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Flood and Erosion Induced Population Displacements: A Socio-economic Case Study in the Gangetic Riverine Tract at Malda District, West Bengal, India

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ABSTRACT Various multipurpose dams around the globe have compelled the people to displace. The figure of dams and displaced people is too high, but displacements for flood and erosion are much higher than the dams. A study of Gangetic Tract at Malda District of West Bengal, India alone again proved the above hypothesis. The study was conducted along the riverine tract of the Ganga, which are frequently affected by regular floods and erosions made by the Ganga. Even the embankments are filled with displaced people as these are the safest refuges. Keeping in mind the above fact, the marginal embankment settlement was also surveyed   It was followed from the survey that many socio-economic factors were changed for such natural hazards in those area and it also changed the demographical factors of the area as well as of the whole district. Out migration is one of the important aspects of such impact. A huge number of people migrated to other distant places of India for livelihoods. It is a serious matter of concern for Government as well as for the researchers.

INTRODUCTION

The Ganga, which is the lifeline of India, originates from the Gangotri glacier in the Himalayas, at an elevation of 7010m above mean sea level and covers a distance of 2525km before it flows into the Bay of Bengal. On its way, the Ganga passes through 29 class-I cities (population> 1 lac), 23 class – II cities (population between 1 lac and 0.5 lac) and 48 towns with population less than 0.5 lac. The entire Ganga basin covers 43 percent of total irrigated area and nearly half of India's total population (Singh 1971).

The Ganga enters West Bengal in its third or lower phase, before egressing through the region and falling into the sea. Of its total course-length of 2500km, however, the river Ganga has limited length in West Bengal, with a bank line of only 76km on its left bank in Malda district.

Like any other alluvial river, because of low velocity and very flat stream slope, the river Ganga meanders eroding banks on the concave side and depositing silt on the bank of the convex side of the bend. Such erosion activities are again aggravated by frequent changes in formation of bed channels and spell channels because of variation of quantum of discharge during different times of the year. Unplanned land use activities, deforestation, development of irrigation in the upper valleys, reduced base flow/lean flow and increased the flood discharge has resulted in wide variation of flow from lean period to monsoon. Variation of discharge being about 1,800 cusec during January to maximum of 79,450 cusec during monsoon months.

The satellite imagery provides synoptic coverage of the play field of the Ganga, Ganga-Padma river system exhibiting various geomor-phological and geological features like abandoned channels, left out meander scrolls, oxbow lakes, and remnants of spill channels, older flood plains etc. and lineaments. It is also interesting to mention that whatever changes occurring in the course of the Ganga, Ganga-Padma river, these are very well within earlier flood plain/alluvial plain of the river system at least in this country.

It has been observed through bank line surveys and from old maps since 1922-23 that the river has normally been changing its course except at two fixed points, *viz.* at Rajmahal and Farakka where it has generally been hugging the right bank. The river at Rajmahal and Farakka is stable as far as its position is concerned. However ,at these two locations, the direction of flow of the river has been changing. In the maps of 1922-23, the direction of flow of the river Ganga between Rajmahal and Farakka was more or less straight. Subsequently, the river direction changed. In 1948-50 survey shows that the river Ganga had a definite tendency to swing to the left below Rajmahal and to the right below Farakka. By 1967-

68, the bank line had moved considerably towards the left below Rajmahal in the Rajmahal-Farakka reach (Sengupta 1969). Though the position at Farakka remained unaltered, the river had move considerably towards the right below Farakka. In 1970-72, the bank line indicates that on the upstream of Farakka Barrage, the erosion on the left bank was continuing unabated though apex of the erosion was moving downstream.

A common difficulty faced by the lower riparian regions along the Ganga is the frequent phenomenon of river floods. The report of the Official Study Group constituted by the Ministry of Water Resources in 1986, and led by the Irrigation Advisor of the Planning Commission, estimates that around 111 million ha land area affected by the water erosion just followed by the water logging which affected 2.46 million ha of land.

The present study will examine the impact of flood and land erosion on the people. The land loss and displacements will be considered. Some demographic parameters will be discussed including flood and erosion induced out-migration of those people who are residing along the riverbank of the Ganga in the district of Malda. Malda has been chosen because its people have so often been a victim of floods and land erosion. The study will try to show that besides displacements and losses by construction of dams, the floods and erosion cause far more displacements and losses.

Literature Review

To protect people and development, various multipurpose valley projects have been taken up, to provide irrigation, hydel electricity and flood control. But in more recent years, several articles or books have been written about the adverse impact of such projects. Even mass movements are occurring in various parts of our country as well as around the globe. A well-reported case study on dam related population displacements in India relates to Rihand Dam (see also Table 1). It caused the dis-placement of 10,000 people from 108 surrounding villages. Same case has been seen during the construction of the Kaptai hydroelectric project over the Karnaphuli River in the Chittagong Hill Tracts (CHT) of Bangladesh. It has been estimated that 1 lakh tribal people have lost their lands of which 40,000 people subsequently crossed the border to India and were resettled in Arunachal Pradesh (Ahmed 2001).

Dams constitute the largest human interventions into the natural flow patterns of a river. More than 45 thousand large dams exist across the world today. The rate at which human intervention on rivers has increased has been quite phenomenal. The first dam for generating hydel power was built in 1890. Sixty years later in 1949, the world still had only 5 thousand large dams. Since then, their number has increased rapidly to 45,000 spread over 140 different countries, and it is estimated that between 160-320 new dams are being. The building of dams on this huge global

Table 1: Demographic displacements caused by dam construction

Dam sites	*Country*	*Displacement*
Dams Already Built		
Srisailam	India	100000
Assad	Syria	60000
Portile de Pier	Romania/Yugoslavia	23000
Victoria	Sri Lanka	31500
Akosombo	Ghana	84000
Kossou	Ivory Coast	85000
Kainji	Nigeria	50000
Aswan High	Egypt	100000
Nangbeto	Togo/Benin	12000
Sanguling	Indonesia	55000
Danjiangkou	China	383000
Sobradinho	Brazil	60000
Mangla	Pakistan	90000
Tarbela	Pakistan	86000
Dams Under Construction		
Ertan	China	30000
Shuikou	China	68000
Tehri	India	105000
Narmada Sardar Sarovar	India	250000
Almatti	India	160000
Narayanpur	India	80000
Itparica	Brazil	45000
Yacyreta	Argentina/Paraguay	48000
Kayraktepe	Turkey	20000
Kotopanjang	Indonesia	20000
Pergau	Malaysia	28000
Tahtali	Turkey	12000
Xiaolangdi	China	181000
Dams Under Design		
Kalabagh	Pakistan	80000
Gandhi Sagar	India	100000
Soubre	Ivory Coast	40000
Komati Basin	Swaziland	20000
Karnali (Chisapani)	Nepal	50000
Three Gorges	China	1100000
Casecnan	Philippines	4000
Jiangya	China	18700
Longtan	China	73000
San Juan Tetelecingo	Mexico	22000
Subarnarekha	India	80000

Source: Compiled from M.M.Cernea 1993b; Veena Das 1996 scale has not been without huge human costs. Between 1989 and 1993, an average of four million people were displaced annually by the construction of 300 large dams. In China, where only 22 large dams existed in 1949, there are 22 thousand dams today. Another 6390 large dams are located in the United States, while India by now has more than 4 thousand large dams. Even relatively small-developed countries like Spain and Japan have between one to two thousand dams each (Dhawan 1994).

The World Commission for Dams (WCD) thus estimates that between 10 to 80 million people across the world have been displaced by large dams. While stating, "For millions of people on all continents, displacement has essentially occurred through official coercion," the WCD report records "little or no meaningful participation of affected people in the planning and implementation of dam projects- including resettlement and rehabilitation."

The building of large dams has also imposed tremendous environmental costs. Large dams have now been built on 60 percent of the world's rivers, often altering their ecosystems irreversibly. The WCD thus states that large dams on the whole have negative environmental externalities, most of which cannot be mitigated by corrective measures. The record of large dams in flood control has also been of a mixed nature. While in some instances, they have helped; they have also made other communities more vulnerable to flood risks.

Although the building of dams across the world has played an important part in increasing irrigation and food production, it has also led to widespread water logging and salinity in irrigated areas, which is estimated at 38 percent in the heavily irrigated Indus Basin. Water logging and salinity appear inevitably following the development of large-scale canal irrigation, and India has not been an exception to this (Sengupta 2001).

Although water logging and soil salinity rises with the rise in groundwater tables, the process is governed by several factors such as natural water-table depth, soil permeability and drainage, irrigation practices, and land proximity to canals, etc. Land degradation can thus occur in differing pockets and over varying time durations in the canal command. The report of the official Study Group constituted by the Ministry of Water Resources in 1986 and led by the Irrigation Advisor of the Planning Commission, estimates that around 2.46 million ha of the farmlands in various canal commands in India are now affected by water logging, 3.06 million ha by salinity, and 0.24 million ha by alkalinity (MOW 1991). Under such estimates, nearly 6 million ha of farmland within the canal commands are degraded lands, which can only offer marginal returns in crop production and farm incomes. Water logging and salinity are however not the principal sources of land degradation in India. An indication of the relative importance of different natural risk factors is provided in the following table (Biswas 1993).

Big multi-purpose river valley projects were earlier (and to a considerable extent still are) known mainly for their contribution to economic development by providing irrigation, hydel electricity and flood control, not to mention the various lesser benefits listed by the promoters of these projects: In more recent years, however, several articles and some books have been written about the other side of these projects - their adverse impact on the environment, and the various hazards arising out of their construction (Table 2). It has also been effectively argued that the irrigation, flood control and other benefits claimed on behalf of these projects are not at all as promising as they are made out to be by the promoters.

Table 2: Natural risk factors and environmental degradation in India

Principal cause of land degradation	*Land area affected (MHa)*	*% to Total*
Water Erosion	111.0	64.09
Wind Erosion	39.0	22.52
Water logging	8.5	4.91
Soil Salinity and Coastal Dunes	5.5	3.18
Soil Alkalinity	2.5	1.44
Ravines and Gullies	4.0	2.31
Riverine and Torrents Area	2.7	1.56
Total Land Area Affected	173.2	100.00

Source: Adapted from M Velaynthum 1992

A well -reported case study on dam-related demographic displacement in India relates to the Rihand dam. The suitability of Renukut as a site for construction of a dam on the river had been first pointed out by the British Deputy Commissioner in Rihand in 1940. The dam was considered desirable for irrigation and hydel generation. After Independence, the proposal was examined in great detail, and survey work on the dam started in 1951-52. When the foundation stone for the project was being laid in 1954, the then Prime Minister Jawaharlal Nehru promised that all dam oustees would be provided with adequate compensation and employment, and the electricity generated by Rihand would first be used to meet their needs. Construction of the dam and its reservoir caused the displacement of10,000 people from 108 surrounding villages. By1960 when the dam was completed, most of them had become contract labourers. The Rihand oustees have since had to pay the price of development, since the Government, as compensation did not give them land (Singh 1985).

Mass displacements and environmental destruction have thus commonly been associated with the construction of big dams. The first documented example of rural residents becoming ecological refugees because of the collapse of environmental security occurred during the construction of the Kaptai hydroelectric project over the Karnaphuli River in the Chittagong Hill Tracts (CHT) of Bangladesh between 1957 to1962.

It is reported by Elahi and Rogge (1990) that while one million people were displaced by flood and erosion in Bangladesh, it is not less than ten thousand people in Murshidabad alone. It is also recorded in the same article that 79,190 people were displaced during 1988 to 1994 in Murshidabad alone for flood and land erosion. The displacement at Malda for the same was not lagging behind in facts and figures (Rudra 2003).

The main problems of managing the Ganga river basin may be summarized as follows-

(i) Large- scale erosion of the bank of the river Ganga appears to be consistent with the geology and hydrology of the river and geotechnical properties of its bed and banks.

(ii) There is a general tendency of the Ganga to shift towards left bank above Farakka, and towards right bank below Farakka. This is aggravated by frequent changes in bed channels and spill channels because of large variation of discharge and human intervention.

(iii) Anti-erosion measures, so far undertaken, have not made with much success because of some constraints at the site.

(iv) Non-availability of adequate quantity of boulders of the desired size is a major constraint in the construction of revetments and spurs.

(v) Construction of spurs and revetments become difficult because of inadequate facility for tagging with bank and placement of boulders for launching apron, under large depth of water.

The table 3 shows that every year some of the area is eroded by Ganga. Up to 1978, the total land loss was 14335 hectares. It can be followed from table 3 that the intensity of erosion has increased after 1978; i.e., just after the construction of Farakka Barrage. The Farakka Barrage blockade the natural movement of the Ganga and the leftward erosion increased at the time of high discharge of water (Parua 1999).

Table 3: Left bank erosion by the Ganga in Malda district *(Upstream from the Farakka Barrage)*

Years	*Maximum approximate bank-length affecte (kilometers)*	*Approximate erosion width (m) (metres)*	*Land loss (hectares)*	*Approximate maximum discharge ('000 cusecs)*	*Maximum water-level (metres)*
1931-1978	-	-	14335	-	-
1979	5.0	200	60	42.80	22.90
1980	7.0	150	105	73.00	24.80
1981	11.0	400	260	57.00	23.70
1982	5.0	150	65	68.0	24.80
1983	5.0	200	90	60.50	24.90
1984	7.0	100	70	61.40	24.80
1985	6.0	150	90	57.30	24.30
1986	6.0	200	105	49.80	24.20
1987	8.0	300	240	73.90	25.40
1988	7.0	100	70	68.00	25.10
1989	10.0	150	150	36.80	22.90
1990	8.0	200	160	55.50	24.20
1991	11.0	150	170	69.70	25.30
1992	9.0	150	130	46.40	23.90
1993	7.0	200	145	54.20	-
1994	7.0	1250	160	67.90	24.90
1995	8.0	200	145	49.80	24.00
1996	15.0	250	310	71.00	25.10
1997	6.0	100	60	47.70	24.10
1998	10.0	900	330	75.90	25.40

Source: Superintending Engineer, Farakka Barrage Project

The tables 4, 5 show the impact of floods and erosion during 1998 and 1999.

The 1998 floods affected more than two- thirds of the district and a population of over 22 lakhs, with nearly 4.4 lakh houses being either destroyed or suffering severe damage. Inspite of the flood-warning system, the loss of human and animal lives was considerable. The 1998 floods affected around 0.25 lakh persons in four Gram Panchayats (GPs) in the area, damaging homes and schools and eating away farming lands. During the 1998 flood, maximum ward/GPs affected by floods were in Old Malda and English Bazar Municipalities. because, huge discharge by river had forced

Table 4: Flood Damage during the 1998 floods in Malda district

Affected Block/Municipality	*Area affected (sq.km)*	*GPs/ wards affected*	*Villages affected*	*Persons affected*	*Families affected*	*Houses fully damaged*	*Houses partly damaged*	*Crop-damage mouzas*	*Crop-damage area (ha)*	*Human lives lost*	*Animal lives lost*
Kaliachak - I	140.5	14	195	300000	60000	18000	28500	66	3050	18	10
Kaliachak - III	127	14	219	214664	44000	11225	19575	74	10690	7	174
Ratua - I	183	10	198	200000	40000	31075	5025	101	15000	4	-
Kaliachak - II	209	10	399	173000	37000	35000	1720	48	5130	10	10
English Bazar	220	11	144	170000	34125	30358	3100	146	6400	4	14
English Bazar (M)	12.1	25	85	170000	32690	937	6927	-	-	-	-
Habibpur	110	9	485	140000	28000	17000	11000	103	9500	-	-
Manikchak	230	8	99	140000	28000	12509	15491	184	12860	15	4
Chanchal - I	111.46	8	191	107035	21407	10870	4600	91	11850	2	26
Chanchal - II	170	6	101	106000	21132	11762	9370	92	12600	1	-
Gazole	250	12	166	100611	21000	8197	7994	123	21231	3	7
Ratua - II	101	8	75	85000	17000	68000	10000	51	10500	4	-
Old Malda	77	5	91	77625	15525	1495	13970	100	7000	3	5
Old Malda (M)	9.54	17	88	62325	16250	3920	11530	-	-	-	7
Harishchandrapur - I I	212	9	74	75000	15000	4000	6000	54	8300	-	-
Bamangola	50	6	50	55000	10640	2500	4500	84	9492	-	2
Harishchandrapur - I	171	7	213	50000	10000	3000	6000	44	5205	-	_
District Total	2383.6	179	2873	2226260	451769	269848	165302	1361	148808	71	262

Source: Uttarbanga Unnayan Parshad

Table 5: Flood damage during the 1999 floods in Malda district

Affected Block/Municipality	*Area affected (sq.km)*	*GPs/ wards affected*	*Villages affected*	*Persons affected*	*Families affected*	*Houses fully damaged*	*Houses partly damaged*	*Crop-damage mouzas*	*Crop-damage area (ha)*	*Human lives lost*	*Animal lives lost*
Manikchak	120	11	413	128135	24290	11100	6565	81	NA	-	-
Harishchandrapur - I I	212	9	218	90000	18000	10000	5000	74	9479	1	-
Ratua - I	200	10	198	88275	17655	4450	1500	101	11025	-	-
Gazole	235	5	177	85000	26000	8000	9000	100	6730	-	-
Ratua - II	125	8	81	80000	10000	10000	15000	51	7632	1	-
Harishchandrapur - I	171	7	195	75000	25000	7000	5000	105	8038	-	-
Chanchal - I	162	8	202	75000	28300	20000	3000	93	8490	-	-
Habibpur	33	9	80	65000	5000	3000	1000	74	2806	-	-
Kaliachak - III	125	14	65	50000	10000	500	2100	74	4161	-	-
Old Malda	80	5	115	38700	7745	4000	3520	60	2546	-	4
Old Malda (M)	8	25	41	56800	11400	8000	8000	-	-	-	-
Kaliachak - I	41	4	35	35000	7000	150	100	43	169	1	-
Chanchal - II	150	3	21	28000	6000	500	700	82	9250	-	-
Kaliachak - II	8	10	62	22000	4025	2800	900	48	244	-	-
Bamangola	20	3	50	4500	4500	2500	2000	75	1600	-	-
English Bazar	5	2	22	2000	2000	520	1080	105	1665	-	2
English Bazar (M)	4	4	25	75000	5000	400	1100	-	-	-	-
District Total	1699	137	2000	998410	211915	92920	65565	1166	73835	3	6

Source: Uttarbanga Unnayan Parshad.

water to backward flow to enter into the city through the exit drain. The loss of human lives was highest in Kaliachak I just followed by Manikchak. The rural area of English Bazar was also affected badly, which lost four lives. Kaliachak II was in second position and Kaliachak III was in third position. Maximum animal lives lost in Kaliachak III block just followed by Chanchal I. Three lakhs people affected by that devastating flood. Almost 22.3 lakhs people were affected by flood in the whole district.

The 1999 floods were only a little more moderate. In this year, the municipal areas were not affected widely but some wards were logged by water for some days. In that year, the flood made by Fulahar, Mahananda and Tangan, affected the huge area of Gazole, Harish-chandrapur I and II, Ratua I and II, Chanchal I and II. The impact of flood was quite low in Kaliachak and Manikchak in 1999 than 1998 (WAPCOS 2001).

METHODOLOGY

The present study was done in Malda district, which is the southern-most district of the North Bengal Region and is included within Jalpaiguri Division. The districts of Uttar and Dakshin Dinajpur and the district of Purnea in the state of Bihar bound it on the north. To its south-west, it is bounded by the river Padma and to the south by Murshidabad district. On the east, it is partly bounded by the district of D.Dinajpur in West Bengal and Rajshahi district in Bangladesh. The district is situated between latitudes 25^{O} 32' 08"N and 24^{O} 40' 20"N and is located entirely to the north of the Tropic of Cancer. The eastern-most extremity of the district is marked by longitude 88^{O} 28' 10"E and its western-most extremity by longitude 87^{O} 45' 50"E. The target villages are Dhrarampur, Dakshin Chandipur, Gopalpur and Embankment No.7 colony located on the left bank between Manikchak and Englishbazar CD Blocks.

The study was conducted along the riverine tract of the Ganges in Malda district. The affected area was identified with the help of secondary information. The socio-economic impact is better understood by visiting the affected area and to see the condition of the sufferer. So, the primary survey is important. The data collected from primary survey has been tabulated and analysed with the help of statistical tools. The sample was collected purposively from the affected area.

The primary survey of flood-affected village residents covered 37 households from Dharampur, Dakshin Chandipur, Gopalpur and the Embankment number 7 colony located on the Ganga left bank, between Manikchak and English Bazar. While 35 of these sample households were male-headed, females headed 2 households. 62 percent of this sample (23 families) was drawn from the Dakshin Chandipur area, 24 percent (9 families) from the Dharampur area, and 8 percent (3 families) and 6 percent (2 families) respectively from the Embankment no.7 and Gopalpur area.

RESULTS AND DISCUSSIONS

The ages of the respondent household-heads ranged between 24 years and 86 years. The age-distribution of respondents was bimodal with two modal clusters in the age groups 20-29 years and 40-49 years. The average age of the sample respondents taken as a whole was 44.5 years.

Most families in the sample were nuclear in structure, with 56.8 percent (21 families) being unitary households. 37.8 percent (14 families) of the households had a joint structure and 2 families had an extended structure. The unitary households were younger aged, with their respondents having an average age of 40.9 years. In comparison, the respondents belonging to joint families were older with an average age of nearly 50 years. It would appear therefore that many of the unitary families had originated from the recent fragmentation of joint households. In keeping with the family structure, many of the unitary families depended on a single earner, with the sample of sole earners also being younger aged at an average of 42.8 years. However, more than 51 percent of the households had two or more earners, and the household heads of such families had a higher average age of 46.3 years. Comparison between the structure and earning-type of the respondent families would indicate that many unitary families had to draw upon the earnings of more than one family member, because of the overall poverty of the family.

The overwhelming majority of respondents (43 percent) had never had access to formal education as seen in table 6. However while 35 percent of the respondents had remained illiterate, 8 percent had become functionally literate through personal effort. Among those who had received formal education, the respondent distribution between Primary, Middle School and Madhyamik level was identical. However, only half as many

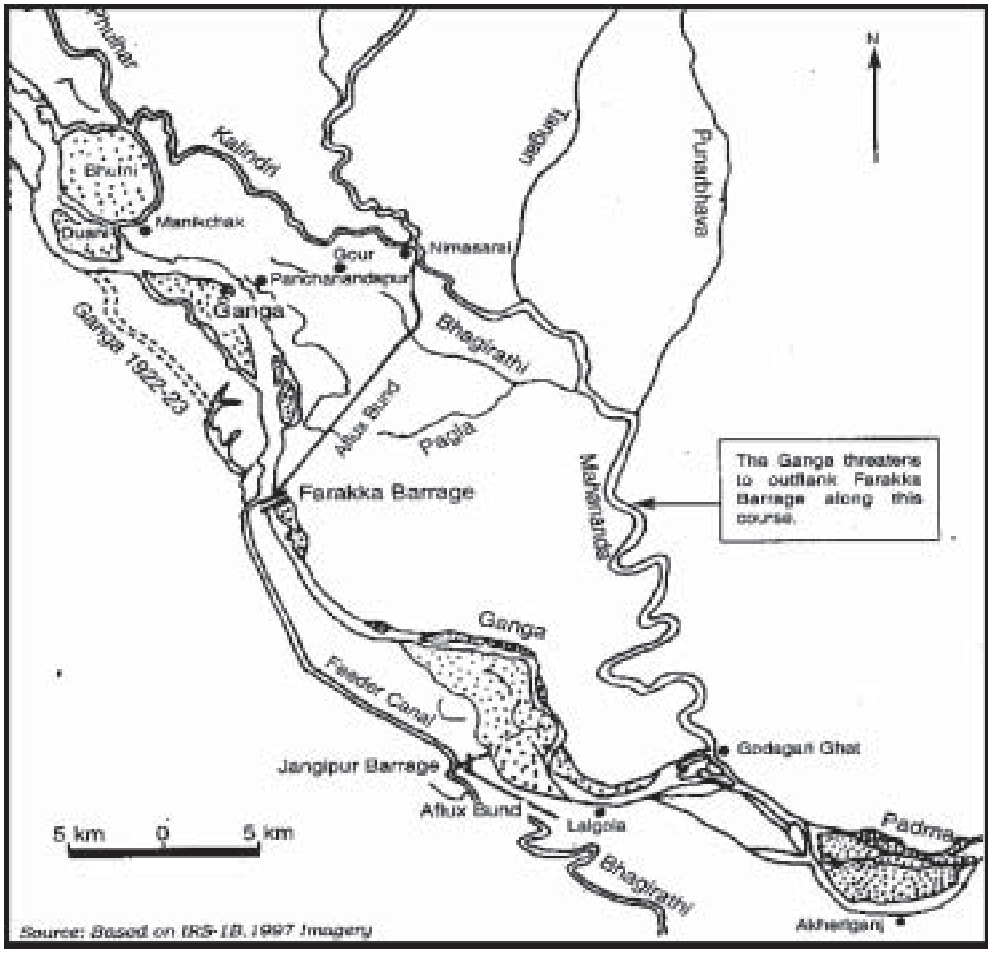

Fig.1.Diagram of Affected Area of the Ganges in Malda District of West Bengal
Courtesy: K. Rudra (2003)

Table 6: Education and literacy among respondents

Education	*Number*	*%*
Illiterate	13	35.1
Functionally Literate	3	8.1
upto cl4	6	16.2
cl5-cl8	6	16.2
cl9-cl10	6	16.2
cl11-cl1	2	38.1

respondents had progressed to the Higher Secondary level.

(a) Respondents with agriculture as their main occupation, who had to supplement their agricultural livelihoods with wage labour, and

(b) Respondents with wage labour as their main occupation, who added to their daily wage earnings through agricultural activities.

The survey covered a total sample population of 250, comprising 137 males (55 percent) and 113 females (45 percent). In ratio terms, the proportion of females to males in the sample was equivalent to an FMR equivalent of 825 females for every 1000 males, which is much lower than the general FMR ratio for Malda district or Manikchak CD Block. There were a total of 83 minors in the sample households with a lower FMR of 694, attributable possibly to higher female mortality in the area. The 37-sample household had a total of 77 earners, yielding an average of 2.08 earners per household. Female participation in earning activity was very negligible, with only 1 female earner in every 11 females. Since the average family size for the entire sample was 6.76 persons, this implied a dependency ratio of 3.25 in the sample population.

Most respondents had cultivation as their primary occupation, although an almost equivalent proportion drew their livelihoods from wage labour (Table 7). These two occupational classes together accounted for nearly 70 percent of all respondent families. A few respondents were engaged in services, petty trade and river-related occupations like boat operation (Iqbal 2001).

Table 7: Primary occupational distribution of respondents

Primary occupation	*Number*	*%*
Cultivation	14	37.8
Wage Labour	12	32.4
Service	4	10.8
Petty Trade	3	8.1
Riverine	3	8.1
Haircutting	1	2.7

Only 2 families in the sample comprised a nuclear couple. Around one-third of the families had between 3-4 members and one-fourth had between 5-6 members (Table 8). While the number of large-sized families was comparatively fewer, the existence of many joint and extended families in the sample population ensured that over one-third of the sample households had 7 or more members. The largest household in the sample, belonging to an extended family at Dakshin Chandipur, had 20 members.

Table 8: Gender composition and dependency among respondent families

Family composition	*Number*	*%*	*FMR*
Total Males	137	54.8	
Total Females	113	45.2	825
Male Minors	49	59.0	
Female Minors	34	41.0	694
Earning Males	67	87.0	
Earning Females	10	13.0	149

Around 41 percent of the sample households had two earners (Table 9). The number of single-earner households marginally exceeded the number of households with 3 earners. Since the combined proportion of 2 and 3 earner households exceeded the proportion of joint families in the sample, this would imply that many unitary families also had 2 or more earners.

Comparing the disaggregated sample across the places of residence, interesting insights begin to emerge about the nature of flood-induced migration and settlement in the study area. It would appear that the colony at Dakshin Chandipur is characterized by older settlement, since many more respondents from the colony showed evidence of having grown up there. The Dakshin Chandipur colony also offered a safe refuge to flood-displaced families from other settlements, who had congregated there. Dharampur also provides a somewhat similar picture, although fewer flood-displaced families have resided there for a long duration. The Embankment no.7 colony is comparatively recent, dating back to the construction of the embankment after the 1998 Ganga floods (Table 8). As such, it offers the safest refuge in the area and has begun to attract new settlement, some of which has spilled over into the adjacent Gopalpur area.

Table 9: Family-earner distribution

Earners	*Families*	*%*
1	11	29.7
2	15	40.5
3.	8	21.6
4	2	5.4
5	1	2.7

These settlement and refuge patterns are captured in the disaggregated data for the resettled households. For example, the average family sizes of respondents presently residing in Dharampur and Gopalpur considerably exceed the average family size for the entire sample, while the Embankment no.7 colony and Dakshin Chandipur respondents show a lower family size than the sample average. Many more flood-affected families in Embankment no.7 and Dakshin Chandipur are unitary in structure and reflect more recent resettlement. Dharampur and Gopalpur are possibly areas of older resettlement and consequently offer more earning opportunities to the resettled families.

It is seen also that the average number of males and females in the Dharampur and Gopalpur

Table10: Family-size distribution by colony

Resettlement colony	*Average family-size*	*Average earners*
Dharampur	8.3	2.7
Gopalpur	13.0	2.5
Embankment 7	6.0	2.0
D.Chandipur	5.7	1.8
Total	250	77
Average	6.8	2.1

households is greater than the sample average, providing evidence that these families have grown in size since they were resettled. In contrast the average number of males and females in the Embankment no.7 and Dakshin Chandipur families barely matches or is lower than the sample average (Table 11).

Table 11: Gender structure of households

Resettlement colony	*Average family-size*	*Average earners*
Dharampur	5.0	3.3
Gopalpur	7.0	6.0
Embankment no.7	3.7	2.3
D.Chandipur	2.9	2.8
Total	137	113
Average	3.7	3.1

It is seen that the poorest flood-affected families reside in the Embankment no.7 colony and have an average monthly income of Rs.1450. The families living at Dakshin Chandipur are slightly better off with an average monthly income of Rs.2190 (Table 12). A marked difference however exists between Dakshin Chandipur and Dharampur, where the average monthly income rises to Rs.3423. Although average monthly income is highest at Gopalpur, the number of respondent families there is few and has access to other income sources.

Table 12: Income patterns of households

Resettlement colony	*Avg. monthly income*
Dharampur	3423
Gopalpur	8300
Embankment no.7	1450
D.Chandipur	2190

The average incomes of the resettled families are examined next in relation to livelihood sources. All families derive incomes from at least one primary occupation. Families having services as their main occupation and amount to Rs. 3990 draw the highest monthly incomes on the average. Such families are closely followed by families involved primarily in trade who have a monthly earning of Rs. 3050 (Table 13). Agriculture offers a comparatively low monthly earning of Rs.1094, while families engaged primarily in wage labour manage to earn Rs.1506 per month. The lowest monthly earnings of Rs.1010 accrue to families

Table 13: Income by sources

Source of income	*Average monthly income*
Household Income by First Source	
Cultivation	1094
Wage Labour	1506
Riverine Activities	1010
Service	3990
Petty Trade	3050
Household Income by Second Source	
Cultivation	1056
Wage Labour	1060
Riverine Activities	700
Bidi-making	400
Remittances	400
Household Income by Third Source	
Wage Labour	860
Bidi-making	600
Remittances	2000

that depend on riverine activities such as fishing and boat operation.

Since average earnings from the main occupational source tend to be low, 19 families draw upon income from a second source. For such families, the highest average monthly earnings of Rs.1060 accrue from wage labour. Earnings from agricultural activity are slightly lower at Rs.1056. No flood-affected family is able to draw upon a second income from minor trade. However, certain families do depend on riverine activities or *bidi* making for supplementary income, and some also receive remittance income from family members who are currently working elsewhere. In all such cases, the average monthly earning is well under Rs.1000.

Only 7 families have access to a third source of income. Once again, wage labour is the main occupational source yielding an average additional income of Rs.860. Some families with working women also generate additional earnings through bidi making. One Gopalpur family is a notable exception, since it receives a sizeable monthly remittance of Rs.2000 as its third source of income.

Most respondent families lived in kuchha houses made of mud-plaster. The more recently displaced families were still living in temporary shelters made of bamboo and had still not built new houses, either because of prohibitive land costs, or because they intended to move back to their old homes as and when the situation improved. The Embankment no.7 families were living almost entirely in temporary shelters as the low construction costs of their dwellings (Table 14). Their dwellings were also smaller. Houses in

Table 14: Dwelling assets of affected families

Resettlement colony	*Number of rooms*	*Cons-truction cost*	*Main-tenance cost*
Dharampur	5.9	34286	3150
Gopalpur	6.0	35000	10000
Embankment 7	3.0	4000	1500
D Chandipur	2.9	23667	2365

Table 16: Reported flood losses of resettled families

Resettlement colony	*Land loss*	*House loss*	*Other loss*	*Total*
Dharampur		2		2
Gopalpur	2	1	1	4
Embankment 7	3	2		5
D Chandipur	18	8	1	27
Total	23	13	2	38

the other colonies were larger and more expensively built.

Most displaced families living in the resettlement colonies had brought their livestock with them. Thus, the average number of bovine heads was almost equal in all colonies. Families living in older resettlement colonies like Gopalpur held more goats. Families in the Embankment no.7 and Gopalpur colonies had also taken to chicken rearing as a temporary means of livelihood and had large holdings of poultry birds (Table 15).

Unlike livestock assets, which are moveable and could be moved to safety, homes and agricultural lands are immobile. Hence, most of the property losses occurred in these forms. Twenty-seven resettled families reported direst flood losses, while seven families reported no loss of property. Land losses were the most frequent form of property loss sustained during floods and were reported by twenty three families. Thirteen families also reported the loss of homes (Table 16).

Against these losses, only one family reported an asset-gain consequent to the flood, in the form of financial support received for rebuilding a home. It was thus widely evident that the flood experience and increased the destitution of families.

The area most affected by land loss was Dakshin Chandipur. The Dharampur families reported no land loss. However the extent of home losses was distributed over all settlements. One family had lost livestock, and another family had surrendered its land for the construction of the embankment, against cash compensation

As per secondary as well as primary source, most of the people, resided in the Gangetic Tract, are cultivators and wage labourers, the opportunity for livelihood shrink day by day. The losses and erosion caused by the frequent floods have compelled the rural people to displace in the safer places. Hence, in local towns (like Malda), the number of Rickshaw Puller increases everyday. It is found from the survey that almost 70 percent of the respondents' family member has gone to distant places for livelihoods. Also the rural people compelled to migrate from their native villages to distant places (like Mumbai, Delhi etc.) for livelihoods. The increased crowd of such people can be seen in the Malda Town Railway Station just after the floods. Monsoon is forthcoming. The poor people of these areas are loosing their sleeps. It is the right time to think of them and need immediate attention for Govt. as well as researchers.

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Table 15: Livestock assets of affected families

Resettlement colony		*Bovine livestock*	*Goats*	*Poultry chickens*	*Poultry ducks*
Dharampur	Total	19	5	-	2
Average	2.4	2.5	-	2.0	
Gopalpur	Total	5	5	38	3
Average	2.5	5.0	19.0	3.0	
Embankment 7	Total	3	2	50	3
Average	3.0	2.0	50.0	3.0	
Dakshin Chandipur	Total	23	2	6	-
Average	2.9	2.0	1.2	-	
All Families	Total	50	14	94	8
Average	2.6	2.8	11.8	2.7	

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