FLOATING FOR HEALTH

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Graduation Presentation
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Introduction
Global warming is causing increasingly severe weather around the globe leading to an increase in flooding events.
Problem statement

**Lack of means**
to move or create preventive measures

**Lack of sanitation**
is the cause of polluted floodwater, which creates health risks
Flooding creates health risks due to disrupted healthcare facilities and contaminated water.
**Problem Statement**

- **68%** of India’s population lives in rural areas.
- **30%** of India’s healthcare facilities are in a rural environment.
- **>70%** of patients in rural India are treated by informal practitioners: “Quacks” whom had no medical training.

There is a lack of trained medical professionals in rural regions of India to supply basic healthcare.
Available of the needed primary healthcare centres in West-Bengal
909 / 2500
(Indian norm for a population of 90 million)
HEAVY MONSOON FLOODS
3 - 5 months in a year the West-Bengal is plagued by heavy floods.

LACK OF FACILITIES
A rural region with little funds available to create preventive solutions and with a lack of facilities

LACK OF KNOWLEDGE
trained medical personnel moves out of the rural region to higher salaries in cities
Develop a **permanent** solution for low income, flood prone areas by offering **floating** healthcare and medical training facilities.

To create real self-resilience, the structure should be **build and owned locally.**
INTRODUCTION

Needs

MEDICAL CLINIC
MEDICAL CLINIC

TRAINING CENTER

INTRODUCTION

Needs
INTRODUCTION

Needs

MEDICAL CLINIC

TRAINING CENTER

COMMUNITY / EMERGENCY
BUILDING SYSTEM
BUILDING SYSTEM

Requirements

FLOOD RESISTANT

EASY CONSTRUCTION

REPRODUCABLE

MODULAR SETUP

REQUIREMENTS
Flood resistant
Building system
Floating
Building system

Grid

FLOATING STRUCTURE
Reproducable
**Building System**

**Material**

- Globally available/
  relatively cheap/
  easy to process/
  standardized dimensions

- Durable /
  Standardized dimensions/
  Simple connections
EASY CONSTRUCTION
BUILDING SYSTEM

System
BUILDING SYSTEM
Building sequence

TECHNIQUE
BUILDING SYSTEM

Analysis

Modular setup
BUILDING SYSTEM

Analysis
Local Craftsmen can contribute by weaving the panels for the second facade.
BUILDING SYSTEM

Variantion facade

Woven bamboo panel
Bamboo sliding door
Fixed bamboo shade panel
Translucent polycarbonate panel
Building system
Second facade pattern

- Woven bamboo panel
- Traditional West Bengalese patterns
- Thicker woven straw panel
- Possibility for local craftsman to contribute
Building system

Roof addition

Connection point for roofing

Tapered bamboo slide on plate

Pinned and lashed at 2 points to attach
## Overview

### Context

<table>
<thead>
<tr>
<th>Inhabitants</th>
<th>219,555</th>
</tr>
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<tbody>
<tr>
<td>Children</td>
<td>25564 age 0-6</td>
</tr>
<tr>
<td>Land area</td>
<td>216 km²</td>
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<tr>
<td>Literacy</td>
<td>81%</td>
</tr>
<tr>
<td>Religion</td>
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### Tropical Region

<table>
<thead>
<tr>
<th>Rainfall</th>
<th>Temperature</th>
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<tbody>
<tr>
<td><em>CLIMATEFACTS</em></td>
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</tbody>
</table>

### Primary occupation

- Farming

### Income average

- 15,200 Rp (€ 189,86)

### FACTS

- Children: 25564 age 0-6
- Inhabitants: 219,555
- Land area: 216 km²
- Literacy: 81%
- Religion:

### CLIMATE

- Rainfall
- Temperature
Context

Needs - facilities

Subdivision Hospital

General Practitioners
Context
Needs - medical care

General care
Small Procedures
Immunization
Basic medicines
Eye care
Birth control / Maternity
CONTEXT
flooding

Dry Season

Monsoon
Context
flooding

FLOODING RESULT
Example Site
Analysis

Village Marichya

Population: 10,500
Main profession: Agriculture
School: No
Medical facility: No
Example Site
Analysis

Housing Situation

Doctors visit
Houses

Clusters

Courtyards
Example Site
Analysis

Village Layout
Example Site
Analysis

Clusters on Higher Ground
Example Site
Analysis

Central Square
Design Motives
CONNECTION WITH MAIN SQUARE
BOUNDARY OF BUILDABLE AREA
3 OBJECTS FOR THE 3 FUNCTIONS
SITE

Concept Mass

OPENING MASS TO THE SQUARE
Site
Concept Mass

Creating opening for air flow
CONNECTION BETWEEN THE OBJECTS
Axonometric view
Main functions per building
Organization spaces from public to private
Central corridors interlinking buildings and spaces within
Watercourts contrasting clean water with floodwater
Floor Plan
Community

- Auditorium / Workshop
- Multi-functional
- Storage
Roof
Roof detail 1:5

**Building system**

one plate to connect two roofbeams

Extra bamboo supports the outer roof edge
CLIMATE
Conditions in West Bengal

SUNSHINE

RAINFALL

WIND DIRECTION

Km/h
Climate
Ventilation with wind
Climate

Ventilation without wind
Climate
1 - 20 section

+9500

+5200

+2000

+1200

+0
Climate
Rooftop detail

Polycarbonate corrugated panel
Wooden batten 50 x 20 mm
Bamboo sub-structure

Thatch roof tied off to bamboo substructure
Rain collection

Central gutter where roofs connect. Water flows into collection pond. Every pond has an overflow possibility if the water storage tanks are full.
Climate
1 - 20 section
Roof next to courtyard directs rain water into the central pond.

Central gutter detail
Climate
Water and Energy

Rain water harvest
Solar energy
Stored in central core
Climate

Daylight concept
Climate
Daylight entry

Bamboo shade doors

Doors function as the shade panels and allow movement to terraces
Design
Central Hall
Develop a **permanent** solution for low income, flood prone areas by offering **floating** healthcare and medical training facilities.

To create real self-resilience, the structure should be **build and owned locally**.
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Conclusion

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To create real self-resilience, the structure should be **build and owned locally**.
Extra Water demand

Clean Water demand

- "the daily average water consumption for the village was found to be 117.0 l per person per capita per day"

- "86 % do not have awareness about rainwater harvesting technology. This needs to be addressed immediately by changing public perception through media and by organizing public awareness programs."

Source: Singh, O. (2012). A survey of household domestic water consumption patterns in rural semi-arid village, India

School Demand

- 1.5 Liter a day per student

- 40 students = 60 L a day = 1800 L a month

- Average = 300 mm per month in monsoon season
  = 300 Liter / square meter
  = 6 m² needed to supply

Health clinic Demand

- 200 Liter a day

- Average = 20 m² needed to supply
Curative Care

General checkups

Malaria and other Vector borne diseases
Early detection of TB, Leprosy, Kala-Azar and other locally endemic communicable diseases and non-communicable diseases such as diabetes and cataract cases

Japanese Encephalitis (JE) vaccine and other epidemic prone communicable diseases

Minor surgical procedures and suturing

Reproductive and Child Care

Ante-natal check up and related services e.g. injection – tetanus toxoid, iron and folic acid tablets
Referral for complicated pregnancies
Promotion of institutional deliveries

Post-natal check up

Immunization clinics
Pulse polio

Treatment of common childhood illness such as diarrhea,
### Extra Floating research

<table>
<thead>
<tr>
<th></th>
<th>Floating Barrels</th>
<th>Floating EPS-blocks</th>
<th>Floating Barges</th>
<th>Floating Local boats</th>
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<tbody>
<tr>
<td>Local availability</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Local technology</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Cost</td>
<td>+/-</td>
<td>-</td>
<td>-</td>
<td>+/-</td>
</tr>
<tr>
<td>Construction time</td>
<td>+/-</td>
<td>+</td>
<td>+</td>
<td>+/-</td>
</tr>
<tr>
<td>Durability</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
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<tr>
<td>Maintenance</td>
<td>+/-</td>
<td>+</td>
<td>+</td>
<td>+/-</td>
</tr>
<tr>
<td>Weight</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+/-</td>
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**Legend:**
- **+** denotes an advantage.
- **-** denotes a disadvantage.
- **+/−** denotes a mixed result or variable impact.
Extra
Location

Village Marichya

Population: 4500
Main profession: Agriculture
School: No
Location

- Town Hall
- Town Square
- Cluster of Residences
- Flood-prone farmlands
- Connection to main square & road