

## Human Security and Vulnerability

### 7.1 Introduction

The notion of Human Security dominated the development and political agenda during the 1990s in the aftermath of Cold War. Primarily it featured discussions about national security but gradually it narrowed down to consider those pervasive threats that loom large over the “vital core” of people’s life. The “vital core” constitutes what is called the “functioning” of the individuals such as assured basic income, access to food, improved health and security from physical violence. Thus, breaches in Human Security can arise due to exposure to downside risks i.e. risks like economic deprivation, crime and environmental degradation that menace long run sustainability of individuals and interfere with the continuation of daily life and dignity. The extent to which such risk translates into decline of well being determines the vulnerability of humans. Typically development policy dialogues see this vulnerability in terms of “entitlement failure” and talks of enhancing the

“capabilities” of individuals by “empowerment” enhancing strategies.

In more than one way the concern over safeguarding human security applies overwhelmingly in case of South 24 Parganas. The district is typically at the lower rung of the ladder in terms of district per capita income compared to other districts of West Bengal (West Bengal Human Development Report, 2004). This place also houses the largest proportion of backward people compared to the state and most of these people depend on traditional agriculture for livelihood support. Along with this, owing to its proximity to the Bay of Bengal, the district often faces the vagaries of extreme climatic events that are mostly hydro-meteorological hazards like cyclones and flood. In fact, in terms of cyclone incidence it ranks first among the ten Indian coastal districts (Ministry of Environment and Forests, 2004). Thus, income shocks are frequent in these areas rendering the populace highly vulnerable.

So far as the crime scenario is concerned the economically weaker group i.e. the women and children suffer the most in this district. West Bengal has the highest share in woman trafficking across all Indian states (National Crime Bureau, 2006) and South 24 Parganas is one of the three districts where such activities are rampant<sup>1</sup>.

In South 24 Parganas the percentage of households falling below poverty line (BPL) in rural areas stood at 35 per cent in 2005<sup>2</sup>. Compared to the BPL Survey results in 2002 that shows the figure to be around 37 per cent, this is surely an improvement but on relative terms there is a large disparity in the incidence of poverty in the rural and urban areas. The estimated rural and urban poverty ratios in the district are 26.86% and 8.5% respectively (West Bengal Human Development Report, 2004). Hence there is a widespread disparity between rural and urban areas of

South 24 Parganas district, in terms of income level. Thus, it is evident that rural areas are poorer and hence more vulnerable compared to their urban counterparts. This chapter would explicitly emphasize on various dimensions of human security with rural population in South 24 Parganas being our unit of analysis. The next section shall only briefly touch upon the economic and social security issues as they are discussed more elaborately in companion chapters. However, one aspect of social security, incidence of crime among the blocks of South 24 Parganas would be discussed in Section III. Section IV will look into vulnerability arising from natural disasters in South 24 Parganas. For gauging vulnerability at the block level, Section V will discuss the vulnerability index and the relative position of the blocks in terms of vulnerability status.

## 7.2 Economic and Social Security Issues

Economic deprivation and poverty are associated with a number of factors like asset position of the households, say, in terms of possession of land and house and occupational status. To demarcate the

parameters that would mostly capture the economic and social (in)security we calculate the correlation between various population characteristics for 18 districts of West Bengal (See Table 7.1).

<sup>1</sup> The other two districts are North 24 Parganas and Murshidabad.

<sup>2</sup> Synopsis of the Rural Household Survey 2005, available at the website of the Panchayat and Rural Development, Government of West Bengal. [http://wbdemo5.nic.in/html/misc/BPL\\_survey2005\\_summary.xls](http://wbdemo5.nic.in/html/misc/BPL_survey2005_summary.xls)



**Table 7.1: Correlation between Population Characteristics of the Districts of West Bengal**

Population Characteristics- percentage of households	BPL	Houseless	Kuccha house	Migration	Landless	Marginal workers	Small farmers	Agri labour	Women headed hh
BPL		.300	.597(**)	.476(*)	-.148	.074	.238	.836(**)	.061
Houseless	.300		-.065	-.093	.289	-.273	-.183	.221	.108
Kuccha house	.597(**)	-.065		.402	-.343	.354	.172	.393	.338
Migration for Casual labour	.476(*)	-.093	.402		.122	-.101	-.122	.637(**)	.318
Landless	-.148	.289	-.343	.122		.925(**)	-.754(**)	.280	-.279
Marginal workers	.074	-.273	.354	-.101	.925(**)		.453	-.294	.524(*)
Small farmers	.238	-.183	.172	-.122	.754(**)	.453		-.154	-.278
Agri Labour	.836(**)	.221	.393	.637(**)	.280	-.294	-.154		.013
Women Headed hh	.061	.108	.338	.318	-.279	.524(*)	-.278	.013	

\*\* Correlation is significant at the 0.01 level (two-tailed).

\* Correlation is significant at the 0.05 level (two-tailed).

Source: Own Calculations from Rural Household Survey, 2005, Department of Panchayat and Rural Development, Government of West Bengal.

The table provides a rough sketch of the inter linkages between risky outcomes, vulnerable groups and the private coping measures. As is evident, households employed as agricultural labour and those that live in kuccha houses are positively associated with incidence of poverty<sup>3</sup>. To smooth their income stream agricultural laborers often choose to migrate for casual employment.

In South 24 Parganas agricultural labour force grew in tandem with that of the state as a whole though the growth rate of agricultural labour in South 24 Parganas has been higher (See Figure 7.1).

Though not strictly significant yet marginal workers also have a positive association with the extent of poverty. Here, also the district has experienced a slightly higher growth rate of marginal workers compared to the state (See Table 7.2). At the same time, proportion of main workers to total workers has also declined both for the state and district as a whole. The growing distress in employment scenario is also reflected in income status of the district. The per capita income of the district has grown over the years but mostly remained below the corresponding state figure (See Table 7.3, Figure 7.2).

<sup>3</sup> Even if statistically non-significant, the positive association between percentage of households working as agricultural labourers and those living in kuccha houses may suggest that there is an overlap between these two groups of people.

Figure 7.1: Growth of Agricultural Labour-force in South 24 Parganas and West Bengal

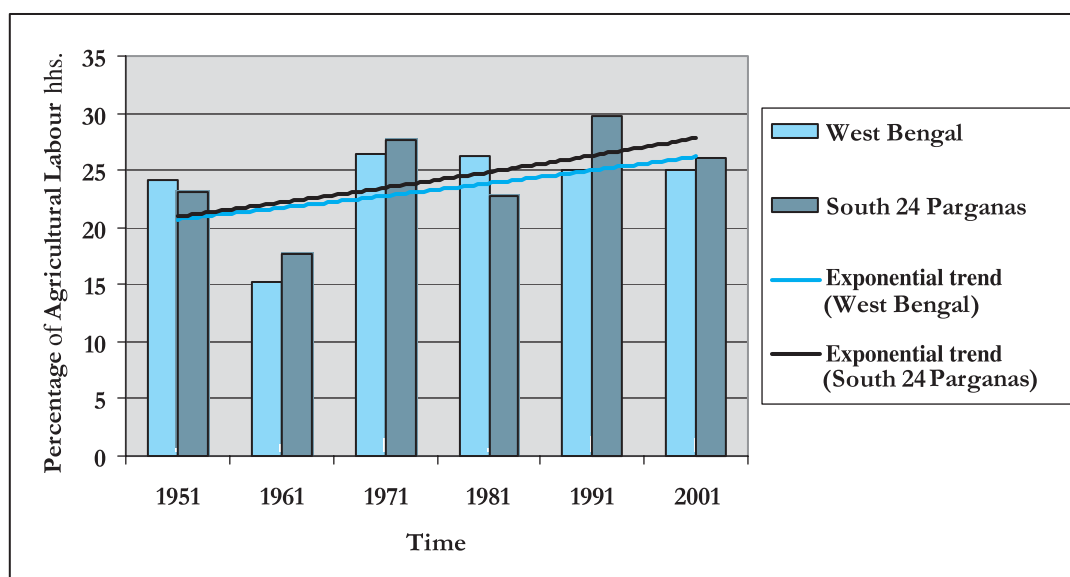


Table 7.2: Percentage of Total (Main+Marginal) workers, Main workers, Marginal workers and Non-workers to total population for West Bengal and South 24 Parganas during 1951-2001

	Total (Main + Marginal) Workers						Main Workers					
	1951	1961	1971	1981	1991	2001	1951	1961	1971	1981	1991	2001
West Bengal	34.68	33.16 (-1.52)	27.91 (-5.25)	30.17 (2.26)	32.19 (2.02)	36.78 (4.59)	34.68	33.16 (-1.52)	27.91 (-5.25)	28.26 (0.35)	30.23 (1.97)	28.75 (-1.48)
South 24-Parganas	31.96	29.35 (-2.61)	25.87 (-3.48)	27.21 (1.34)	28.29 (1.08)	32.47 (4.18)	31.96	29.35 (-2.61)	25.87 (-3.48)	26.15 (.28)	26.09 (-0.06)	24.31 (-1.78)
	Marginal Workers						Non-workers					
	1951	1961	1971	1981	1991	2001	1951	1961	1971	1981	1991	2001
West Bengal				1.91	1.96 (0.05)	8.03 (6.07)	65.32	66.84 (1.52)	72.09 (5.25)	69.83 (-2.26)	67.81 (-2.02)	63.22 (-4.59)
South 24-Parganas				1.06	0.58 (-0.48)	8.16 (7.58)	68.04	70.65 (2.61)	74.13 (3.48)	72.79 (-1.34)	71.71 (-1.08)	67.52 (-4.19)

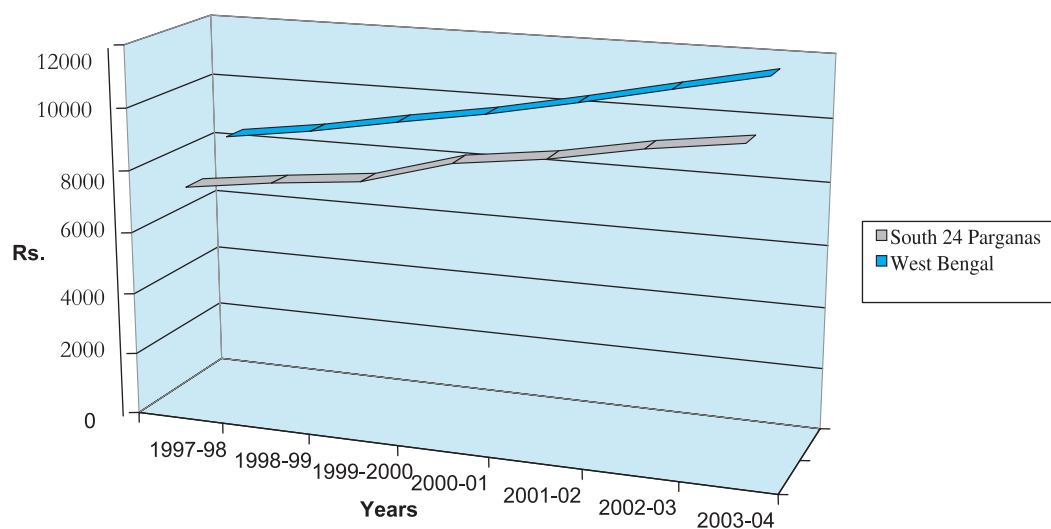
Source: Census 2001



**Table 7.3: Estimates of per Capita income of West Bengal and South 24 Parganas at constant prices (1993-94) (In Rupees)**

Year	West Bengal	South 24-Parganas
1997-98	8407.58	7370.33
1998-99	8813.76	7768.71
1999-2000	9319.70	8061.44
2000-01	9796.33	8873.74
2001-02	10380.20	9245.95
2002-03	10986.53	9786.47
2003-04(P)	11607.81	10173.99
2004-05(Q)	12271.37	10446.34

Source: State Domestic Product and District Domestic Product of West Bengal, 1993-94 to 2004-05, BAE&S, 2006

**Figure 7.2: Per Capita Income of West Bengal and South 24 Parganas**

In fact our own calculations showed that the compound growth rate of South 24 Parganas (5%) has been slightly lower than that of West Bengal (6%) from 1997-98 to 2004-05 (See Table 7.4). Going by district per capita incomes, the rank of South 24 Parganas in 2000-01 was 14 among 18 districts. The rank was 6 in

1980-81 (*West Bengal Human Development Report, 2004*). Hence the comparative position of South 24 Parganas in the State is not at all impressive and even more alarming is the fact that its relative position has deteriorated over time (See Table 7.4).

**Table 7.4: Compound Growth Rates of Triennium Averages of Per Capita income (at 1993-94 prices) of South 24 Parganas and West Bengal**

Years	South 24-Parganas			West Bengal		
	Per Capita Income	Triennium Average	Growth Rate	Per Capita Income	Triennium Average	Growth Rate
1997-98	7390.33		5%	8407.58		6%
1998-99	7768.71	7740.16		8813.76	8847.013	
1999-00	8061.44	8234.63		9319.7	9309.93	
2000-01	8873.74	8727.043		9796.33	9832.076	
2001-02	9245.95	9302.053		10380.2	10387.686	
2002-03	9786.47	9735.47		10986.53	10991.513	
2003-04	10173.99	10135.6		11607.81	11621.903	
2004-05	10446.34			12271.37		

Source: Own Calculations

People with low income lack the capability to achieve secure shelter for residence and so it may be interesting to observe the pattern of dwelling possession in South 24 Parganas. Census 2001 has divided the households according to the condition of houses. These categories are “Good”,

“Livable” and “Dilapidated” houses. From Table 7.4, it is clear that the conditions of households in South 24 Parganas are more or less similar to the condition of the State. But it is alarming that about 60% households in South 24 Parganas are not living in ‘good’ houses.

**Table 7.5: Percentage of Households (by type of houses) : 2001**

		Good	Livable	Dilapidated
West Bengal	Total	42.43	48.91	8.66
	Rural	37.8	52.65	9.55
	Urban	53.77	39.75	6.48
South 24-Parganas	Total	40.35	50.52	9.13
	Rural	38.28	52.2	9.52
	Urban	50.01	42.7	7.29

Source: Census 2001

The condition/ status of houses can also be classified into four categories: Permanent, Semi-Permanent, Temporary Serviceable and Temporary Non-Serviceable. The number of permanent

households considerably increased from 1991 to 2001 and the increase was greater in the district compared to the overall state figures (Table 7.6).

**Table 7.6: Percentage distribution of households according to house condition: 2001**

		1991	2001
West Bengal	Permanent	33.54	40.43
	Semi-Permanent	24.66	37.26
	Temporary Serviceable	27.27	16.47
	Temporary Non-Serviceable	14.53	5.80
South 24-Parganas	Permanent	28.55	37.14
	Semi-Permanent	28.03	33.24
	Temporary Serviceable	36.25	25.84
	Temporary Non-Serviceable	7.18	3.77

Source: Census 2001

The foregoing discussion clearly demonstrates that the district has recorded some improvements in matters of housing. On the other hand, it has generally lagged behind so far as employment and income generation is concerned thereby making the resident households more prone to economic and social shocks. In this context the social safety nets provided through institutional arrangements could be one crucial determinant of vulnerability. Here we discuss the performance of district for six major schemes: a) National Old Age Pension Scheme (NOAPS) b) National Family Benefit Scheme (NFBS) c) Sampoorna Gramin Rojgar Yojana (SGRY) that was subsequently replaced by National Rural Employment Guarantee Act (NREGA) from 2<sup>nd</sup> February 2006, d) Swarnajayanti Gram Swarajgar Yojana (SGSY) and e) Indira Awas Yojana (IAY).

Both NOAPS and NFBS function under the National Social Assistance Programme (NSAP). Primarily designed for ensuring

subsistence to destitute persons above 65 years of age. NOAPS provides a monthly pension of Rs. 400. On the other hand, NFBS provides one-time financial assistance of Rs. 10,000/- to poor families that have lost their principal earning members. So far as utilization is concerned South 24 Parganas have performed well with respect to the overall performance of the state (See Figure 7.3). However, its performance somewhat dropped down in 2004-2005 in regard to NFBS and in fact it had the lowest number of beneficiaries among the nineteen districts of state in 2004-05 (Annual Report 2004-05, Department of Panchayat and Rural Development, Government of West Bengal)<sup>4</sup>.

The SGRY was intended to provide wage based employment to agricultural workers mainly during the lean season. Its successor, NREGA, that was later introduced in ten districts including South 24 Parganas expanded the approach and in

<sup>4</sup> The records show that only six families out of every hundred thousand families benefited under the NFBS scheme in South 24 Parganas.

addition to employment generation of the district both in terms of coverage emphasises on awareness about the right to get employed. NREGA now extends to all the districts. However, the performance of the scheme and the number of person-days generated is dismal (See Table 7.7).

Figure 7.3: Percentage Utilisation of National Social Assistance Funds

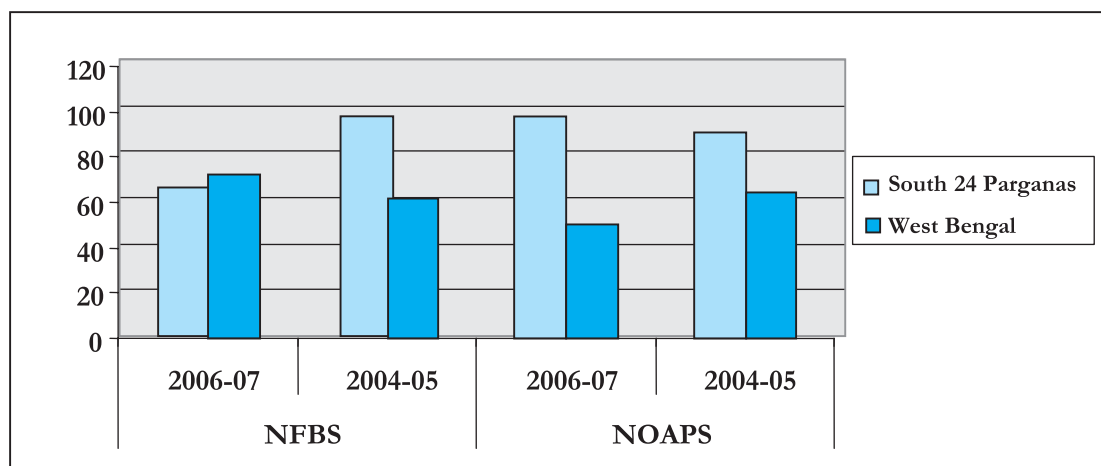


Table 7.7: Performance of the NREGA in Districts of West Bengal (2006-2007)

District	Person-days Generated (Cumulative) (in lakh)	Person-days generated per household provided employment	Average Expenditure per GP (Rs. in lakh)	Expenditure per person-day	Total no. of hhs as per hh survey (lakh)	No. of hhs who got registered (lakh)	% of rural hhs registered
Bankura	53.09	24	25.60	91.63	5.97	4.17	69.84
Birbhum	100.79	22	53.17	88.10	6.54	5.54	84.7
D. Dinajpur	27.70	16	33.72	79.13	3.65	2.47	67.67
Jalpaiguri	38.49	11	24.11	91.46	6.72	5.51	81.99
Malda	23.16	13	14.43	90.96	6.4	4.67	72.96
Murshidabad	36.85	8	13.80	95.15	11.57	8.65	74.76
Purulia	40.50	15	22.89	96.07	4.89	3.86	78.93
South 24 Pgs.	28.37	11	7.67	84.37	11.56	5.78	50
U. Dinajpur	32.11	10	32.92	100.47	4.9	4.3	87.7
W. Medinipur	58.03	16	17.37	86.81	9.97	6.52	65.39
Total	100.79	14	21.56	90.23	70.17	51.47	73.35

Source: Office of the District Magistrate, South 24 Parganas

Both in terms of number of registered households in NREGA and average expenditure per Gram Panchayat South 24

Parganas ranks last among the ten participating districts. Apart from that the average number of person-days generated



**Table 7.8: Performance of South 24 Parganas with respect to SGSY scheme (2004-05 & 2006-07)**

		Percentage of Fund Utilisation	Number of Swarojgaris formed				Per capita Investment(Rs.)
			SC	ST	Women	Disabled	
2006-07	South 24 Parganas	52.35	457	1	929	0	23859.94
	All West Bengal Average	86.11	581.28	115.44	1318.94	2.00	19312.06
2004-05	South 24 Parganas	64.00	437	1	566	0	19840.18
	All West Bengal Average	81.19	468.94	50.06	911.67	0.72	19546.30

Source: Office of the District Magistrate, South 24 Parganas

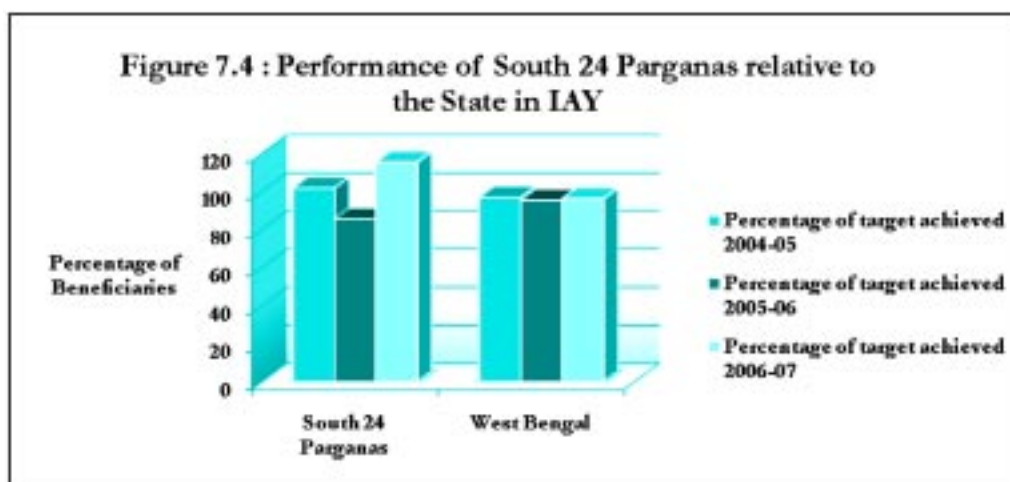
under the programme is among the third lowest in the district<sup>5</sup>.

The SGSY scheme is designed to generate self employment among the rural poor by organizing them into self help groups. SGSY is funded by both Central and State Governments in the ratio 75:25. In this case also the performance of the district is poorer than the average over the districts. Particularly notable is the neglect of woman and scheduled tribes from the ambit of the scheme (Table 7.8).

In summary the social assistance programmes related to employment

generation and poverty alleviation did not perform satisfactorily in recent times. The weaker groups like women and scheduled tribes received relatively lesser coverage under the schemes of self employment having adverse implications for their vulnerability status.

Lastly, one may look into the IAY scheme that provides shelter to the rural households lying below the poverty line. Programmewise this is the most successful one in South 24 Parganas as in West Bengal (See Figure 7.4)<sup>6</sup>.



Source: Annual Reports, 2004-05, 2006-07, Department of Panchayati Raj and Rural Development, GoWB

<sup>5</sup> On the whole, the performance of NREGA has been poor in West Bengal. Although, the number of registered households for employment assistance is substantial, on an average only 14 days of employment could be generated per household during 2006-07.

<sup>6</sup> The targets for the IAY scheme is the number of households that are planned to get assistance under the programme. This is set according to caste, disability and other criterions for women like widow, war widow and unmarried woman.

For both 2004-05 and 2006-07 South 24 Parganas have not only exceeded the state figure but also bypassed the target set under the IAY scheme especially in

2006-07. This is perfectly commensurate with improved conditions of dwellings prevailing in the district.

### 7.3 Crime and Violence

In terms of IPC Crime rates West Bengal had a fairly good position vis-à-vis the national average in 2006. For both overall crime rates and violent crime rates West Bengal had the fourth lowest figure among the 32 states in the country (National Crime Records Bureau, 2006) thus maintaining the position it had in 2000 (West Bengal Human Development Report, 2004)<sup>7</sup>. Unfortunately its record in crime relating to women trafficking is the worst and in 2006 out of 123 cases of girls sold for prostitution in the country 114 had hailed from this state (National Crime Records Bureau, 2006). Along with Murshidabad and North 24 Parganas, South 24 Parganas is identified as one of the major areas where such illegal trafficking takes place.

In fact, so far as crime against women (CAW) is concerned South 24 Parganas had a remarkably high share in the State. According to Indian Penal Code (IPC) crimes against women can be classified as:

- Rape (Sec 376 IPC)

- Kidnapping and Abduction for different purposes (Sec 363-373 IPC)
- Homicide for Dowry, Dowry deaths or their attempts (Sec 302/304B IPC)
- Torture /cruelty both physical and mental (Sec 498A IPC)
- Molestation (Sec 354 IPC)
- Sexual Harassment /Eve-Teasing (Sec 509 or 294 IPC)
- Importation of girls up to 21 years of age ( Sec 366B IPC)

The composition of crimes in the state as well as in the district is biased towards post marital violence accounting for more than half of the total crimes in 2002. In terms of share of the total CAW in the state South 24 Parganas takes the lead among all 18 districts in 2000 and 2003 (Table 7.9). The relative position of women got worse as its share in total IPC CAW increased between these two time periods.

<sup>7</sup> The overall IPC crime rate in West Bengal stood at 79 compared to the all India average of 167.7 while for violent crime, the figure is 12.1 as against the country average of 18.4. However one distressing fact is that while the average cognizable crime rate in India dropped from 172.3 it actually increased in case of West Bengal from 76.7 in 2001 (National Crime Record Bureau, 2001).



**Table 7.9: Districtwise incidence of crime against women (CAW) and persons arrested in West Bengal during selected years**

Districts	Total IPC CAW		No. of cases of Torture/cruelty by Husbands/relatives			No. of Dowry Deaths			No. of Arrests for CAW	
	2000	2003	1995	2000	2003	1995	2000	2003	2000	2003
Bankura	194(2.56)	264(2.98)	59(1.78)	112(2.34)	153(2.73)	9(10.11)	17(6.34)	20(6.41)	258	459
Birbhum	353(4.65)	367(4.14)	115(3.46)	201(4.2)	219(3.91)	6(6.74)	11(12.69)	13(4.17)	195	381
Bardhaman	727(9.58)	739(8.33)	223(6.72)	482(10.07)	107(1.91)	8(8.99)	34(12.69)	30(9.62)	2062	2526
Coochbehar	336(4.43)	369(4.16)	111(3.34)	189(3.95)	209(3.73)	0	3(1.12)	11(3.53)	249	538
Darjeeling	133(1.75)	146(1.65)	28(0.84)	64(1.34)	69(1.23)	0	1(0.37)	3(0.96)	177	182
Hooghly	583(7.69)	567(6.39)	320(9.64)	453(9.47)	457(8.16)	4(4.49)	7(2.61)	14(4.49)	457	667
Howrah	267(3.52)	237(2.67)	107(3.22)	175(3.66)	168(3.00)	5(5.62)	22(8.21)	17(5.45)	383	409
Jalpaiguri	297(3.92)	376(4.24)	108(3.25)	158(3.30)	210(3.75)	1(1.12)	3(1.12)	4(1.28)	263	496
Paschim Medinipur	904(11.92)	530(5.97)	558(16.81)	598(12.50)	376(6.71)	28(31.46)	56(20.90)	18(5.77)	675	545
Purba Medinipur	—	402(4.53)	—	—	267(4.77)	—	—	37(11.86)	—	446
Murshidabad	440(5.80)	814(9.17)	78(2.35)	245(5.12)	468(8.35)	0	4(1.49)	17(5.45)	432	1363
Malda	213(2.81)	275(3.10)	43(1.30)	89(1.86)	119(2.12)	1(1.12)	5(1.87)	4(1.28)	389	383
Nadia	595(7.84)	600(6.76)	226(6.81)	370(7.73)	363(6.48)	11(12.36)	22(8.21)	23(7.37)	1053	1422
24 Parganas North	843(11.11)	1128(12.71)	546(16.45)	589(12.31)	784(13.99)	3(3.37)	21(7.84)	24(7.69)	968	1367
24 Parganas South	975(12.85)	1214(13.68)	469(14.13)	692(14.46)	884(15.78)	2(2.25)	49(18.28)	44(14.10)	930	1759
Purulia	259(3.41)	187(2.11)	107(3.22)	139(2.90)	94(1.68)	0	4(1.49)	8(2.56)	443	543
Uttar Dinajpur	225(2.97)	170(1.92)	74(2.23)	113(2.36)	85(1.52)	1(1.12)	5(1.87)	14(4.49)	179	233
Dakshin Dinajpur	242(3.19)	227(2.56)	37(1.11)	126(2.63)	113(2.02)	—	4(1.49)	8(2.56)	193	440
Total (excluding cases registered by Govt. Railway Police)	7586	8872	3319	4785	5603	89	268	312	9330	14176

Source: National Women Commission

Figures in parentheses show percentages of each category of crime to total crime for the year year.

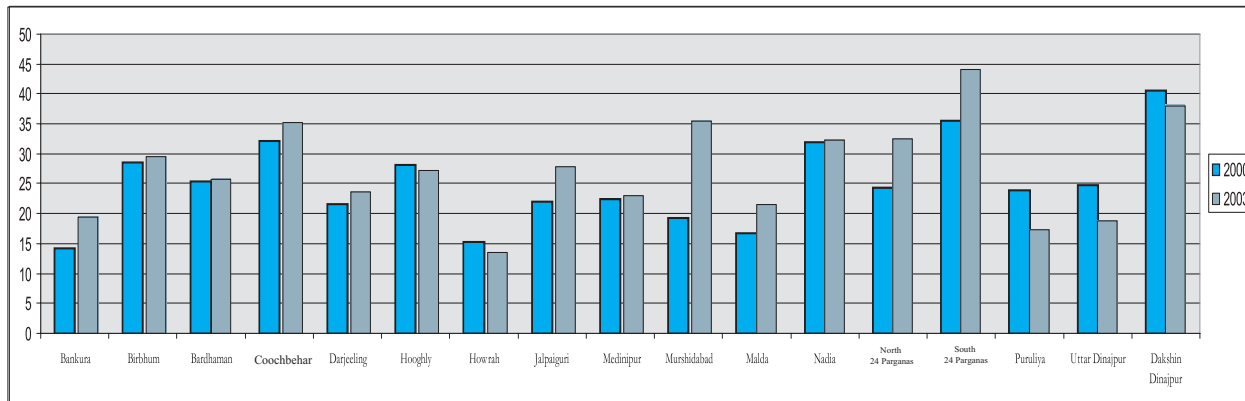
So far as different components of CAW are concerned the share of South 24 Parganas in cases of torture etc. was the highest in the state accounting for about 15 per cent of all cases. Its share in dowry related deaths was very low in 1995 but took a sudden spurt in 2000 and 2003 and once again remained the highest among districts. Given the fact that female literacy rate in the district is lower than the state average

(62 per cent) and most of the women headed households are employed as marginal workers (Table 7.1) the high rate of crimes impart adverse implication for the vulnerability status of women.

A more reliable estimate of exposure to internal violence is given by the crime rate and here also the district has the second highest crime rate in 2000 and the highest in 2003<sup>8</sup> (See Figure 7.5).

<sup>8</sup> Crime rate is defined as number of crime committed per lakh population. For the year 2000 we have taken census 2001 population and the projected population for 2003 is calculated assuming an annual growth rate of 2 per cent.

**Figure 7.5: Crime Rates per lakh of population for the Districts of West Bengal: 2000 and 2003**



Within South 24 Parganas there is marked interregional variation in overall crime rates as well as in rates of CAW. For brevity we have decomposed the overall crime incidence into three groups. The first is violent crimes consisting of dacoity, robbery, burglary, theft, murder and culpable homicide. The other two categories are riots and crime against

woman. Taking the average values of the total incidence of crime over three years from 2005 to 2007 it is seen that on an average violent crimes decreases as we move away from Kolkata but the incidence of CAW and riots increase significantly (Table 7.10)

On an average, the region closer to Kolkata has a higher crime rate followed

**Table 7.10: Regionwise Average Incidence of Crime in South 24 Paragans: 2005-2007**

	Violent Crime	Riots	CAW
Region I: North West (Kolkata Surroundings)	59.78	40.67	460.67
Region II: North East and Mid West	39.17	141.67	434.67
Region III: South (Sundarbans)	30.17	161.67	680.00

**Figure 7.6: Trends in Crime Rates in different Regions of South 24 Parganas**

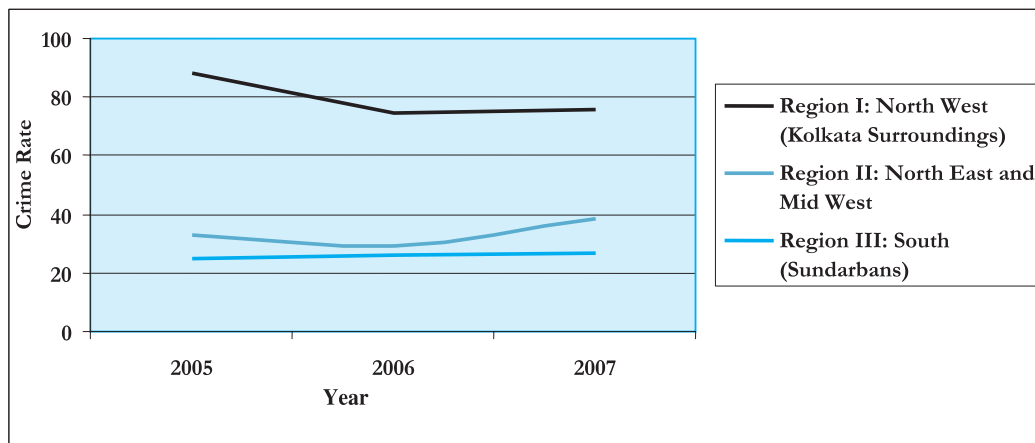


Figure 7.7: Incidence of CAW in Regions of South 24 Parganas: 2005-2007

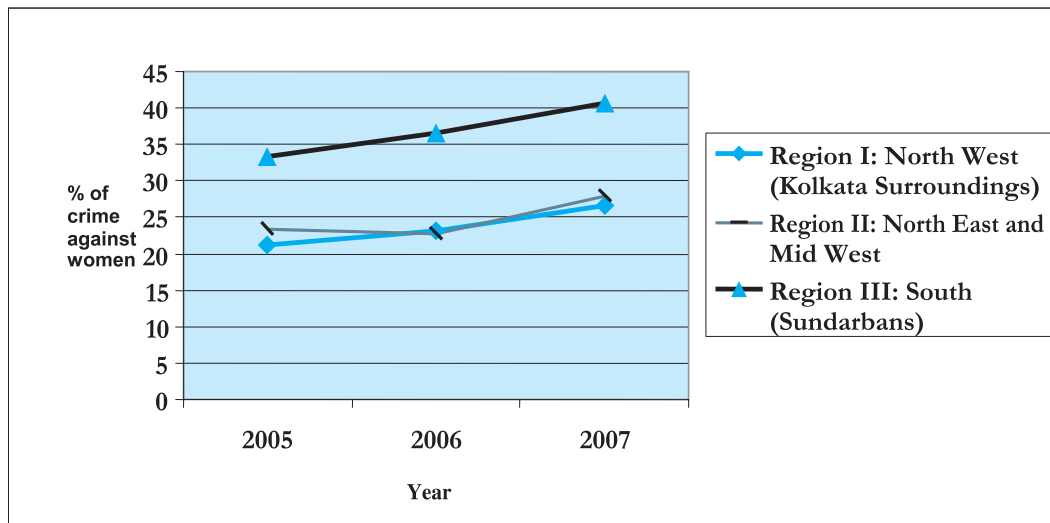
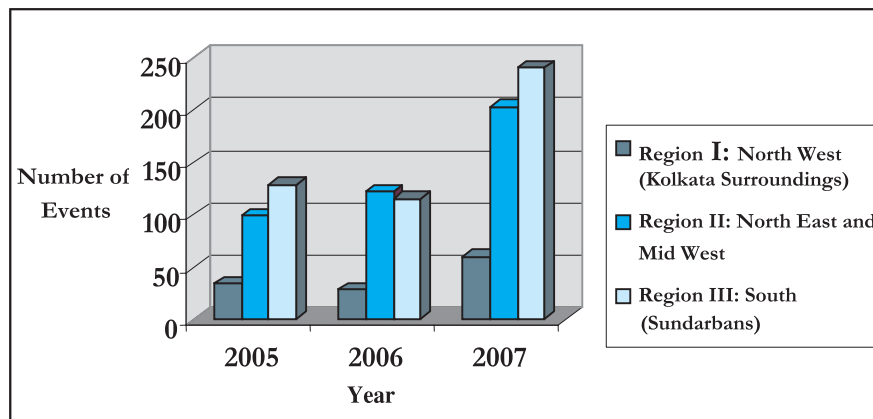


Figure 7.8: Incidence of Riots in South 24 Parganas : 2005-07



by the North East and Mid West region and then by the Sundarbans cluster. Of course, Figure 7.6 must be interpreted with some caution as there is a high possibility of underreporting of crimes in remote areas like Sundarbans.

CAW have highest incidence in Sundarbans while the other two regions have experienced almost equal proportions of such crimes in last three years (Figure

7.7). For riots the highest incidence is in Sundarbans area followed by the North East and Mid West and the incidence is the least in Kolkata surroundings (Figure 7.8). Blockwise Thakurpukur - Maheshtala and Sonarpur in Region-I, Bhangar in Region-II and Canning in Region-III are most crime prone for all the three types of crime reported (Table 7.11)<sup>9</sup>.

<sup>9</sup> Data on incidence of crime is provided at Police Station level and in some cases two different blocks came under the jurisdictions of the same Police Stations. Thus in some cases we had to merge two blocks like Bishnupur, Bhangar, Canning and Joynagar in Table 7.11.

Table 7.11: Block-wise Incidence of IPC crimes in South 24 Parganas: 2005-2007

	Block	VIOLENT CRIMES			RIOTS			CRIME AGAINST WOMAN (CAW)		
		2005	2006	2007	2005	2006	2007	2005	2006	2007
Region I: North West (Kolkata Surroundings)	Thakurpukur Mahestala	136	147	106	9	7	18	134	142	184
	Budge Budge - I	39	9	9	3	3	6	33	35	48
	Budge Budge - II	26	9	23	0	0	0	24	47	42
	Bishnupur	72	43	55	14	4	14	80	69	91
	Sonarpur	146	111	145	8	14	22	109	125	219
Region II: North East and Mid West	Baruipur	28	14	27	10	20	45	31	38	53
	Bhangar	57	77	92	27	27	57	87	100	190
	Falta	18	21	19	7	3	4	31	29	55
	Diamond Harbour I-II	36	28	39	15	19	30	38	36	81
	Magrahat - I	36	28	39	15	19	30	38	36	81
	Magrahat - II	26	13	11	18	31	19	52	52	46
	Kulpi	28	14	14	5	3	8	48	42	59
	Mandirbazar	15	13	12	2	0	11	29	28	24
Region III: South (Sundarbans)	Canning I-II	31	48	46	9	21	50	98	170	215
	Basanti	7	11	15	9	10	25	22	52	66
	Gosaba	6	8	8	4	2	18	17	14	21
	Joynagar I-II	35	24	23	21	8	25	60	82	118
	Mathurapur - I	8	7	4	0	2	5	28	30	44
	Mathurapur - II	2	14	10	10	5	8	20	43	34
	Kultali	9	18	14	16	16	29	79	30	105
	Patharpratima	3	7	7	23	7	22	35	46	88
	Kakdwip	20	35	28	24	14	34	51	90	78
	Namkhana	4	9	10	3	6	4	20	49	46
Sagar	35	21	16	10	24	21	50	53	86	

Source: Office of the SP, South 24 Parganas

Note: Violent crimes include dacoity, theft, robbery, burglary, murder and culpable homicide.

## 7.4 Vulnerability to Natural Disasters

Natural disasters, especially hydrometeorological hazards like cyclones and storm surges frequently occur in South 24 Parganas. The southern part of the district comprising the Sundarbans mostly bears the brunt of such disasters and hence we shall largely limit the discussion of this

chapter to the 13 blocks of Sundarbans in South 24 Parganas.

The stretch of Indian Sundarbans extends over an area of 9360 sq km comprising 102 islands of which 52 have human settlements<sup>10</sup>. When early settlement began in the area in 1770 (Bhattacharya, 1990)

<sup>10</sup> The geographical span of Indian Sundarbans is divided in 19 administrative blocks of which 13 falls under the South 24 Parganas district and the remaining 6 falls in the district of North 24 Parganas.

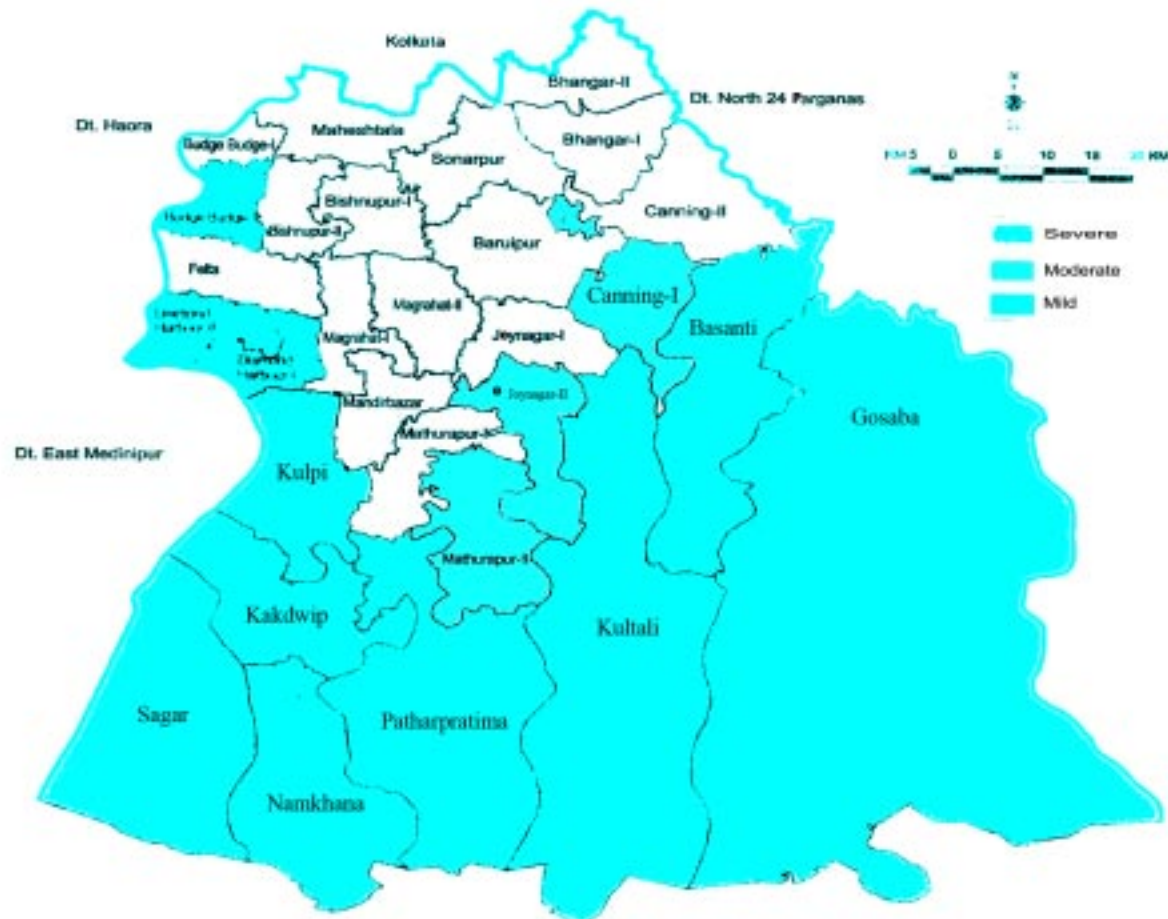


it was immediately recognized that economic activity in the area faces the risk of tidal inundation from the complex network of the river system interspersing the area<sup>11</sup>. Moreover, as it lies in the apex of Bay of Bengal tropical depressions leading to cyclones and storms occurred frequently<sup>12</sup>. Thus, apart from the damage risk of cyclonic wind, storm induced wave

surges causing tidal floods were another potent disaster the local people had to cope with. To avoid the damage cost from these hazards, mud embankments called the “*circuit embankments*” around 3500 sq km of area were constructed and till date this remains the first line of defence against insurgence of tidal waves.

A much talked about disaster in recent

**Figure 7.9: Vulnerability Profile (Flood and Cyclone Hazard Map) of South 24 Parganas as per Official Estimate**



Source: Disaster Preparedness & Response Plan-2002, South 24 Parganas, Government of West Bengal.

<sup>11</sup> The main rivers in this area including the estuarine and all having a southward course towards the sea are the Hugli, Piyali-Bidyadhari, Muriganga, Saptamukhi, Thakuran, Matla, Gosaba and Haribhanga. The Sundarban delta experiences two flow (inflow) tides and two ebb (outflow) tides during 24 hours. The tidal range varies from 3m to 5m and may rise up to 8m during normal spring tide.

<sup>12</sup> Analyzing the records of incidence of tropical cyclones in Sundarbans from 1582 to 1994 one finds that on an average cyclonic depression hits the area every two to three year.

times is of course the coastal erosion induced submergence of islands, especially in the Sagar Block. The tidal movement has already engulfed two islands, Lohachara and Suparibhanga and it is gradually eroding away the Ghoramara Island in the Sagar Block. According to Ghosh et.al. (2003) the island has already lost 75 per cent of its land in the past 30 years with the refugees moving away to adjacent islands like Kakdwip. An estimate by School of Oceanographic Studies, Jadavpur University, predicts that at the present rate of erosion almost 30,000 people will be displaced from Sagar and another 20,000 from Namkhana by 2020. Several other islands in the western estuarine delta including Ghoramara will be completely deserted (Priyadarshini, 2006).

Keeping in mind the fact that the region is lagging behind in terms of basic human development indicators like health and education and that women and children are also less secure it is obvious that coping ability of the inhabitants in these areas are minimal and hence they are highly vulnerable to such hazards.

According to official estimate the vulnerability from natural disasters like flood and cyclone is extremely severe in 7 out of 13 blocks in Sundarban area falling under South 24 Parganas (See Figure 7.9).

The ranking criteria are however largely guided by past risk exposure evidence (Table 7.12) without taking into account the adaptive capacity of the communities that depends on a host of factors like *ex-ante* mitigation works of the government and coping abilities of settlers, which in turn is contingent on countless social and economic factors like income and awareness level.

Risks from natural disasters in Sundarbans can be broadly classified into two types depending on the scale of occurrence: regular idiosyncratic risks occurring from embankment collapse and systematic risk occurring from the cyclones and storm surges that are low probability high consequence events.

Embankments raised along the river bed are the most vital “public defence” that are supposed to protect the people from not only extreme events of tidal surges but also from the flow tide and ebb tide that takes place every 24 hours in the area. During the months of April to October the tidal waves assume giant proportions and causes breach in the mud dykes. This is especially detrimental for paddy cultivation as the tidal ingress raises the salinity of the soil until a couple of monsoon rains completely washes away the salt deposition from the field. In most cases gushing flow of saline water also causes considerable damage to physical assets and livestock. Thus, maintenance of embankments and their



Table 7.12: Recent History of Disasters in South 24 Parganas

Type of Hazard	Year of Occurrence	Blocks affected	Impact on Life	Impact on Live-stock
Cyclone	1999	1. Budge-Budge-II	Mild	affected to a great extent
		2. Kultali	Severe	
		3. Joynagar-II	Moderate	
		4. Canning-I	Do	
		5. Gosaba	Severe	
		6. Basanti	Do	
		7. Mathurapur-II	Moderate	
		8. Kulpi	Severe	
		9. Kakdwip	Do	
		10. Namkhana	Do	
		11. Sagar	Do	
		12. Patharprotima	Do	
Flood	1978	All Blocks	Severe	affected to a great extent
	1986	1. Budge-Budge-II	Mild	
		2. Kultali	Severe	
		3. Joynagar-II	Moderate	
		4. Canning-I	Do	
		5. Gosaba	Severe	
		6. Basanti	Do	
		7. Mathurapur-II	Moderate	
		8. Kulpi	Severe	
		9. Kakdwip	Do	
		10. Namkhana	Do	
		11. Sagar	Do	
		12. Patharprotima	Do	
Drought	1998-99	1. Kakdwip (5 mouzas affected)	Moderate	affected to a great extent
		2. Sonarpur (12 mouzas affected)	-Do-	
		3. Baruipur (5 mouzas affected)	-Do-	
		4. Bishnupur (2 mouzas affected)	-Do-	
		5. Basanti (6 mouzas affected)	-Do-	
		6. Canning-II (5 mouzas affected)	-Do-	
		7. Gosaba (23 mouzas affected)	-Do-	
		8. Magrahat-I (4 mouzas affected)	-Do-	
		9. Mathurapur-I (6 mouzas affected)	-Do-	
		10. Patharprotima (2 mouzas affected)	-Do-	

timely repair is synonymous to maintaining a smooth income stream of the people.

Under the colonial rule the *Zamindars*, who encroached the land, looked after the maintenance of the dykes. But with the abolition of the *Zamindari System* the onus of repair and surveillance of the mud embankments lay solely with the Department of Irrigation and Waterways (DIW), Government of West Bengal<sup>13</sup>. Government response to the exigency are of two types: (i) *ex-ante* mitigation, involving maintenance of embankments and in times of adverse weather, dissemination of warning messages and evacuation, and (ii) *ex-post* coping in terms of repair of breached embankments and allocation of relief to the affected villagers.

According to the DIW there are two major causes of embankment damage in the Sundarbans area<sup>14</sup>. Technologically the embankment structures are weak since they were initially built out of uncohesive silt available on the upper layer of riverside that cannot resist the tidal surges in the long run. Also, unplanned settlement even in concave sides of the bends of the meandering river necessitated construction of embankments that were highly unstable due to natural

scouring away of underneath river silt that gradually weakened its base. Secondly, embankment damage is also linked with the proper drainage through sluice gates in these areas. The average annual rainfall in the area is 1625 mms (65 inches). The area is flat with a silty clay soil and so there is little ground water absorption. To protect the crops from inundation sluice gates have been placed in these areas that drain away the water to the adjoining rivers and canals. However, they are largely inadequate as they serve only 0.119 million hectares (460 sq. miles) of land out of 0.259 million hectares of land. As rainwater accumulates in the crop fields, people make crude cuts on the embankments for draining away the water. These unauthorized cuts are seldom closed to proper sections thereby making the embankments vulnerable to tidal surges and wave action.

Apart from hydro-meteorological causes large-scale conversion of paddy fields to brackish aquaculture is yet another threat to the structural stability of the existing system of embankments. Conversion of paddy fields into brackish aquaculture is a steadily growing practice in Sundarbans<sup>15</sup>. As a part of the process the *Bheri* (fishery) owner initially acquires land from large

<sup>13</sup> Initially the land was parcelled out in 'lots' to the affluent people who brought in tribal people called 'Chakdars' to begin clearing and cultivation in the area. Knowing that the island inundates during high tides twice a day the stretch of mud embankments was constructed by these 'lot-holders' and was commonly hailed as *Zamindari Bandhs* (Bandopadhyay, 2000).

<sup>14</sup> Status report on the progress of "Urgent Repair works in Sundarbans" in 2006, Department of Irrigation and Waterways.

<sup>15</sup> Chopra, Kumar and Khan (2007) find that declining land productivity and increasing population density is the determining factor for the conversion of agricultural lands to aquaculture in Indian Sundarbans.



landholders for a lease<sup>16</sup>. To ensure inflow of saline water they dig channels in embankments that reportedly increase the chance of embankment failure during high tides. The water inlets are completely illegal, as The Bengal Embankment Acts of 1876 and 1882 require that any alteration of the existing embankments should be notified to the Collector for approval<sup>17</sup>. The spread of these inland fisheries also raises the demand for wild prawn seeds as the supply from the hatcheries is not adequate. The supply of the prawn seeds, called *Meen* in local parlance, comes from informal seed collectors who wade through the river banks. Apart from adverse health consequences, the process also weakens the embankments as the seed collectors trample upon the mud base and aggravate soil erosion. Thus, damage risk of the existing embankments is multidimensional

and vulnerability of the victimized populace is likely to be different depending on whether the embankment breach is from natural and/or anthropogenic factors.

Officially 9 out of 13 blocks of Sundarbans in the South 24 Parganas district have been identified to have potentially weak embankments due to natural shocks and fishery problems (Table 7.13).

Among the vulnerable blocks the conditions of Basanti, Gosaba, Mathurapur-II and Patharpratima are fast deteriorating (Table 7.13)<sup>18</sup>. Maintenance of embankments requires huge capital expenditure the fund comes from three sources: Calamity Relief fund (CRF) from the Central Government, allocation of the State Government for Disaster Management and the own fund of DIW. The expenditure on embankments has a rising trend though it petered out in last five years (Figure 7.10).

**Table 7.13: Embankment breaches in Sundarbans area in South 24 Parganas**

Block	Reasons for Embankment Problems
Canning-I	Fishery
Basanti	Scouring
Joynagar-II	Scouring, Silting & Breach
Canning-II	Fishery
Kultali	Weakening, Raincuts, Breach, Scouring & Fishery
Gosaba	Tidal Bores
Namkhana	Erosion & Tidal Bores
Patharpratima	Erosion & Tidal Bores
Sagar	Tidal Bores

Source: Disaster Preparedness & Response Plan-2002, South 24 Parganas, Government of West Bengal

<sup>16</sup> Field visits conducted in villages of Basanti and Gosaba revealed that *Bheri* owners pay on an average Rs. 3000 to Rs.3500 per bigha annually to the landholders for leasing out their land. After tax deductions net income from leased out land comes around Rs.2500/bigha per year.

<sup>17</sup> For a discussion of flood control laws in India see Kamta Prasad (2006).

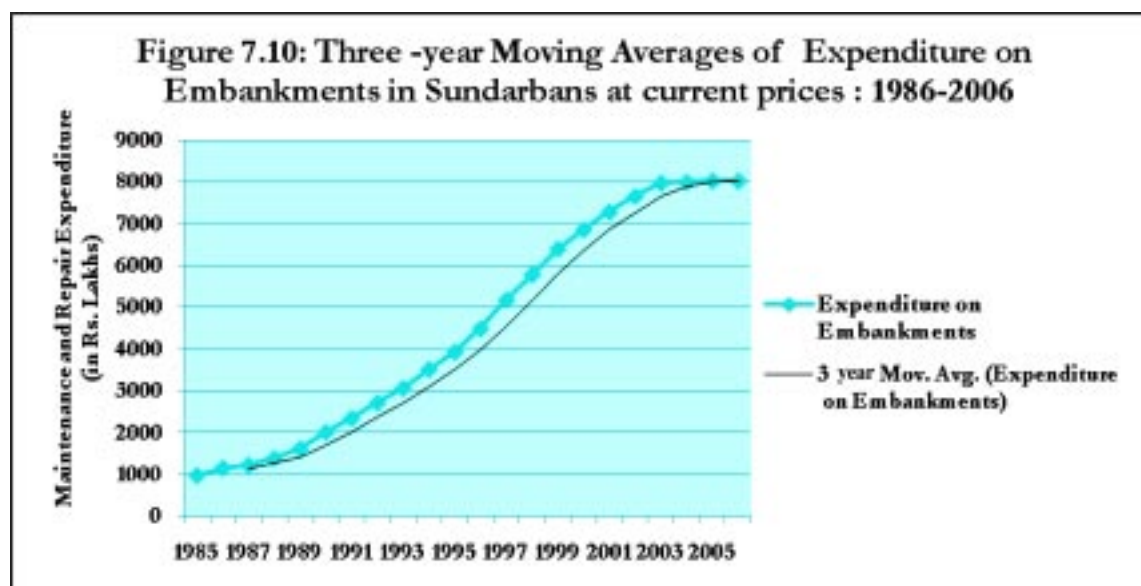
<sup>18</sup> Having said this it must be kept in mind that without a sufficiently large time series inference about the growth in breach would surely involve a large margin of error. Thus, while several areas in Namkhana like Patibonia and Dhoblaat in Sagar are highly vulnerable to tidal surges aggregation at the block level in fact show a declining trend in embankment breach. With limited observation and large level of aggregation the vulnerability from embankment damage must be understood with caution.

**Table 7.14: Extent of Embankment Damage in 13 Blocks of Sundarbans in South 24 Parganas (2002-2007) †.**

Block	Breach (in Km.)						Total Length of Embankments (km)	Percentage growth rate
	2002-03	2003-04	2004-05	2005-06	2006-07	Average		
Basanti	6.6 (3.32)	8 (4.02)	15 (7.54)	10.5 (5.28)	42.3 (21.28)	16.48 (8.29)	198.723	39.8
Canning-I	2 (3.09)	4 (6.19)	1.5 (2.32)	4.5 (6.96)	3.3 (5.10)	3.06 (4.73)	64.61	11.89
Canning-II	0.6 (1.40)	1 (2.34)	0.4 (.93)	0.9 (2.11)	0.7 (1.64)	0.72 (1.68)	42.63	2.03
Gosaba	11 (2.95)	6 (1.61)	23 (6.17)	40 (10.74)	54 (14.50)	26.80 (7.19)	372.5	50.79
Joynagar-I								
Joynagar-II					3.6 (8.57)		42	
Kakdwip			3.5 (1.72)	3.6 (1.77)	3.4 (1.67)	3.50 (1.72)	203.35	-1.14
Kultali	15.5 (8.09)	5 (2.61)	13 (6.78)	28 (14.61)	23.4 (12.21)	16.98 (8.86)	191.561	25.47
Mathurapur-I	1 (6.66)	1 (6.66)	1.5 (10)	1.2 (8.00)	1.3 (8.66)	1.20 (8.00)	15	7.7
Mathurapur-II	4 (1.77)	4 (1.77)	6.6 (2.92)	3.3 (1.46)	18.5 (8.20)	7.28 (3.22)	225.46	28.71
Namkhana			7.2 (2.72)	7.09 (2.68)	6.09 (2.30)	6.79 (2.57)	264	
Patharpratima	5.95 (2.45)	12.44 (5.14)	15 (6.20)	18.8 (7.77)	18.7 (7.73)	17.50 (7.23)	241.9	19.55
Sagar			7 (8.23)	6.885 (8.1)	6.7 (7.88)	6.86 (8.07)	85	-2.19

† Figures in parentheses show percentage breach out of total length of embankments in the Block.

Source: Department of Irrigation and Waterways, GoWB



While the general consensus is unambiguous about the natural causes of embankment damage the opinion is divided about whether human activities like fishery or cutting through embankments to drain out rain water are significant determinants of breaches. Interactions with local people and people of Sundarban Development Board repeatedly gave rise to the concern that unregulated fishery activities are one of the many causes of embankment failure in Sundarbans. On the other hand, promoting brackish water aquaculture is an important livelihood strategy undertaken by the Government in these areas. This involves bank credit and so economic consideration may point towards a diametrically opposite thing: people whose payback is contingent on the stability of the embankments would rather look after their maintenance purely for private benefit that can convey a positive externality on the neighborhood residents. It seems that what matters here is the institutional arrangement under which fishery is organized. If it is largely informal then the fishery owner flouts the norms<sup>19</sup> for setting up the fishery and so will try and maximize his short run gain. Thus,

#### **BOX 7.1 : Embankment Collapse and Community Action**

The Mousuni Gram Panchayat in Namkhana Block is known to be vulnerable for frequent collapse of embankment stretches. In one such incident in May 2003 the embankment breached in Kusumtala close to the mouza boundary of Baliara engulfing among other things the unpaved road that leads to a primary school near the river. Children were kept from attending the school which also meant they would not get the supply of mid day meals that supplemented their diet to a large extent. When mothers complained about the incident to the Panchayats they advised them to go for mending the road on their own. As the Namkhana Panchayat Samiti was of a different political orientation so they feared that sanction for public works would be delayed. The women folk under a Self Help Group decided that male members of the community would do the work and they would cook for them in temporary camps on the road side. However, the day when the work would start no male member turned up and finally the women decided to carry out the work on their own. They completed the work in four days engaging 118 labour hours. Though this could stand as an example of community involvement in risk coping, it also shows the delayed reaction that could as well prolong the burden of damage cost among politically fragmented rural self governments.

Source : Danda, A. A. (2007) "Surviving in the Sundarbans : Threats and Responses - An analytical description of life in an Indian Commons", Ph.D Thesis, University of Twente, The Netherlands.

<sup>19</sup> According to official sources the average per hectare yield is 900 kg for aquaculture farms. Some preconditions for setting up the fisheries include: a) a minimum distance of 200-300 meters from the shoreline (though coastal zone regulations require a minimum distance of 500m from coastal line for any economic activity to take place) b) registration from the aquaculture authority and permission of the Environment Department and c) the entrepreneur must have at least two hectares of land at their disposal.

little attention will be paid towards mitigation of breach events and maintenance of embankments. So far as breaches due to unauthorized cuts for draining out rainwater is concerned the counter-argument goes that it occurs only in a few places and that its frequency of occurrence over the years is very low.

Whatever may be the cause, the rising difficulty of embankment maintenance is highlighted from the fact that mitigation expenditures have increased over the years but have failed to arrest the breach and the resultant damage significantly. One important drawback that thwarts collective action for risk coping at the community level is the possibility of coordination failure across the different tiers of the Panchayats (See Box 7.1).

Naturally, the question arises whether the community organizes itself to pool indigenous resources for maintaining the embankments and to minimize the cost of tidal ingress. Surprisingly, it is seen that no such efforts exist among the people in Sundarbans<sup>20</sup>. Those who get displaced by tidal floods again settle on the raised platform of embankments knowing fully

well that they may have to relocate shortly when the next tide occurs. Here, intra block relocation of households is the chosen coping strategy rather than expending resources on mitigation.

Historically, however, settlement in these areas did not follow the pattern followed in Bangladesh part of Sundarbans where there were large scale private initiatives to raise and maintain embankments. When reclamation of Bangladesh Sundarbans was nearly complete in 1904 barely 40 per cent of the South 24 Parganas Sundarbans had human settlements (Ascoli, 1920). It was understood that the required scale of investment to raise embankments in these areas would be far greater than the private benefit accruing from agricultural activities due to the frequency of extreme weather events. Hence to encourage settlements active governmental support in the form of reclamation loans and embankment construction were extended. Thus, collective action in the form of a tradition in these areas is largely absent. Moreover, the alienation of the local people as an agent of management of local resources

<sup>20</sup> In areas where there are brackish water farms near the river embankments, farm owners commit some money for embankment maintenance every year on a regular basis. This is because except in times of dire emergency Department of Irrigation and Waterways are reluctant to carry out mud patching in these areas. They reason that since the fishery farm owners carry out their business by digging channels in the embankment structure it's also their responsibility to maintain it. In a way this has encouraged a lot of private effort towards provisioning of flood defense in form of embankment maintenance. In Sundarbans two types of public effort is present: individual maintenance expenditure and collective expenditure on embankment maintenance through committees involving fishery owners. In South 24 Parganas part of Sundarbans the former type of arrangement is mostly seen while collective maintenance through activities is largely present in North 24 Parganas part of Sundarbans like Sandeshkhali-I and II.



like embankments by delegating the responsibility to decentralized institutions like Panchayats might have also triggered such inaction<sup>21,22</sup>.

Finally, for co-variate risks like tropical depressions and cyclones one important problem in the district is the lack of adequate Cyclone Warning Message Centres (CWMC) and the complete absence of cyclone shelters. Among the

seven extremely vulnerable blocks only Basanti, Namkhana and Kakdwip have early warning systems. One study about information gaps in the Sundarbans revealed that fishermen generally depend on Bangladesh radio for warning messages as there have been cases when the warning messages from All India Radio (AIR) reached them after the disaster has struck<sup>23</sup>.

## 7.5 Towards a Block Vulnerability Profile: Vulnerability Index

The official estimate of vulnerability has one important drawback in the sense that it solely relies on historical risk exposure data to assess the susceptibility of damage to disaster shock. The assessment is not complete in the sense that it does not take into account the adaptive capacity of the community that is governed by their entitlement reflected by asset position and the extent of empowerment that can be obtained from indicators like education, health and social security that the people can avail of. Thus, given the same level of risk exposure the community with higher adaptive capacity is less likely to be vulnerable. To account for that, a

vulnerability index is constructed as a composite of two indices: Economic and Social Vulnerability Index (ECVI) and Bio-Physical Vulnerability Index (BPVI). The ECVI is constructed by choosing deprivation measures from the Rural Household Survey (RHS) data with the idea that communities having lower level of deprivation are more capable of adapting to extreme events than those with higher level of deprivation. The RHS provides categorical (percentage of households) data on the following 8 indicators:

- a) Possessions of land,
- b) possessions of house,
- c) clothing,
- d) food intake
- e) earning members
- f) literacy, g)

<sup>21</sup> Interaction with people in Sundarbans during field visits clearly revealed that earlier family members actively patched damaged embankments with mud before and during the occurrence of breach. But gradually the decision making process regarding embankment maintenance slipped away from them and they now complain of untimely and inadequate repair works that they think is caused by the chain DIW-Panchayat-Contractors operating in those areas.

<sup>22</sup> In recent times mud patching of the embankments is being carried out through the NREG programme. In fact for most of the villages one of the most important sources of employment delegating people for strengthening the embankments. Though people are critical about the allocation of NREGA funds there is a general consensus that the state of embankments has improved after the introduction of NREGA.

<sup>23</sup> Action Aid and Reuters Foundation (2006) "The Need For Information and Communication Technology In The Sundarbans," Project Report.

indebtedness, and h) migration.

For the ECVI we standardized the indicators as follows

$$\frac{x_{ij} - x_i^{\min}}{x_i^{\max} - x_i^{\min}}$$

Here,  $x_{ij}$  is the  $i^{\text{th}}$  indicator for the  $j^{\text{th}}$  block and  $x_i^{\max}$  and  $x_i^{\min}$  are the maximum and the minimum values of a particular indicator across blocks with  $i=1,2,\dots, 8$  and

$j=1,2,\dots,29$ . Then the standardized indicators are combined by computing a simple average for each block to obtain the ECVI. Here, we have attached equal weight to each factor. By way of construction higher values of ECVI would denote higher vulnerability and thus is assigned a higher rank. The ECVI shows that regionwise Sundarbans has the lowest adaptive capacity and given the preponderance of natural

disasters, naturally more vulnerable than the other two regions (Table 7.15). It is clearly seen Budge Budge-II in Region-I, Kulpi in Region-II and Basanti in Region-III are most vulnerable blocks so far as adaptive capacity is concerned.

Table 7.15: Block-wise Economic and Social Vulnerability Indices

Region	Block	ACI	Rank	Average ACI Region Wise
Region I: North West (Kolkata Surroundings)	TAKURPUKUR - MAHESHTALA	0.221	3	
	BUDGE BUDGE I	0.293	5	
	BUDGE BUDGE II	0.794	28	
	BISHNUPUR I	0.277	4	0.364
	BISHNUPUR II	0.217	2	
	SONARPUR	0.384	9	
Region II: North East and Mid West	BARUIPUR	0.397	12	
	BHANGAR-I	0.479	22	
	BHANGAR-II	0.154	1	
	FALTA	0.392	11	0.405
	DIAMOND HARBOUR I	0.398	13	
	DIAMOND HARBOUR II	0.429	18	
	MAGRAHAT I	0.411	15	
	MAGRAHAT II	0.337	6	
	KULPI	0.639	27	
	MANDIRBAZAR	0.416	17	
Region III: South (Sundarbans)	CANNING I	0.359	8	
	CANNING II	0.585	24	
	BASANTI	0.887	29	
	GOSABA	0.384	10	
	JOYNAGAR I	0.628	26	0.496
	JOYNAGAR II	0.415	16	
	MATHURAPUR I	0.433	20	
	MATHURAPUR II	0.432	19	
	KULTALI	0.460	21	
	PATHARPRATIMA	0.606	25	
	KAKDWIP	0.409	14	
	NAMKHANA	0.489	23	
	SAGAR	0.355	7	



The next task is to arrive at an aggregate index combining both ECVI and BPVI. The BPVI is derived from the estimate of the population likely to be affected by the natural disasters out of the total population in each block (Disaster Preparedness &

Response Plan-2002, South 24 Parganas, Government of West Bengal). Here we require an ordinal aggregator and towards this end the *Borda Rule* as a method of rank-order scoring suggests itself<sup>24</sup>. Going by it we first rank each of the standardized

measures of deprivation that we obtained from the RHS of South 24 Parganas. Adding up the ranks gives us the *Borda Score* of economic and social vulnerability. Then we rank the blocks according to the percentage of the population that are likely to be affected from natural disasters using the earlier standardization method (Table 7.16)

Finally, we add up the ranks of the BPVI with the Borda Score of the economic and social indicators to arrive at the aggregate Borda Score and rank the blocks according to the score obtained (See Table 7.17)

**Table 7.16: Block-wise BPVI**

Block	BPVI	Ranks
Baruipur	0.250	1
Basanti	0.835	2
Bhangar - I	0.167	3
Bhangar - II	0.167	4
Bishnupur-I	0.000	5
Bishnupur-II	0.000	6
Budge Budge -I	0.000	7
Budge Budge -II	0.000	8
Canning - I	0.750	9
Canning - II	0.750	10
Diamond Harbour - II	0.500	11
Falta	0.667	12
Gosaba	0.710	13
Joynagar -I	0.167	14
Joynagar -II	0.167	15
Kakdwip	0.753	16
Kulpi	1.000	17
Kultali	0.750	18
Magrahat - I	0.583	19
Magrahat - II	0.583	20
Mandirbazar	0.659	21
Mathurapur - I	0.667	22
Mathurapur - II	0.667	23
Namkhana	0.815	24
Patharpratima	0.852	25
Sagar	0.884	26
Sonarpur	0.083	27
Thakurpukur Mahestala	0.000	28

Note: Diamond Harbour-I is excluded from the analysis because the exposure data was not reliable.

<sup>24</sup> See Dasgupta P (1995) An Inquiry into Well-Being and Destitution, Clarendon Press, Oxford pages 109-111

Table 7.17: Composite Vulnerability Index (VI) of South 24 Parganas

BLOCK	Ranking based on Standardized Economic and Social Indicators								BSESI	BSPLA	Total Borda Score (BSESI + BSPLA)	Borda Rank
	H	G	F	EDU	EARN	D	M	L				
Bhangar - II	1	4	1	10	2	4	1	11	34	8	42	1
Bishnupur-I	14	2	2	3	17	1	8	22	69	3	72	2
Bishnupur-II	7	3	4	7	5	3	14	27	70	4	74	3
Mandirbazar	2	10	17	6	4	10	3	17	69	15	84	4
Sonarpur	12	17	13	19	3	2	4	15	85	6	91	5
Joynagar -II	4	9	21	22	12	17	9	8	102	10	112	6
Budge Budge -II	28	1	6	9	28	8	6	26	112	5	117	7
Falta	5	7	10	12	19	7	21	24	105	16	121	8
Bhangar - I	23	16	24	27	1	14	2	9	116	7	123	9
Diamond Harbour - II	13	12	14	11	13	6	17	25	111	12	123	9
Canning - II	25	8	8	16	11	15	10	10	103	22	125	11
Sagar	18	23	15	1	23	5	12	3	100	27	127	12
Mathurapur - II	10	14	11	18	14	16	23	7	113	17	130	13
Magrahat - I	6	20	9	5	16	11	22	28	117	14	131	14
Mathurapur - I	11	13	5	20	15	12	26	14	116	18	134	15
Baruipur	17	18	20	21	18	9	5	16	124	11	135	16
Gosaba	20	11	12	13	25	25	11	4	121	19	140	17
Thakurpukur Mahestala	21	6	3	2	29	29	29	21	140	2	142	18
Kakdwip	16	22	18	8	20	21	7	12	124	23	147	19
Budge - Budge I	3	29	28	26	8	19	13	23	149	1	150	20
Magrahat - II	15	21	19	15	24	18	20	18	150	13	163	21
Kulpi	8	27	22	25	7	20	27	2	138	28	166	22
Namkhana	26	15	23	4	27	28	16	5	144	24	168	23
Canning - I	19	24	25	28	6	22	19	13	156	21	177	24
Patharpratima	27	26	27	14	10	24	24	1	153	26	179	25
Joynagar -I	24	19	26	24	22	23	18	20	176	9	185	26
Kultali	22	25	16	23	21	27	15	19	168	20	188	27
Basanti	29	28	29	29	26	26	28	6	201	25	226	28

Note:

H: Percentage of households with no house

G: Percentage of households with number of garments less than 2

F: Percentage of households that can manage less than 1 square meal a day for the major part of the year

EDU: Percentage of households where all 7+ members are illiterate

EARN: Percentage of households having no regular wage earner or consisting of women, infirm, old or children only

D: Percentage of households that have to take loans from familiar persons for everyday needs

M: Percentage of households that have to migrate for various reasons to earn livelihood

L: Percentage of households with no land holdings

BSESI: Borda Score based on the ranks of Economic and Social indicators

BSPLA: Borda Score based on population likely to be affected from Natural Disasters

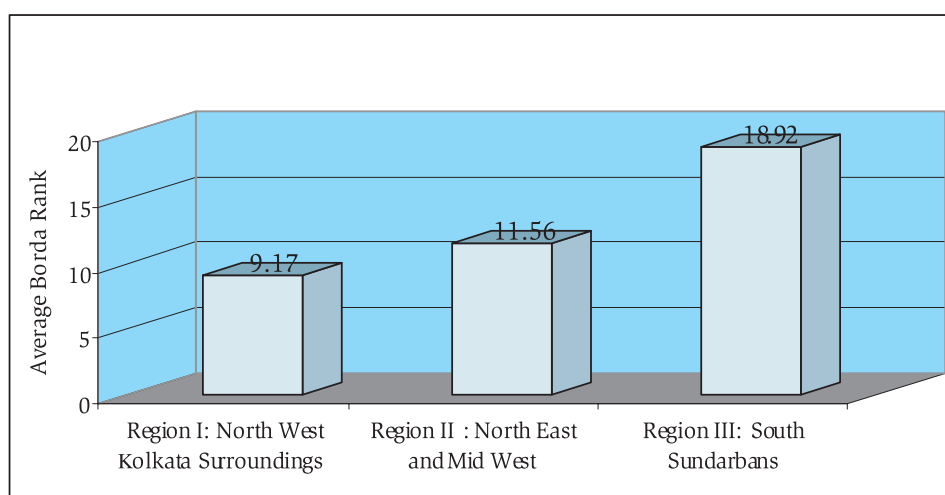
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The composite Vulnerability Index (VI) preserves the ranking of ECVI and EI in the sense that here also the Sundarban region is most vulnerable followed by Region II and Region I (Figure 7.11). Moreover the rank correlation between the BSESI and BSPLA is positive and significant at the

level of 10 percent<sup>25</sup>.

Taking Sundarbans in isolation it is found that in terms of Composite Vulnerability Index Basanti and Pathapratima are the most vulnerable among the 13 blocks (Table 7.18).

**Figure 7.11: Average Borda Score of Composite Vulnerability Index across regions**



**Table 7.18: Block-wise Vulnerability in Sundarbans**

Block	BSESI	BSPLA	Total Borda Score	Borda Rank
Canning II	32	8	40	1
Joynagar II	42	2	44	2
Gosaba	42	5	47	3
Kakdwip	42	9	51	4
Sagar	38	13	51	4
Mathurapur II	49	3	52	6
Mathurapur I	49	4	53	7
Kultali	55	6	61	8
Namkhana	61	10	71	9
Canning I	69	7	76	10
Joynagar I	76	1	77	11
Patharpratima	79	12	91	12
Basanti	94	11	105	13

<sup>25</sup> It is absolutely necessary, however, to keep in mind the possible causality between economic and social vulnerability and exposure to climatic hazards. Poorer people tend to settle in risky areas and hence are more exposed to natural disasters. On the other hand disaster driven income shocks can be the sole determinant of poverty and vulnerability.

In terms of overall vulnerability this exercise conforms partially to official assessment in that Basanti and Patharpratima display high vulnerability. But unlike official estimates Gosaba and Sagar display lesser vulnerability and herein lies the role of economic and social factors that determine adaptive capacity of the communities. For instance in terms of asset position Gosaba and Sagar fare well compared to their counterparts in

Sundarbans as here the percentages of landless households are very small. In addition, Sagar Block displays lesser indebtedness and higher levels of literacy that can be suggestive of better capacity to cope with natural hazards. On another note tourism benefits from *Sagar Mela* might have prompted better maintenance of infrastructure in Sagar Block thereby moderating the damage potential of climatic shocks.

## 7.6 Concluding Observations

Employment generation strategies have not worked well in South 24 Parganas – number of mandays generated is the third lowest among the districts. Given the low per capita income and the highest concentration of backward classes in the district this implies low levels of economic security. However, its performance in housing schemes is better.

Social security for women is severely lacking as crime rate against women is the highest in the district. Incidence of Riots and CAW outnumbers the violent crimes in the district and these two types of crimes multiply as one moves from regions near Kolkata towards south in Sundarbans. In terms of crime rates for violent crimes, CAW and riots, Thakurpukur - Maheshtala and Sonarpur in Region-I, Bhangar in Region-II and Canning in Region-III are

most vulnerable.

Idiosyncratic risks arising from embankment damages are on the rise despite huge mitigation expenditures. Conditions of Basanti and Gosaba are fast deteriorating. Apart from natural causes unorganized fishery activities are supposed to be the prime drivers of embankment breaches. Community institutions for collectively managing embankments are missing in Sundarbans raising question marks regarding operation of decentralized Panchayati Raj bodies.

Finally, in terms of Economic and Social Vulnerability Budge Budge-I, Kulpi and Basanti come out as the most vulnerable blocks in South 24 Parganas. But in terms of overall vulnerability Basanti, Kultali, Joynagar-I and Patharpratima occupies last four positions among the 29 blocks.