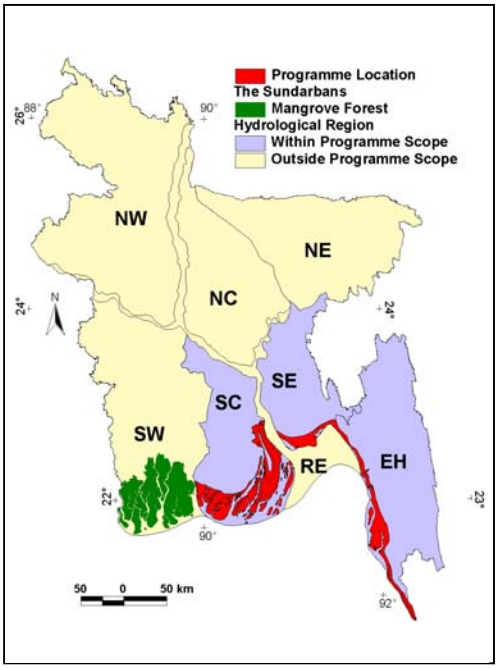
Bari-Level Cyclone Shelters Ref: **DM 002**

Basic Data

NWMP Sub-sector **Disaster Management**

Region(s) **South Central, South East and Eastern Hills**



Relevance to NWPo

This programme is relevant to the NWPo and the National Goals in that it "takes into account the particular needs of women and children" while providing a means by which the people may "be motivated to develop different cyclone proofing measures". The latter is relevant to the broader objectives of institutional reform and the enabling environment, and in this regard is complemented by the considerable opportunities for decentralised implementation that the programme provides.

Purpose of Programme

Almost six million people live or subsist in areas exposed to significant risk of destruction and loss of life due to cyclone surge (see below). The Programme is intended to provide safe havens in the form of 12m^2 concrete framed buildings on raised 72m^2 earth platforms of 2m height, one in each bari (group of houses or homesteads) in the coastal areas. At this stage the approach remains innovative and in need of piloting but, if successful, could be replicated with considerable savings over more conventional approaches, as well as being far more easily accessible to women.

Programme Outline

A major cyclone hit Bangladesh in 1991, killing some 140,000 people. Following the completion of the Multi-Purpose Cyclone Shelter Programme Study by BUET and BIDS in the following year, the EC-funded Cyclone Shelter Preparatory Study (CSPS) Stage I (1996–1998) undertook a detailed mouza-by-mouza assessment of the present and likely future population at Risk and High Risk from cyclone surges. At present, some 4.8M people are estimated to be at High Risk. Addition of a further 1.1M at Risk results in a total at-risk population of 5.9M, of which 3.6M (61%) are inside coastal embankments and 2.3M are outside. With the anticipated falling off in the rural population growth rate the at-risk population in 2025 would be only slightly higher, at 6.3M.

Almost the whole at-risk population is located in three regions, SC Region, the Chittagong Coastal Plain of EH Region and SE Region. Few people are at risk in the extensive coastal zone of the SW, because of the protection provided by the Sundarbans mangrove forest.

Cyclone shelters and killas (large raised earth wounds) are the principal existing means of protection against cyclone surges. Cyclone shelters are substantial concrete and brick buildings set on columns above cyclone surge level. The main purpose of killas is for the protection of livestock and, outside the coastal embankments, also the human population. They can be either linked with shelters or be on their own.

According to the CSPS Final Report, in 1996 there were 1,816 purpose built-cyclone shelters. There are probably few more than 2,000 at present. Since many shelters are located outside the risk area, the effective shelter provision is less than this total would suggest. CSPS estimates indicate that, based on the projected 2001 population, the existing shelter capacity inside the embankment in 1996 was sufficient to accommodate only 27% of the people at risk from a 1 in 20 year cyclone event.

The need for more safe havens is widely recognised. The CSPS Final Report (1998) recommended that some 1,500-2,000 new multi-purpose shelters (ie incorporating schools), each catering for 2,000 people, or their equivalent, should be the target. However, follow-up to these proposals has been limited and the present rate of expansion of safe haven provision is modest. Current activities include a KfW – funded cyclone shelter programme which is just finishing, the Japanese aid – funded construction of about 100 shelters, of which the majority have been completed, and a small USAID – funded shelter construction programme to be executed by World Vision, an NGO. The Comprehensive Disaster Management Programme recently prepared with UNDP assistance is concerned primarily with institutional aspects rather than physical infrastructure like cyclone shelters. Clearly, a major acceleration in new safe haven construction is required for the adequate protection of the 5.9M population in the areas at risk.

Shelter provision by means of conventional multi-purpose cyclone shelter is relatively expensive (an estimated Tk4,660/head). Access can be problematical for some beneficiaries, because of the distance of their dwellings from the nearest shelter. An alternative approach is to decentralise shelter provision and greatly reduce shelter size, by introducing bari-level shelters. These would also be cheaper (an estimated Tk1,820/head). Based on the dimensions listed above, a typical shelter would accommodate 22 people (four families). It would include a 1m high parapet wall, to ensure that the total protection reaches a height 6m above natural ground level. The ground floor area of the building on the raised platform would provide accommodation in normal times for one of the four families of the bari.

The Government's safe haven provision strategy is based on protection against the 1 in 30 year cyclone surge event in the medium term, with provision improving to the 1 in 100 year level in the long term. For the medium term the breakdown of new safe haven provision by population is envisaged as being 47% shelters, 33% killas (these together make up Programme DM001) and 20% bari-level shelters; these proportions would change to 33% each in the long term. Based on these assumptions, some 43,700 bari-level shelters would be constructed, to shelter 960,400 people, at a total capital cost of Tk1,748M. Notional regional distribution of the shelters is as follows:

Region	**No. of Shelters**		
	Short term	Medium term	Long term
South Central	2756	6431	11,312
South East	1259	2938	5,169
Eastern Hills	1854	4326	7,610
Total	5,869	13,695	24,091

If successful, this type of local-level shelter would be cheaper and also more effective than conventional shelters, because of its close proximity to the beneficiaries' homes. Social benefits would be high and there would be no significant environmental impacts.

Financing Arrangements

The programme would be funded by GoB, but maintenance should be the responsibility of the beneficiaries. Suitable arrangements would need to be made for the sharing of costs between GoB and the one family per shelter using it as its home, and between this family and the other three families.

Objectives and Indicators

Objective	Suffix	Indicators/Means of Verification	Due
• Pilot programme in progress	I1	• Signed contracts/work orders • Progress reports	2004
• Pilot programme evaluated	I2	• Evaluation reports	2006
• Modalities accepted	I3	• Signed agreements	2006
• 43776 bari-level cyclone shelters	K	• Actual numbers of bari-level cyclone shelters	2027
• Lives and national infrastructure protected against inundation damage	D	• Risk of loss of life (human and livestock) as estimated actuarially • Risk of income disruption as estimated actuarially • Risk of damage as estimated actuarially	2027

Institutional Arrangements

The programme would be implemented under Disaster Management Bureau through NGOs in close coordination with local government.

Existing Documentation

NWMP DSR Sections 9.3 and 9.8, the National Water Resources Database (NWRD). The whole subject of cyclone risk and protection is described in considerable detail in the CSPS reports of June 1998.

Linkages

There would be linkage with the Integrated Coastal Zone Management Programme, as well as with NWMP programmes DM 001: Cyclone Shelters and Killas, ID 001: Local Government Capacity Building for Water Management and ID 007: Disaster Management Bureau Capacity Building.

Risks and Assumptions

The main risk concerns the feasibility of this type of cyclone shelter, which has yet to be tested. Key factors will include beneficiary organisation, especially regarding the relationship and cost sharing between the family using the shelter as a full-time residence and the other beneficiary families, and the GoB funding support arrangements for NGOs.

Bari-level Cyclone Shelters

Ref : **DM 002**

Cluster :	**Disaster Management**	Region(s) :	**SC, SE, EH**	
Focus/Foci :	**Cyclone Protection**	Location :	**SC, SE, EH**	
Start Year[1] :	**2003** Duration[2] : **25 year(s)**	Agency(s) Responsible :	**DMB** None	**(Lead)** (Supporting)
Short Description :	This programme is for the cyclone risk areas and is relevant to the NWPo as it provides "flood proofing systems to manage natural disasters: (NWPo §4.2.o) and takes special account the particular needs of women and children (NWPo §3.b) while motivating the people themselves to develop different flood proofing measures. Over three million people live or subsist in areas exposed to significant risk of destruction and loss of life due to cyclone strike. This programme is intended to provide safe havens in the form of 12m2 concrete framed buildings on raised 72m2 earth platforms, one in each bari in the coastal areas. A total of 43,768 bari-level-cyclone-shelters will be raised over 15 years, benefiting some 1.72 million people in the short/medium term.			

MIS Links

Cost Calculation :	DM Programme costing.xls	Map :	DM 002 Map.jpg
Disb't Schedule :	DM Programme costing.xls	Description :	DM 002 PgP.doc

Finance

	Costs		Private	Funding (%) GoB	Beneficiaries	Expected by Programme Year
Total Capital[3]	**1,747.90**	MTk	**0%**	**100%**	**0%**	**25**
Ultimate Recurring	**52.40**	MTk/yr	**n/a**	**0%**	**100%**	**26**

Date of Data : **31** (dd) **07** (mm) **01** (yy)

Status : **Identified**

Financial Base Year: **mid-2000**

Planned Expenditure (to date) : MTk

Actual Expenditure[4] (to date) : MTk

Stacked Cumulative Cash Flow Chart

Monitoring

Objective	Indicator	Present Status[5]
• Pilot programme in progress	• Signed contracts/work orders • Progress reports	NYD
• Pilot programme evaluated	• Evaluation reports	NYD
• Modalities accepted	• Signed agreements	NYD
• 43,776 bari-level cyclone shelters	• Actual numbers of bari-level cyclone shelters	NYD

Notes : 1. Indicative 2. Until commissioning 3. Inclusive of planning, design _supervision 4. For future monitoring purposes and NWMP updates
5. Present Status keys: NYD- Not yet due, IP- In progress, D- Done

National Water Management Plan

Programme Costing Sheet

Programme Ref	**DM 002**
Title	**Bari-level Cyclone Shelters**

Assumptions:

Taka/US$ 51.000 | TA duration 0.0 years | Investment duration 25.0 years | All prices in mid-2000 values

Item	Unit	Quantity	Rate US$	Rate Tk'000	Amount TkM	O&M %	O&M/yr TkM
Technical Assistance							
Expatriate consultants (all-in rate)	p-m	-	20,000		-		
Senior National consultants (all-in rate)	p-m	-		150	-		
Mid-level National consultants (all-in rate)	p-m	-		90	-		
Sub-totals					-		
Other general TA programme costs		*25%*			-		
Specific other TA programme costs					-		
Total TA Costs					**-**		
Other Programme Costs							
1. Bari-level flood protection					1,747.9	*3.0%*	52.4
2.					-	*0.0%*	-
3.					-	*0.0%*	-
4.					-	*0.0%*	-
5.					-	*0.0%*	-
6.					-	*0.0%*	-
7.					-	*0.0%*	-
8.					-	*0.0%*	-
9.					-	*0.0%*	-
10.					-	*0.0%*	-
Total Other Programme Costs					**1,747.9**		**52.4**
Overall Programme Costs					**1,747.9**		**52.4**

		Short-term (first 15 years)	Med Term	Long Term	Total
DM 002	**Bari-level Shelters**				
	People	129,120	301,280	530,000	960,400
	Shelters	5,869	13,695	24,091	43,655
	Cost (TkM)	235.0	548.3	964.6	1,747.9