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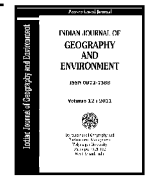

Trend of Flood at Riverine Bengal Basin of Kandi Block of Murshidabad District: A Hydrogeomorphological Overview.

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KEY WORDS

Flood hazard
Trend of Flood
Anthropogenic intervention

ABSTRACT

River flood represents the most common geomorphic hazard encompassing a wide range of events like largely unpredictable, highly localized, flash flood to anticipated and widespread floods. According to the geological history of the moribund delta formation of Ganga system of West Bengal, Kandi block of Murshidabad district was formed by gradual deposition of sand silt and clay and is experiencing floods almost in every year since the period of immemorial. But the character of flood has been changing rapidly due to large scale human interference in regard to dam & barrage construction, lofty embankment construction, encroachment of human being to the wetland (beel) area, unplanned road construction without much of sluice gates etc. As a result of all the deposition within river channel & beel area have hastened as well as water retention capacity of have reduced down in a large extent which in turn making the situation grave some.

As per the local people's perception also flood frequency, flood stagnation period & flood level height have increased in a considerable extent. Memorable flood frequency analysis of the last century has revealed that intensive flood occurrences have been increased progressively in helter & skelter manner since after the construction of Massonjore & Tilpara.

1. Introduction

Flood is one of the most acquainted hydrological phenomena since the period of immemorial. But now it becomes hydro-geomorphological hazard not because of its furiousness rather due to greedy, bureaucratic, self-conceiting behaviour of human being, their mal-planning in the utilization of land and over exploitation of the existing river system. As a result of such collective misguidance, flood character of today has taken a fatal some shape. Kandi block of Murshidabad district nay entire part of moribund deltaic zone of Murshidabad today is unmanageably affected by the ferocity of flood-paws. Due to such inundation most of the cultivable lands has remained as waste lands or these lands may be devoured by flood damages. Moreover fluvio- dynamic

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characteristics of the rivers have changed in response to the changing behaviour of flood

Objectives

A few objectives of this current work are

i. to find out flood intensity zone on the basis of some relevant parameters.
ii. to analyse the trend of flood since last century.
iii. to examine the causes of flood.
iv. to assess the responsibility of dam, barrage & zamindari bundh for flood occurrences.
v. to detect the changing character of flood both on the basis of empirical study & perception of the flood victims for a long time.
vi. to articulate some justified remedial measures to cope with flood.

Location

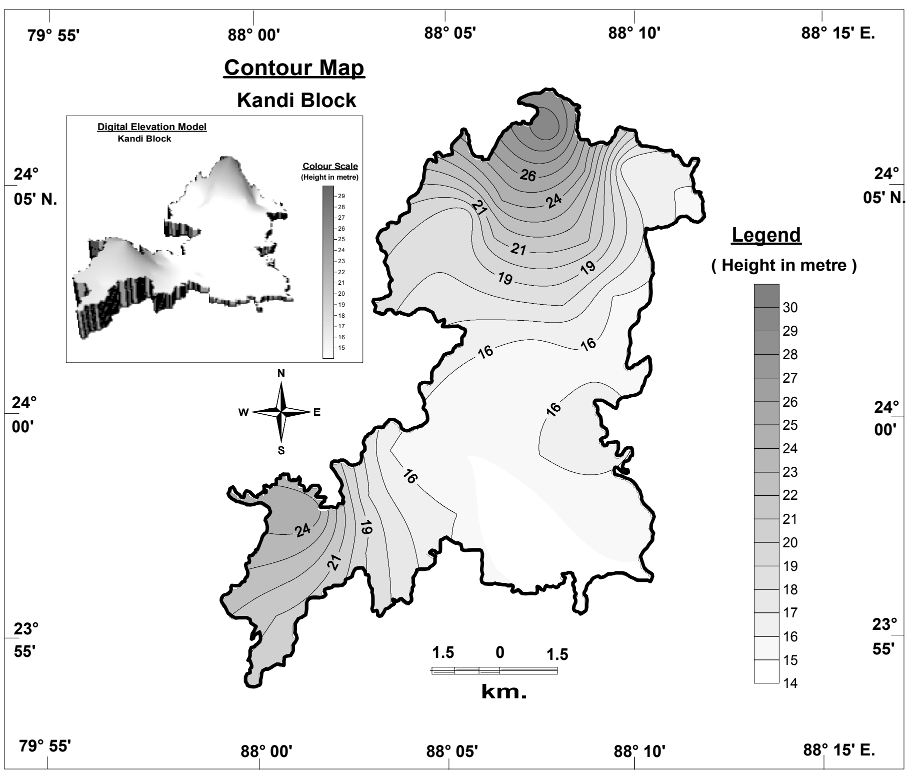
Kandi Block is one of the largest areal unit of Murshidabad district carrying 240.43 sq.km. of area.

2. Geomorphic Condition of the Study Area

Topographically, this block is almost a part of flat moribund deltaic flood plain with very mild slope (0.19m./km. or 1: 5280). Pedologically, thick alluvium soils of recent origin covers almost the whole area. Hydrologically, large number of seasonal water logging areas also exist here. Seasonality of rainfall i.e. intensive rainfall during monsoon period makes an adverse flood situation almost in every year. Topographical situation of the study area has shown here by the contour map of fig 1. in which a low land can be marked at the central part of the block, detailed discussion of it will be done latter.

3. Database and methodology:

Most of the data upon which the present discussion has done are the primary data collected through empirical survey and perception survey and secondary data from different official sources. Water level



Source: Prepared on the basis of GPS information.

The absolute location of this block is from 23°54'34" N to 24°07'09" N latitudes and from 87°59'09" E to 88°11'37" E longitude.

fluctuation data has been collected from Ranagram gauge station of Water Ways and Irrigation Dept. Govt. of West Bengal.

The changing nature of flood has also explored on the basis of few perspicuous, some opaque ripple marks of the human mind and also on the basis of some previous scriptures.

For flood intensity zoning, a simple statistical tool e.g. Composite Index has been employed. Simple equation of this index

$$Fij = \sum_{n=1}^{n} Rij$$

Where Fij = Composite Flood Index, Rij = Rank of i^{th} parameter in j^{th} region. According to the calculation less the value more the flood intensity and vice versa. On the basis of composite indices, clustering of flood frequency has also being executed to get a zonal range of flood intensity level.

Distribution of flood frequency & cumulative flood frequency have been calculated to show the concentrative pattern of flood occurrences.

4. Results and Discussion :

Flood zoning :

Very furious flood intensity zones:

The regions where both flood frequency, duration of water stagnation, and flood water level are considerably more, having lower ranking identity individually for each parameters and low composite indices value. About 8 mouzas of Hizole, Gakarna-I and Kamarsanda G.P. , covering area of about 48.59 sq.km. or 20.20% of total areal coverage of the block, are in this category. Flood intensity is highest (86.04%) at Hizole G.P. At Gokarna-I about 13.82% and at Kumarsanda G.P. 5.16% area of the total are also in this category. Large number of rivers like Mayurakshi, Kuya, Hijuli, Babla, Dwarka etc. with their frequent embankment breaching, depressed topographical situation or presence of silted beel areas collectively momentize the very furious flood phenomena. Here particularly flood depth from river embankment is more than 4.57m. and large part of this section is frequently experienced by flood every year. For example during 2007 this regions have faced 3 major flood occurrences. Fortnight or month long flood stagnation in this zone is also not any rare phenomena today.

Furious flood intensity zones:

To some extent less intensive than previous category but has biting effects on human beings and also on their agro properties and related resources. Fifteen mouzas of Hizole, Andulia, Gokarna-I, Kumarsanda are in this category. About 23.44 sq.km. area of 9.75% area to the total block area is under the dominance of furious flood intensity zone. About 13.96% area of Hizole, 40.86% area of Andulia, 15.81% of Gokarna-I, 17.64% of Kumarsanda Gram Panchayat are included in this zone. JL No. of the mouzas have mentioned in Table 1. Embankment breaching and surge of water are mainly responsible for such flood phenomena.

Intensive flood intensity zone :

Composite indices values range from 6-8 in 27 mouzas. Out of total area of each panchayat, 16.88% area of

Table : 1 Level of flood intensity.

Flood Intensity Class	FIj	Symbolic Designation	Number of Mouza	JL. No. of the Mouzas	Area in Sq.km.	% of Area
Very Furious	<4	I	8	12, 13, 14, 98, 99, 100, 101, 41	48.59	20.20
Furious	4-6	II	15	2, 5, 10, 18, 42, 43, 44, 45, 46, 50, 51, 92, 95, 96, 97	23.44	9.75
Intensive	6-8	III	27	1, 3, 4, 6, 8, 9, 11, 15, 16, 17, 29, 31, 33, 49, 52, 53, 47, 48, 59, 60, 61, 62, 72, 19, 38, 39, 40	68.35	28.43
Moderate	8-10	IV	28	7, 34, 32, 30, 28, 27, 54, 55, 56, 57, 58, 94, 68, 69, 71, 73, 81, 64, 65, 66, 70, 82, 83, 84, 35, 36, 37, 20	72.67	30.22
Low	>10	V	15	36, 74, 75, 76, 77, 78, 79, 80, 67, 68, 24, 25, 21, 22, 23	27.19	11.31

* FIj = Composite Flood Index Value

Andulia G.P., 100% of Purandarpur G.P., 10.19% of Jasohari Anukha-I G.P., 70.37% of Gokarna-I G.P., 48.75% of Gokarna-II G.P., 58.96% of Kumarsanda G.P. 23.73% of Mahalandi-II G.P. are within this category. Flood water level ranges from 1.22m-2.13m. Ignited eyes of Kana Mayurakshi, Dwarka are fueling for such condition.

Moderate flood intensity zone:

About 28 mouzas, covering 72.67sq.km or 30.22% to the total area of the block, are under this moderate flood intensity zone. The affected mouzas are Andulia (42.24%), Jasohari Anukha-I (27.59%), Jasohari Anukha-II (65.19%), Gokarna-II (51.25%), Kumarsanda (4.52%), Mahalandi-I (75.86%), Mahalandi-II (59.62%) and Kandi Municipality (100%). Composite indices value of this region ranges from 8 to 10. Relatively upper topography and quite good drainage system largely responsible for such moderate degree of flood intensity.

Low flood intensity zone:

About 15 mouzas of different Gram Panchayats like Jasohari Anukha-I (62.20%) Jasohari Anukha-II (34.81%), Kumarsanda (13.72%), Mahalandi-I (24.14%), Mahalandi-II (16.64%) having an area collectively 27.19 sq.km or 11.31% to the total area are under the domain of low flood intensity zone.

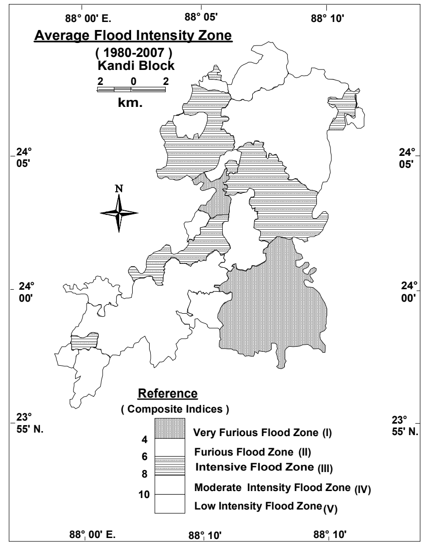
Causes of Flood :

Natural causes:

Flood basically a natural fluvial event specially in the late mature and old stage of the cycle of erosion. From such statement it needs not to be interpreted that no flood events are experienced by the youth or early youth stage of the fluvial cycle. In Kandi block nay the entire Murshidabad district there is a well bred geo-physical environment for inviting and nourishing the flood devastations. Moribund deltaic morphology, poor drainage condition, bifurcation of river Mayurakshi, huge deposition in the river bed, large number of braids and highly winding channel, lack of forest coverage, long standing siltation within the beel command area, poor infiltration capacity of the soil, highly concentrative rainfall etc. collectively responsible for intensive flood situation.

A) Poor drainage condition:

It has been observed that most of the part of Kandi block, specially the south eastern part, is suffering under poor drainage (Fig.2). Large number of rivers like Mor, Beli or Tengramari, Kuya, Banki etc. have concentrated in Hizole beel and influxed with Dwarka river within very short range of space. It should also be mentioned that Dwarka river before interception



Source: Perception Study & Empirical Survey.

of these rivers has conceived some other significant rivers just north of Kandi block. So, in general situation, Dwarka itself becomes brimful with its own huge volume of water as well as it has not any further ability to carry out any extra water debouched by the tributaries. Average slope of this region is 0.19 m. per 1 km. which is further reasonably low in the south eastern part of this block. Due to such poor physiographic slope swift water movement is beyond expectation.

The water holding capacity of both the inceptor river (Dwarka) and its tributaries (Mor, Beli, Kuya) have calculated on the basis of their cross sectional areas (Table 2). Cross sectional area of Dwarka river (Length × Depth) is about 302.4 sq.m but the total section area of the tributaries is 377.937 sq.m. There are no significant slope & relief differences and the water pressure during monsoon is much stronger in the tributaries. So from these information, inference can easily be drawn out that the parent stream Dwaraka has not ability to carry the combined discharges of the tributaries which is about 25% greater than master river. So, it is highly responsible for inundation.

Moreover, large number of river segments have spaced interwovenly in the confluence zone of Mayurakshi - Kuya river in such a fashion that no one could find their paths due to abyssal submergence by monsoonal water and often this area represents itself as a stagnant beel area.

B) Effect of Bhagirathi and Uttrason:

Mighty Bhagirathi River flows at 2 to 4 km. east of the eastern margin of Kandi block which is

Table: 2 Comparative water holding capacity of inceptor river and tributaries and surplus water for inundation.

Inceptor river	Area(sq.m.) W × D	Water holding capacity (litre)	Tributary rivers	Area (sq.m.) W × D	Water holding capacity (litre)	Surplus Water for inundation(litre)
			Banki	35×2.77 = 96.95	96,950	(3,77,937–3,02,400)
Dwarka	80×3.78 = 302.4		Mor	32.5×2.89 = 93.92	93,925	
		3,02,400	Kuya	45×3.78 = 123.01	1,23,012	
			Beli	35×1.83= 64.05	64,050	
	302.4	3,02,400		377.97	3,77,937	75,537

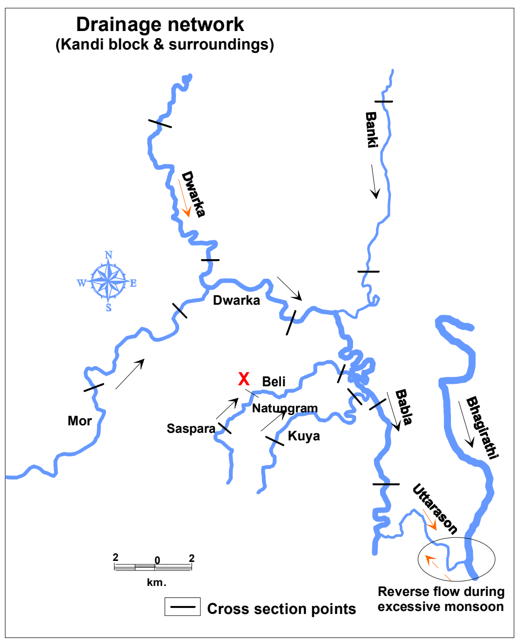
demarcated by Dwarka-Babla river. Uttarasan, a connecting river between Dwarka-Babla and Bhagirathi, flows few km south east of south-eastern Kandi block. (Fig. 3) There is very little relief variation (1 m. to 1.5 m.) between Dwarka and Bhagirathi as well as very meagre differences of water level. So during monsoon period as the elevation of water level in Bhagirathi soars up, huge water carried by the tributary (Dwarka-Babla) does not get free accession opportunity to meet with master river. Similarly swelling up water level in Dwarka-Babla river does not make it readily available to welcome huge volume of water of the surrounding tributaries and it tends to inundate the surropundings.

Uttarasan is an excellent feeder draining route from river Dwarka-Babla to Bhagirathi river (Fig. 3). But during heavy monsoon period, due to little relief differences between its source to mouth, excess water of river Bhagirathi or released water from Farakka reversely enters into the river Uttarasan like back thrust, which is actually hampering the normal river flow of Babla to the Bhagirathi river. Strong eddying and helical flow in this river are the empirical evidences of such seasonal flow character of Uttarasan river. However the external effects to some extent directly responsible for such dreadful, long durated flood.

C) Massive downpour within very short range of time:

Peak flood height as well as flood resurgence have increased severely as per the perception of the sufferer. Accordingly, flood frequency has also got progressively increasing swing which have mentioned in the earlier section of this article. Monsoonal rainfall pattern very recently have altered to some extent. Total amount of rainfall during monsoon months have not been changed notably but the irregular rainfall pattern have noticed due to arrhythmic short ranged outburst interleaved by long range rainless days. During 23rd to 25th Sept. 2007 amount of rainfall was 174.8 mm. recorded by Kandi Meteorological Station is not just enough to inundate the region. But large amount of rainfall in the Chottanagpur area and the Rarh region of West Bengal are mainly responsible for flood.

About 872.4 mm. or more rain within 3 days (19th to 21st Sept. 2000) in the study area is highly responsible for acute flooding in the Kandi block and surrounding areas. About 358.2 mm. rainfall between 9th to 11th July of 2006 or 435.4 mm. between 9th to 13th July of



2007 beaten the region black and blue with flood surge.

D) Huge siltation and sand deposition in the beel and river:

According to O'Malley (1914), Hizole beel was a natural storage unit but steady deposition has forced it to lose its retention capacity. He also put forwarded that some of the sporadic places were very deep (water depth was 6.09 m.) and average depth was 3-4 m. all over 130 sq.km. area. But now except flood period greater than 60% of the area is not gripped with water and there is not a single pocket where water depth has reached beyond 2.80 m. According to present field study average rate of deposition is near about 2 mm. / year.

Similarly, the rivers like Mayurakshi, Mor, Kuya have lost their carrying capacities and competencies in substantial degree. Estimated volume of sand deposition is about 0.786×10^6 cubic meter in the river courses within the administrative area of Kandi block in respect to the last 54 years. It has been estimated deducting average depth, length, and average width, overall area of the rivers of the present from the past. Such huge deposition is caused by discharge of water from Tilpara barrage all on a sudden and fast forward movement of huge mass of sand upto the confluence area of Mayurakshi river and inter linked Kuya river. This inference has been generated from the analysis of the coarseness of sand samples taking just near from the Tilpara barrage and confluence area of Mayurakshi and Kuya rivers by the authors. Ability to carry discharges of all the rivers collectively have reduced down of about 0.786×10^6 cubic meters as per velocity. Retaintability of the Hizole beel area has reduced down to about 1.90×10^6 to 1.56×10^6 cubic meters. So such extra water of Hizole beel and loss of carrying capacity of the rivers are greatly responsible for flood severity.

E) Channel cross section and sinuosity:

The cross sectional area of the upper reach of Mayurakshi river is more (depth-1.85 m., width-67 m. near Santhia) in compare to the lower course which is really inverse to the natural law of channel form. In normal situation, cross sectional width gradually increases toward downstream. Due to such bottole neck like cross sectional pattern the huge amount of water from the upper streams do not getting enough space to flow down within its wetted perimeter area. So water certainly spreading outward.

Most of the rivers are highly winding in character and the standard sinuosity index (S.I.) of Dwarka river is 2.14, of Banki river is 1.47, of Mor river is 1.69, of Kuya river is 1.77 and of Beli river is 2.55. As per SI value, all the rivers, except Banki river, have intense meandering form so there is less possibility of swift water movement. That's why when water pressure is very high during monsoon period, water gets huge constrictions as well as water spilling. Beli or Tengramari river have endowed with huge temporary sand bar (braiding channel); permanent sand bar (anatomising channel) are also strongly influence the chronic flood situation.

Anthropogenic causes:

Today's flood in the study area is not the outcome of sole naturality, a sets of anthropogenic activities are also proportionately responsible for such barbarity. Population pressure is gradually increasing and to keep parity with the needs of human being, there has been a parallel attempt to rule the river flow and to force the rivers to surrender under the feet of human civilization. To fulfil his dream, he sometimes has built up lofty embankment alongside the rivers or rose up dam or barrage across the rivers, sometimes he has tried to divert the river course or canal. Through dam, barrage or river lift irrigation human beings have attempted to produce substantial volume of crops. Multipurpose river valley projects like DVC, (Damodar Valley Corporation), Sutlej project in India have been developed to gain an integrated package of profit in diversified ground. Such apparently beneficial activities today in many cases have been yielding a series of consequent curse like boomerang effect. Few relevant aspects here have been pointed out briefly.

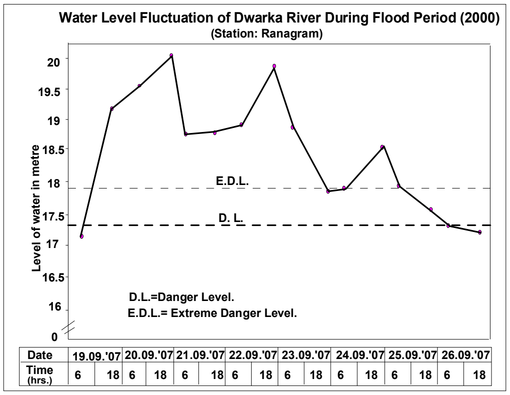
A) Lofty embankment construction:

Present day's river is mostly guided by the arrogant signature of the technological advancement of the engineers e.g. embankment. In Kandi block all the rivers are regulated entirely by river embankments for about more than 100 km. length, most of the embankments are 4.26 m. to >6.40 m. high. Almost every 2-3 years interval, elevation of the embankment is getting rise in parity with rising flood height. During 2007 centre pool of the Dwarka-Babla system have been raised up almost about 0.914 m.

Table: 3 Cross-sectional pattern and potential discharge ability along Mayurakshi downstream.

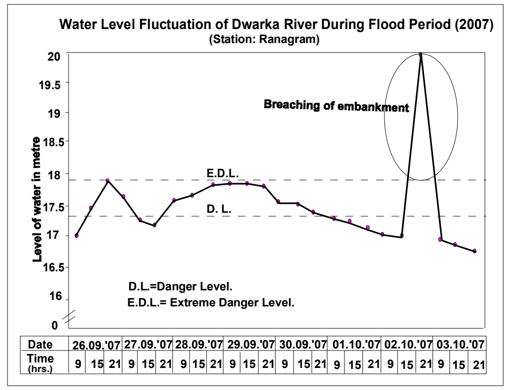
	Cross Section Sites	Width	Depth	Cross sectional area(sq.m.)
Downstream ↓	Santhia	67 m.	1.85 m.	123.95
	Near Saspara	18.9 m.	1.22 m.	23.05
	Near Natungram	27.2 m.	1.37 m.	37.52

Source : Field Survey



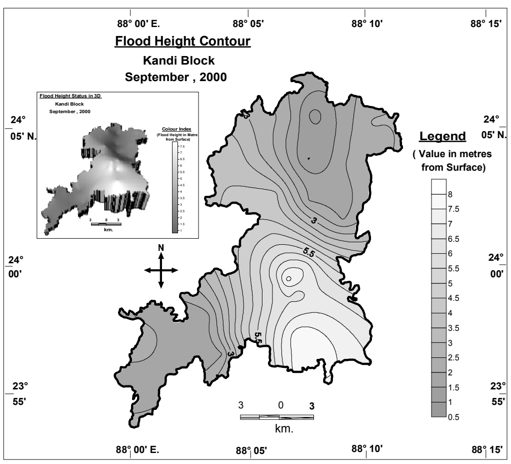
Source: Ranagram Gauge Station.

Fig. 4



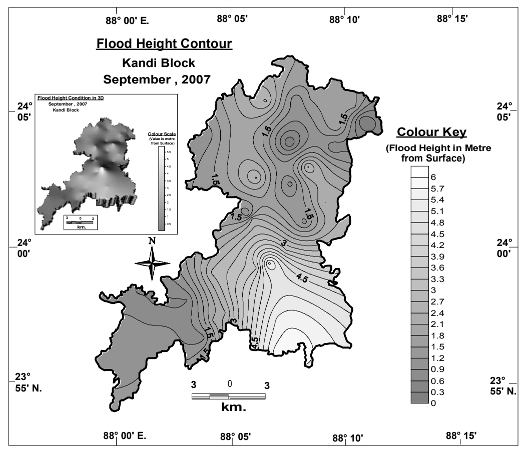
Source: Ranagram Gauge Station.

Fig. 5



Source: Field Survey.

Fig. 6



Source: Field Survey Based Data.

Fig. 7

Noteworthy, (a) Constructional material of the river embankment are very fragile loose sand or sandy soil. Huge sands have been employed to erect the embankment along the river Kuya near Bhawanandapur, Sabitrinagar, embankment along Kuya river. So how much venturesome it is really perceptible to any common people. (b) Moreover, soil used for embankment, is just collected from the base of the embankments as a result deep scours have been developed at the outer margin of embankment. These scours contain water like marshy land almost all through the years as well as weaken the basement. (c) If embankment is the ultimatum its base should be much wider than apex to resist huge water pressure.

B) Presence of Zamindari Gher bundh:
Before independence Zamindars had built up several zamindari gher bundh to save their agricultural farmyard from flood invasion. Some remnant parts of that bindh still exist with sufficient length. About 59 km. long gher bundh was present up to 1970 but latter on more than 50% gher bundhs have been eradicated without any proper safe guard. Theseold bundhs do not able to resist the flood rather hinder the free trespass of water in this region consequently due to low drainage flow extensive marshy lands have formed during flood period. People of this region are also in view to expunge the gher bundhs.

D) Construction of dam and barrage:
Massonjore dam across Mayurakshi river, Tilpara barrage across the same river, Farakka barrage across Bhagirathi river, Deucha across Dwarka have irrefutable effects on Kandi block. These projects bear some boon for the upstream habitats but it is really

Table 4 : Trend of flood concentration before and after Tilpara barrage (1954)

Range of Time	Flood Frequency		Cumulative Flood Frequency	
	Frequency	% of Frequency	Frequency	% of Frequency
1900-1910	1	7.14	1	7.14
1911-1920	1	7.14	2	14.28
1921-1930	–	–	2	14.28
1931-1940	–	–	2	14.28
1941-1954	1	7.14	3	21.42
1955-1960	2	14.28	5	35.70
1961-1970	1	7.14	6	42.84
1971-1980	2	14.28	8	57.12
1981-1990	–	–	–	57.12
1991-2000	2	14.28	10	71.40
2001-2008	4	28.56	14	1000

Source : Door to door survey and Ankur Patrika, Annual Journal of Purandarpur.

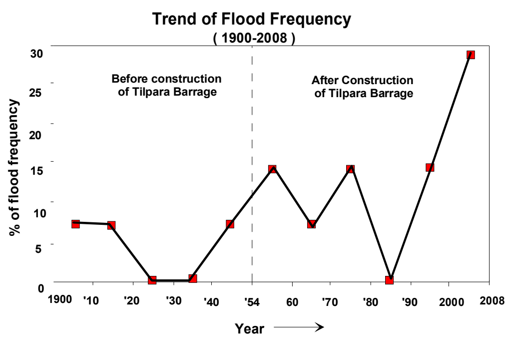


Fig. 8

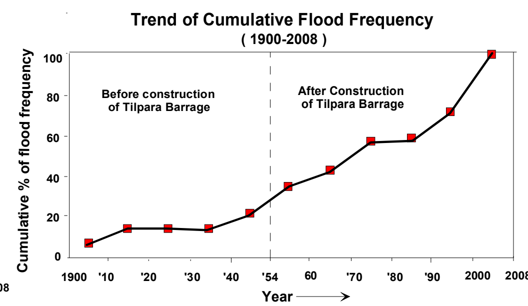


Fig. 9

devastating for downstream residents. For increasing the popularity of the irrigation these dam and barrages were being constructed but the studies have revealed the fact that the results of such irrigation facilities are much lesser compare to the massive loss through flood savagery. During monsoon period due to heavy rain these barrages or dams release huge volume of water which is beyond the retaintability of the rivers and causes massive flood in the Kandi block nay entire Murshidabad district. Flood-2000 and flood-2007 are two immemorable flood of this current century is because of sudden outbreak of dam and barrage water. During 2000, within 5 days (18^{th} to 22^{nd} Sept.) Tilpara barrage released 52,49,884 cusec water and consequently the residents experienced a gigantic, threaten some flood. In this context it can be cited out that almost 83% of total flood run off generated in the Mayurakshi basin in Sept., 2000 were the contribution from the unregulated catchment, as against the relatively unassuming outflow from the spillway of the the Massanjore dam and the Tilpara barrage (Ray, 2001:18). As reservoirs are filled to their bursting points during heavy and incessant rains of Sept. 2000, huge volumes of water are released abruptly from the Massonjore and other barrages traced a similar grim picture of devastation in the downstream reach of Mayurakshi river basin (Pearce, 2001, Dasgupta, 2002: 52, 53). During September, 2007 another flood devastation has experienced due to sudden water discharge from Tilpara barrage. Flood water height in Ranagram gauge station during both mentioned flood devastation periods and flood height contour map have given below (Fig. 4, 5, 6, 7) which will make the situation easy to understand.

Flood frequency analysis from the last century to present:

Kandi block has experienced 37 memorable floods since 1900 to present . Among it more than >75% floods phenomena have occurred after 1950 and about 14 devastating floods have been recorded during this period. Among these extreme flood 21.42% occurred before 1954 and rest 78.58% have agitated after 1954. Moreover it is observed that among the rest amount about 42.88% flood have happened from 1981 onward, among it also about 28.56% flood occurrences have taken place between 2001 and 2008 (Table. 4). According to the perception study and recorded secondary data it is clear that the most devastating floods ever experienced by the existing generation of people are the floods of 1978 and 2000. It is also clearly evident that the flood discrete and cumulative flood frequency have been progressively increasing (vide fig. 8, 9).

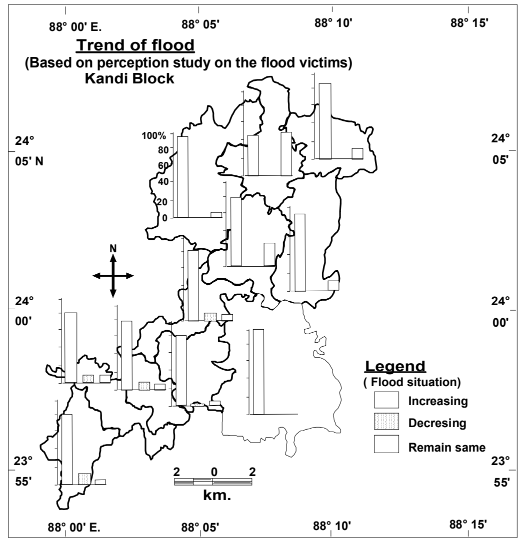
Flood trend in victims' perception:

Maximum population opined that flood intensity is gallopingly increasing all over the block and only few part of Mahalandi I dwellers are in favour of decreasing trend of flood. In Hizole beel area 100% interviewee opined that the frequency of flood is increasing. The relatively elevated area of Mahalandi I GP has least possibility of flood hazard (see fig. 10).

Measures of flood recovery:

Where there is problem, there is means to recover from problem. But its nature may not be equally stronger in all space and time perspective. Flood is a natural event, it has its own command area. If someone infiltrates to that command area obviously he will be ghosted or lashed by flood. Then flood is likely to be a problem to him. When demand for space is gradually increasing it is difficult to keep the corridor apart for flood occurrences. At the lower reach of the river as carrying capacity and competency reach to the marginal level, usual storage units naturally develop. So by any cost this storage ground should not be disturbed.

Hizole beel is also accordingly a natural storage unit in the confluence zone of Mayurakshi, Kuya river. So, it is very difficult to scrape all water from its endemic storage units and similarly it is not scientific enough also. But the settlements have already been



Source: Perception Study.

Fig. 10

encroached in the interior of the beel. Therefore, any simple measure is not just enough to reins on the flood but few destructive hard decisions as well as few structural and non structural adjustments can help to combat the flood ferocity to some extent.

Proposed steps for flood alleviation:

Complete eradication of flood is quite impossible from such grave situation but
few steps to be taken in this regard.

Highly tortuous rivers like Mayurakshi, Kuya, Dwarka after all Bhagirathi river should be reformed. If highly meandering & braids of the river is possible to straight, water movement would be normalized to some extent.

Previously taken Mayurakshi Master plan should be enacted where there was plan to integrate Mayurakshi with Kuya river and redirected this joint flow toward the Bharatpur beel near Gantala ghat by govt. Such plan was taken because near around Bharatpur beel the possibility of loss is relatively less than the study area.

Non structural adjustment with flood should be extended much priority to cope up with flood. So instead of monsoon cultivation, rabi crops, zaid crops, summer crops as per the water availability is essential to compensate the loss.

Raised basement and flood withstanding architecture of the houses for settlement construction may be another step to adapt with flood.

Common, concrete grain preservation centre preparation may provide security to finish grain some extent.

Sand splay management by preparing proper crop chart for that, voluntary group should be made to warn people & save people during & prior to the flood.

Constructions of the satisfactory number of culverts across embankments, roads could be helped for free water trespass.

Minute detection of growing rate of deposition in the river and beel area to predict future tendency of flood or flood level rise. Presently, deposition rate within river Mayurakshi, Dwarka is on an average about 7 cm./ year and deposition progression rate is almost 12% per year as estimated during last 4 years. So, it is obvious fact that if such deposition rate will sustain for next 5 years, water level will probably rise further 38 cm. If it will sustain for next 10 years water level will rise 82 cm. which will create abyssal submergence of the entire block. In such condition, further rise of embankment in compare to current deposition rate would not be possible. Already the height of the embankment is about 6.4 m.-7.3 m. Moreover, river bed will be raised much above ground surface which will increase danger level because on that condition, large number of settlements will remain below river bed level.

To escape people from such ensuing danger, as soon as possible some vulnerable settlements within Hizole beel corridor should be shifted and rehabilated them to other safer places in several phases. Real fact is that beel corridor for beel dynamics is not for human habitation.

Within next 5 or 10 years phase wise embankment abolition mechanism should be enacted concerning beel & embankment dwellers.

Profit-loss calculation should immediately be revised for Tilpara barrage or Massonjore dam and likewise constructive or necessarily destructive measures should be rudely taken.

However, flood situation today reached in such a situation that complete recovery is quite impossible. So prediction of flood in regard to rainfall, measurement of deposition rate in beel area and river channel are very much necessary to adapt with flood. No alternative today left to keep aloof from flood, so wise act would be gradual adjustment with flood recurrences and live creatively with flood.

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