

**ARCASIA Committee on Social Responsibility (ACSR)
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The 2019 one of the Winners of the Aga Khan Award for Architecture



One of the best examples of “Design for Resilience”



The Arcadia Education Project, in South Kanarchor, Bangladesh, is a modular building that includes a preschool, nursery and vocational training center. Because its riverfront site is flooded for months during the monsoon season, the architect, Saif Ul Haque Sthapati, of Dhaka, ingeniously designed “an amphibious structure” anchored to the ground with bamboo posts: it sits on the ground during the dry season or can float on 30-gallon steel drums, within bamboo frames, that form a substructure.





Monsoon is here and it floats



Water has receded.



Declined the offer to use this machine.



Site transportation.



Substructure and superstructure



Substructure work in progress.



Driving of
Bollah posts



Roof of the mock up installed.



Trial of window options begins.



Successful attempt in prefabrication.

Test it out on water.



On a riverside where monsoon season submerges the landscape in up to three metres of water, this new school floats with the tide. The Arcadia Education Project utilizes bamboo to create a lightweight, cost-efficient, and low-carbon structure.





Bait Ur Rouf Mosque,
Faidabad, Uttara, Dhaka, Bangladesh.
Architect : Merina Tabassum.
Winner, Aga Khan award for Architecture, 2016
Award Cycle: 2014 - 2016 Cycle



Friendship Centre, Dhaka, Bangladesh.
Architect : Kashef Mahboob Chowdhury
Winner, Aga Khan award for Architecture, 2016
Award Cycle: 2014 - 2016 Cycle

Percentage distribution of urban households in terms of structural types is shown below in the Table.

Percent of Urban Households by Structure Type		
Type of Structure	2001	2010
Jhuprie	7.58	1.56
Kutcha	47.15	41.85
Semi pucca	23.26	28.92
Pucca	22.01	27.67
Total	100	100

Source: 2010: Estimation from HIES Survey, 2010, BBS.

The Table above shows that nearly 44% of the urban households live in purely temporary structures while those living in semi-permanent structures comprise about 29 percent of the urban households. Only about 28 percent of the households live in pucca structures. These data suggest that overwhelming majority of urban households live in poor quality houses. So, in terms of both quantity (housing deficit) and quality, urban housing presents a major policy challenge for Bangladesh.

72% purely temporary or semi permanent structures

28% pucca structures

Source: 2010-estimation from HIES Survey, 2010, BBS.

**Permanent Structure :
More than 96% :**

**Temporary Structure
Less than 4% :**



COLOR CODING

overall critical threat

local critical threat

minor threat

no threat

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	
THREATS	Chars, beaches and river edges in the coastal area	Inland coastal area South	Inland hilly area South-east	River edges and chars Central and North	Distant from river edges Central and North	North-west border area	North-east low-lying area	North-east hilly area	
1	Earthquake	Moderate & Low	Low	Moderate	Severe, Moderate & Low	Severe, Moderate & Low	Severe and Moderate	Severe	Severe
2	Landslide			Hilly area					Hilly area
3	Wind	cyclone area	cyclone area	cyclone area	southern central part	southern central part	regular tropical storms	regular tropical storms	regular tropical storms
4	Storm surge	cyclone area	still close to coast		due to regular storms			due to regular storms	
5	Regular flood	in context of cyclone	in context of cyclone	in specific locations	monsoon	monsoon	in specific locations	monsoon	in specific locations
6	Flash flood			in specific locations			trans border rivers		trans border rivers
7	River and coastal erosion	along rivers and coast	in specific locations	in specific locations	along river		in specific locations	in specific locations	in specific locations
8	Drought			in specific locations	in specific locations	in specific locations	in specific locations		
9	Tornado	in specific locations	in specific locations	in specific locations					

Figure 5.3: the hazard profile of Bangladesh:

(Source: Kaat Boon, 2015)



**NORTHERN
FLOODPLAIN**

**NORTH - EASTERN
HAOR REGION**

**CENTRAL
REGION**

**SOUTH-WEST
COASTAL REGION**

**SOUTH-EAST
HILL TRACTS REGION**

Disaster Threats: Cyclone+Storm surge + River bank and coastal erosion+ Tornado

Location: Barisal+ Chittagong+ Khulna

Major housing design consideration:

i. Structural durability to withstand high wind pressure

- Chou-Chala roof
- Closed varandah
- Low roof
- Bracing and ties

ii. Use of trees as wind breaker

CYCLONE RESILIENT HOUSE-CUM-SCHOOL FOR MANGROVE COASTAL-BELT OF BANGLADESH

DONT RESIST THE WIND!!

The site at 'Pichu Gad Hagar' village is situated at Satkhira district, 16kms from 'Bhabhar' with hundreds standing just on opposite bank. The entire locality immediately faces threats of cyclones. The structure was designed for a joint family who currently runs a schooling operation. The structure, drop-out and working children at off work hours in return of some monetary benefits from government as part of current education program. But the learning class was situated at a compound available in one of the buildings. So they wanted to develop one of their old northern, traditional and the kitchen that were facing the risk of collapsing and replace the learning space and the kitchen at a single site structure. Here an attempt has been taken from designer's side to design an architectural entity that apart from meeting traditional requirement, also incorporated safety features. In construction details against cyclonic systems, upon incorporating sustainable and available resources which are affordable for surrounding community to construct, replicate and build to reach to the scale.

1. Coastal Area

Disaster Threats : Storm Surge + Flood + River Bank & Coastal Erosion +Tornado + Earthquake

Location: Barisal+Chittagong+Dhaka+ Khulna + Rajshahi+ Rangpur

Major disaster consideration: River and coastal erosion and flood resilient housing

Major housing design consideration:

- i. Homestead/plinth raising
- ii. Housing on moving land (portable housing)

CHAR (RIVER SHOAL) LANDSCAPE



2. Char Area

Disaster Threats: Flood + Flash flood+ Tornado + Earthquake + Cold wave

Location: Barisal+Chittagong+Dhaka+ Khulna+ Rajshahi+Rangpur

Major housing design consideration:

- i. Homestead/plinth raising
- ii. Housing resettlement (cluster village, linear housing on raised ground)
- iii. Integrated drainage system for the flash flood areas
- iv. Earthquake resilient construction technology
- v. Earthquake resilient building materials

Floods ravage South Asia
Eastern India, Nepal and Bangladesh have been severely flooded by the annual monsoon rains.

Country	Area (sq km)	Population
India	781*	27,000
Nepal	148	23,000
Bangladesh	148	80,000

EROSION-PRONE AND FLOOD AFFECTED RIVER SHOALS (CHAR)

FLOOD RESILIENT HABITAT OPTIONS FOR TRANSIENT NORTHERN TISTA FLOOD PLAINS OF BANGLADESH

PORTABLE PLATFORM MODULE

FEATURES:

- DESIGNED FOR LOWEST INCOME GROUP AND LANDLESS FLEETING FARMERS/INHABITANTS
- DESIGNED FOR GEOGRAPHIC LOCATIONS PRONE TO HEAVY FLOODING AND LAND EROSION
- COMPOSED OF TRANSPORTABLE MODULAR BUILDING COMPONENTS
- MADE OF AVAILABLE BUILDING MATERIALS
- ANY TYPE OF REINFORCED CONCRETE HOUSE FORM IS POSSIBLE (TRADITIONAL OR PROPOSED)

PORTABLE PLATFORM MODULE

FEATURES:

- DESIGNED FOR MID-LOWER OR HIGH-ADDER INCOME GROUP
- COMPOSED OF TRANSPORTABLE MODULAR BUILDING COMPONENTS
- MADE OF AVAILABLE BUILDING MATERIALS
- ANY TYPE OF REINFORCED CONCRETE HOUSE FORM IS POSSIBLE (TRADITIONAL OR PROPOSED)

PORTABLE PLATFORM MODULE

FEATURES:

- DESIGNED FOR LOWEST INCOME GROUP OF FLEETING HOUSEHOLD CONDITIONS
- DESIGNED FOR GEOGRAPHIC LOCATIONS PRONE TO HEAVY FLOODING AND LAND EROSION
- COMPOSED OF TRANSPORTABLE MODULAR BUILDING COMPONENTS
- MADE OF AVAILABLE BUILDING MATERIALS
- ANY TYPE OF REINFORCED LIGHT-WEIGHT HOUSE FORM IS POSSIBLE (TRADITIONAL OR PROPOSED)

3. Flood-Plain Area

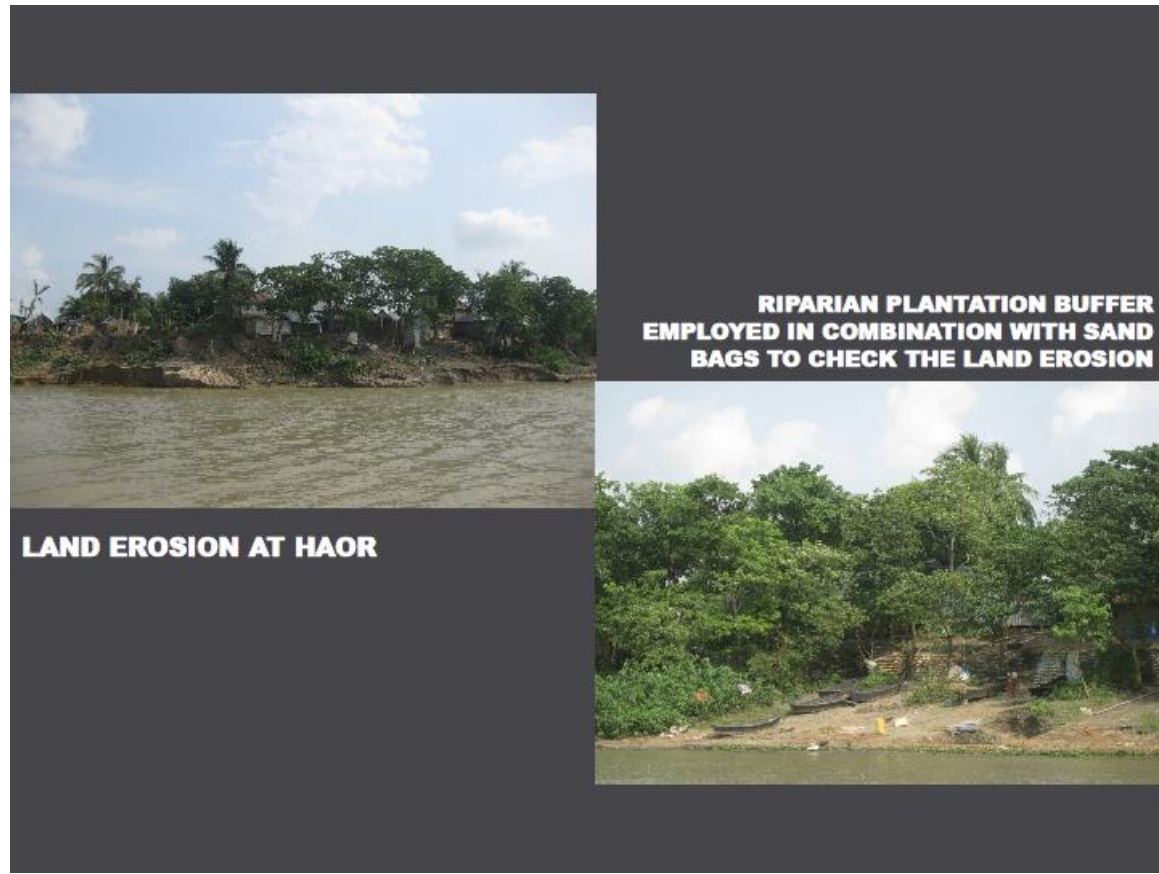
Disaster Threats: Earthquake + Flood + Flush Flood+ Tornado+ Cold wave

Location: Chittagong+ Sylhet

Major disaster consideration: Flood and Earthquake resilient Housing

Major housing design consideration:

- **i. Homestead/plinth raising**
- **ii. Housing resettlement (cluster village, linear housing on raised ground)**
- **Boat house for Bede**
- **iii. Ecological aspects**



4. Haor Area

Disaster Threats: Land slide + Cyclone + Earthquake+ Tornado+ Flash flood + Cold wave

Location: Chittagong + Dhaka+ Sylhet

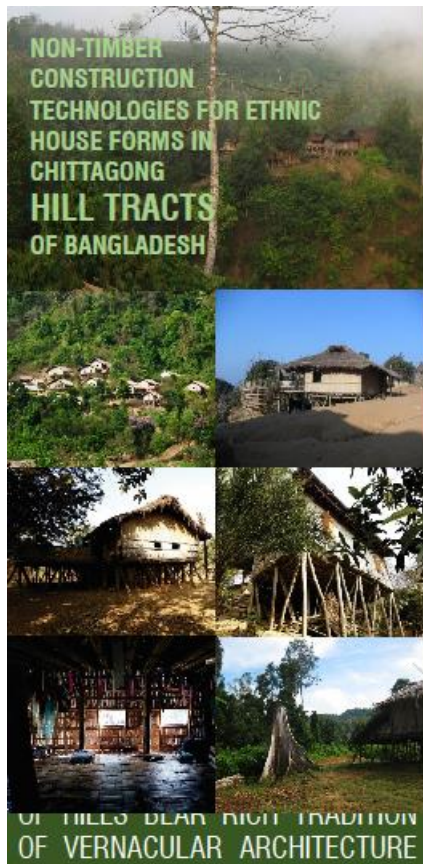
Major housing design consideration:

- i. Earthquake resilient construction technology
- ii. Earthquake resilient building materials
- iii. Building construction guidelines for landslide prone areas
- iv. Cultural aspects

Characteristics of housing in hilly areas:

- Stilts
- Built on bamboo and timber mostly

5. Hilly Area





THANK YOU ALL