and 2020

(n=90)

Sl. No.	Particulars	Number reported	Average loss (Rs.)	2019			2020		
				Average Compensation received (Rs.)	Percentage loss covered	Number reported	Average loss (Rs.)	Average Compensation received (Rs.)	Percentage loss covered
1	Crop loss	90	7,02,131	64,222	9.15	86	3,29,440	29,833	9.05
2	Loss of livestock	41	8,258	0	0	26	2,434	0	0
3	Loss of farm buildings	28	43,400	35,000	80.64	18	33,333	11,444	34.33
4	Loss of farm machinery	56	54,614	0	0	35	18,883	0	0
5	Loss of food grain and household assets	34	10,433	0	0	21	5,844	0	0
6	On and off-farm income loss	60	25,271	0	0	45	9,404	0	0
7	Loss of Non-farm employment	39	8,155	0	0	33	4,591	0	0
8	Loss of trees	10	3,277	0	0	6	1,444	0	0
	Total loss		8,55,540	99,222	11.59		4,05,373	41,277	10.18

3.3 Loss of Farm Produce and Other Household Assets Due to Floods during 2019 and 2020

Table 3 represents the results of loss incurred to farm produce and other assets due to floods during 2019 and 2020. During 2019, five households reported the damage to the stored grains due to floods with an average loss of Rs. 19,400 which was available for family consumption and sale. The households numbering three reported the loss incurred to fodder with an average loss of Rs. 7,166. The households numbering two reported the loss of farm implements due to floods with an average loss of Rs. 4,250. Households numbering three reported the loss of fodder cutters with an average loss of Rs. 35,000. The sample households numbering four reported the loss of transformers to the tune of Rs. 41,250. The households numbering four reported the loss of household vessels due to floods with an average loss of Rs. 13,750. The households numbering three reported the loss incurred to televisions sets due to floods with an average loss Rs. 11,666. Similarly, loss incurred to the bicycle as reported by eight households with an average loss of Rs. 4,688. Finally, two respondents reported loss to barrels with an average loss of Rs. 45,000 (Table 3).

During 2020, the sample households numbering three reported loss of stored grains with an average damage of Rs. 13,333 (Table 3). The households numbering two reported loss to fodder due to floods with an average loss of Rs. 5,500. The sample households numbering one reported the loss of fodder cutter with an average loss of Rs. 35,000. The households numbering two reported loss of transformers due to floods with an average loss of Rs. 37,500. Similarly, there are six households reported loss to household vessels with an average loss of Rs. 5,000. The sample households numbering two reported the loss of televisions with an average damage of Rs. 10,000. The household numbering one reported loss to Bicycle due to floods with an average loss of Rs. 3,000. Finally, four respondents reported loss to barrels with an average loss of Rs. 27,500.

3.4 On-farm Income Loss Due to Floods during 2019 and 2020

The results presented in Table 4, indicated that the loss of on and off-farm employment followed

by income due to floods during 2019 and 2020. During 2019, 60 households reported that loss of on farm employment of 3,650 man days resulted in income loss to the extent of Rs. 11,24,200. Similarly, during 2020, 45 households reported loss of employment of 1430 man days with an income loss of Rs.4,40,440. This shows the severity of flooding which was much severe in 2019 in comparison with 2020.

3.5 Off-farm Income Loss Due to Floods during 2019 and 2020

The results presented in the Table 4 also indicated the loss of off-farm employment followed by income due to floods during 2019 and 2020. During 2019, 46 households reported loss of off farm employment to the tune of 3,140 man days resulted in income loss of Rs.9,67,900. Similarly, 9 households reported loss of employment from trading of agricultural produce to the tune of 415 man days with an income loss of Rs.1,82,250. During 2020, the impact of flooding on loss of employment was quite less compared to 2019. The households numbering 29 reported loss of off farm employment to the tune of 1,225 man days resulted in income loss of Rs.3,60,050. Similarly, eight households reported loss of employment from trading of agricultural produce to the tune of 116 man days with an income loss of Rs. 45,900.

3.6 Loss of Non-farm Employment and Income from Various Sources Due to Floods during 2019 and 2020

The results presented in the Table 5 indicated that the total loss of employment followed by income due to floods during 2019 and 2020. It was a difficult time for the people in the study area who depend on daily wages for their livelihood. During 2019, in total, 1,750 man days of off farm employment was lost due to severe floods, Among the off farm employment, the employment lost from regular jobs was the highest with 860 (49.14 %) man days followed by business, non-agricultural labour and petty shops with 585 (33.43 %), 190 (10.86 %) and 115 (6.57 %) man days, respectively. As a results the income lost due to floods from regular jobs was highest with Rs.3,45,350 (47.05 %) followed by income from business, non-agricultural labour and petty shops with Rs. 2,73,000 (37.17 %), Rs. 62,600 (8.53 %) and Rs. 53,000 (7.22 %), respectively.

During 2020, the impact of flooding on loss of employment was quite less compared to 2019. The total off farm employment days lost due to floods was 980 man days. Out of the total, the employment lost from regular jobs was the highest with 540 (55.10 %) man days followed by business, non-agricultural labour and petty shops with 200 (20.40 %), 160 (16.33 %) and 80 (8.16 %) man days, respectively. As a results, the income lost due to floods from regular jobs was highest with Rs.2,21,500 (53.60 %) followed by income from business, non-agricultural labour and petty shops with Rs. 93,750 (22.69 %), Rs. 52,950 (12.81 %) and Rs.45,000 (10.89 %), respectively.

3.7 Coping Mechanism Adapted by the Farmers during 2019

Table 6 represents the coping mechanism adapted by the farmers due to severe floods during 2019. In order to meet immediate cash requirement, 14 sample farmers reported sale of farm produce with an average value realisation of Rs. 15,357. The sample farmers numbering 12 sold their livestock to meet the family consumption expenditure with value realisation of 38,750. While 10 farmers reported selling of their farm machinery to meet the family consumption with average value realisation of Rs. 19,000. The sample farmers numbering 7 reported sold their valuable assets including gold and silver to meet their consumption expenditure with an average value realisation of Rs. 41,428 and the sample respondents numbering 15 reported the credit taken values of Rs. 87667.

3.8 Source of Credit Barrowed to Meet Consumption Expenditure

It is observed from the Table 7 that total of 15 farmer's barrowed credit from different sources to meet the consumption expenditure. The number of sample farmers barrowed credit from institutional, non-institutional and from friends and relatives were 5,6 and 4 with an average barrowing of Rs. 29000, 24167 and 34500 were taken loan from the different sources like institutes, non-institutes, family and friends for meeting the family consumption needs. During 2019, five farmers were taken credit from the institutional source of credit with average amount of Rs. 29,000. The total amount borrowed from the institutional source was Rs. 1,45,000 to cope up family expenditure. Whereas, six farmers reported that they had taken credit from the non-institutional source of credit with average amount

of Rs. 24,167, the total amount borrowed from non-institutional source was Rs. 1,45,000 and the four farmers reported credit taken from the friends and family average of Rs. 34500, the total amount borrowed from family and friends was Rs. 1,38,000 to maintain family expenditure during the flood timing.

Here from the Table 14, 0.16 per cent of the total sample respondents took an average credit of Rs. 4,755.55 from the different sources. It was a burden to the farmers but they need are in of credit to meet to consumption expenditure. Due to flood, large number farming community lost their income, shelter, assets, farming implements, farm produce and many other things in the flood.

3.9 Loss and Compensation Received Due to Floods during 2019 and 2020

Table 8 depicts the results of average loss and compensation received during 2019 and 2020. During 2019, the average crop loss due to floods amounts to Rs.7,02,131 per household and the compensation received from the state government was Rs. 64,222 constituting only 9.15 per cent of the loss incurred in crops by the farmers. In case of farm building, average loss incurred by the households was Rs. 43,400 while the compensation given by the government was Rs. 35,000 constituting 80.64 per cent of the loss incurred by the farmers. Similarly, the average loss incurred by the farmers due to loss of livestock (Rs.8258/household), loss of farm machinery (Rs.54614/household), loss of food grain and household assets (Rs.10433/household), on and off-farm income (Rs. 25,271/household), non-farm income (Rs.8155/household) and loss of trees (Rs.3277/household) for which no compensation is paid from the government. In total, Rs. 8,55,540 per household is lost due to floods occurred during 2019 [26,27,28].

During 2020, the average crop loss due to floods amounts to Rs.3,29,440 per household and the compensation received from the state government was Rs. 29,833 constituting only 9.05 per cent of the loss incurred in crops by the farmers. In case of farm building, average loss incurred by the households was Rs. 33,333 while the compensation given by the government was Rs. 11,444 constituting 34.33 per cent of the loss incurred by the farmers. Similarly, the average loss incurred by the farmers due to loss of livestock (Rs. 2,434/household), loss of farm

machinery (Rs. 18,883/household), loss of food grain and household assets (Rs.5,488/household), on and off- farm income (Rs. 9,404/household), non-farm income (Rs.4591/household) and loss of trees (Rs.1444/household) for which no compensation is paid from the government. In total, the overall loss incurred by the households during 2020 was less *i.e.*, Rs. 4,05,373 per household in comparison with 2019.

4. CONCLUSION

The effect flood on farm infrastructure and livelihoods in the Bagalkot district give emphasis to the severity of losses incurred by farmers during 2019 and 2020. In 2019, floods caused substantial damage to farm buildings, residences, and agricultural equipment, resulting in significant financial assistance for farmers. The average loss per household due to crop damage, infrastructure destruction, and income loss was substantial, amounting to Rs. 8,55,540. However, the compensation provided by the government fell short, covering only a fraction of the incurred losses. Similarly, in 2020, while the overall loss per household reduced to Rs. 4,05,373, the compensation received remained inadequate, constituting a mere percentage of the actual losses suffered. The disparity between the losses incurred and the compensation received highlights the need for more comprehensive and responsive disaster management policies to support affected farmers in rebuilding their livelihoods and agricultural infrastructure. Additionally, the coping mechanisms adopted by farmers, such as selling assets and borrowing credit, underscore the financial strain imposed by recurring flood events. These findings emphasize the urgency of enhancing resilience and providing adequate support mechanisms to mitigate the adverse impacts of floods on agricultural communities in Bagalkot district.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Kumar A, Singh AK. Flood-induced Migration and its socio-economic impact on women-A Case Study of Kosi Flood in North-Bihar. *Int. J. of Res.in Social Sci.* 2018;8(9):486-501.
2. Das S. Socioeconomic impacts of floods on agricultural households in India. *Econ. and Pol. Weekly*, 2018;53(40):51-58.
3. Femi Elezabeth George. Assessment of Agricultural loss due to 2018 flood to farm households in the flood plains of Chalakudy River. M.Sc. (Agri.) Thesis Submitted to Kerala Agric. Univ., Thrissur (India); 2020.
4. Parvin G, Shimi A, Shaw R, Biswas C. Flood in a changing climate: The impact on livelihood and how the rural poor cope in Bangladesh. *Climate*. 2016;4(4):60.
5. Ramamoorthy V. Impact of Floods on Farmers Income in Kulgam District of Jammu and Kashmir. *Asia Pacific J. of Res.* 2017;1(1):149-156.
6. Krishna Rajaram Jadhav, Impact of Flood on Agriculture in Upper Krishna basin of Maharashtra. *Int. J. of Adv. and Appl. Res.* 2023;10(5):615-621.
7. Islam MS, Solaiman M, Islam MS, Tusher TR, Kabir MH. Effects of flood on char livelihoods and its adaptation techniques by the local people. *Bangladesh J. Sci. Res.* 2015;28(2):123-135.
8. Sharma R. Impact of floods on agriculture: A review. *International Journal of Agriculture, Env. and Biotech.* 2020; 13(5):737-745.
9. Soulibouth L, Hwang, HS, Shin DH. The impact of flood damage on farmers, agricultural sector and food security in Laos: A regional case study of Champhone district, savannaket province. *J. of Int. Dev. Coop.* 2021;16(2):151-170.
10. Scoones I. Sustainable rural livelihoods: A framework for analysis. *IDS Working Paper No. 72*, Brighton, UK; 1998.
11. Ellis F. *Rural livelihoods and diversity in developing countries.* Oxf. Uni. Press, UK; 2000.
12. Dharm AH. Farm income and financing in rural Indonesia: A case study from West Kalimantan. Alano Verlag, Aachen, Germany; 1994.
13. Upton M. *The economics of tropical farming systems.* Cambridge Univ. Press, UK; 1996.
14. Chowdhury JR, Parida Y, Agarwal P. How flood affects rural employment in India: A gender analysis. *Int. J. of Disaster Risk Red.* 2022;73:102881.
15. Poddar RP, Lokesh S, Shweta Byahatti SB, Udikeri SS, Naveen V. Socio-economic impacts of Don River flood on

- farmers economy, Vijayapura district, Karnataka; 2016.
16. Fakhruddin SHM, Kawasaki A, Babel MS. Community responses to flood early warning system: Case study in Kaijuri Union, Bangladesh. *Int. J. Disaster Risk Red.* 2015;14(4):323-331.
 17. Feng T, Xiong R, Huan P. Productive use of natural resources in agriculture: The main policy lessons. *Resources Policy.* 2023;85:103793.
 18. Lavanya V. Impact of natural disasters on farm economy in Srikakulam district of Andhra Pradesh. *M.Sc (Agri.) Thesis* Submitted to Acharya NG. Ranga Agric. Univ., Guntur (India); 2016.
 19. Roy A, Kumar S, Rahaman M. Exploring climate change impacts on rural livelihoods and adaptation strategies: Reflections from marginalized communities in India. *Env. Dev.* 2024;49:100937.
 20. Bhaduri A. Impact of climate change on life and livelihood of Dalits: An Exploratory Study from Disaster Risk Reduction Lens. *Nat. Camp. On Dalit human rights.* 2013;1-45.
 21. Beevi NH, Sivakumar S, Vasanthi R. Natural disaster (tsunami) and its socio economic and environmental impact -A case study of Kanniya Kumari coast. *Int. J. Engg. Res. Appln.* 2014;4(11): 99-111.
 22. Santhi SL, Veerakumaran G. Impact Assessment Of Kerala Flood 2018 on Agriculture of Farmers In Edathua Panchayat, Kuttanad Taluk Of Alappuzha District. *Shanlax Int. J. Econ.* 2019;7(4):24-28.
 23. Anonymous. Disaster Management report September. Karnataka State Disaster Management Authority, Karnataka; 2019.
 24. Ara MJ. Effect of floods on farmer's livelihood: A case study for building agriculture resilient to floods in Bangladesh. *Int. J. Sci. Environ. Tech.* 2019;8(2):334-344.
 25. Poddar RS, Lokesh S, Byahatti S. Impacts of Don River flood on agriculture crops, dwelling units and economy of farmers: A case study of Vijayapura district karnataka, India. *Res. J. of Agri. Sci.* 2017;8(5):1225-1229.
 26. Anonymous. Disaster Management report August. Karnataka State Disaster Management Authority, Karnataka; 2020.
 27. Narayan Murigeppa Gunadal, Madhu DM, Harshitha HC, Arun Shivayogi Honyal. Assessing the Effects of Flood on Crop and Livestock Production in Bagalkot District of Karnataka. India. *Int. J. of Env. Clim. Change.* 2024;14(3):682-693. DOI: 10.9734/ijecc/2024/v14i34076
 28. Shivappa R, Handigund, Chandrika KB. Effect of flood on lives and livelihoods a comparative study India and karnataka. *Int. J. of Emerging Tech. and Innovative Res.* 2021;8(5):131-141. Available:<http://doi.one/10.1729/Journal.27001>

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