Flood Hazard Cause Assessment and Their Mitigation Option using Geo-informatics Technology

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Abstract- Floods are related to several environmental processes. Therefore, its causes are as diverse as its consequences, both of which vary with the nature of the flood prone environment. In the low lying parts of flood plains, atmospheric extremes, especially excessive rainfall- are the primary causes of most of the flood episodes. The river Kaliaghai was originated from the highlands of the Jhargram P.S in the Paschim Medinipur district. The combined flows of the Kaliaghai and kangsabati which meet at Dheubhanga in P.S.-Moyna in the district of Purba Medinipur is known as the river Haldi. The river Kapaleswari and Baghai are two main tributaries of the Kaliaghai. The Kaliaghai-Kapaleswari- Baghai drainage basin covers an area of 2145 Km^2. The lower parts of the basin comprising of 1576.25 Km^2 of low lying terrain historically suffers from flood and tidal inundation. Therefore it is essential to controlled flood, but practically we can't control due to climatic condition. Better water management is necessary in order to achieve maximize returns per unit of water and land. Some anthropogenic activity will be restricted for reduce flood vulnerability.

I. INTRODUCTION

Flooding is regarded as one of the most dangerous natural hazards and as a principal trigger of disasters (Alc´antara-Ayala -2002). Floods have also occurred in areas, which were earlier not considered flood prone. Eighty percent of the precipitation takes place in the monsoon months from June to September. The rivers bring heavy sediment load from the catchments. These, coupled with inadequate carrying capacity of the rivers are responsible for causing floods, drainage congestion and erosion of river-banks (Correia, F. et al -1998). Cyclones, cyclonic circulations and cloud bursts cause flash floods. Sankar Kumar Nath and Kiran Kumar Singh Thingbaijam of Department of Geology and Geophysics and Debasis Roy of Department of Civil Engineering, IIT, Kharagpur published a detailed review of the flood situation in West Bengal. Kolkata, Hooghly, Howrah, Paraganas, Midnapore, Burdwan, Birbhum, Jalpaiguri, Cooch Behar, Malda, Murshidabad and Darjeeling areas are worst affected districts.

The present research work has been designed to pursue the above issues in the context of 'Lower Kaliaghai Baghai-Kapaleswary flood basins of Purba and Paschim Medinipur district, West Bengal'. The interfluves of the numerous distributaries are ill drained (Spate et al -1967) and frequently cause water logging during the southwest monsoon season in June–September, leading ultimately to stagnation and the development of palaeo- channels known as "bills". The study also reviews the projects accepted and accomplished by the Govt. departments to bring the flood events under control and scrutinize the legacies of such programmers that have resisted achieving desired results in managing the situation. Efforts have been made to investigate the indigenous methods adopted by the local people to cope with the flood prone sub-environment. All such studies have been carried out to explore the probable management options for reducing the sufferings of the local peoples which have been borne by them for about last three- four decades.

II. BACKGROUND OF THE STUDY

The river Kalighai is the main drainage channel of the basin. The other rivers like- Kapaleswari, Deuli, Chandia, Baghai etc. outfall in the river Kaliaghai at different points. The drainage channels like Katakhali, Ganpat, Kalimandap, Rajwar, Sridharpur Khal, Moyna Dry channel etc. along with many tertiary drainage channels join with river Kalighai. The river Kaliaghai joins with the river new Cossye at Dhewbhanga to river Haldi. As the catchment areas of cossye and Kaliaghai are adjacent and hyfrometeorologically similar and synchronization of flood of new Cossye and Kaliaghai is very common and become a major cause for flood problem. Moreover, the tidal effect of the river Hooghly via Haldi also traverses along river Kaliaghai up to Amgachhia and causes tidal lockage of the basin. A very large area in the lower reach of the Kaliaghai is affected every year by floods (Barman -2009).

Erstwhile Zamindars of the Bengal Presidency in general and of the basin under study in particular, mandated by the Permanent Settlement 1793, built series of embankments first in isolated stretches of no systematic alignments in order to reclaim the low lying areas of the 4 basin to increase cultivable land and protect them for flood and tidal inundation. By degrees, certain lengths were connected to give them a semblance of a regular system of embankments either constructed in the lines along the rivers or tidal creeks. Through these attempts yielded some immediate benefits, did not sustain for long. These piecemeal efforts to prevent flood and tidal inundation set forth fast deterioration of the carrying capacities of the rive Kaliaghai and its tributaries on account of accelerated rate of siltation of river beds. Out of 584 Km^2 of area, which has been identified as flood prone in the lower basin, an area of about 385 Km^2 chronically suffers from flood hazards. The premature development of the country side by construction of circuit embankments by the

zamindars have resulted in rise of the berm and the bed level of the rivers and drainage channel than that of the ground level on country side. This has also resulted in problem of water logging during the rainy season. The circuit and Jalpai (Jalpai lands mean lands exposed to overflow of tidal water) embankments of this region restrict the tidal ingress within the channel and cause accelerated silting up of the river bed. This in turn progressively reduced the carrying capacities of rivers and resulted in prolonged drainage congestion. After repetitive floods of 1954, 1956 and 1959 are some of the major floods years in the State after the Independence, the State Government decided to frame a Flood protection and Drainage scheme for the basin. The Flood Enquiry Committee 1959 also made certain observation relating to the flood and drainage problems in the basin. The scheme styled as "Resuscitation of the Kaliaghai River" framed in 1970 was the outcome of the above decision. The scheme was executed during 1971-74 period. Since the scheme aimed at augmenting only the carrying capacity of the river Kaliaghai only and did not incorporate the remedies to causes of fast siltation of the river beds, it failed to solve the flood and drainage problems on a long term basis. Though the scheme, when executed, gave relief in varying degrees from flood and drainage congestion for about 10 to 12 years, the problems reappeared thereafter.

III. Aim & Objectives

Aim of the study is Flood Hazard Analysis and Management. And objectives are: Demarcation of flood hazards area.

Identification causes of flood hazards.

Un-controlling resigns flood hazard vulnerability.

Local label (Village) forecasting and Warning system

IV. About the Study Area

The study has been carried out in some blocks of the flood prone areas of Purba and Paschim Medinipur districts, West Bengal (Fig No-1.1), namely- Egra I and II, Pataspur I and II, Bhagabanpur I (Egra Subdivision); Bhagabanpur II (Contai Subdivision); Moyna Community Development (C.D) Block (Tamluk Subdivision) of Purba Medinipur District and Narayangarh and Sabang (C.D) Block (Kharagpur Subdivision) of Paschim Medinipur District (Fig No-1.2). Hydrologically, the area belongs to the Lower Kaliaghai-Baghai-Kapaleswary Basin; it is an extensive floodplain consisting of a number of flood basins like Barachoka, Dubda, Moyna, Bhagabanpur Basins etc. The study area extends between Poktapole (22°07'40.9l"N, 87'22'46.85"E) and Dhewbhanga (22"09'50.31"N, 87°49'34.45"E) along the course of the main stream i.e., Kaliaghai which has been designated as the Lower Kaliaghai Basin by the Department of Irrigation, Govt. of West Bengal. The total area is 2011.05sq km., within which the lengths of the rivers Kaliaghai Kapaleswary and Baghai are 63 km, 37km and 35 km. respectively. Topographically the study area can be divided broadly in to three major slope units- moderately slopping western part, gently sloping northern part and very gently sloping southern part. The study area, being covered mostly by fertile alluvial soils of Vindhyan family, is intensively cultivated with three rice system (Aman, Aush and Boro) along with potato and many oil seeds like mustard seed, summer season. The area is densely populated having density ranging between 540.31persons/km^2 in Narayangarh block and 1336.76 persons/km^2 in Moyna block (Laha.et.al-2014).

BLOCK MAP OF THE STUDY AREA

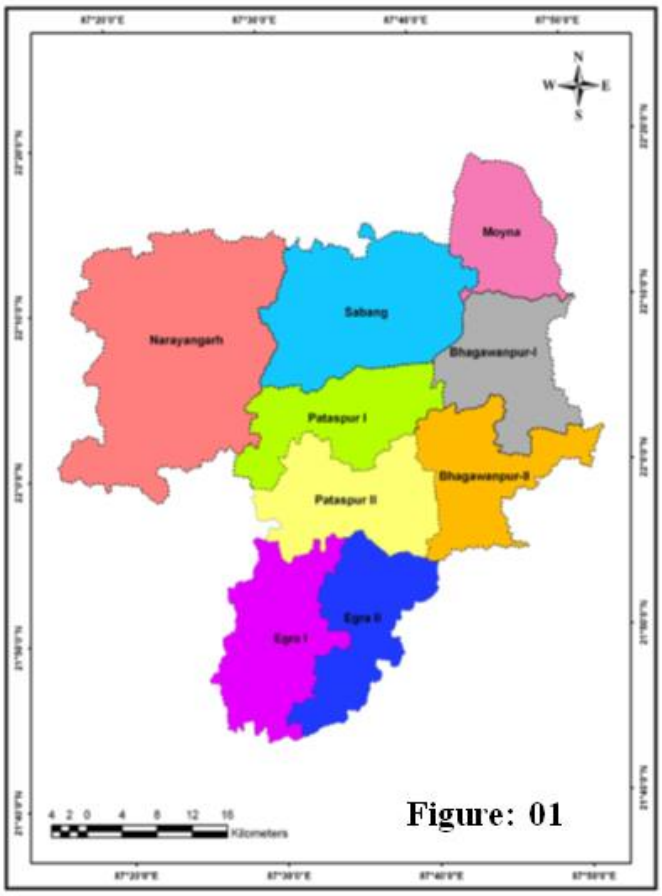


Figure: 01

V. Material & Methodology

Data	Data type	Scale	Data Source
1. Boundary	Topographic map	1:50000	Survey of India & NATMO, Kolkata
2. Landuse	IRS LISS III image	Pixel Size 23.5m	NRSC, Hydrabad
3. Drainage	Drainage map & SRTM DEM	-	District NRDMS Center
4. Rainfall	Daily, during flood	-	Meteorological Dept
5. Elevation	SRTM image	Pixel Size 30m	Bhuban
6. Geology	Surface geology	1:250000	GSI, Kolkata
7. Soil	Soil map	1:100000	NBSS&LUP, Kolkata
8.Geomorphology	Geomorphology map	1:100000	GSI, Kolkata
9. Drainage Density	SRTM DEM	Pixel Size 30m	Bhuban
10. Population Density	Census of India	-	Janagnana Bhaban, Kolkata
11. Flood Level	Flood height	-	Different guage station & field survey
12. Ground water level	Level flections	-	SWID, Kolkata.

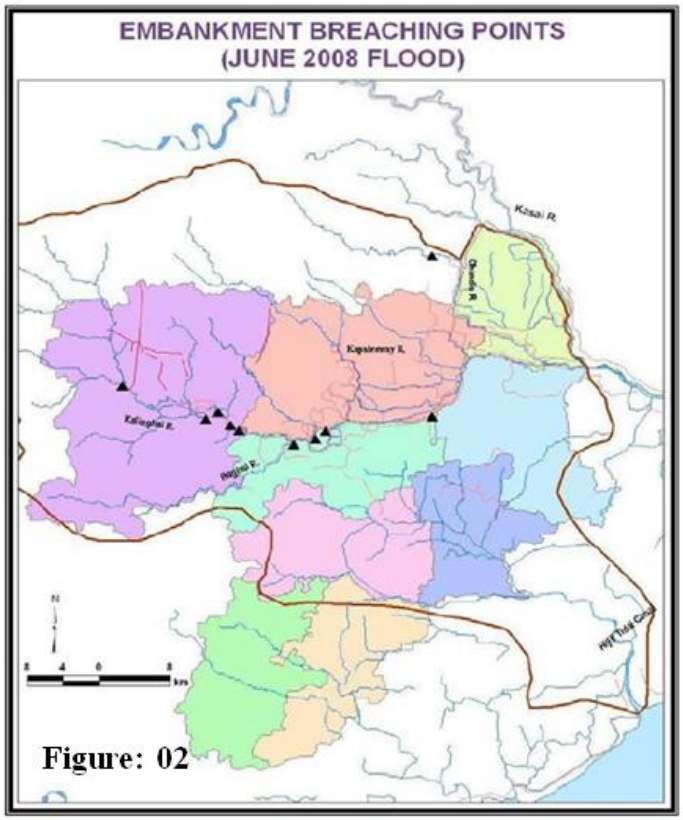
Table 1 : Data used and their sources

VI. Result and Discussion

Causes of Flood: A large amount of water from the Northern and Western parts of the Paschim Medinipur generally flows through innumerable rivers, canals and natural drains of Egra and Kharagpur sub-division and falls in to the Bay of Bengal. The main routes of water to fall into the sea are along Orissa Coast Canal and some rivers like Baghai, Kaliaghai, Haldi and Rasulpur and the Picchabani canal- which is the erstwhile Champa canal excavated about 35 years ago. But the natural and anthropogenic modifications of drainage system of the area have completely altered the regional geomorphological setting which is responsible for high intensity frequent flooding in this area. Upstream widths are more than the downstream widths. So such saucer shape river course is predominantly responsible for the slow water movement and inundation in the study area (Bera. et al -2012). Moreover, the bed of river Kaliaghai and Kapaleswary has risen to such a level, due to siltation, that drainage of rain water is hindered because of reversal of river bed slope that has taken place for a long period of time. Therefore, most of the rivers have become incapable of draining sudden inflow of water from the rain storm event in the catchment areas. Sudden release of water from the irrigation dams on River Kangsabati and Subernarekha also adds fuel to the flooding episodes.

The main cause of flood in the whole area is the river Kaleghai. The Kaliaghai carries water of the catchment areas of Baghai and Kapaleswary to the sea. About 40 years ago, under the Kaliaghai project, the river course was channelized along a newly excavated canal. The old river – course was left unused near Amgachia, but the new course is gradually becoming narrow and shallow just beyond Amgachia. The Baghai is also narrow and shallow. It has no embankment along its bank. Therefore, torrential rain causes the river to overflow and a considerable portion of Egra Block gets flooded.

Flood intensifying factors: The flood problem of nine blocks in the Kaliaghai- Kapaleswary-Baghai riverine complex has emerged as a response to the adjustments in flow and sediment regimes under above mentioned topographic modifications. In addition to absolute mismatch between sediment load and power of Kaliaghai, estuarine influence that reaches upto Langalkata (to the west of Kaliaghai-Chandia confluence), has caused the river to become incapable of flushing out all the sediments. As such, enormous sedimentation near Langalkata has been manifested in the form of bar formation along with a reversal in channel bed gradient. Cumulative effects of all these factors have led the Kaliaghai channel to arrive into a new adjustment through revival of its earlier course along Rasulpur estuary. The situation becomes episodic in years of high intensity monsoon rainfall in the upper catchment of Kaliaghai (Heritage et al -2004). Furthermore, incapability of Kaliaghai to drain out water received from its tributaries (Baghai, Kapaleswary and Chandia) causes spilling of water and breaching (Fig No-2 & Table No-2) of embankments and consequent devastating flood. Bottleneck like narrow outlet at the mouth of River Chandia is also another factor that frequently causes breaching of its embankment and the water finds a slope-guided straight course to Kaliaghai inundating the villages on its way.



Besides the above natural adjustments, human activities have also been found to be responsible for introducing changes in the river environment which facilitate the flood situation to pick up momentum (Gupta -1995). River channelization through straightening, construction of levee and embankments etc. have changed the channel phase (Heritage et. al -2004). A primary morphological response to the change in flow regime is a decrease in channel capacity, brought about principally by reduction in channel width by setting up of embankments on both the sides of river Kaliaghai and its tributaries. As a result, the rivers fail to accommodate and distribute sediments within the protective areas between embankments. Landuse change in the form of forest clearance for agriculture has caused sediment overloading in the rivers. Accelerated valley floor sedimentation has been increasingly responsible for lessening the recurrence interval of high magnitude floods, vertical accretion of floodplain throughout the drainage system due to increased runoff and extensive bank erosion even along the tributaries. Thus removal of natural vegetation has largely increased the catchment sensitivity to extreme climatic events. River flow has also been constricted by occupying valley floor for agricultural plots, fish farm ponds etc.

Table: 2 Embankment Breaching Places

Police Station	River	Embankment	Location
Narayangarh	Kaliaghai	Left	Paharpur
		Left	Dehati
		Left	Duria
		Right	Gokulpur
		Right	Jarua
Pataspur-I	Kaliaghai	Right	Salmara
			Selimabad
			Purba Selimabad
			Barberia
Pingla	Chandia	Right	Naratha

Anthropogenic Modification: Channel Constrictions

Major channels of the area have been constricted at different sections of their reaches in variety of ways.

1. Channel constriction by construction of bridges or pools with concrete structures. **2.** Channel constriction by encroachment of brick built stations on the river bed. **3.** Channel constriction by encroachment of fish farm plots with surrounding mud banks on the river beds. **4.** Channel constriction by encroachment of paddy fields with surrounding mud banks on the rivers beds. **5.** Channel constriction by encroachment of settlements with land filling process on the river beds. **6.** Channel constriction by relocation of embankments along the river beds. **7.** Channel constriction by construction of roads and railways across the river beds.

Drainage Modifications within the River Basins

1. Jacketed courses with embankments and ring dykes. 2. Salt water- freshwater drainage control with sluice gates of older constructions. 3. Channel constrictions at different places with cross structures. 4. Encroachment into the river valley with housing structures, rice paddy farming plots, brick-field stations and fish farming plots. 5. Channel diversion for irrigation and flood control measures. 6. Attempts of channel straightening and channel deepening through channel excavation in few places. 7. Channel obstructions by cross roads and railway bridges. 8. Ponded flood water basins at the confluences of Kaliaghai River with left hand tributary channels and ineffective earthen embankments.

Drainage Responses to the Human Modification Processes

1. Channel shifting from older courses to the newer courses in many places. 2. River bank erosion and embankment breaches due to concentration of hydrostatic pressure within the protective embankments. 3. Unequal exposures of siltation and drainage gradient modifications along the channel courses. 4. Formation of bottle-neck situations of the channel reaches. 5. Formation of beheaded streams and revival of older courses of streams. 6. over spill and over flow of excess water in the downstream sections following the modified slope of the floodplain.

7. Channel meandering and channel decaying process with uneven siltation rates produced by tidal inflow of sea water and annual monssonal runoff and floodings. 8. Decreasing channel capacity with reduction of cross-sectional areas.

The area under study has been experiencing extensive inundation due to flood during monsoon, resulting in large scale losses of agricultural crops, houses, lives etc. along with many accompanied problems summarized below-

I. The area has been threatened by high and medium intensity (Table No:-3) floods during last forty years. Major flood events occurred in 1961, 1962, 1964, 1969, 1973, 1974, 1979, 1984, 1986, 1990, 1993, 1997, 1998, 2001, 2002, 2003, 2004, 2005, and 2007. II**.** The natural slope, being very low, and the area being interspersed with number of wetlands, basins, ex-zamindary embankments, roads, railway lines etc. giving rise to drainage congestion and floods due to breaches along embankments. Ill Construction of Borobandhs (13 nos.) for irrigating insignificant expanse of agricultural area, fishing ponds with embankments surrounding them beside the river embankments making them inaccessible for maintenance, fishing ponds and agriculture on river valley etc. have made the rivers nonfunctioning. All these have added fuels to the situation. IV. Siltation in the river bed is another problem. Kaliaghai the depth of siltation increased about 2m -4m since 1974. This has been augmented by construction of Bandhs across the river during boro cultivation. V. Encroachment of river bed by agricultural plots, settlements, tree plantations, and many other uses, has made the rivers incapable of draining large volume of water during monsoon. VI. Channelization of Kaliaghai along a ditched canal under Kaliaghai Project and subsequent shallowing and narrowing of that canal are the other problems of the area

VII. The pressure of high-tide water is another problem in this area. At its confluence with Kaliaghai the River Chandia takes the shape of a bottle-mouth causing the water pressure to be multiplied during high-tides which frequently breaks the poor embankments of the Chandia River. VIII**.** The depth of the bed of Kapaleswary at its mouth is gradually declining due to siltation, therefore the banks are overflowed and broken and flood occurs.

Table No- 03: Significant Past Flood Events in Kaliaghai River Basin

Years of high magnitude flood events	Total time span	Number of flood events	Recurrence interval of high magnitude flood events	Remarks
1967, 1968, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1990, 1993, 1996, 1999, 2003, 2005, 2007, 2008.	1967 – 2008 = 41 years	20 (high magnitude floods)	41+1/20 = 2.1 (One each in 2.1 years)	Remarkable floodprone area in the state of West of Bengal with high flood frequency

Why flood not getting controlled: Though a series of projects have been announced to control flood none has been implemented so far. Kaliaghai, Baghai and Kapaleswary are the rivers responsible for flood in this area for most of the time. No appropriate plan has yet been taken up to reform these rivers apart from some stray efforts. Water of Jhargram, Lodhashuli, Kharagpur, Narayangarh, Keshiari, Dantan, Khakurda and other places in this area is released through Kaliaghai and her tributary Baghai via Haldi River and is finally getting into the sea, whereas water of Sabang, Pingla and Mayna is released through Kaliaghai along with her tributaries Kapaleswary and Chandia. Kapaleswary meets Kaliaghai at Langalkata where Kaliaghai river bed is too high to pass water because of accumulating alluvial deposit. Furthermore, the current of Kaliaghai is so slow that it can't even wash out the deposit. These deposits have formed mounds in the river beds to grow trees on it. This has been the story for last twenty years ever since the normal path of Kaliaghai has been altered. From that incident Kaliaghai had lost its current. This has been the root cause of flood in Pataspur Bhagabanpur area every year. Mass rain water unable to get released via Kaliaghai, washes away every embankment of Baghai to enter Barachoka wrecking havoc in the area.

As Kapaleswary cannot release its water through its outlet due to silting up at its mouth the water breaks through its embankments and inundates vast area of Sabang. To add more to this, the mouth of Chandi is too narrow to pass water. To worsen the situation the fishermen who take leasehold of various Mouza in Mayna block, drive the water through lock gate for their fisheries resulting delay of water to come down. There are number of reasons behind water not going through lock gates placed at the mouth of big canals meant for one way drainage of fresh water up to the river. Most important reason is silt deposition at the mouth of lock gates. Another reason is the lock gates are not operated at regular intervals and sometimes the gates even do not work properly for poor maintenance of Zamindari embankments. Besides all these, cogitations taken aftermath of 2005 flood for reforming all the concerning canals

have not yet been implemented due to either administrative bottleneck or some local constraints.

Reduce Exposure of flood hazards

Following protective measures can be suggested for reduction of exposure to floods.

1. High wall made of woods and timber can be built around the houses, so that flood water cannot hit the wall of the houses. 2. At the advent of rainy season the food items like rice, paddy etc. are to be stored and other properties which are difficult to move are to be sold. 3. A shelter of about 10 ft high is to be made with woods and bamboos in front of the houses, so that the valuable belongings are to be moved there and the family member can take shelter over there during flood. As the shelter is made near the house, there would be no case of theft. 4. Kerosene oil is to be stored to avoid fuel problem at the of flood. Dry food is to be kept and drinking water is to be stored in large pots. 5. Every family should have a boat for transport, collection from Govt. reliefs, collection of water and for sanitary works. Even this boat can be used as a shelter during flood. 6. Most of the tube wells go under flood water. As such, people collect water from long distance or often they drink flood water. It is important to arrange a reservoir in every village and to install tube wells at a higher place and its platform should be made of cement. 7. Sufficient medical assistance booths with boat facilities are required to be set up during flood in all affected villages. 8. Dwellings are to be made on the high lands in the flood affected areas. The walls of the houses should be built either with bricks or with bamboos, so that the flood may not cause any harm to them. 9. Temporary tents for shelter are to be setup on roads and other high land areas. For example the State High Way from Bajkul to Pataspur, from Temathani to Pataspur, Belda – Chennai road, State High Way from Belda to Digha the high river bank of the Kaliaghai and the Kapaleswary 36 miles circular dyke, the banks of various canals etc. can be favorable location for setting up the rehabilitation centers.

Temporary flood shelters can be set up on the school buildings, by spreading tents along Highways, and on road bridges and embankments.

Reduce Vulnerability of flood hazards

The people of the surrounding areas of Kaliaghai, Baghai and Kapalewari are badly affected in every year by flood. They lose their houses, lands, crops and students are in compelled to discontinue their studies. As a result, local community generally requires some years to recover themselves. Though they suffer every year, they do not want to leave their lands and houses. Flood is inevitable here. People of those areas cannot avoid Flood but they can reduce vulnerability in the following ways (Islam. et.al. -2001).

1. The low lying lands of the area should be cultivated with those varieties of paddy which will grow well in spite of being under water for many days. These types of paddy require much time and yield is less. 2. Fisheries should be encouraged instead of paddy cultivation in the basin areas during the rainy season. 3. Ponds can be excavated and materials thus obtained can be used to make the grounds higher than flood level, and on this surface houses can be building. Vegetable gardening can also be practiced on these lands depending on water from the ponds. 4. The lands which are not suitable for the cultivation of paddy can be used to cultivate mat sticks. This can open up an opportunity for another livelihood which may compensate crop damage losses due to flood. 5. The low lands can be given to jute. Different types of household things like carpets, sacks, bags, covers curtains etc. can be made from jute and these articles can be sold in the markets. This can be another livelihood option for the local people. 6. In most of the cases relief materials, flood warnings, Govt. announcements cannot be disseminated among the flood victims due to poor social network. Narrow political interest falters the Govt. efforts to help the distressed people. Therefore, there is a need to encourage NGO's to take part in rescue and relief operation.

Review of existing water management and Agricultural practices

The objective of water management in irrigated agriculture is to provide a suitable moisture environment to crops for obtaining optimum crop yields with maximum economy in use of irrigation water. The process of water management in a dependable system is to remove excess water and to apply additional water when needed. It includes the intake conveyance regulation and measurement of water available to crop lands in appropriate quantities at appropriate time which can increase production. Timely and effective drainage are also taken in to consideration. It is also essential to know the moisture dynamics within the soil and the amount of water used by the crop through evaporative demand. Crop production is the main enterprise of this basin area and rice is the dominant crop grown in kharif season in medium to low land situation. Rice grown in Rabi summer season (Jan-Feb to Apr-May) in medium to low land situation is locally known as "Boro". Other crops grown in high lands are vegetables, mustard and pulses with irrigation facilities from canal, Shallow Tube wells, Deep Tube wells, ponds etc. Overall rice based cropping pattern is followed in the basin area. The canal systems require proper on farm development work for proper water management according to the actual needs to crop plant. Ground water is extensively used to irrigate summer paddy (Boro). Here also flood irrigation is resorted. Water management and agricultural practices now followed in the basin area needs further improvement.

VII. Conclusion

Irrigation is one of the main inputs to agricultural production. When water is applied to crop land, it is not only increases its productivity naturally side by side improvement of agricultural production and controlling flood hazards. In this context giving some suggestion: this are 1.Short duration paddy varieties should be cultivated to minimize the water requirement. 2. Unnecessary over irrigation should be avoided. 3. Irrigation to the crop after ripening should be avoided. 4. Irrigation and fertilization must coincide for better absorption of moisture and nutrients. 5. Crop fields should be divided by providing small bunds to ensure uniform application of irrigation water. A barrage has to be built to hold the water of Kaliaghai and Baghai during rainy season and utilize the barrage water for irrigation later on. All the embankments have to be heightened and strengthened so that these can withstand water pressure during overflow.

Renovations of all lock gates and if possible plantation of few new lock gates too. To prevent flood at Chandia the associated embankments must be widened a heightened as well. The canal from Debikhali should be widened in order to drain the Chandia water directly to Kaliaghai thereby reducing the pressure of water in Chandia. For controlling the water pressure at Sabang a canal can be opened from Chandia near Dubrajpur to Kaliaghai. For drainage of water that enters Barochauka basin during flood a regulator can be planted on Argoal circuit embankment at Sardabar. Implementation of Lower Barochauka project by opening up a new canal from Sardabar to Argoal Drainage Cut channel off take point. Singda Pratapdighi canal has to be extended up to Baghai. Opening up of new Singda canal has to be stopped. Water should be allowed to flow directly through Barochauka basin along old Singda canal according to regional slope. This water would be drained through upper Barochauka and lower Barochauka to Rasulpur River. A new lock-gate has to be placed over Totanala embankment that runs along the border of Bhagawanpur-I and Pataspur-I Blocks so that the water can be drained to Totanala by a new canal to be dug from Udbadal to Rasulpur River.

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