

## **CHAPTER 7 DEVELOPMENT PLAN**

### **7.0 Model Project Development Plan**

Model projects are to be formulated to experiment implementing arrangement with local participation. The model projects are to have minimal structural components that may be planned in detail and implemented immediately by LGED within its capacity. The basic strategy for the rural development in flood prone Char and Haor areas is to focus first on more promising areas of flood proofing.

Following the accepted criteria of selection, Algar char Gram in Upazila Fulchari under Gaibandha district in the Char area and Gurai Gram in Upazila Nikli under Kishoreganj district in the Haor area have been selected as the two sites of model projects.

### **7.1 Flood proofing programs in Algar char Gram (Char area)**

#### **7.1.1 Situation in Algar char**

Algar char Gram, being an attached char of the Jamuna river, has almost all the flood related characteristics of Char areas. As is common with the char areas, inundation of households and erosion of Char itself make dwellers of Algar char vulnerable to floods. As described under Chapter 6, two of its 7 paras are now in grip of erosion of the Jamuna channels. The houses in the erosion prone paras of the village are built with such materials as can be dismantled and moved easily in time of need. None of the paras in the village is protected from flooding of any degree nor are from the river erosion of the char itself. River erosion in char areas is a prime hazard. Protection of households against Jamuna river erosion not being cost-effective is an easily recognized unfeasible item. So there will be no way out but to shift the houses in case of an immediate vulnerability from river erosion.

Homesteads of all the paras are susceptible to inundation in varying degrees. Flood affected people take shelter in the 3 School-cum-Flood-Shelters as well as on the village roads, which are on higher elevation than the inundated homesteads. There is no flood warning dissemination system prevailing in the village.

Even though the conditions are cruel the villagers of Algar char have been living with flood enduring all the consequences for a long time. They encounter difficulties not only to develop their livelihood but also to maintain a minimal standard of living.

#### **7.1.2 Considering remedial measures**

The model project in the Algar char has to provide flood proofing for maximum number of people by raising plinths of homestead areas. The plinth raising aims at securing flood free homestead during normal flood so that household works and some livelihood activities could be continued without being confined to houses. The homestead raising in 5 of the 7 paras of Algar char would be

feasible so far as the stability of the char against flood-induced river erosion is concerned. The 5 paras of the village have not been affected by river erosion in more than 20 years and there is no sign of erosion in their immediate vicinity.

There being 3 School cum Flood Shelters developed by CARE in 2000 in Algar char Gram above 1988 flood level, inclusion of such item has not been considered under the model project program, although the total capacity of the 3 shelters are hardly 340 persons (ref: Section 6.1.3.3 of Chapter 6). Most of the flood victims coming from the two remote paras (Zolil dewani para and Mehar munshi para) find their place only on the open-air village roads which are barely 4 m wide and can sustain only under a normal flood. In case of a severe flood, open-air refuge place comes in dire shortage due to increased number of evacuees.

Floods come suddenly in case of Char areas through the Brahmaputra-Jamuna river. Besides Flood Shelter and refuge place facilities, flood warning and dissemination system is essential in flood-prone areas.

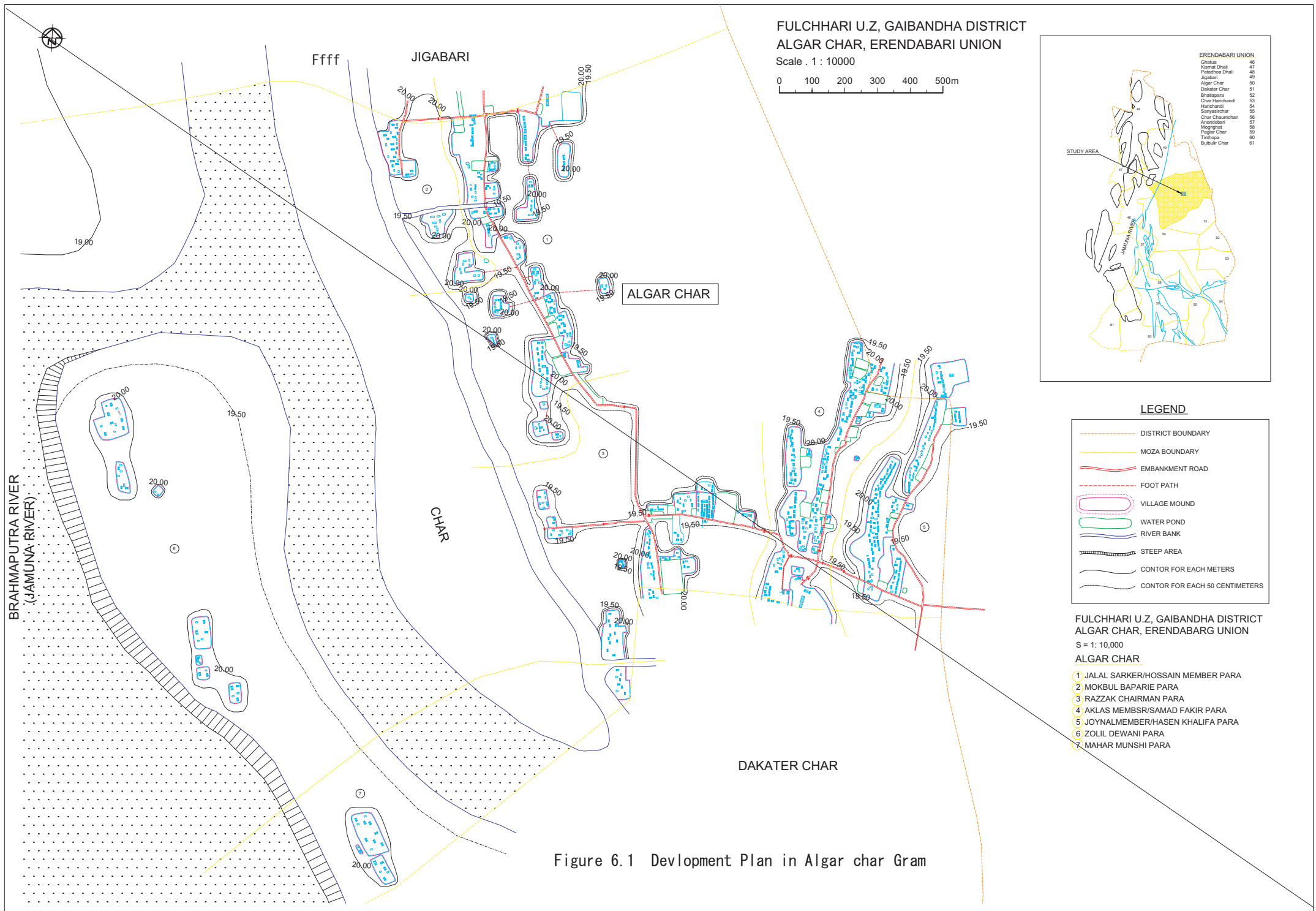
In consideration with the above, the following programs related to the flood proofing are proposed.

1. Raising plinth of homestead area
2. Raising a ground to make a refuge place
3. Establishing effective flood warning system

#### **7.1.2.1 Raising plinth of homestead area in Algar char**

The objective of raising homestead plinth above normal flood level is to facilitate improvement of living environment and to support livelihood development by flood proofing. In principle, the homestead raising is to be implemented in a stable char that has not been affected by flood induced erosion for at least 20 years. Two of the seven paras of Algar char namely Zolil dewani para and Mehar munshi para are at present vulnerable to river erosion. Hence these 2 paras are excluded from the consideration of development by homestead raising. Out of the remaining 5 paras, CARE has carried out works of homestead raising in 2 paras namely: Jalal sarker/Hossain member para and Razzak chairman para. Therefore, these 2 paras are also excluded from the present development program of homestead raising. The remaining 3 paras namely: Mokbul bepari para, Aklas member/Samad Fokir para and Joyanal member/Hassan Khalifa para will be taken up for homestead raising under the Model Project of Algar char.

From Table 4 of the Chapter 6 it is observed that in the 3 paras considered for homestead raising under the model project there are 66 houses which went under 50-100 cm of inundation for 2-3 weeks even under the normal flood of 1999. It is apparent that the locations of the 66 houses are at the lowest elevation in the settlement areas of the paras. More details regarding the inundation of houses in the 3 paras are presented below in **Table 7.1** (which is extracted from Table 6.4 of Chapter 6).



**Table 7.1: Number of houses in 3 ‘paras’ of Algar char with depth and duration of flooding**

Sl.no.	Name of para	Year	Total no. of houses in the para	No. of houses with maximum range of depth in cm of flooding					No. of houses with duration of flooding (weeks)					
				Depth range >	0	0-50	50-100	100-150	>150	Duration >	<2	2-3	4-5	>5
2	Mokbul bepari para	1988	59		0	15	30	15	0		22	37	0	0
		1998			22	22	15	0	0		0	22	15	0
		1999			48	9	1	0	0			10	1	0
4	Akklas member/ Samad fokir para	1988	238		0	60	67	52	60		60	119	60	0
		1998			98	19	62	60	0		19	79	40	0
		1999			217	12	10	0	0		0	0	0	0
5	Joynal member/ Hassan khalifa para	1988	225		0	0	0	56	169		1	81	0	0
		1998			0	101	113	11	0		0	113	11	0
		1999			198	14	14	0	0		14	14	0	0

The 25 houses constituting 13 households, which were submerged under 50-100 cm of water in 1999, should be raised against severe flood level of 1998. Both LGED and CARE recognize 1998 flood as equivalent to 20-year return period flood. From the leveling survey the following information presented in **Table 7.2 and Table 7.3** regarding elevation of the settlement areas and earthwork volume in homestead raising of the 3 paras have been obtained.

**Table 7.2: Information of levels in the settlement areas of 3 paras**

Sl No. para	Name of para	Elevation of 1988 flood mark (mPWD)	Lowest elevation of settlement area in the para (mPWD)	Difference between lowest elevation of settlement and 1998–flood mark (m)
2	Mokbul bepari para	22.20	20.50	1.70
4	Aklas member/ Samad fokir para	22.20	20.50	1.70
5	Joynal member/ Hassan khalifa para	22.20	20.50	1.70

As per FAP 14/FAP23 recommendation, free board for homestead in the char areas is taken as 0.30m. The of volume of earth for raising of homesteads/household of 3 paras will be as follows:

## B. MEASURES FOR FLOODS

**Table 7.3: Earthwork volume in homestead raising in Algar char**

Sl no of para	Name of para	No. to be raised		Average area of (m2)		Average height of fill including freeboard 30 cm	Volume of earth M3
		Houses	House holds	Houses	House holds		
2	Mokbul bepari para	1	1	24m2	100m2	2.00 m	200m3
4	Aklas member/ Samad fokir para	10	5	24m2	100m2	2.00 m	1000m3
5	Joynal member/ Hassan khalifa para	14	6	24m2	100m2	2.00 m	1200m3
	<b>TOTAL</b>	<b>25</b>	<b>12</b>	<b>24 m2</b>	<b>100m2</b>	<b>2.00m</b>	<b>2400m3</b>

### 7.1.2.2 Flood shelter and refuge place

There are 3 School-cum-flood-shelters having total capacity of 340 persons. Obviously, this is insufficient. So most of the evacuees take refuge on the open-air space in front of the School cum Shelter and on the un-submerged parts village roads. But that too comes in acute shortage during a severe flood. Therefore it will be imperative that an open-air raised refuge place be implemented in the village. In Aklas member/Samad fakir para there is a primary school (Algar char Government Primary School) having in front an open ground measuring on average 60 m X 75m. This should be raised to develop as a refuse place for about 1000 people and their cattle.

Area of the ground is approx 4500 m2, present average elevation is 21.20 mPWD and the level of fill will be at 22.66 mPWD (1988 level) plus free board. The Free Board may be considered 0.60 m. However, the FAP recommendation for free board of Shelter is 1.00 m. Some statistics about the ground in front of the Algarchar Govt Primary School are presented in Table 7.4.

**Table 7.4: Statistics about the Algar char Govt Pry School ground raising**

Approx area (m2)	Average present ground level (mPWD)	1988-level in the area (mPWD)	Difference of 1988-flood level and the present ground level (m)	Free board (m)	Total height of fill (m)	Total volume of earthwork (m3)
4500	21.20	22.66	1.46	0.60	2.06	9270

### 7.1.2.3 Flood warning dissemination and evacuation in Algar char

There is no proper flood warning and dissemination system working in Algar char; similar to the situation of warning and dissemination system prevailing in most parts of the country (vide section 6.1.3.4 under Chapter 6). Like the 3 pilot UZs under the FFWC's dissemination activities (vide Chapter 2, Section 2.10), system of dissemination of flood warning dissemination system may be set up for Algar char also. There has been Disaster Management Committees (DMC) formed already at District, UZ and Union levels for all districts of Bangladesh. The Erendabari Union (in

which the village of Algar char is situated) is under Fulchari UZ. After receiving FFWC flood warnings, the UZDMC at Fulchari will interpret the forecasted water level in the context of the flood prone areas of the UZ. Should it be appropriate for the Erendabari Union, the information of flood warnings will be arranged to be sent to the Union DMC.

The HQ of Fulchari UZ happens to be on the other bank of the Brahmaputra river. During dry season, boat communication from Algar char to Fulchari UZ HQs is easily possible. But during the wet season, when a flood warning is likely to be communicated, transmission of warnings to the Union by messengers may not be easy and on time. At present the Union is not covered by Mobile telephone network. Therefore, a 2-way wireless system between Fulchari and Erendabari will be necessary to transmit the flood warnings of the FFWC through the UZ Disaster Management Committee.

After a message of warning is received from the Fulchari UZDMC, the Union DMC will disseminate it through its Committee Members, Volunteers and Chowkidars to Algar char and other villages. Local School Teachers, Imams of the mosques, members of the UP will play important roles in dissemination by announcing in schools, religious congregations, drum beating in markets and using mikes of the village mosques.

The dwellers of Algar char Gram, being informed of the impending floods, will look for appropriate shelters. In most of the cases, they will move by their own arrangement of boats. However, in some cases, the Union Disaster Management Committee under the support of the UZDMC and the district administration will arrange boats as it was done before.

There is no proper flood warning and dissemination system working in Gurai, same as the situation of warning and dissemination system prevailing in most parts of the country (vide section 6.1.3.4 under Chapter 6). Like the 3 pilot UZs under the FFWC's dissemination activities, planning for the dissemination of flood warning may be made for Gurai also. There has been Disaster Management Committees (DMC) formed already at District, UZ and Union levels for all districts of Bangladesh. The Gurai Union (in which the village of Gurai is situated) is under Nikli UZ. After receiving FFWC flood warnings, the UZDMC at Nikli will interpret the forecasted rise of water level in the context of the flood prone areas of the UZ. Should it be appropriate for the Gurai Gram, the information of flood warnings will be sent to the Union DMC through messenger. At present the Union/village is covered by Mobile telephone network though the signal is very weak but expected to improve soon.

## **B. MEASURES FOR FLOODS**

### **7.2 Flood proofing programs in Gurai Gram (Haor area)**

#### **7.2.1 Situation in Gurai Gram**

Due to its location in haor area, the Gurai Gram is situated in a village mound. Some of its 17 paras are susceptible to inundation but in a lesser degree than the char areas because of elevated position of the mound. It may be seen from the Table 11 of the Chapter 6 that overall inundation of homesteads in Gurai Gram were 85% in 1988, 21% in 1998 and 1% in 1999 floods. As is common, the inundation of homesteads in the village mounds of haor areas is not so acute as that in the homesteads of char areas.

The main flood related constraint of the village is erosion of the village mound due to waves in monsoon. Surveys show that about 30 meters for the length facing the waves have yielded to the wave action in 30 years time in spite of villagers continuous effort to check it by indigenous means like earthfilled gunny bags, chailla grass, bamboo fence etc.

During a severe flood when the inundation is high the affected people look for flood shelter. In Gurai Gram there is a flood shelter which was built during the mid seventies. Although the flood shelter is now in a dilapidated condition it still accommodates many of the families of the village who have been displaced from their homes due to wave erosion during the last decade or so.

There is no proper flood warning and dissemination system working in Gurai. When flood situation arises, people decide to take to a safer place by themselves observing the rate of rise in water level and other natural indications.

#### **7.2.2 Considering remedial measures**

In consideration with the above, the following programs related to the flood proofing are proposed for the model project in Gurai Gram.

1. Protection of village mound from wave erosion
2. Setting up a Flood warning and evacuation system

##### **7.2.2.1 Protection of village mound from wave erosion**

It may be observed from the Table 6.16 of the Chapter 6 that out of 17 paras of the village 8 paras are now facing the onslaught of the wave action. These paras are situated on south, east and north sides of the village mound. The main onslaught of the waves come from the eastern side while the other two sides have it in a lesser degree.. The number of households, which are vulnerable to the wave action at present, is 44. Another 506 number of households are in a potentially vulnerable position as they are on lines next to the present vulnerable ones.

The para-wise approximate length of erosion is stated in **Table 7.5**.

**Table 7.5: Para-wise requirement of Protection wall**

Sl. No. of para	Name of para	Length of existing wall (m)	Length of Wall (m)	Approximate intrusion of erosion into mound during last 30 years (m)
1	Chaila para		115	20
2	Bania para		230	20
4	Uttar para		307	20
5	Fakir para		154	30
6	Jal para		266	30
7	Kuna para		202	30
10	Dakhin para		227	20
11	Purba para	230	283	30
	<b>TOTAL:</b>		<b>1,784</b>	

From the X-sections taken during the field survey we see that average height of the village mound from the ground level is 2.0m.

Materials that may be used for the wave protection by (i) earth-only (ii) brick matressing (iii) sand-cement bags (iv) concrete blocks (v) brick blocks (vi) brick-chips covered by wire net (vii) RCC wall (viii) brick wall etc. There also some indigenous methods practiced for slope protection which includes placement of Chaila grass (*Hematheria Protensa*) with bamboo poles framework. This grass is resistant to rotting even when submerged. Another vegetative measure is growing of Vetiver grass along the slope. The deep root of this grass is very effective to stabilize embankments. Hijal and Koroch are two types of trees used for wave protection in Haor areas. However, full growth of them may take 5-15 years.

In the recent days, for erosion protection from waves, there are three methods planned by CARE and LGED. They are RCC retaining wall, brick retaining wall and wave protection wall. These methods are proved to be effective from CARE pilot projects during 1997-2000. The possible types of the erosion protection from waves have advantages and disadvantages over one another as summarized below in Table 7.6. In the type 'Brick chips in gabion with Koroch/Hijal vegetation', the idea of putting the two types together is due to lack of durability of 'brick chips in gabion'. During the first 5-7 years, the gabions will act alone to resist erosion, while after the initial 5-7 years the gabions will be in distressed condition when the Koroch/Hijal will come in to action.



**B. MEASURES FOR FLOODS**

**Table 7.6: Comparative study of erosion protection methods**

Alternative Study of protection works against mound erosion							
TYPE OF PROTECTION >  Item of works for comparison ▽	Protection by						
	Brick chips in gabion with Koroch vegetation	Revetment with CC/brick blocks	RCC retaining wall	Brick retaining wall	Vegetation on slope	Hijal/Koroch vegetation	RCC wave protection wall
	1	2	3	4	5	6	7
Major materials required: a.Brick b.Cement c.Sand d.MSbar e.wiremesh f.geo-tex g.Nursery	a,c,e,f,g	a,b,c,f,g	a,b,c,d	a,b,c	g	g	a,b,c,d
1. Earth retaining or Not (Retaining type will provide max landuse)	No (-)	No (-)	Yes (+)	Yes (+)	No (-)	No (-)	No (-)
2 Availability of constn. material	Yes (+)	Yes (+)	Yes (+)	Yes (+)	Yes (+)	Yes (+)	Yes (+)
3 Cost/unit (tk./meter)	7,200 plus Koroch cost (+)	6,000 (+)	10,500 (+)	4,600 (++)	Low (+++)	Low (+++)	4,200 (++)
4. Generation of employment opportunity	Yes (+)	Yes (+)	Yes (+)	Yes (+)	Limited (+)	Limited (+)	Yes (+)
5 Requirement of O&M	Yearly (+)	Yearly (+)	3-5 years interval (++)	3-5 years interval (++)	2-3 years interval (++)	No O&M reqd (++)	3-5 years interval (++)
6.Can the villagers provide O&M themselves	No (-)	No (-)	Partly (+)	Partly (+)	Yes (++)	Not reqd (++)	Partly (+)
7. Security of the work	Pilferage possible (-)	Pilferage possible (-)	Pilferage not possible (+)	Pilferage not possible (+)	Somewhat possible (-)	Pilferage Most possible (--)	Pilferage not possible (+)
8.Durability of work	Medium durable (+)	Medium durable (+)	Highly durable (+++)	Highly durable (+++)	Not durable (-)	Very durable (+++)	Highly durable (+++)
9. Effectiveness to resist erosion	Effective (+)	Effective (+)	Highly effective (+++)	Highly effective (+++)	Not adequately (-)	Long term (+++)	Effective (+)
10. Time required for construction	Medium time (+)	More time consuming (-)	More time consuming (-)	Med time consuming (+)	More time consuming (-)	Most time consuming (--)	More time consuming (-)
11..Possibility to increase mound land area	Yes (+)	Yes (+)	Yes (+)	Yes (+)	No (-)	Yes (+)	Yes (+)
<b>Total points</b>	<b>8 (+), 3(-)</b>	<b>7(+), 4(-)</b>	<b>15(+), 1(-)</b>	<b>17 (+)</b>	<b>8(+), 5(-)</b>	<b>17(+), 5(-)</b>	<b>13(+), 2(-)</b>

Types 1 to 5 are erosion protection type of works, while types 6 to 7 are wave protection type. In the ranking result, Brick retaining wall carries the highest points amongst the erosion protection type of works (1-5), while the result of the ranking of wave protection type (6-7) shows that plantation of Hijal/Koroch carries higher weight. As the Hijal/Koroch plantation from the second group will take 10-15 years to be grown up for effective protection, brick wall from the first group is recommended for construction.

At present there are two places where measures for protection from wave erosion have been in existence in Gurai. One was constructed about 15 years ago covering parts of Dakhin para and

Purba para. According to the villagers the measure is very effective. The type of measure is a brick retaining wall for a length of 190 m. The other one which is an RCC retaining wall type measuring 265m length, is situated at the newly constructed raised market covering its south and eastern sides.

The villagers demand brick retaining wall - the same type they have already in Dakhin para and Purba paras - for the protection of their mound.

In view of effectiveness, construction time required, maintenance and public demand, brick retaining wall is recommended for construction for a length of 1,784 m on north, east and south sides.

#### **7.2.2.2 Flood warning dissemination and evacuation in Gurai**

There is no proper flood warning and dissemination system working in Gurai; similar to the situation of warning and dissemination system prevailing in most parts of the country (vide section 6.1.3.4 under Chapter 6). Like the 3 pilot UZs under the FFWC's dissemination activities (vide Chapter 2, section 2.10), system of dissemination of flood warning may be set up for Gurai also. There has been Disaster Management Committees (DMC) formed already at District, UZ and Union levels for all districts of Bangladesh. The Gurai Union (in which the village of Gurai is situated) is under Nikli UZ. After receiving FFWC flood warnings, the UZDMC at Nikli will interpret the forecasted rise of water level in the context of the flood prone areas of the UZ. Should it be appropriate for the Gurai Union, the information of flood warnings will be sent to the Union DMC through messenger. At present the Union is covered by Mobile telephone network though the signal is very weak but expected to improve soon.

After a message of warning is received from the Nikli UZDMC, the Union DMC will disseminate it through its Committee Members, Volunteers and Chowkidars to Gurai Gram mound and other villages. Local School Teachers, Imams of the mosques, members of the UP will play important roles in dissemination by announcing in schools, religious congregations, drum beating in markets and using mikes of the village mosques.

The dwellers of Gurai Gram, being informed of the impending floods, will look for appropriate shelters. The raised platform of the newly constructed Market can serve as a good refuge place in time of need. In most of the cases, they will move by their own arrangement of boats. However, in some cases, the Union Disaster Management Committee under the support of the UZDMC and the district administration will arrange boats.

The existing Flood Shelter situated in Shibir para in the village mound may be repaired under the initiative of LGED.