

CHAPTER 7

EFFECTS OF FLOOD

7.1 DAMAGES TO LIVES

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7.1 Damages to lives

Every year flood comes in this District and damages to lives. Majority of the death from flooding in this District results from attempting to drive, walk or swim through flood water. Flood water depth and current are easily misjudged and are capable of sweeping away and submerging many of those through to have drowned in floods especially flash flood, may actually have been killed by the violence of the water. Total 14 people died due to flooding during 2000-2008. Maximum death occurred in 2004 (Fig. 7.1). There is no record of death in 2002, 2003, 2005 and 2006. Total 47 cattle died during 2000-2008 and maximum cattle death in 2007 (Fig. 7.2).

Flooding during the growing season typically is more harmful to plants than flooding during dormant periods. The longer trees are exposed to flooding, the greater the potential for injury. Short period of flooding during the season can be tolerated by most trees, but if flooding is recurrent or uninterrupted and keeps soils saturated, serious damages to trees may occur. Flood stressed trees exhibit a wide range of symptoms including leaf chlorosis, defoliation, reduced leaf size and shoot growth, epicormic sprouting and crown dieback. Early fall coloration and leaf drop often occur. Large seed crops may appear on stressed trees in the growing after flooding. These symptoms may progress in if tree decline and death, reoccur for several years and then eventually disappear, or subside as early as the next year indicating rapid tree recovery. Tree injury increase in proportion to the amount of crown covered by water. Many tree species can survive months of flooding as long as their canopies remain above the water. But when foliage is completely submerged, death may occur in less than one month. This is particularly noticeable on confers when lower branches covered by flood water die after only a few days of submersion. Mature, well established trees are more tolerant of flooding than over mature trees or seedlings of the same species. Vigorous, healthy trees withstand flooding better than trees that were already under stress.

7.2 Loss of properties

Flood in the District damages properties every year. The most people of District are poor and they are hardly capable to bear their losses from flood. Many poor families have become beggar as flood swept away their shelter and land. Every year cropping area damages due to flood water (Table 7.3). Maximum cropping areas damaged in 2002 during 2000 to 2008 period. Almost same amount of

cropping areas damaged in 2004. Only in the year of 2006 there was no damage of cropping area (Fig. 7.3).

Table 7.1 Year-wise loss of human lives in the District Koch Bihar.

Sl. No.	Year	No.'s
1	2000	2
2	2001	2
3	2002	0
4	2003	0
5	2004	6
6	2005	0
7	2006	0
8	2007	2
9	2008	2
Total		14

Source: Office of the District Magistrate, Koch Bihar.

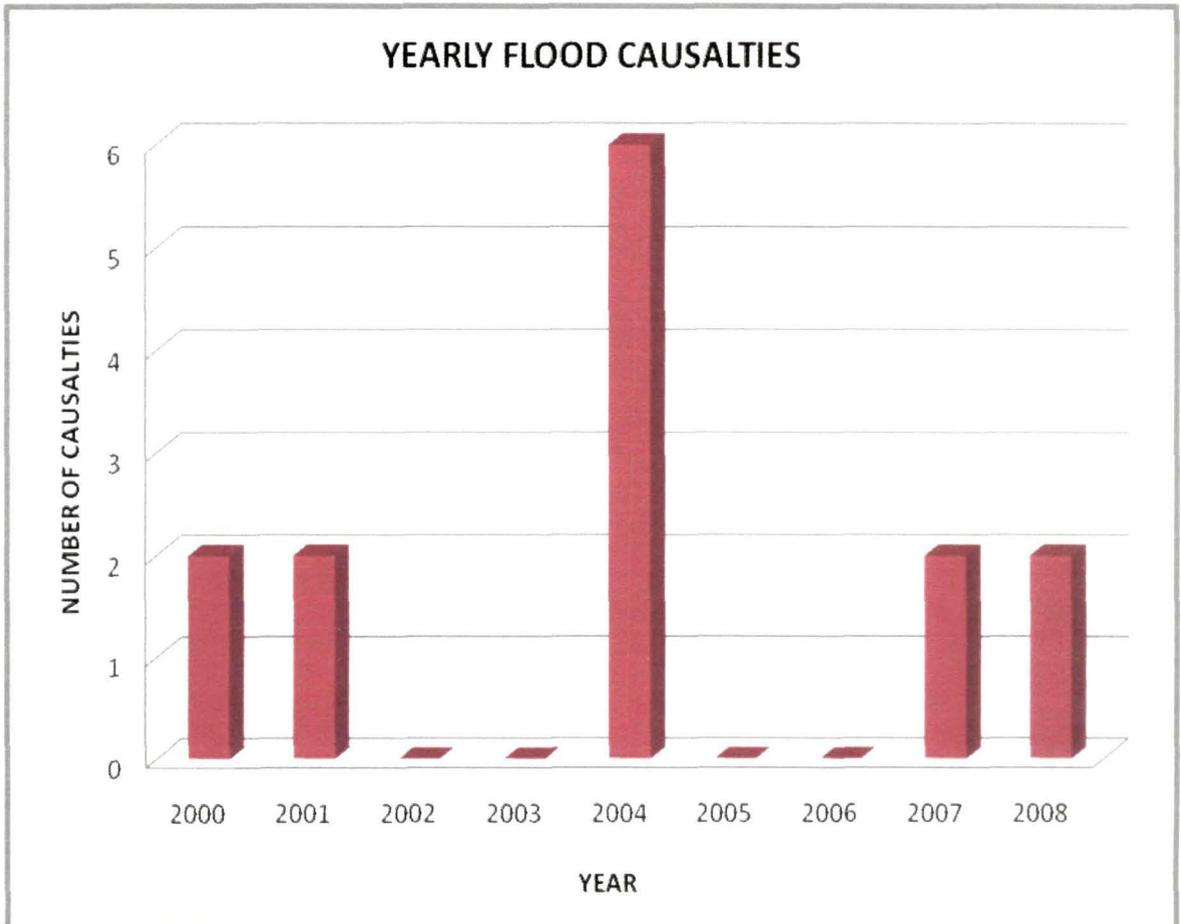


Fig 7.1 Year-wise loss of human lives in the District Koch Bihar. (Ref. Table 7.1).

Table 7.2 Year wise loss of cattle in the District.

Sl. No.	Year	No.'s
1	2000	4
2	2001	4
3	2002	0
4	2003	0
5	2004	16
6	2005	4
7	2006	0
8	2007	19
9	2008	0
Total		47

Source: Office of the District Magistrate, Koch Bihar.

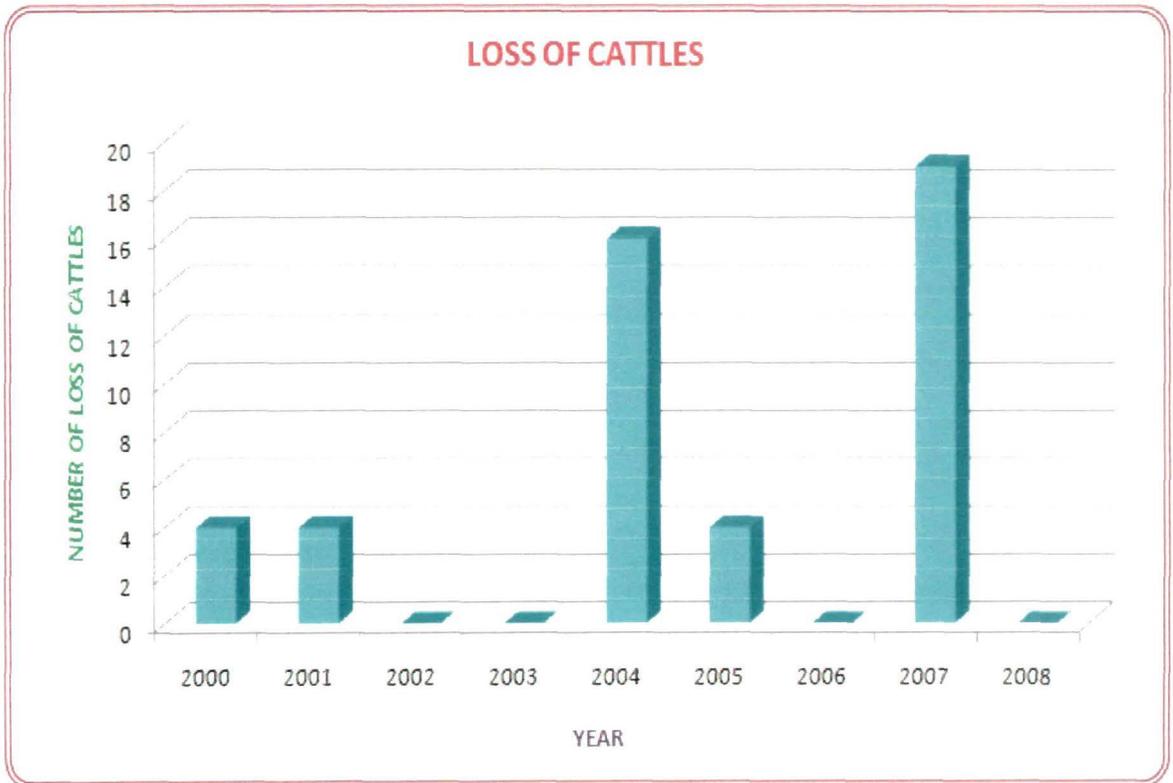
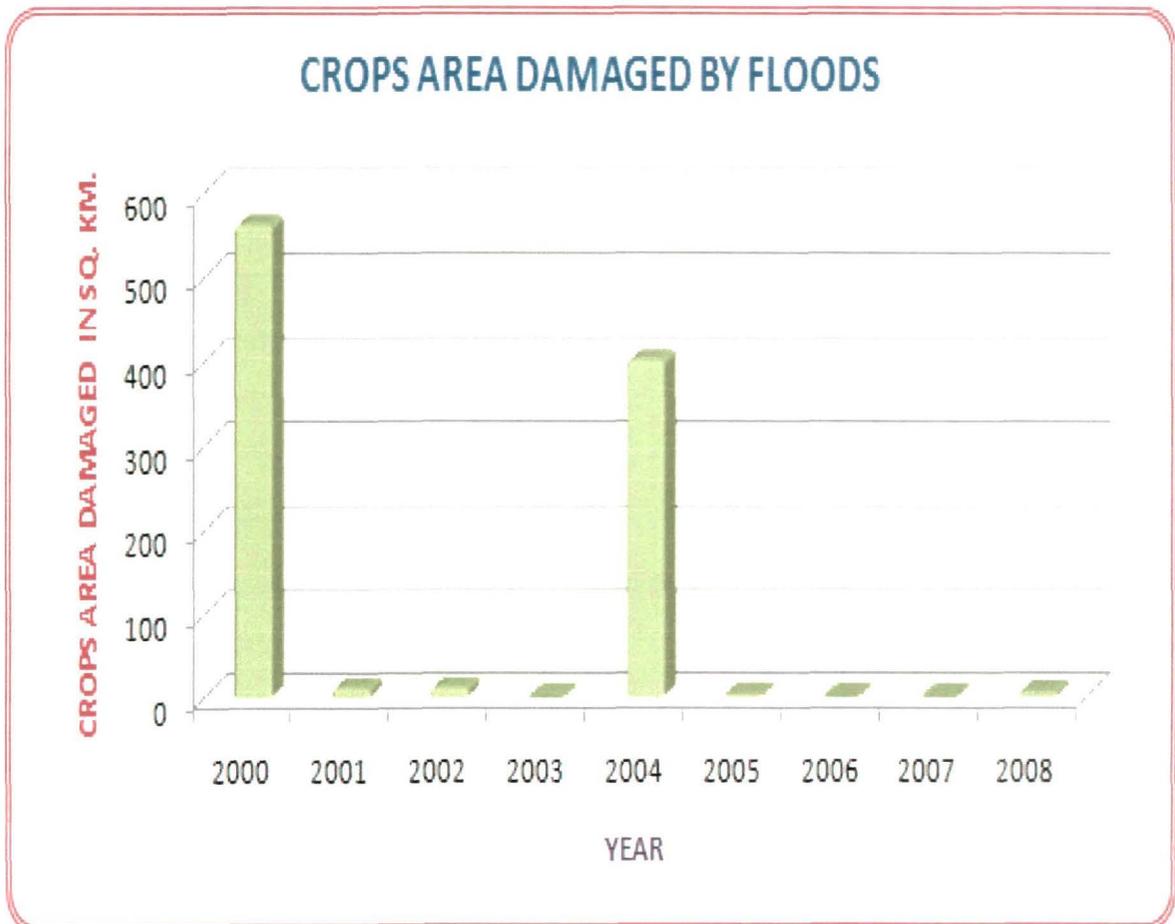
**Fig. 7.2** Year wise loss of cattle in Koch Bihar District. (Ref. Table 7.2).

Table 7.3 Year-wise damages of houses and cropping area.

Sl. No.	Year	Cropping area damages (sq. km.)	Houses damages	
			Fully (No.'s)	Partly (No.'s)
1	2000	562.93	5229	14134
2	2001	11.47	676	1029
3	2002	11.47	676	1029
4	2003	< 1.00	57	485
5	2004	401.85	8400	27600
6	2005	3.34	288	138
7	2006	Nil	Nil	Nil
8	2007	Not assessed	4947	8972
9	2008	5.8	1512	3459

Source: D.M. Office, Koch Bihar.

**Fig. 7.3** Year wise crops area damages in sq. km. (Ref. Table 7.3).

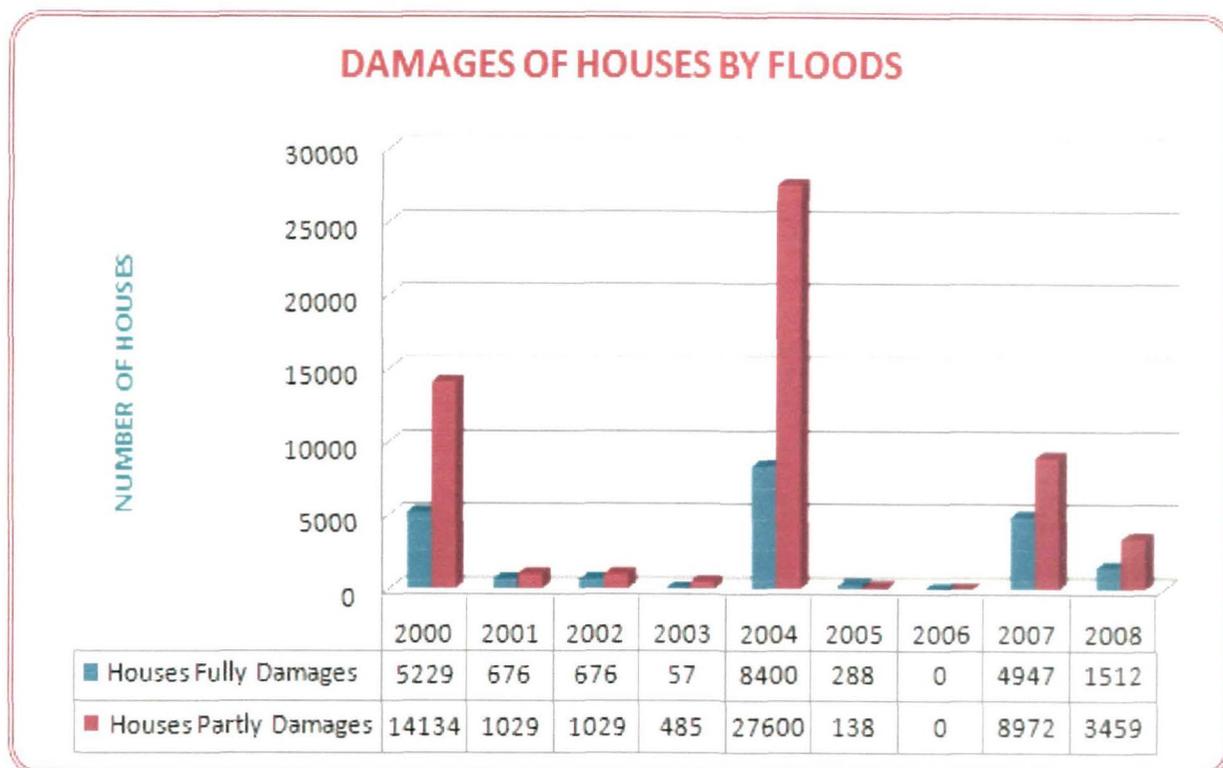


Fig. 7.4 Year wise damages of houses by flood in Koch Bihar District, (Ref. Table 7.3).

7.3 Loss of fertile arable land

Flooding reduces the supply of oxygen to the soil and roots and usually results in growth inhibition and injury to flooded trees. The deposition of sediments during flood condition also contributes to poor soil aeration. Deposition of silts or sands as shallow as three inches can be injurious especially to newly planted trees. Tree roots also must contend with high concentrations of toxic compounds, such as alcohol and hydrogen sulfide that accumulate in waterlogged soils. Finally, strong currents and soil particles suspended in flood waters can erode soil from around the base of trees, exposing tree roots. Exposed roots are vulnerable to drying and mechanical injury, and their occurrences may make trees more vulnerable to withdraw. As flood is regular phenomenon in this District, almost every year this experience occurred for the inhabitants of this District. The mighty of Brahmaputra has the world's biggest catchments area carry water within a very narrow flat valley. The District has the acute problem of surface erosion. The water logging problem has now been increasing in this District and has become an important factor responsible for intensifying flood condition in this region. Massive bank erosion is causing loss of valuable arable lands. Natural erosion along the banks of the Tista, Torsa and other rivers are causing huge loss of agricultural and residential land especially in rainy season is a serious problem in the Blocks besides the river bank.



Plate 7.1 The Bridge over the River Sutunga in the town Mathabhanga is in danger because of removal of earthen material from the floor of the river for construction purpose.



Plate 7.2 Road side culvert being destroyed during flood at Hazrahat, Mathabhanga I.



Plate 7.3 Communication pole at the stake of flood havoc at Ghogarkhuthi, Tufanganj I.

7.4 Damages in public and civic amenities

Flood in every year damages public and civic amenities. Roads- *pacca* and *kacha* both damage every year. The District has 77 km NH, 113km SH and 522.807 km District roads. Out of this, 340.107 km are bituminous road while the rest 182.70 km are non-bituminous road, 204 km other metal roads and 605 km of muddy roads. Metal roads damage every year. In the flood of 1993 vast part of NH 31 swept away in Chilakhana and Ghoramara, SH 12A in Satmile. Metal roads in villages of Tufanganj, Koch Bihar and Dinhata Subdivision breaks every year. Muddy road destroys every year all over the District. Electric poles are fallen due to soil erosion in Ashokebari in 2005. The Falimari, Tista Payesti, Lotafola, Tistar char, Hussener char Balabhut villages become road less every year as flood water swept away roads in every year.



Plate 7.4 Damage of high raised road due to improper drainage flow (View at N.H 31 at Haripur).

The roads under National Highway that are likely to be affected by flood in this District are:

- i) NH Road at Belakopa, threatened by the River Kaljani.
- ii) NH Road at Chilakhana, threatened by the River Kaljani.
- iii) NH Road at Haripur threatened by the River Raidak I (Plate 7.4).

During flood period villagers take shelter mainly in the primary and high schools as flood shelters are insufficient, students obliged not to go to the school still flood water recedes. The consequences of flooding have become increasingly serious due to the increase in human habitation and activity along the rivers. Rivers of the District flow on a very flat plains over often extremely complicated in flood situations due to the river spilling, overtopping of structures, stores and two dimensional flows on usually dry plains, interconnected river systems, morphological changes, etc.



Plate 7.5 Use of temporary bamboo built bridge during flood period at Bhanga-more, Mathabhanga I.



Plate 7.6 Village-road damaged by flood causing inconvenience to villagers (View at Kurshamari Village).



Plate 7.7 Border Bridge damaged over Nenda *nadi* at Chenakata village.

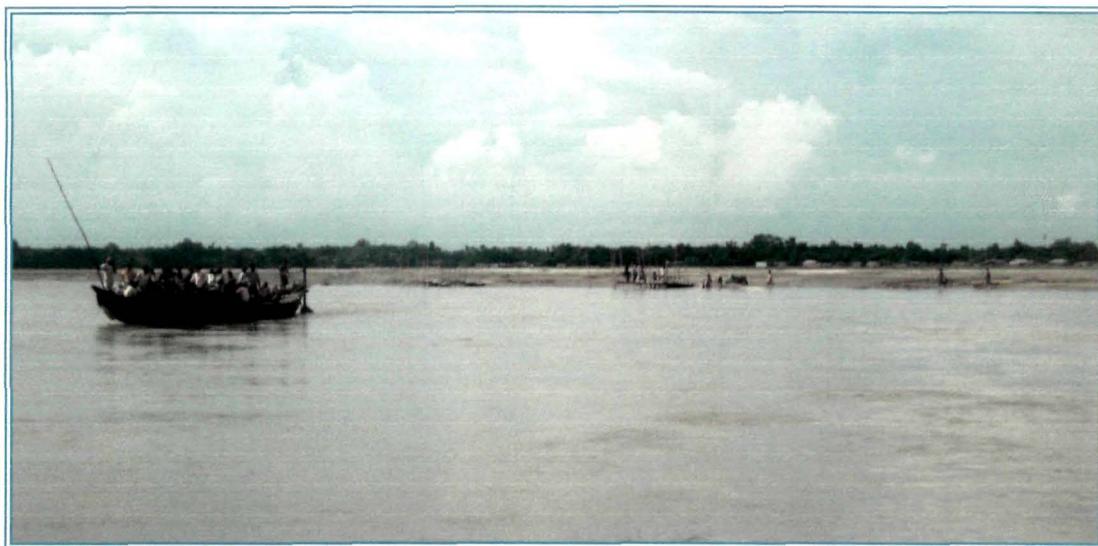


Plate 7.8 Boats being used during monsoon river flow as means of transport at Ghugumari, Koch Bihar II.

7.5 Break out of various water borne diseases

The District is backward economically. Most of the people live in villages and they are poor. They use drinking water mainly from tube well and well. As water is available in the near surface, they very rarely use deep tube well. In a few villages, river or pond water also use for drinking and other purposes. After two or three years large flood come, small flood comes in ever year. The upper most problem for the dweller of the District is drinking water during flood period and after flood period. As

the crisis of fresh water they use the flood water during flood period. In the post-flood period they use the same tube well and well for drinking water. Very few families know the use of halogen tablet or the means to purify the water. As a result, every year diarrhea, dysentery, is common fact all over the District. But there is no statistics about this phenomenon. Many family lives near the wetland areas like Krishnapur, Jhaljhalii, Deocharai etc. areas, where incidence of fever like malaria are common.

7.6 Land building by sedimentation

Alluvium and diluvium are constantly going on a large scale and sand banks are numerous near big rivers. Many small ponds and low land areas of the District become flat land. Ox-bow-lakes, bills, ponds becoming shallower and lastly they become agricultural land or for settlement as flood water deposited sediment year after year. A large famous ox-bow-lake of Raidak I is in Tufanganj town, now it is a cattle market and a settlement with a primary school and every year a large fair (*Dol Mela*) arranged there. A small portion of this lakes exits with shallow water.

7.7 Improvement in soil fertility status

There are many disruptive effects of flooding on human settlements and economic activities. However, flooding can bring benefits such as making soil more fertile and providing nutrients in which it is deficient. Floods can deposits silt, which can acts as fertilizer and eventually increases crop production after flood recedes. Periodic flooding was essential to the well being of ancient communities along the Tigris- Euphrates Rivers, the Nile River, Indus River, the Ganga and the Yellow River, among others. The viability for hydrological based renewable sources of energy is higher in flood prone regions. In the rainy season, rivers of the District annually deposited successive super strata of fertile silt upon the plains around. The agricultural lands of the District are fertile due to alluvial deposition during floods. Low land areas of Dinhata and Tufanganj Subdivision are much more fertile and are granary of the District. But alluvial deposition has been decreasing as in many places embankments which have been constructed to protect land from flood water. There are two types of lands in the District– high lands or *Dangas* and low lands or *Dolas*. *Dangas* are more sandy than the *Dolas* and are less fertile. Whereas *Dolas* are more fertile and are formed by yearly alluvium deposition which are carried by flood water.

Floods increase the ground water level and recharge the aquifers on river banks which in turn increase the productivity level and used for irrigation.

7.8 Sample opinion survey

Nine villages namely Santoshpur, Nepalerkhata, Jhaljhali, Deocharai, Chhat Deocharai, Balabhut, Krishnapur, Chengmari and Chowkhushi Balarampur of Deocharai Gram Panchayet (GP) under Tufanganj Block I, are situated along Torsa-Kaljani River subjected to flood every year.



Plate 7.9 Respondent of Village sample survey at Deocharai, Tufanganj I.

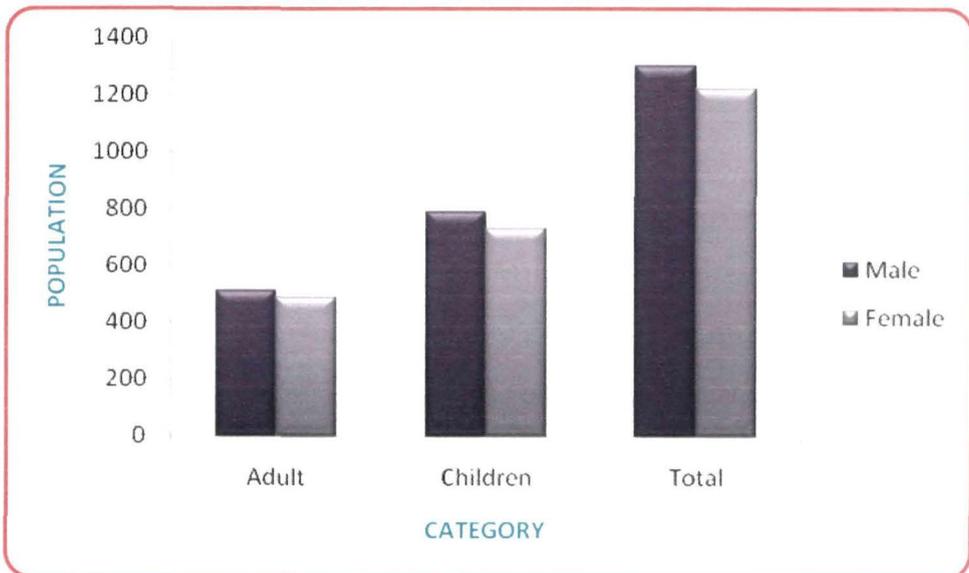
A sample opinion survey is conducted among 512 households of these nine villages during 2006-2008 to ascertain the local people's response to the flooding. The people of the villages are facing, struggling and protect themselves from flooding.

Table 7.4 Surveyed villages with household and population.

SI. No.	Name of the Villages Surveyed	Surveyed House Hold	Population
1	Santoshpur	115	605
2	Nepalerkhata	5	22
3	Jhaljhali	98	464
4	Deocharai	97	470
5	Chhat Deocharai	40	170
6	Balaghat	28	141
7	Krishnapur	31	139
8	Chengmari	34	207
9	Chowkushi Balarampur	64	306

Table 7.5 Male and Female Population.

Categories	Male	Female
Adult	511	489
Children	791	733
Total	1302	1222
Total Population: 2524		

**Fig. 7.5** Male and Female Population (Ref. Table 7.5).

According to sample survey total population of these 512 household is 2524, where male is 1302 (51.58%) and female is 1222(48.42%). Male - Female Ratio is 939 which are better than the State Ratio (934) but less than the District Ratio (949). Sex Ratio of children (0-6) is 927 which are much less than the District (964) and State Ratio (960).

Table 7.6 Literates and Illiterates

Sex	Literates	Illiterates
Male	1045	257
Female	897	325
Total	1942	582

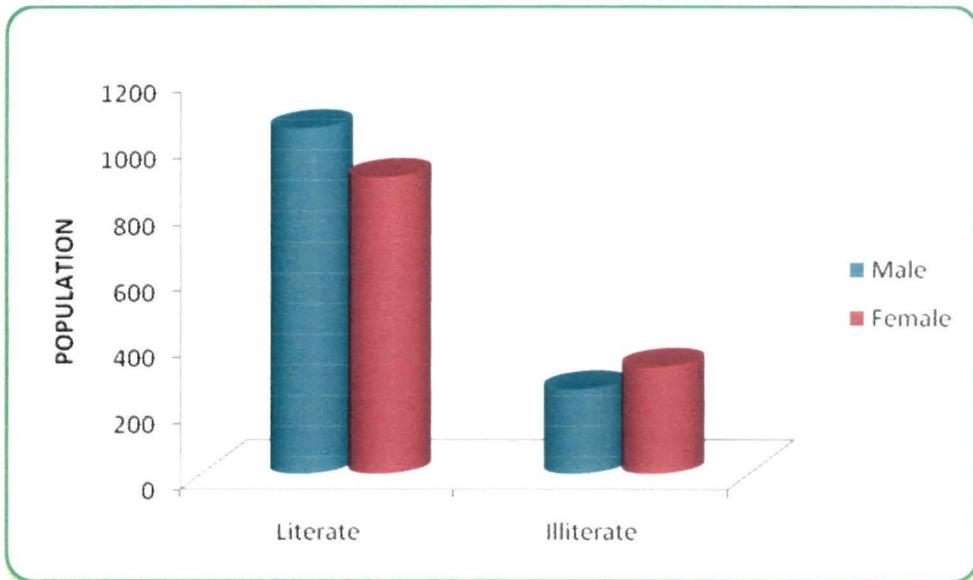
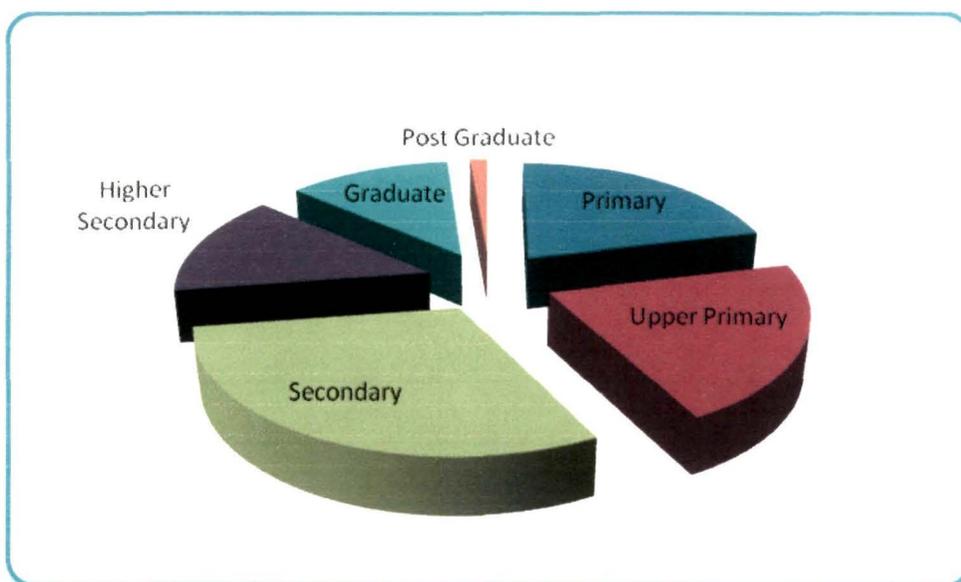


Fig. 7.6 Male-Female literates and Illiterates (Ref. Table 7.6)

Percentage of literacy is 76.94% and rest 23.06% is illiterate of the surveyed population. Literacy rate is higher than the State (68.30%) as well as the District (66.30%). Female literacy rate is 73.40% which is better than the State rate (59.61%) and the District literacy rate (56.12%). Male literacy rate is 80.26%.

Table 7.7 Level of Education.

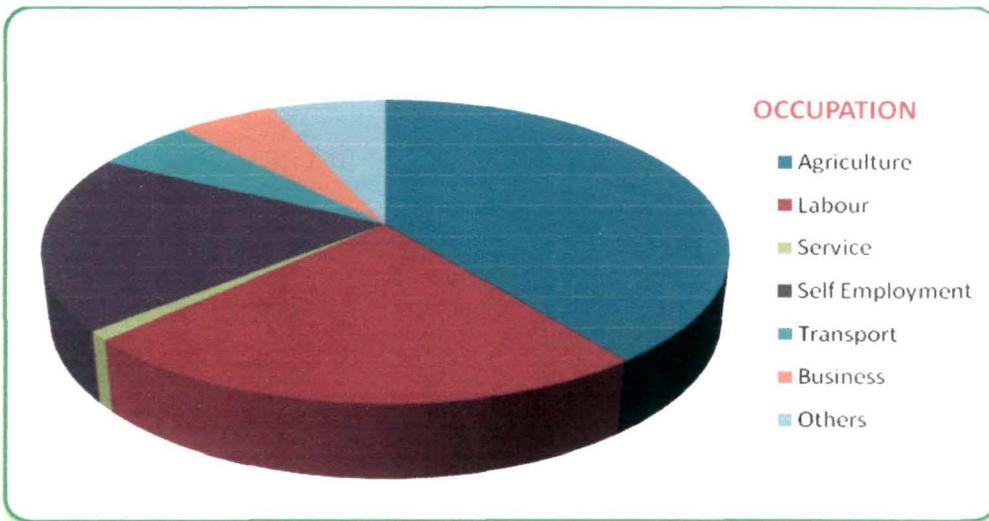
Sl. No.	Level of Education	Population	Population in %
1	Primary	410	21.11
2	Upper Primary	412	21.21
3	Secondary	587	30.23
4	Higher Secondary	269	13.85
5	Graduate	238	12.26
6	Post Graduate	26	1.34
Total		1942	100.00

**Fig. 7.7** Level of Education (Ref. Table 7.7).

Among the surveyed population 1942 (76.94%) is literate. Among the literate person 21.11% has been completed Primary Education Level, 21.21% completed Upper Primary Education Level, 30.23% completed Madhyamik Education Level, 13.85% completed Higher Secondary Level, 12.26% Graduate Level and only 1.34 Completed Post Graduation Level of Education. Educational level is Progressing due Illiteracy programme which was initiated in 1990s and now due *Sarvo Siksha* Mission of Govt. and consciousness about education among the villagers.

Table 7.8 Occupational Structure.

Sl. No.	Occupation	No. of Households
1	Agriculture	203
2	Labour	119
3	Service	5
4	Self Employment	96
5	Transport	28
6	Business	28
7	Others	33
Total		512

**Fig. 7.8** Occupational structure of the surveyed Household (Ref. Table 7.8).

Economically the surveyed villages are backward. Floods create most problems in job. Many people have left the villages for job searching. In spite of this, still now 39.65% of family fully depends on agriculture. 23.24% of family became labourer due land capture by rivers during flooding. Only 0.98% family depends on service. 18.75% of the total family find out their jobs in self employment. 5.47% and another 5.47% family engaged for job in transport sector and business respectively. 6.44% family earns from other sectors like hunting, beggary, *dhooli* etc.

Table 7.9 Caste-wise Population.

Categories/Caste	Population	% of Total Population
ST	0	0
SC	1280	50.71

OBC	995	39.42
GENERAL	249	9.87
TOTAL	2524	100

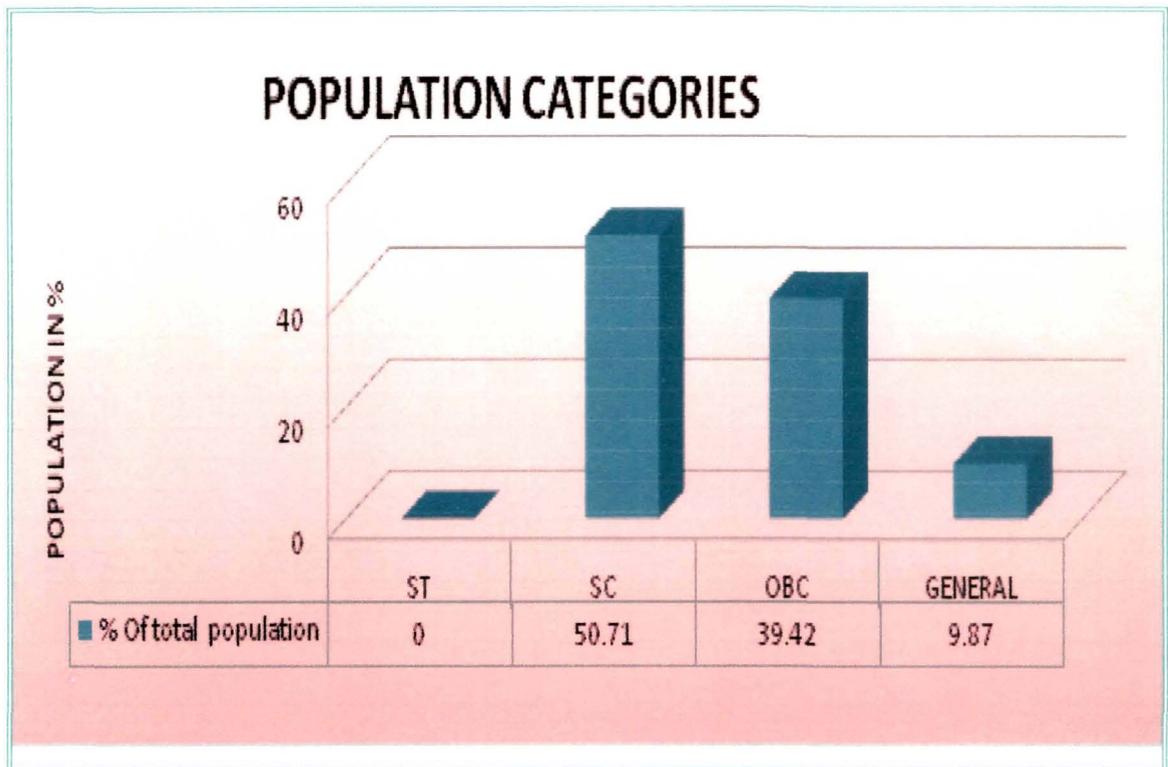


Fig. 7.9 Caste of Population, (Ref. Table 7.9).

There is no ST population in surveyed families. SC Population shares more than half of total population (50.71%), OBC IS 39.42%. This two community comprises more than 90% of total population and only 9.87% population is General category live in this villages.

Table 7.10 Religion-wise Population.

Religion	Total Population	% of Total Population
Hindu	1835	72.70
Muslim	689	27.30
Total	2524	100.00

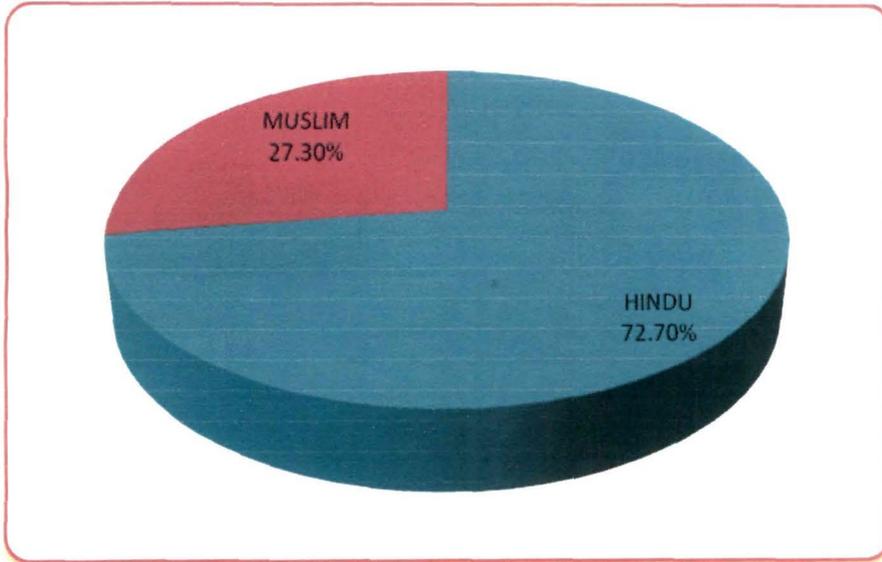


Fig. 7.10 Religion wise population (Ref. Table 7.10).

There is only two religion community live in these villages viz. the Hindus and the Muslims. Hindus comprise nearly 3/4th part (72.70%) and rest 1/4th part (27.30%) is Muslim population live in these villages.

Table 7.11 Shelter during flood.

SL No.	Category of shelter	No. of family take shelter	% of family
1	Permanent Flood Shelter	102	19.92
2	Temporary Flood Shelter in School	218	42.58
3	Embankment	134	26.17
4	Others	35	6.84
5	Not needed	23	4.49
Total		512	100.00

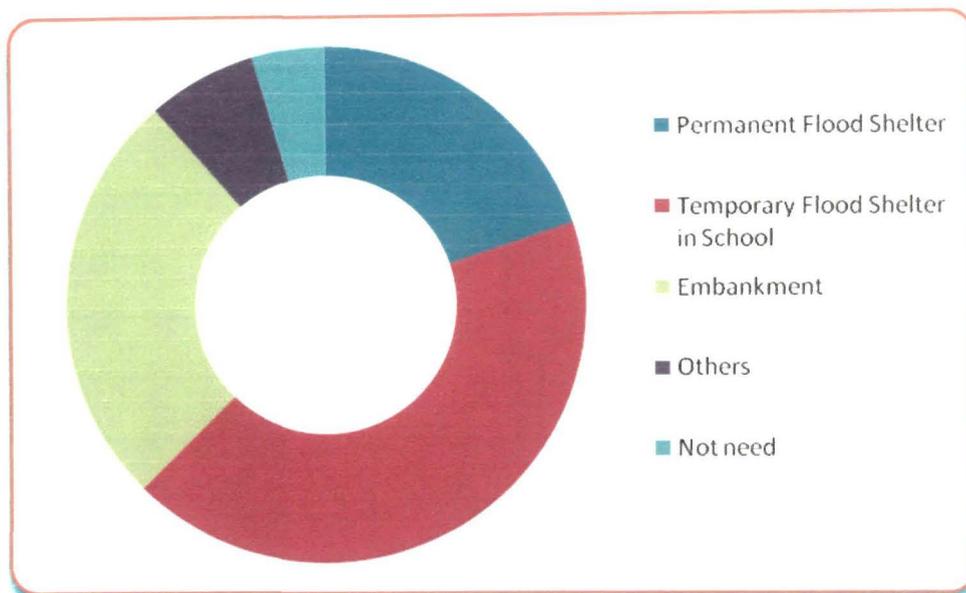


Fig. 7.11 Shelter during flood (Ref. Table 7.11).

During high flood situation maximum families of the surveyed villages have to shift in flood shelters. Among the shifted families only 19.92% can shift in permanent flood shelters in Deocharai Bazar. Most of the families (42.58%) shifted to the temporary flood shelter in their local Primary School and in High School of Deocharai High School, Krishnapur High School and in Krishnapur High Madrasa. Another 26.17% families take shelter above the embankments of Kaljani River. 6.84% family shifts to other places like *bund* of local pond, house of neighbor or relative's houses. Only 4.49% of families do not need to shift in high flood.

Table 7.12 Loss of agricultural land due to bank erosion.

Response	No. of family	% of family
Yes	132	25.78
No	380	74.22
Total	512	100.00

Table 7.13 Amount of agricultural land lost due to bank erosion.

Sl. No.	Amount of land lost in bigha	No. of family
1	< 1	56
2	1– 3	33
3	3– 6	17
4	6– 9	21

5	>9	5
Total		132

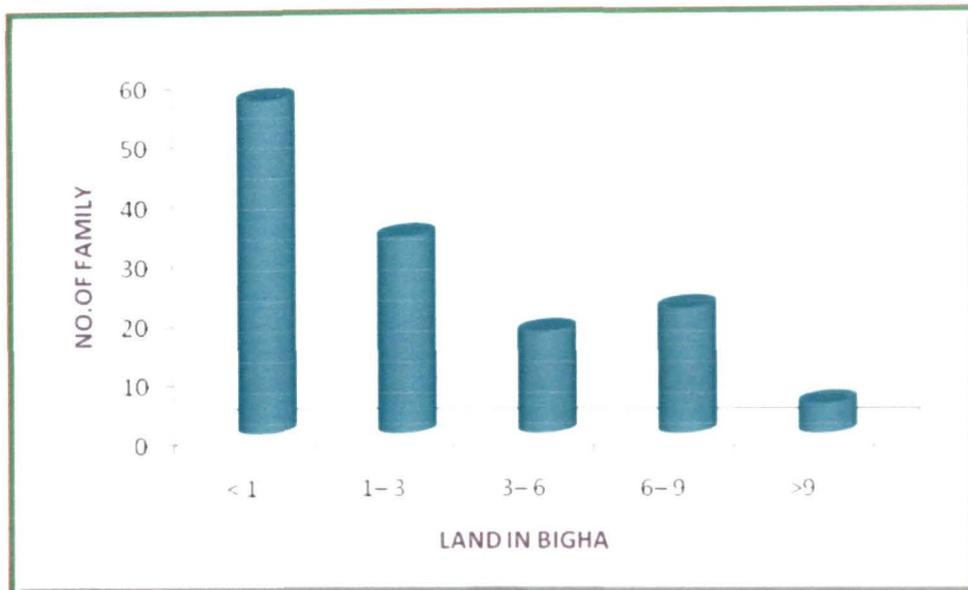


Fig. 7.12 Families lost Agricultural lands due to bank erosion, (Ref. Table 7.13).

Out of the surveyed 512 families, 132 (25.78%) family losses fertile agricultural land due to bank erosion of River Kaljani-Torsa and River Gadadhar. Among these 132 families, 56% family lost less than one bigha agricultural lands, 33% family lost 1-3 bigha agricultural lands, 17% family lost 3-6 bigha agricultural lands, 21% family lost 6-9 bigha agricultural lands and 5% family lost more than 9 bigha agricultural lands. In all total 26% family have become land less labourer.

Table 7.14 Death in flood.

Year	Villages	No. of human being	No. of cattle
1993	Jhaljhali	2	9
1993	Santoshpur	1	5
1993	Deocharai	0	4
1993	Chowkushi Balarampur	3	12
1993	Balaghat	1	6
1993	Chengmari	1	3
2003	Krishnapur	0	3
	TOTAL	8	42

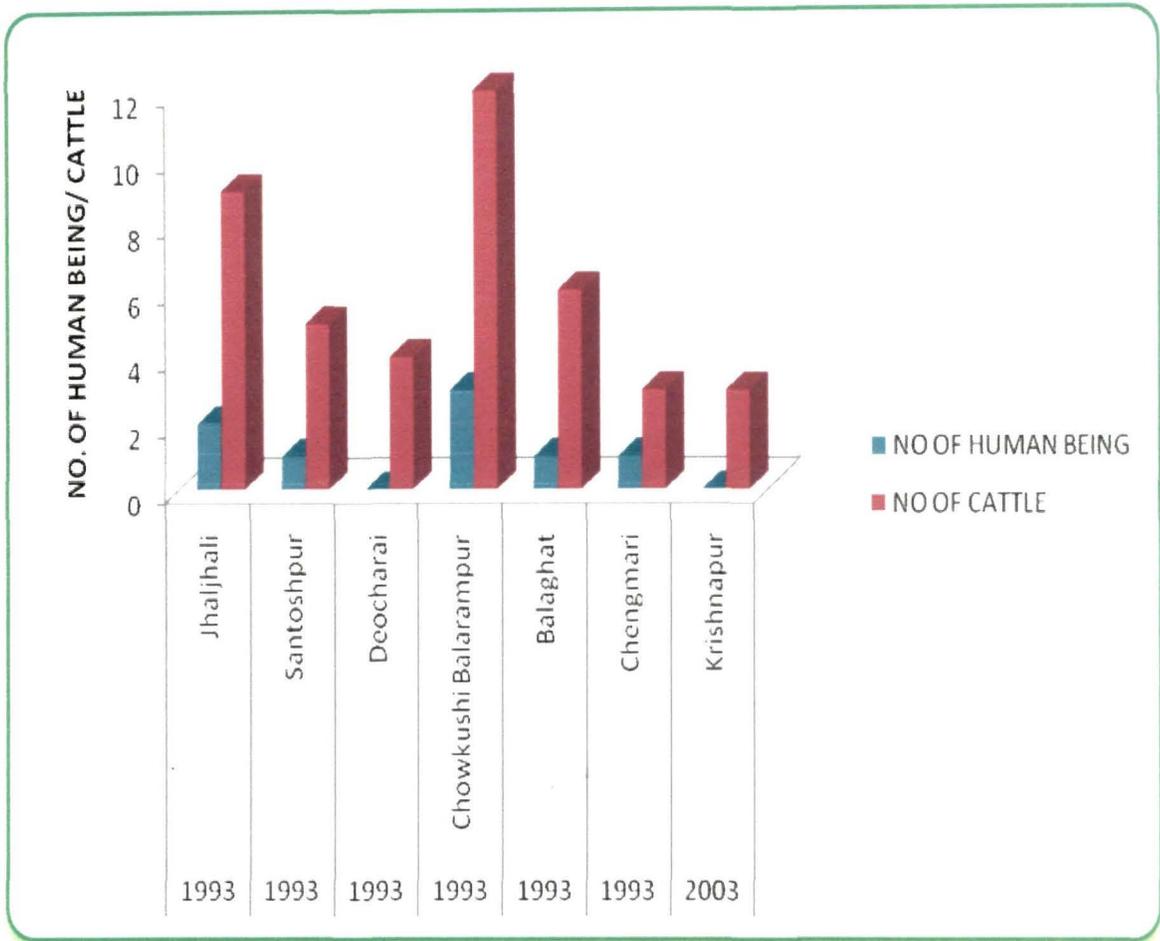


Fig. 7.13 Number of death in flood (Ref. Table 7.14).

In the surveyed area death incident mainly occurred in the havoc flood of 1993. Total 8 persons died in the flood of 1993. 3 persons died in Chowkhushi Balarampur, 2 villagers died in Jhaljhali, 1 in Santoshpur, Balgahat, and Chengmari villages. Chowkhushi Balarampur is the most sufferers in the 1993 flood. 12 cattle from Chowkhushi Balarampur, 9 from Jhaljhali, 6 from Balaghat, 5 from Santoshpur, 4 from Deocharai and 3 from Chengmari swift away due to flash flood of 1993. 3 cattle also died during flood of 2003 in Krishnapur village.

Table 7.15 Wanted to leave the village.

Response	No. of family	% of family
Yes	327	63.87
No	185	36.13
Total	512	100.00

There are many problems in these villages due to flood. Problems of job, income, communication, food and drinking water etc. the villagers have to face. For these reasons most of the family heads (63.87%) want to leave their villages to settle

flood free areas. Only 36.13% of family heads do not want to shift. They want to stay in their own villages in any situation.

Table 7.16 Causes of flood according to the villagers.

Sl. No.	Causes	No. of household	%
1	Heavy Rainfall	512	100
2	Absent of Embankment	379	74.02
3	Water comes from upstream	277	54.1
4	Weakness of Embankment	128	25.00
5	Stagnation of Rainwater	152	29.68

Permanently migrated due to flood

1. Within the Village = 102 Families

2. Outside the Village = 57 Families

Total = 159 Families

Almost every year flood comes and destroys houses, crops and capture fertile agricultural lands. Due to these problems people of surveyed villages have to shift or migrate to another place for settlement. 102 families have shifted to other better places within the villages and 57 families shifted or migrated outside their villages to save themselves from flooding.

Table 7.17 Migrations for job.

Sl. No.	Place of migration	No. of population migrated
1	Mumbai	52
2	Assam	34
3	Fulia, Burdwan	17
4	Bihar	6
5	Bhutan	1
6	Delhi	18
7	Rajasthan	19
8	Kolkata	2

9	Haryana	1
10	Siliguri	2
11	Gujrat	1
12	Tufanganj	5
Total	Total	158

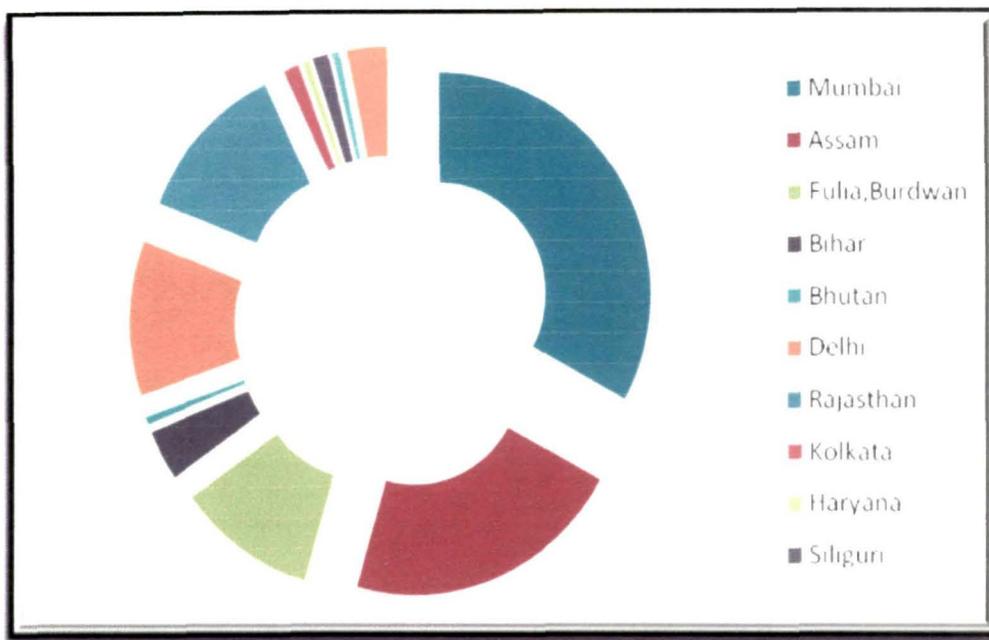


Fig. 7.14 Migration outside the villages for job, (Ref. Table 7.17).

As floods have captured many fertile agricultural lands, many farmers became landless as well as jobless. Later, they became landless labourer and their young boys are migrated outside for job searching. Total 158 young boys of these 512 families migrated temporarily to different places. Among them, 52 persons have gone to Mumbai as industrial worker, 34 to Assam as agricultural worker, 17 to Fulia, Burdwan for weaving, 6 to Bihar, 19 to Rajasthan, 18 to Delhi to work at brick industries, 5 to Tufanganj town for work in shop. Besides, a few female also works as domestic helpers at Tufanganj town.

Table 7.18 Income level.

Sl. No.	Income in Rs.	No. of family	% of family
1	Below 1000	119	23.24
2	1000 - 5000	251	49.02
3	5000 – 10000	108	21.09

4	Above 10000	34	6.64
Total		512	100.00

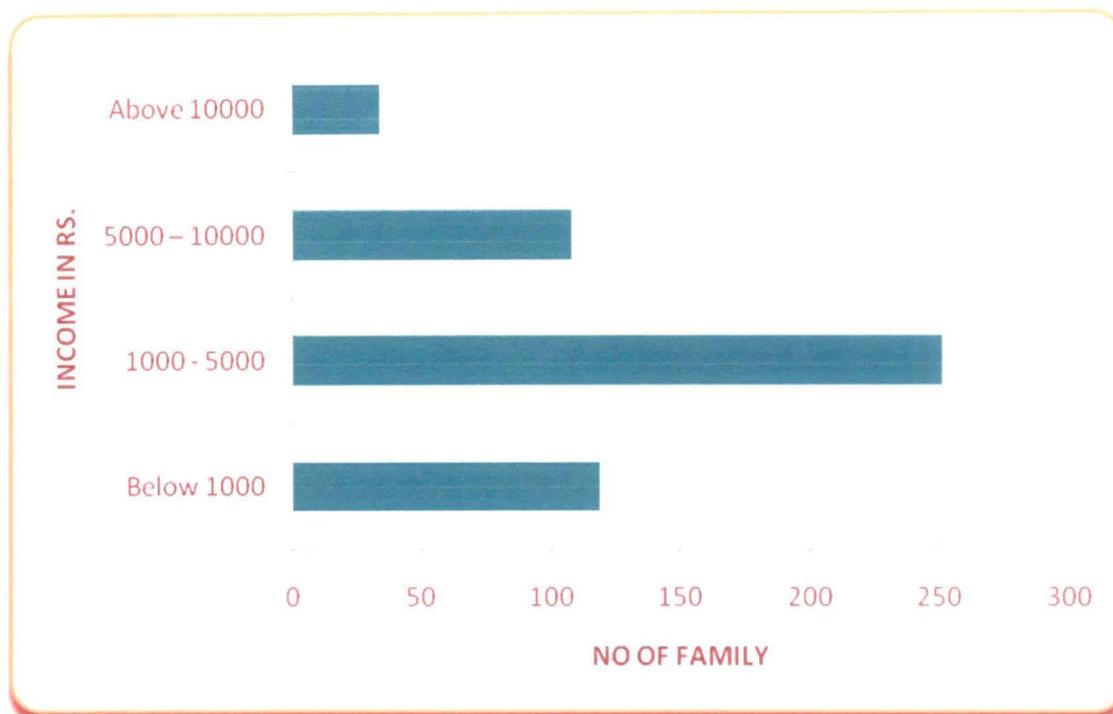


Fig. 7.15 Income level of the household (Ref. Table 7.18).

Most of the families in the surveyed area are poor. Their income level is very low. Monthly income of the 24.24% family is below Rs. 1,000. Most of the family (49.02%) earns Rs. 1,000 – Rs. 2,000 monthly. 21.09% of the total family monthly earn Rs. 5,000 – Rs. 10,000. Only 6.64% of the total family monthly income is more than Rs.10,000.

According to all the villagers, the main cause of flood in this District is its heavy rainfall. There are other causes also. 74.02% of villagers think that absent of embankment and 25% of the villagers think weakness and crack of embankments are the other causes of flood in these villages. According to 54.1% of the villagers, flood comes due to release of excessive rain water from upstream of Bhutan Government. According to the villagers the main remedial measures of flood is the construction of embankment to protect villages. Construction of permanent flood shelter in every flood prone area and proper flood warning system can help them from the loss of lives and damages of properties.