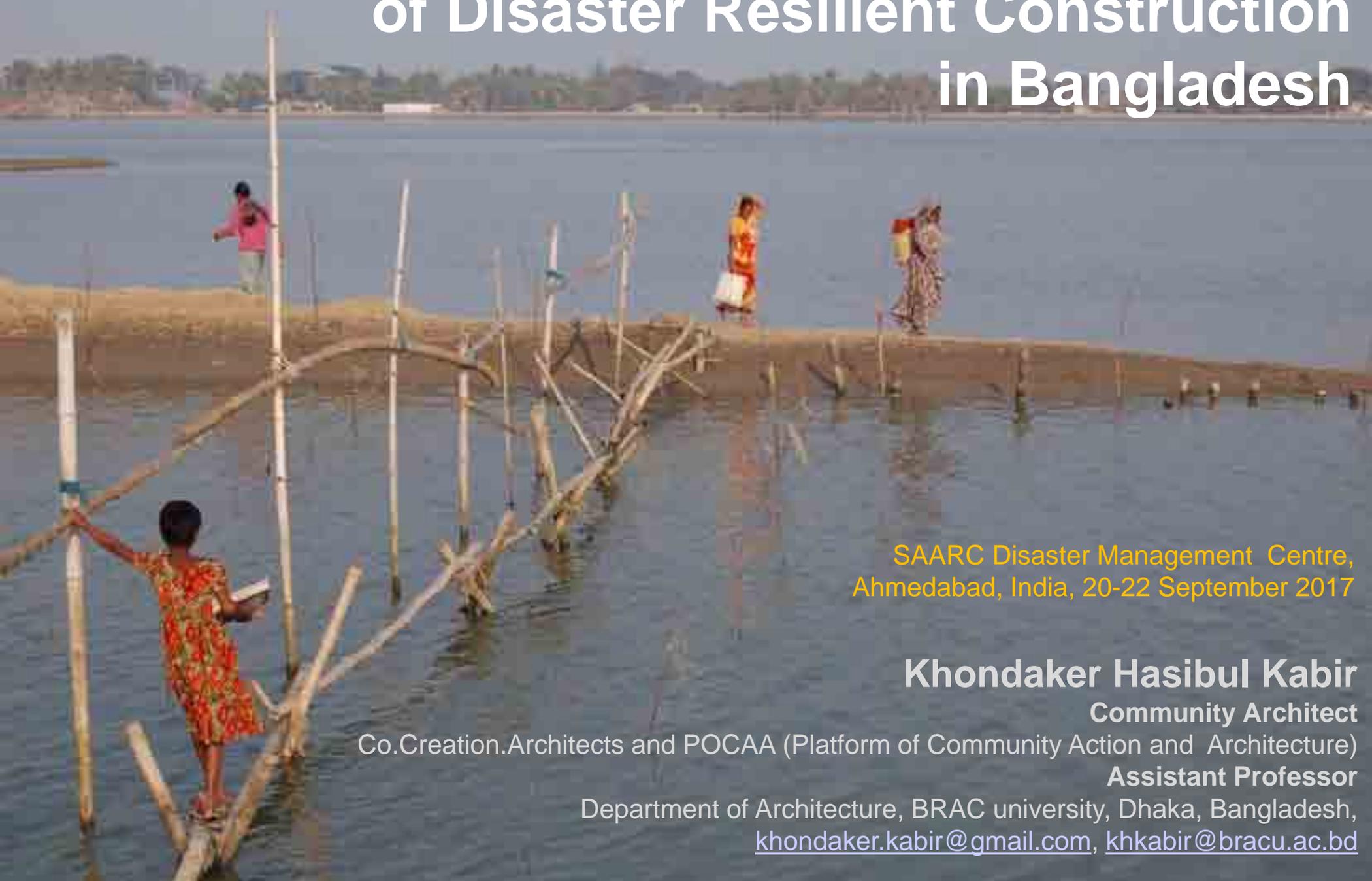


# Indigenous Skills and Practices of Disaster Resilient Construction in Bangladesh



SAARC Disaster Management Centre,  
Ahmedabad, India, 20-22 September 2017

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**BRAC is one of the biggest development NGOs in the world.**

**BRAC University has Postgraduate Programs in Disaster Management (PPDM)**

**Action research on participatory design and construction in disaster-prone rural areas**

**Community-based approach: “Let people be the solution”**

**Flood, Cyclone SIDR 2007, Cyclone AILA 2009 in Bangladesh**

**Earthquake in Haiti 2010, Earthquake in Nepal 2015**

How disaster management **professionals** will reach  
**other 90% of the population?**

Amalgamation of **indigenous** knowledge and  
**academic** knowledge

**Consider your placing,  
Local wisdom / law of nature  
is your blessing.**

**Act together,  
Strengthen weaker.**

**See the quality,  
Understand the beauty.**

**Embrace the culture,  
Local people is the future.**



**To build better,  
Co-create with people and nature.**

# Indigenous / vernacular knowledge

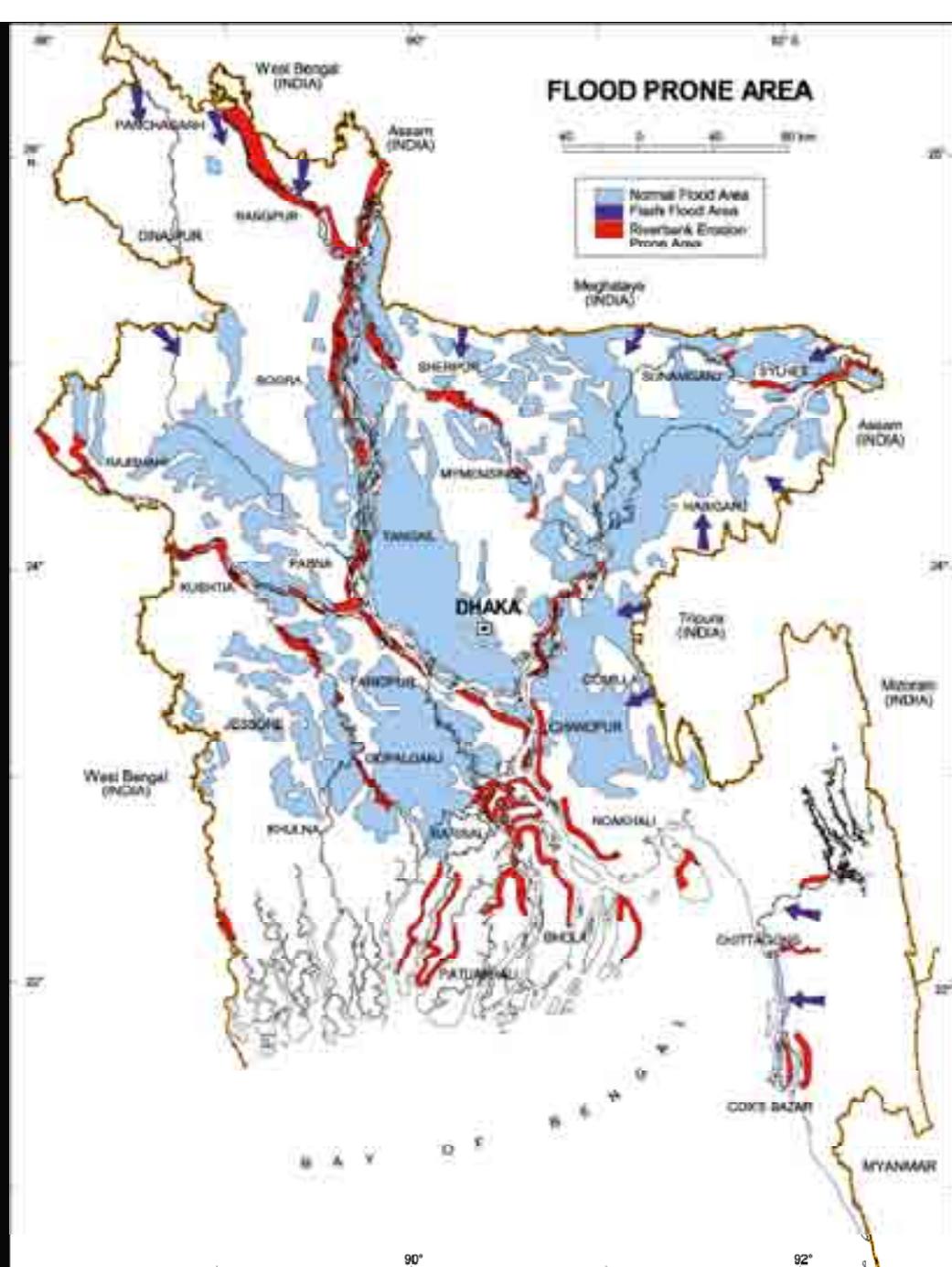
It's more of a process of **understanding**.....than just gaining knowledge for the sake of knowledge.

**Passed on** by one generation to the next **orally** and through **practices**;.....**not in written form.**



## Rivers of Bangladesh

<http://www.thebangladesh.net/rivers-of-bangladesh.html>



## Flood and erosion-prone areas

<http://www.poribesh.com/Maps/Flood.htm>

# Disasters in Bangladesh

Flood

Flash flood

Cyclone and storm surge

Tornado

Drought

Hail storm and lightning

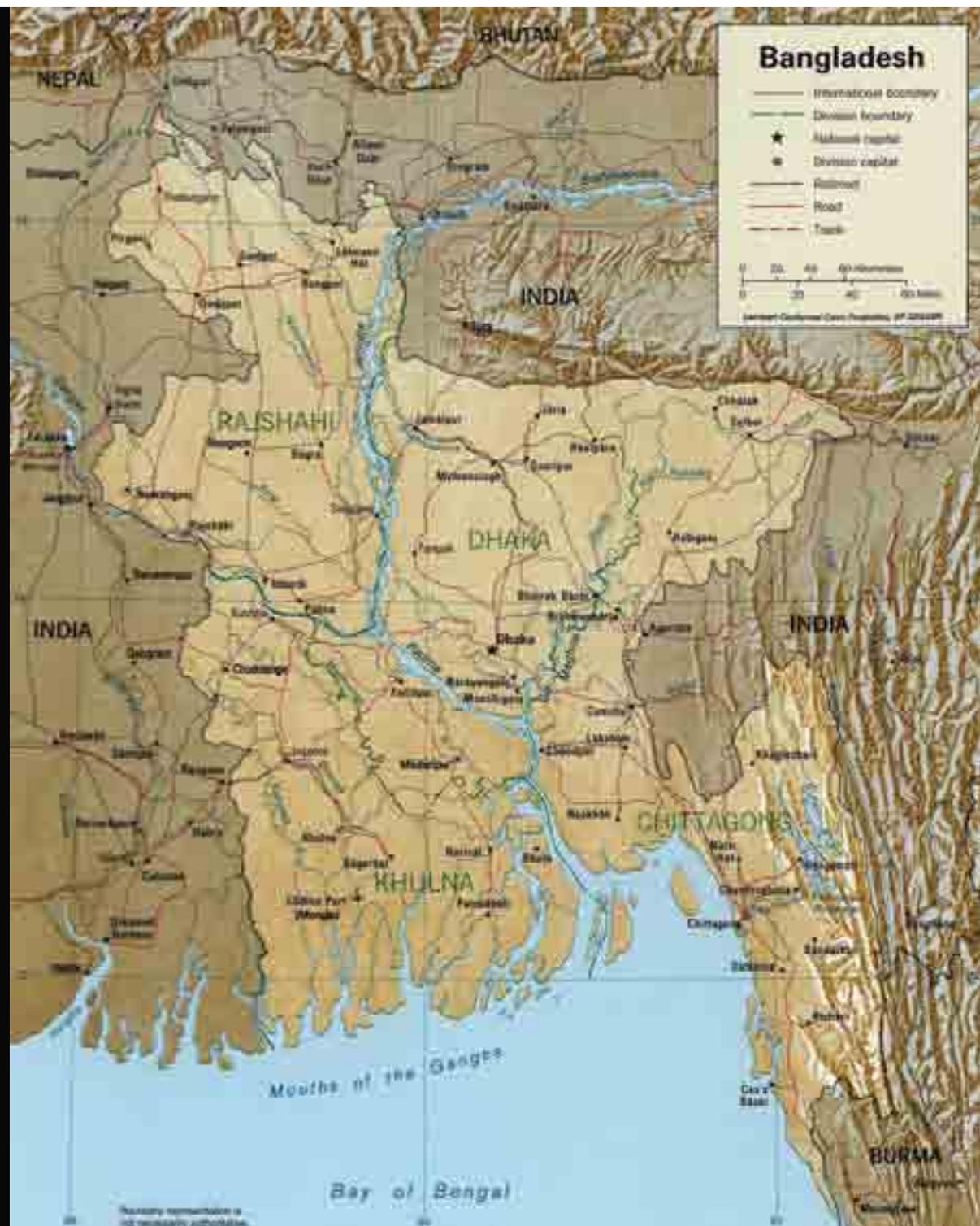
Riverbank erosion

Landslide

Earthquake



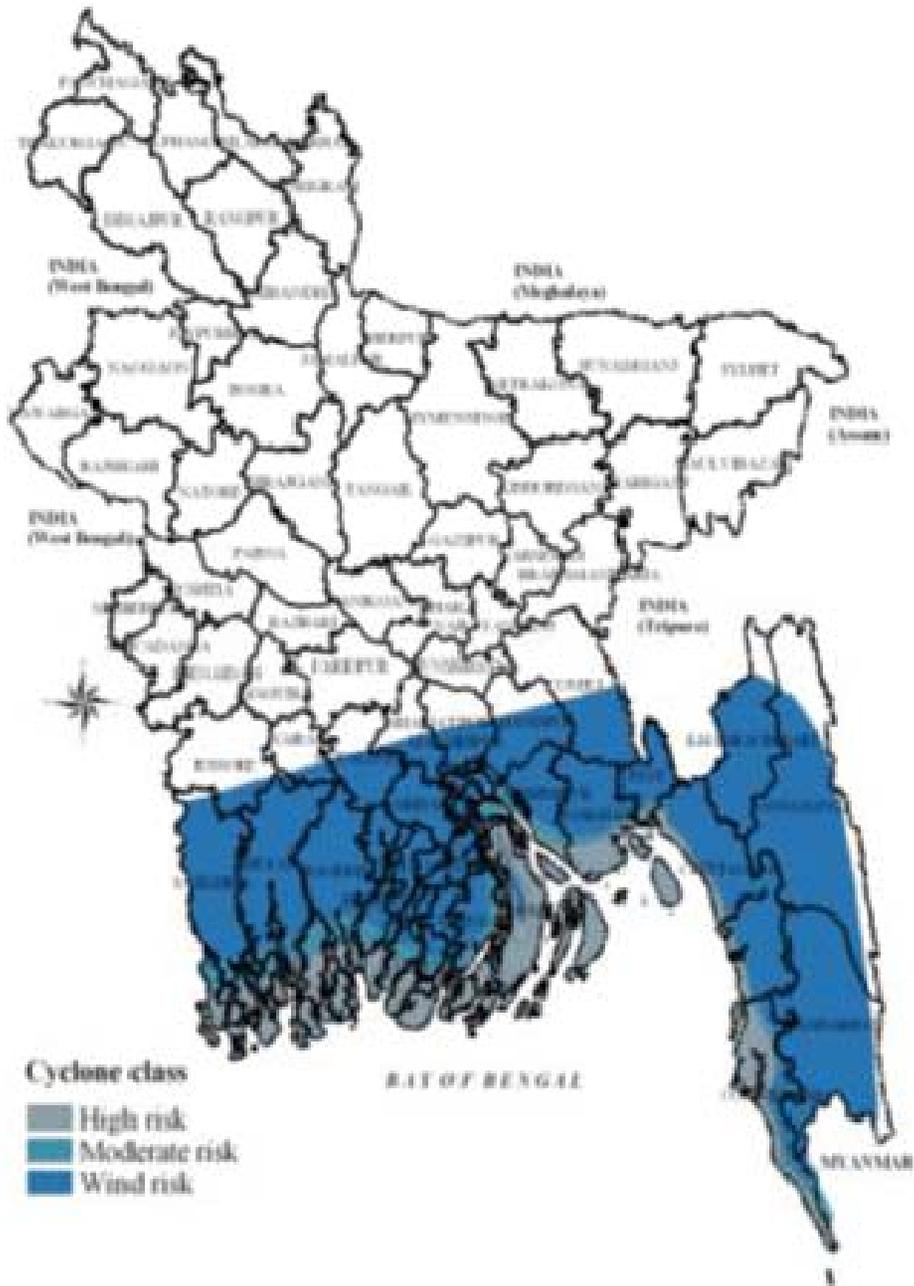
**Bangladesh:**  
Chemistry of land and water



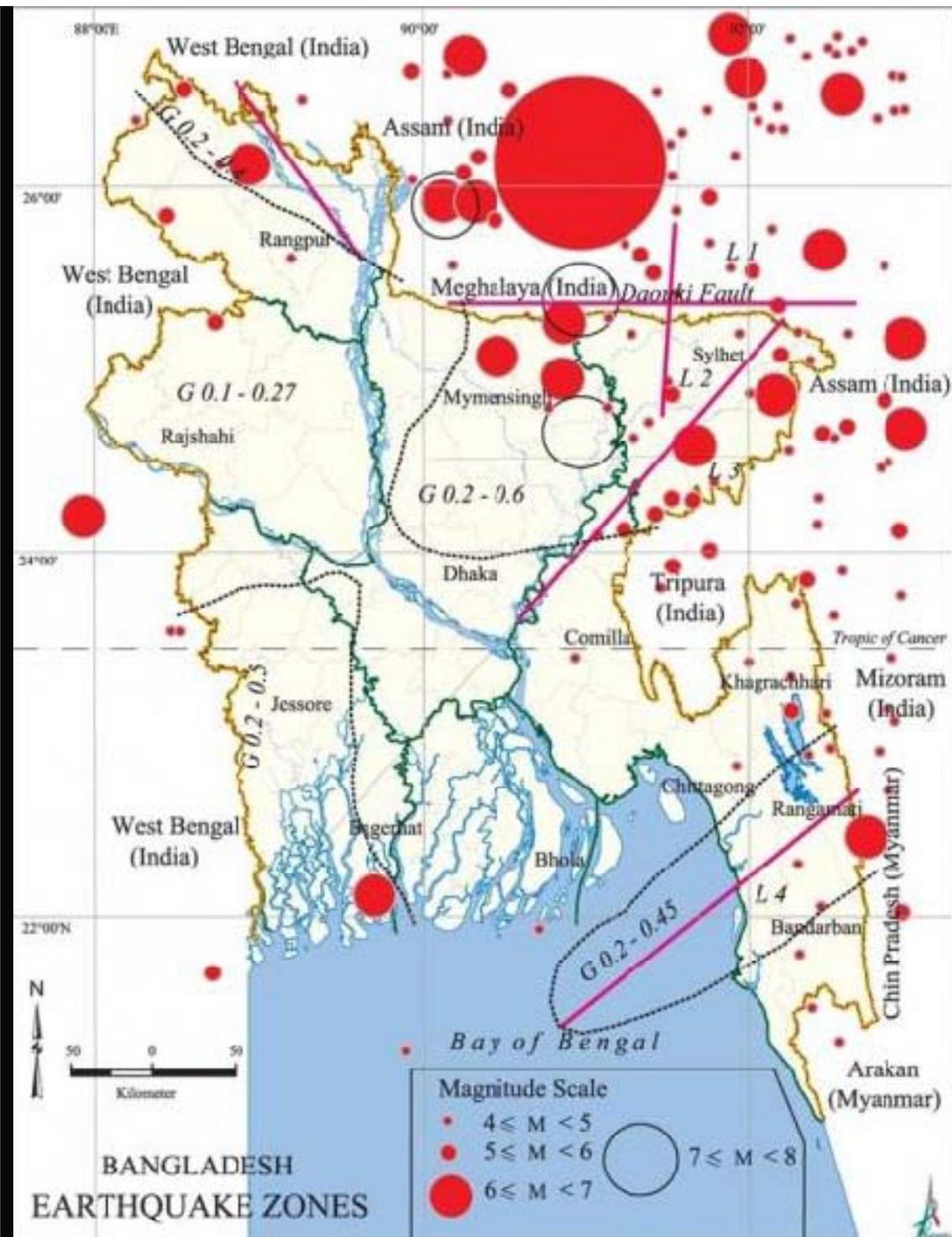


Human habitat through  
dig and mound





Cyclone



Earthquake

Soil

Bioregion

Climate

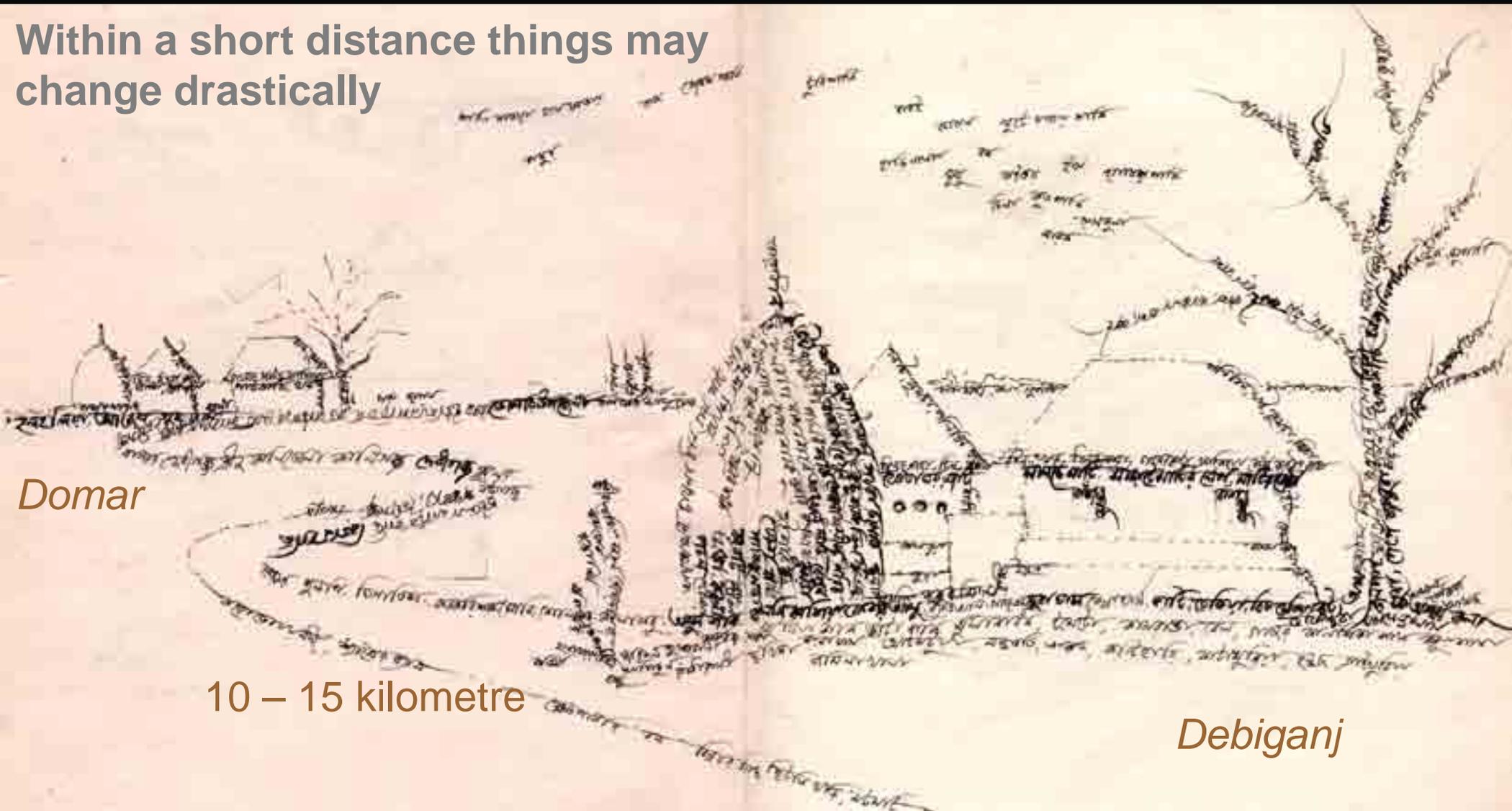


Mud plinth



Mud wall

Within a short distance things may change drastically



# Flood-prone (Flash flood) Northeast of Bangladesh

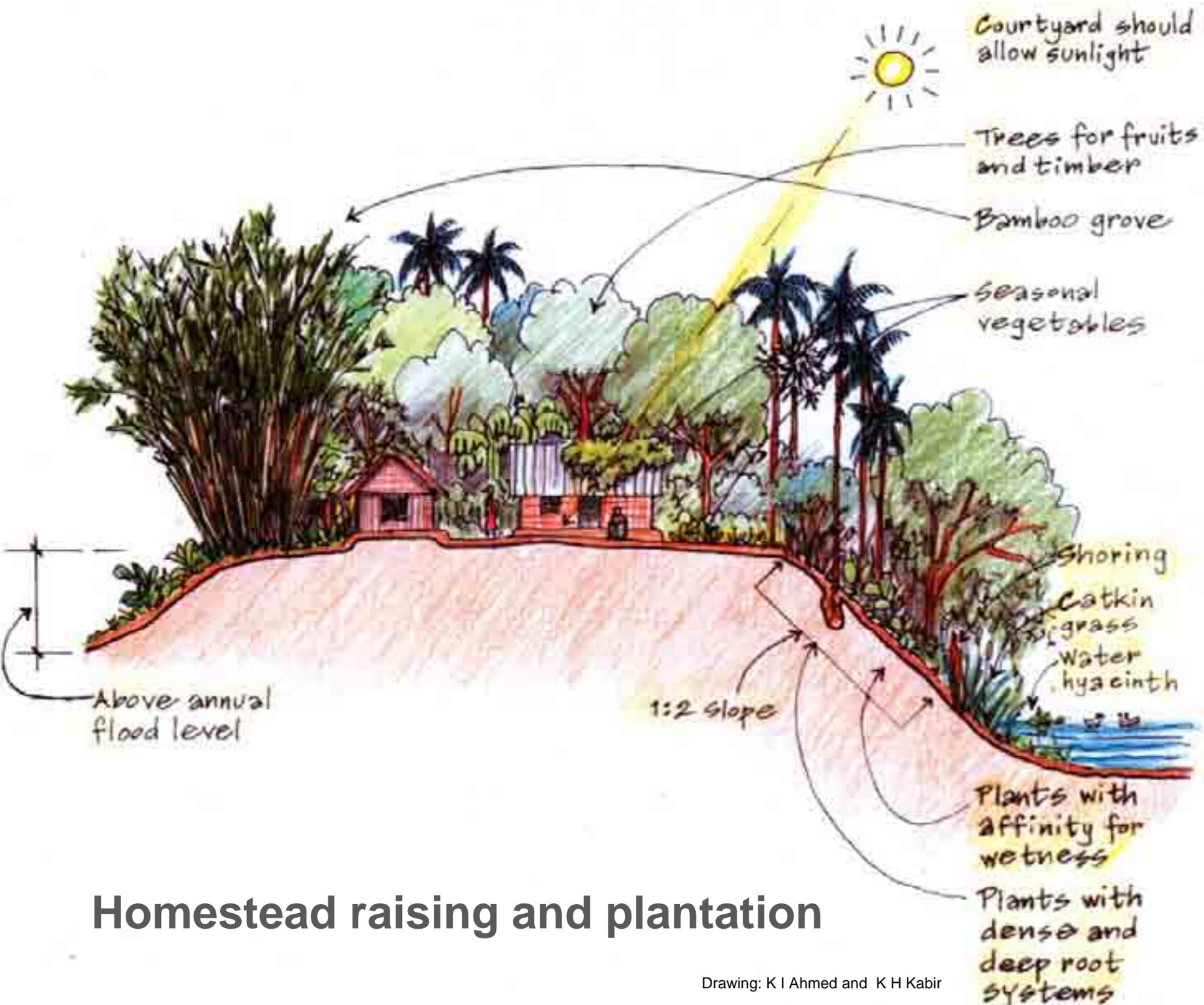




**Flood-prone**  
**Middle of Bangladesh**  
During dry season



During rainy season



# Homestead raising and plantation

Drawing: K I Ahmed and K H Kabir

# Landslide-prone Southeast of Bangladesh (Chittagong Hill Tracts)



# Cyclone-prone Coastal regions in the south of Bangladesh



**Middle** (Dhaka, the capital city of Bangladesh)

**Flood, earthquake, fire as disaster**

Photographs: Huraera Jabeen



**Good practices are happening in the “shadow”.**



Cyclone and storm surge

# Appropriate design options for disaster resilient housing in Teknaf and Cox's Bazar

Department of Architecture, BRAC University  
Supported by IUCN Bangladesh

# Good practices by local people



- Use of Nylon rope
- Top-kata

Building with available , recycle materials like polythene sheets, bamboo



Anchoring with ground (*Bhuitan*), Cyclone-strap (*kan-mochona*)

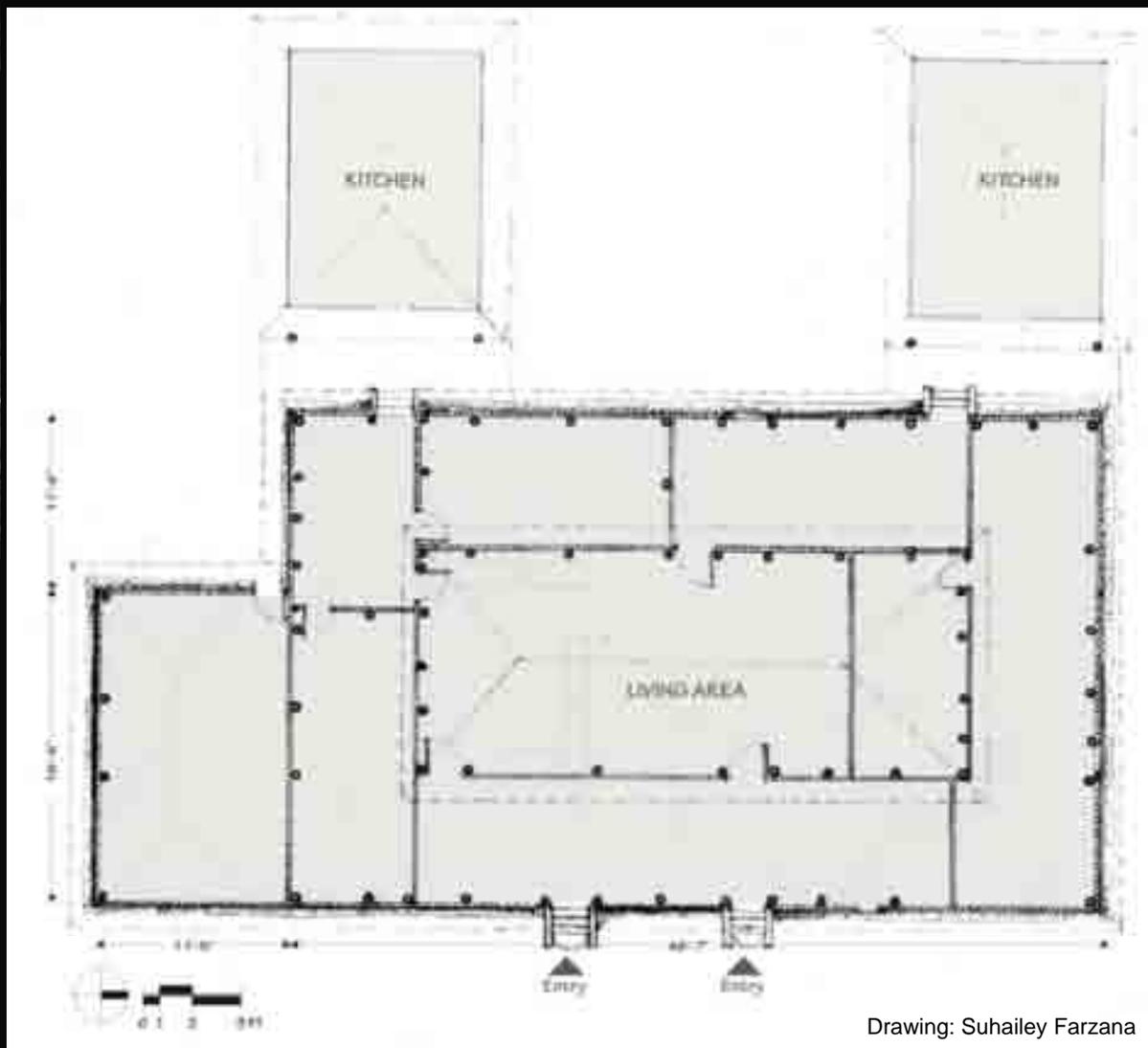


Vegetation



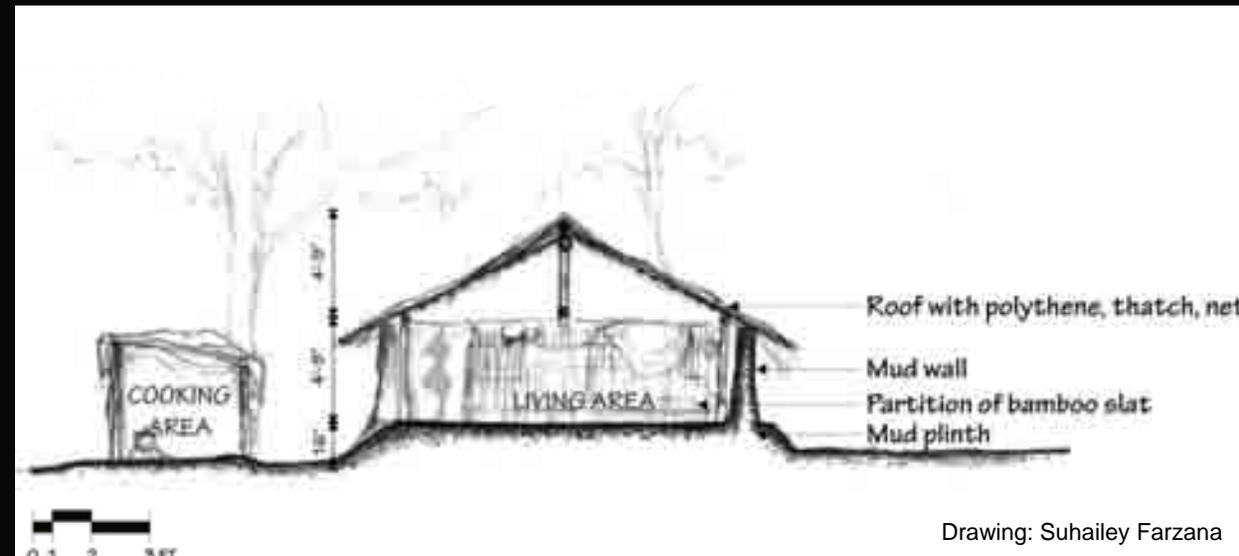
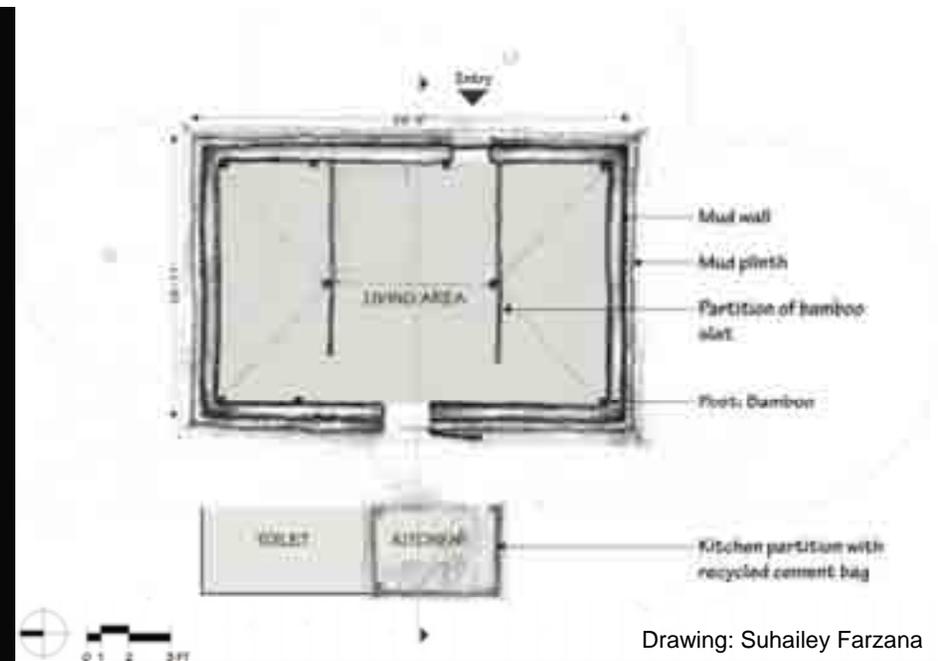


# Form and Shape of House



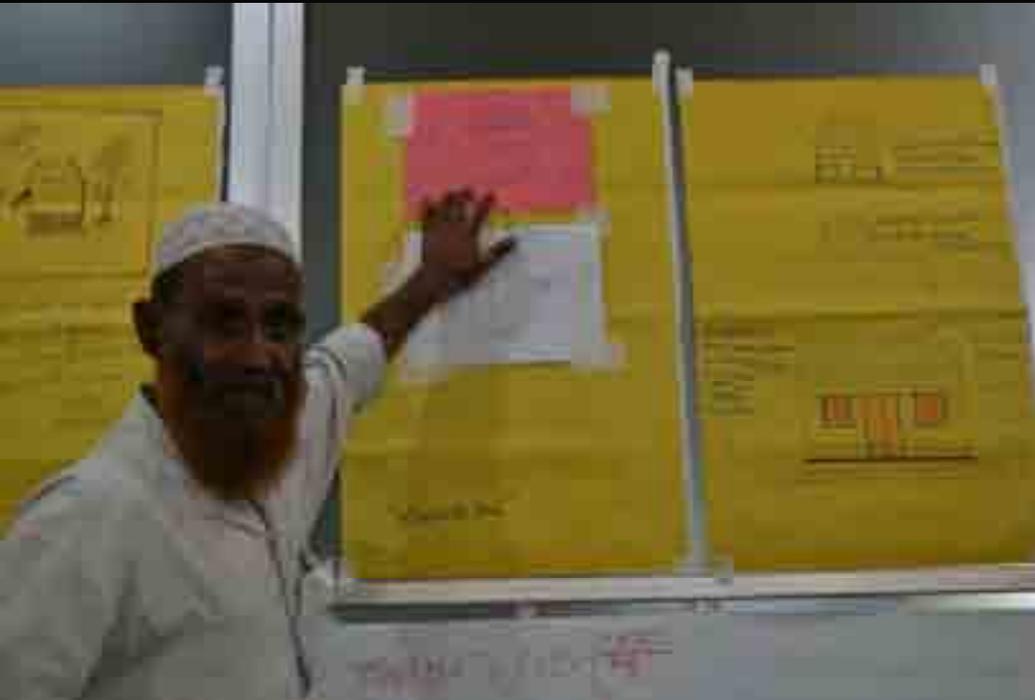
Drawing: Suhailey Farzana

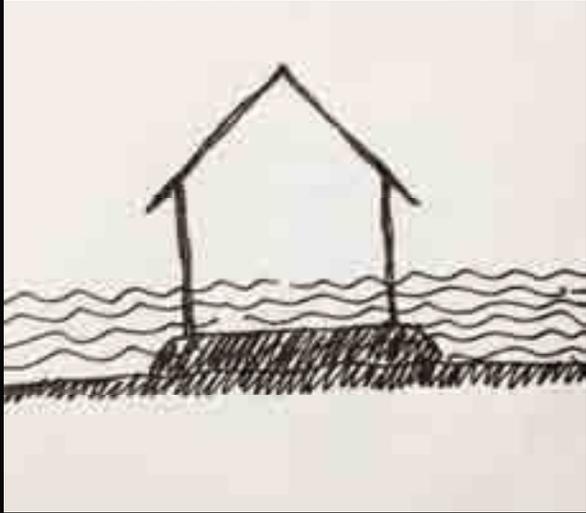
Floor	Post	Frame	Wall	Roof cover
cement finish	RCC	bamboo	bamboo mat	C I sheet



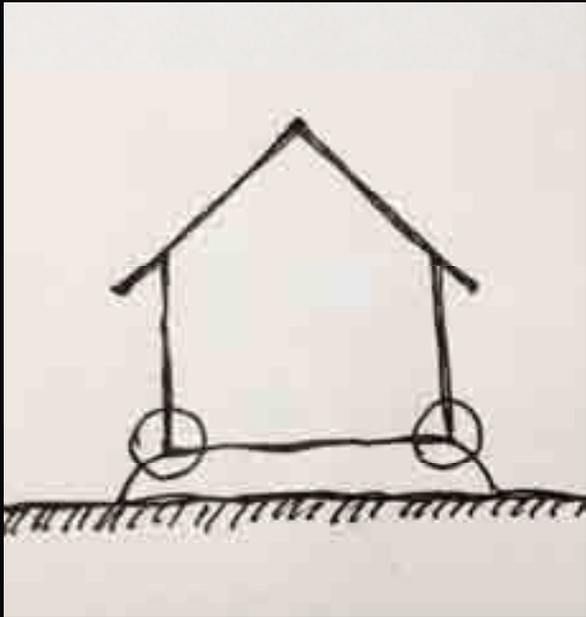
Floor	Post	Frame	Wall	Roof cover
mud	bamboo	bamboo	mud	polythene

## Participatory design workshop to develop **building-for-safety** options





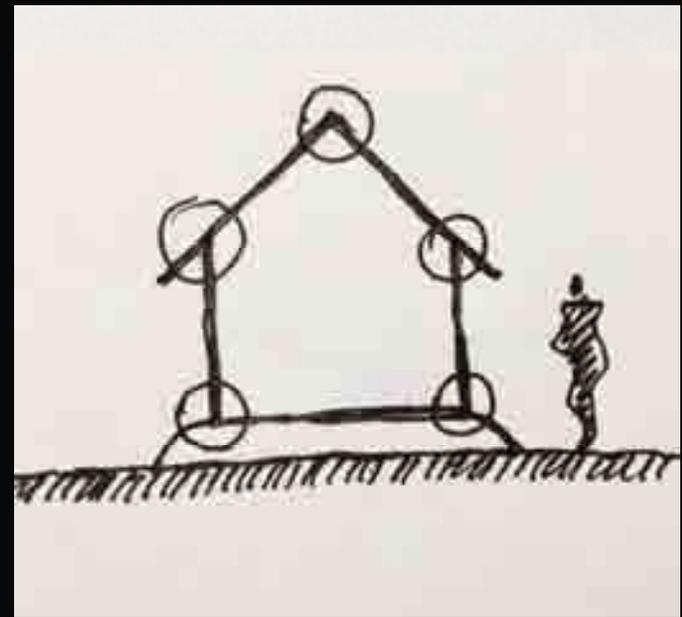
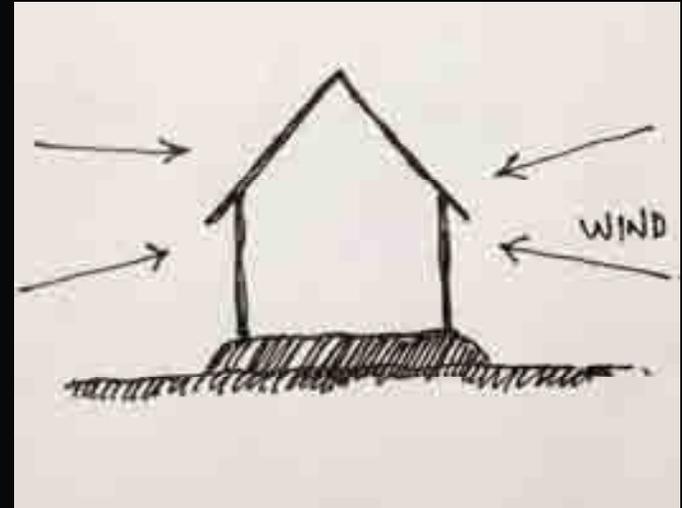
**Flood**



Plinth  
Walls  
Posts

**Effect on building**

## **Cyclone and storm surge**

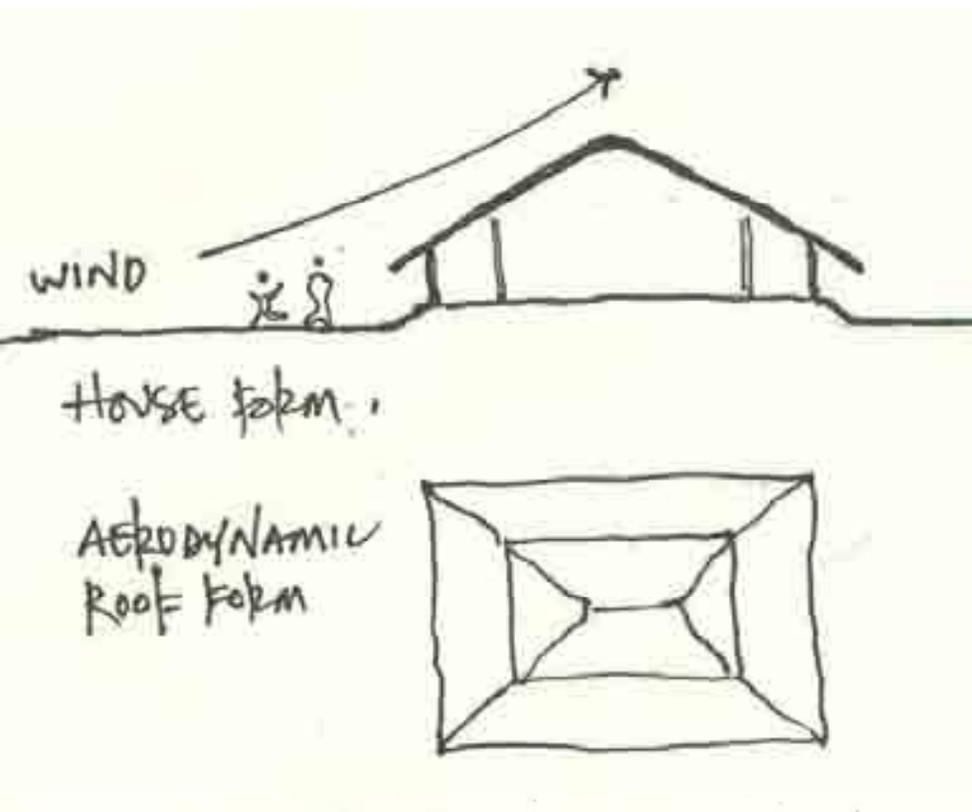


Plinth  
Walls  
Posts  
Roof frame  
Roofing materials

**Effect on building**

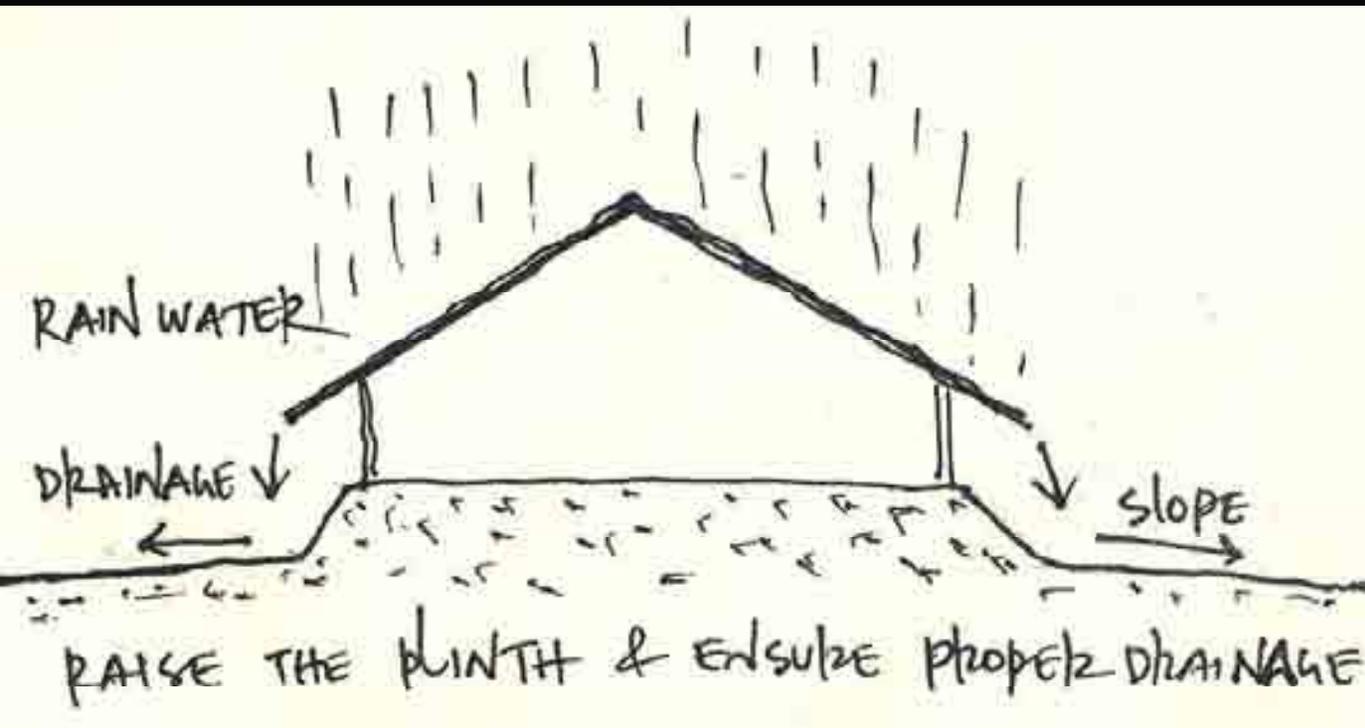
# Building-for-safety options

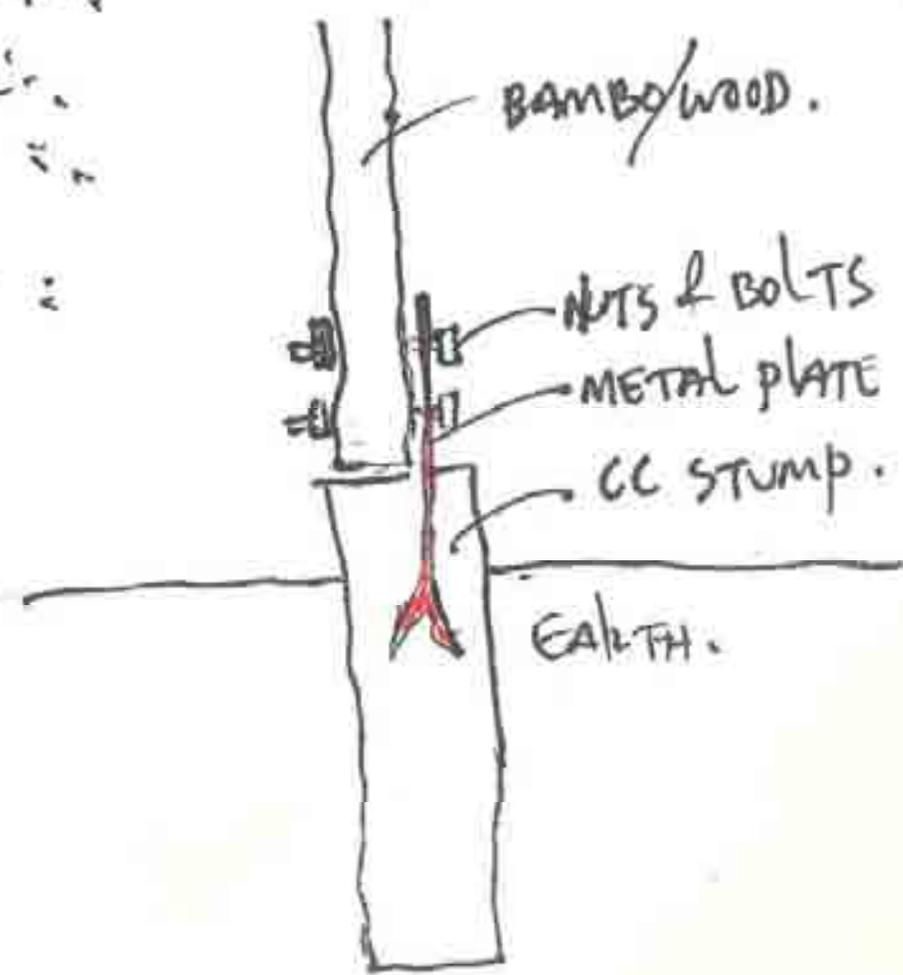
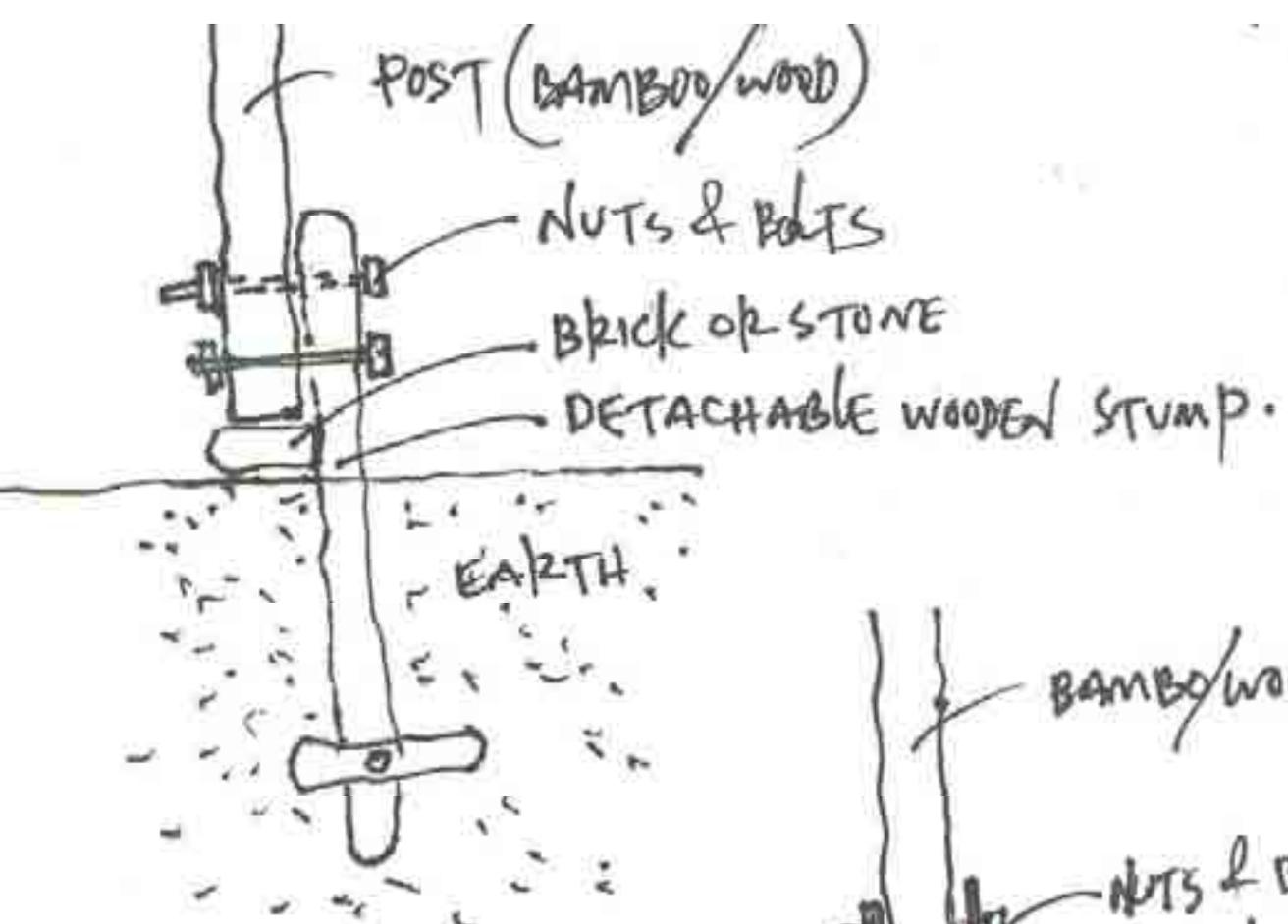
Indigenous knowledge  
and  
Academic knowledge



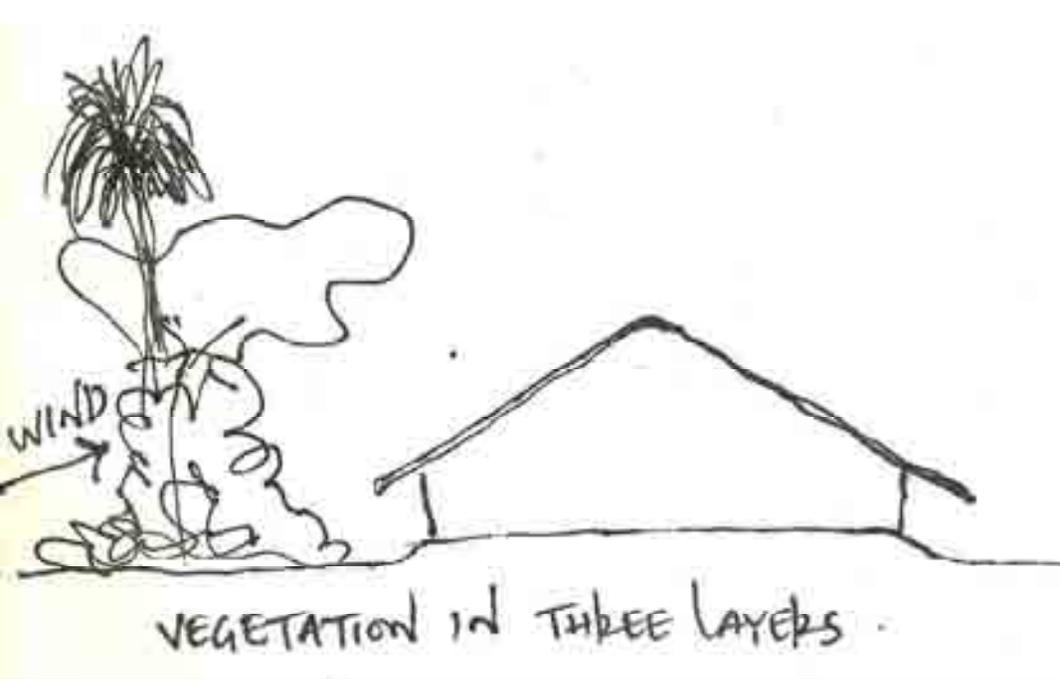
Shape and  
Form

Plinth



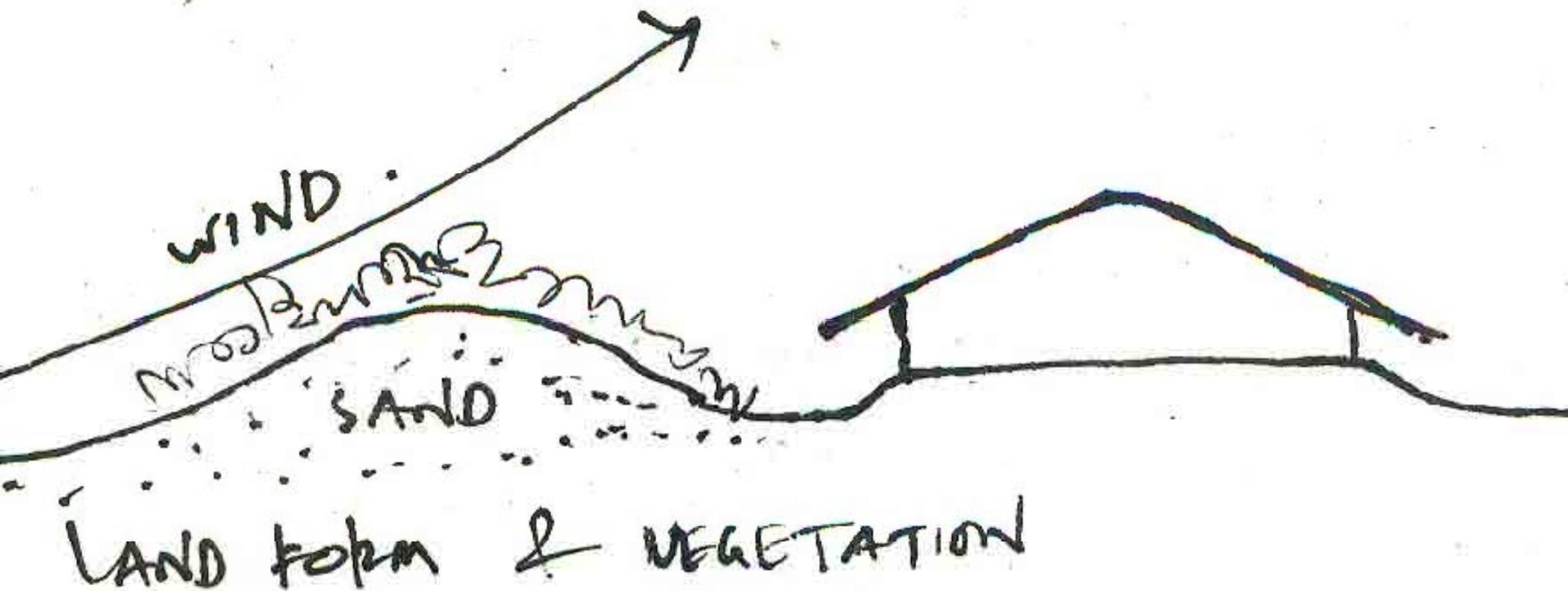


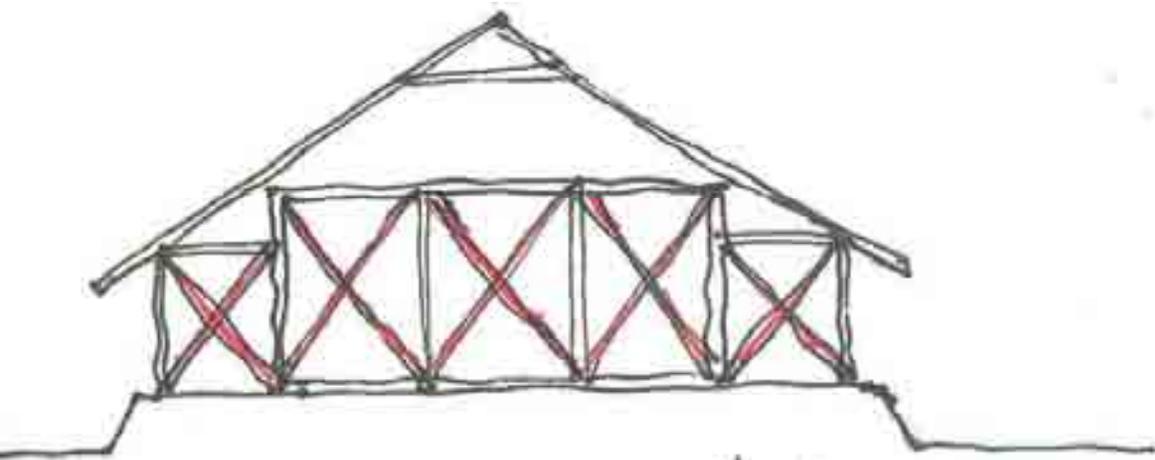
Posts



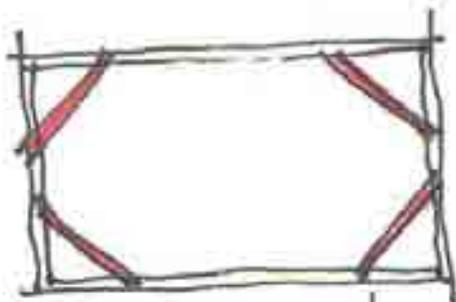
**Wind**

Vegetation and  
land-form

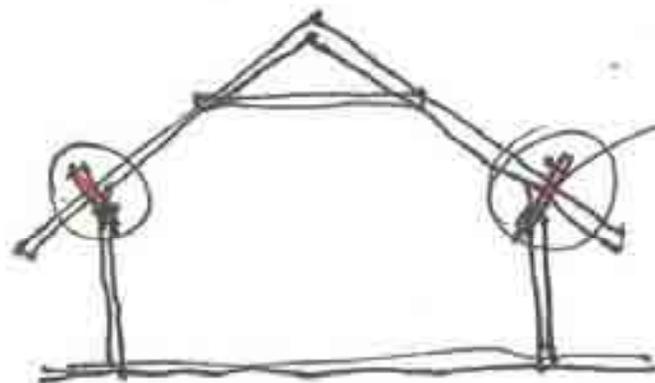




Cross BRACINGS IN WALL FRAMES.

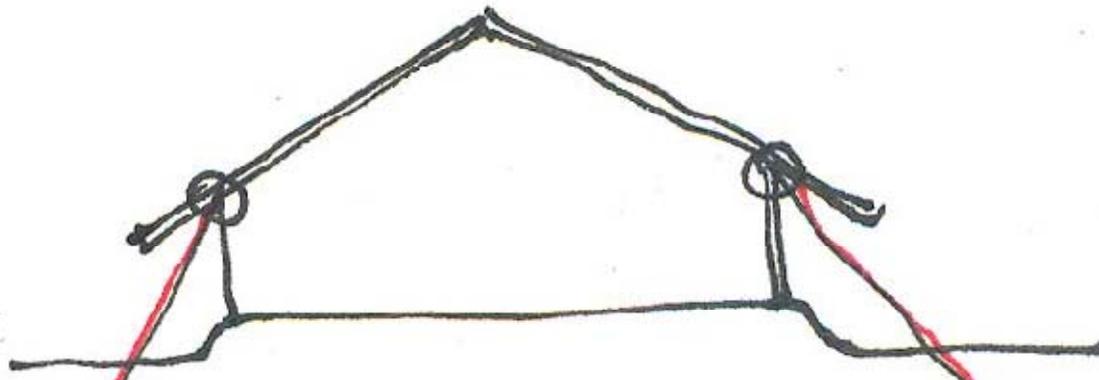


BRACINGS IN ROOF FRAME.



NYLON TIE  
OR  
METAL STRAPS.

## Bracings



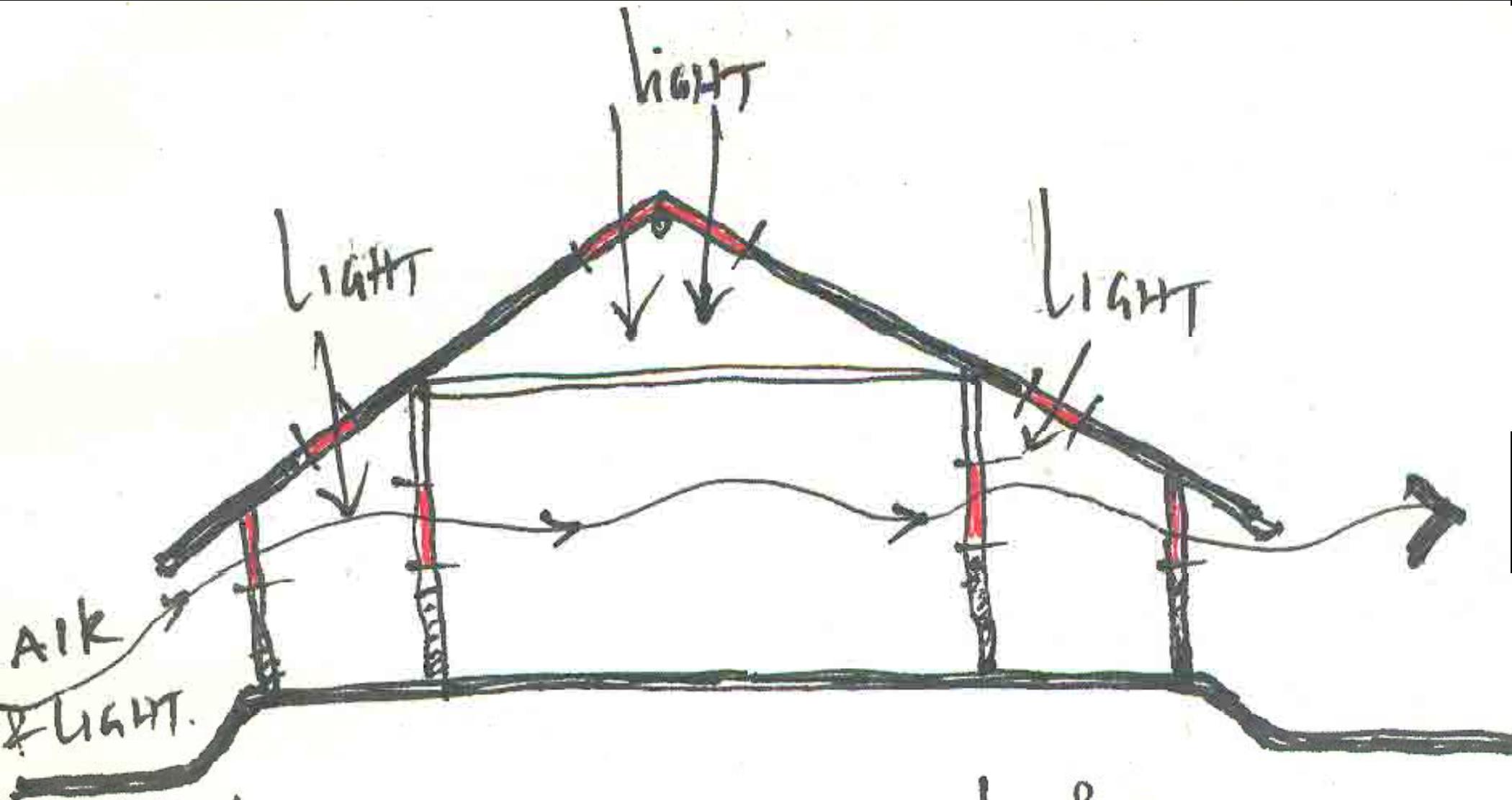
ANCHORING HOUSE FRAME  
~~ANCHORING~~



ANCHORING ROOFING MATERIALS &  
THE HOUSE

Anchoring

# Lighting and ventilation



LIGHTING THROUGH ROOF &  
VENTILATION THROUGH WALLS.

**Let us build a house with building-for-safety options we developed together**



**Dismantle, design and recycle.** Mother and son are dismantling their house.







**Horizontal sharing is important**





Bring in scientific knowledge and share. And facilitate local people to do it by themselves.



Wattle and daub wall with bamboo and cement stabilized soil

Improving the local technique for stronger walls  
Horizontal and vertical cross-bracings make houses stronger











## Lighting through roof







Anchoring  
house in  
ground



Understand the process of local vernacular and try to bring appropriate knowledge through local vernacular



Cross-bracing has become a symbol of stronger house

Freedom to design own spaces heightens aesthetic sensitivity.





# Disaster Resilient Habitat after Cyclone Aila

Department of Architecture, BRAC University, UNDP and BRAC, Bangladesh, 2009-2011



+++++++ +++ ++++++++ + ++ +++ +++ ??? ???

the team



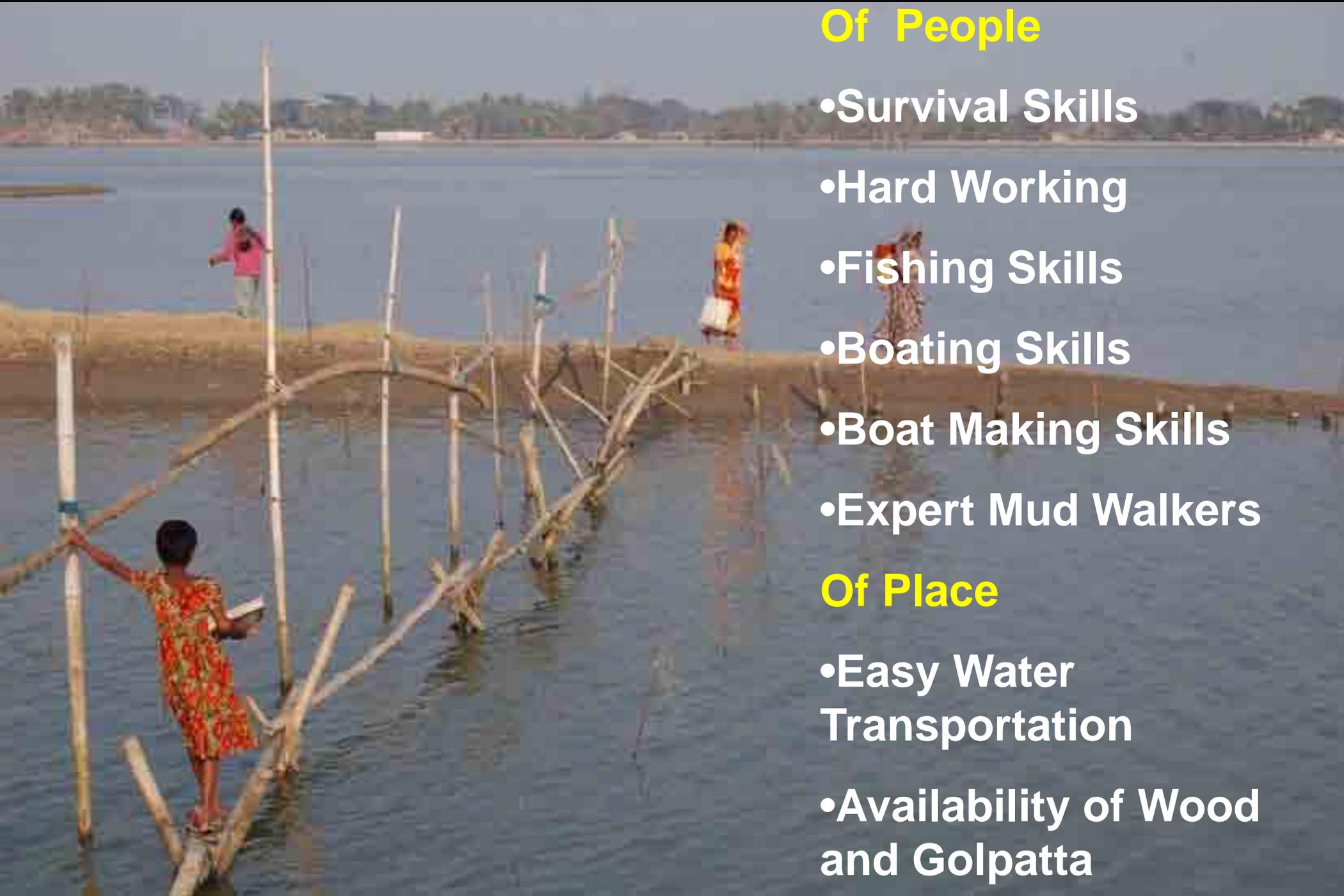
# Strengths

## Of People

- Survival Skills
- Hard Working
- Fishing Skills
- Boating Skills
- Boat Making Skills
- Expert Mud Walkers

## Of Place

- Easy Water Transportation
- Availability of Wood and Golpatta



# Weaknesses

## Of People

- Back Talking
- Less Sharing
- Relief Minded

## Of Place

- Salt Water
- Soil Quality
- Lack of Sweet Water
- Cyclone Prone Area
- Transportation



# Design workshop 1: dream houses



# Design workshop 2: options of real houses

At the Department of Architecture, BRAC University



**Participants:**  
**Masons,**  
**carpenters, poet,**  
**singer,**  
**mud-workers,**  
**house-owners,**  
**engineers,**  
**architects,**  
**disaster**  
**managers,**  
**students of**  
**architecture.**

# Lets build a demonstration house



**“The outsiders”**

**animator, poet, architect, landscape architect, engineer,  
disaster manager.....**

# Material purchase and transportation with/by house owners and local builders



# Hands-on construction

Sharing of Knowledge

Technical + Indigenous

Working Together

**Build Trust**



 **trust** =  **speed**  **cost**

 **trust** =  **speed**  **cost**

 **trust** =  **speed**  **cost**

“our distrust is very expensive”.

↓ trust = ↓ speed ↑ cost

↑ trust = ↑ speed ↓ cost

“our distrust is very expensive”.

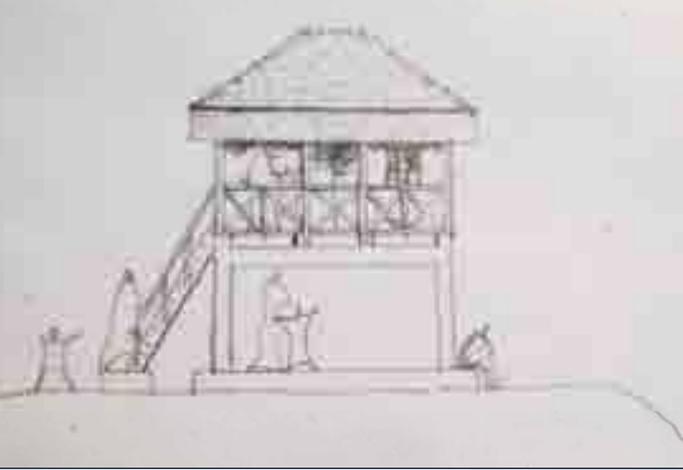
“technique and technology are important, but adding **trust** is the issue of the decade.”

**Sustainability**

**Sustainability** in term of **global environmental** point of view is important but **sustainability** in terms of **local needs and aspirations** must not be ignored.



Available resources.....local strengths and weaknesses



# Innovation / improvement on local building techniques

## Concrete

Appropriate cement, aggregate, water ratio

Use of sweet water

Appropriate specification of reinforcement

Appropriate curing



**Use of local wood**

**Diagonal and horizontal Cross-bracings**

**Metal clamps under posts**

**Metal straps with roof frames**

**GI wire tie with roof and concrete beams**



# Improvements of clay-roofing-tiles



# Improvements of clay-roofing-tiles



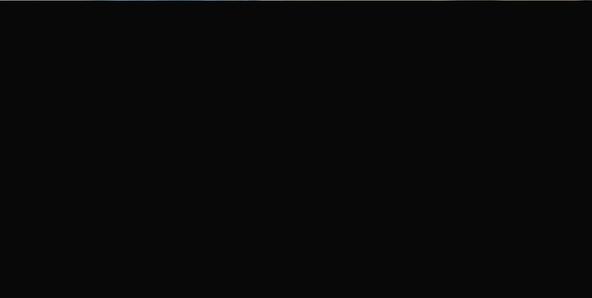
# Work with rivers and tide



**Work together and distribute responsibilities**



# Work together and distribute responsibilities



## **How Nature designs?**

**No two flowers are same in detail.**

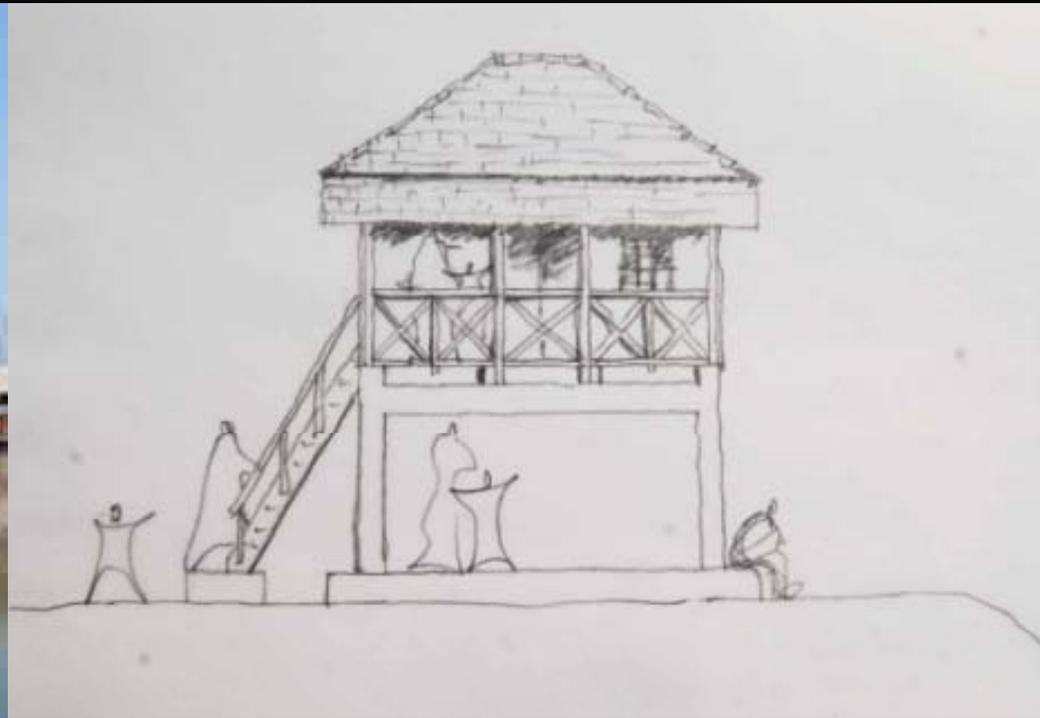
**No two persons are same too.**

**However, there is an inherent order in Nature's creation  
where diversity is achieved through co-creation.**

**To build better  
Co-create with people and nature.**

# **Basic Design Considerations**

# Make houses stronger. Reduce building footprint



Allow flexibility

**Respect local** climate: orientation, lighting and ventilation  
Reduce **use of materials which have high** embodied energy  
**Respect local** ecology and landscape  
**Respect local** culture and local perception of aesthetics.



**Respect** users' and craft-people's **participation** in design and construction



**Design process of school**

**And don't forget to have fun during design and construction**

**Happy stories of building and construction can make a building more sustainable.**

**Unhappy stories are important too.**



**Challenge is to integrate this process in the mainstream development strategy.**

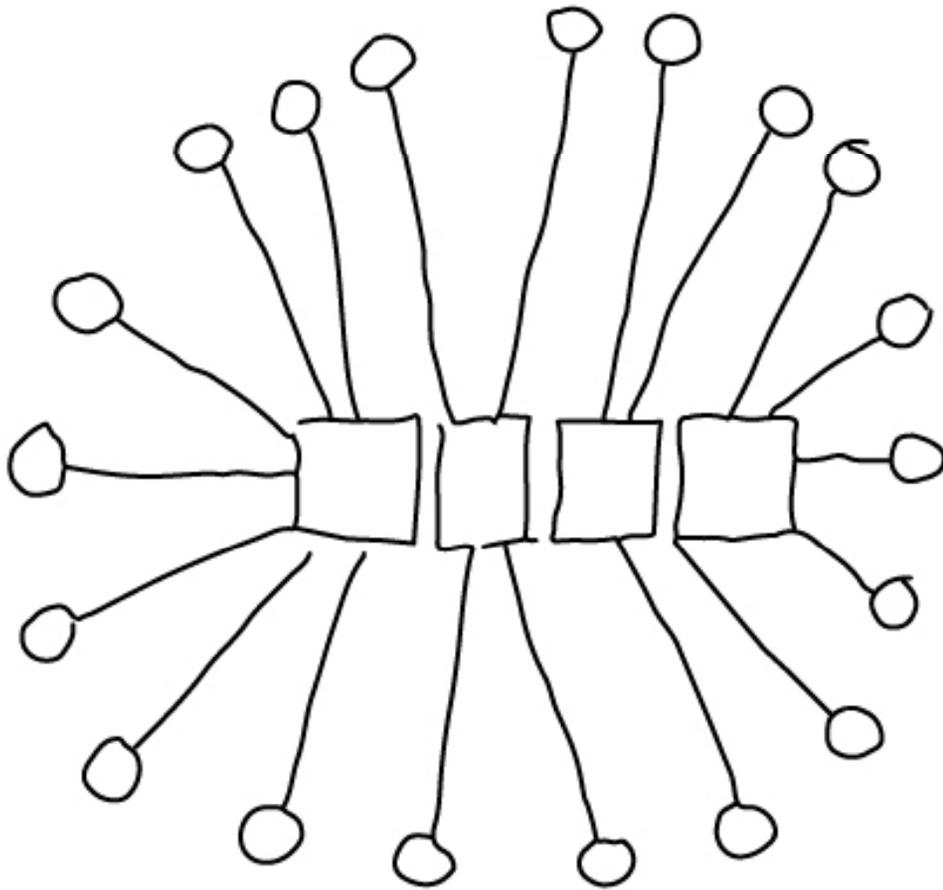
## What is disaster?!!

For poor people, a small wind might cause **disaster**.  
Poverty is disaster.....

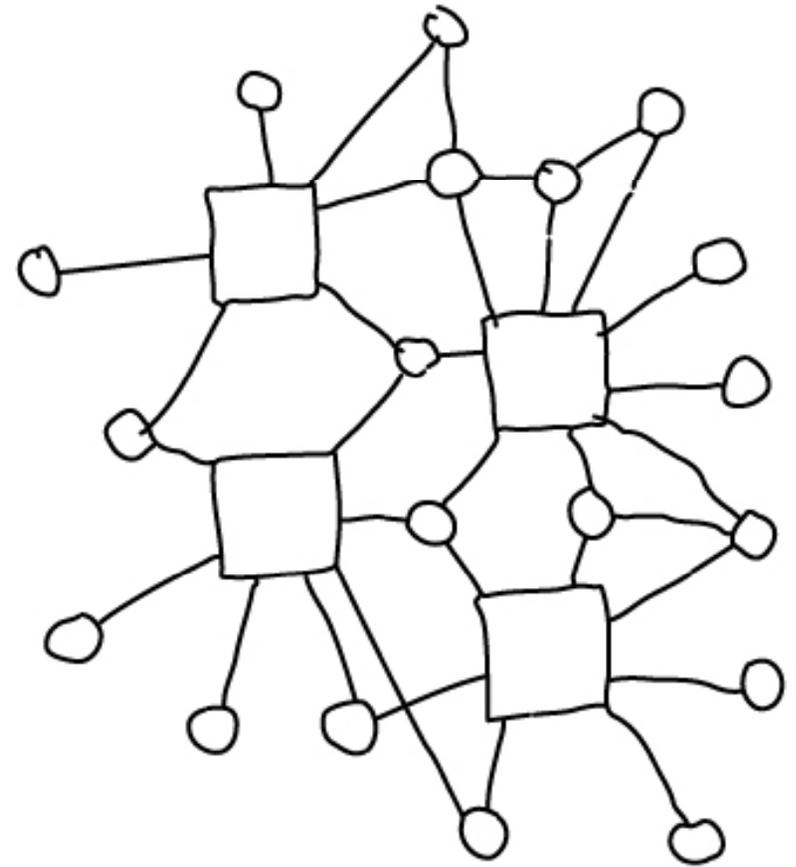
Make people stronger by empowering them.  
Make communities stronger and work together.



“Weak” organizations  
Stronger communities.



**Non-resilient system**



**Organic system**

Source: Community Architects Network (CAN)

**Co-creation**

## **The process**

**You want to build  
appropriate houses?  
Visit the place first.**

**Invite local builders  
and facilitate a “design” workshop with all.  
Build trust, discuss about trust.  
Trust all.  
Provide them the support you can.  
Let them build the first building in their places by themselves.  
Several ‘first buildings’ in several places  
by several groups.**

**Visit those buildings with local builders.  
Invite them again and  
facilitate another workshop  
on the reflection of the work.  
Then facilitate them to build hundreds of buildings  
by themselves.**

Video  
Disaster Resilient Habitat

# Participation

Participation between architects and local builders is not difficult. But architects and local builders are not going to use the space after building. Users' participation during design, budget and construction is the most important aspect to sustain the spaces. Even if, sometimes, participation costs more money and time, It is worth it.

Here everybody can enjoy the freedom to say, "I designed it".

**Doner Funded process**

**Vs**

**Owner funded process**

**State funded process**



# In urban areas

**Citywide Community  
Upgrading by community  
networks of Jhenaidah city**

**Through saving, mapping and  
cooperative action**



## In urban areas

**Citywide Community  
Upgrading by community  
networks of Jhenaidah city**

**Through saving, mapping and  
cooperative action**



**“Trust that poor people can do it too!”**

**“People make cities.  
Poor people do too”**

**team**

**Citywide community network**

**Co.Creation.Architects**

**POCAA (Platform of Community Action and Architecture)**

**ALIVE NGO**

**BRAC University**

**ACHR (Asian Coalition for Housing Rights)**

**CAN (Community Architects Network)**

Video

“Let people be the solution”

**Trust that poor people are the “experts” too**



**Trust that poor people are the “experts” too**

**THANK YOU**

