# Shelter assesment after the SIDR cyclone in the THANA MATHBARIA - BARISAL DIVISION - Bangladesh From 06 december 2007 to 05 january 2008

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## I. Background

One week after the SIDR cyclone, Solidarités carried out a first three weeks assessment focused on water and sanitation aspects in Mathbaria Thana, Barisal District. Since the 1st of December 2007 a partnership between Gonoshto Kendro (GK), a Bangladesh NGO and Solidarités have been established to implement a 5 months project and provide drinking water to the affected population in Mathbaria area.

The situation of the disaster households remains a major issue, particularly for the most vulnerable households. 80% of houses were partially or completely destroyed in the SIDR cyclone area further to its passage. Most of the disaster population rebuilds its house without proper technical guidance. Bangladesh government and NGOs targeted shelters issue as the first priority of immediate assistance.

As Solidarites had specific professional and technical expertise in construction of shelters, we decided to conduct an assessment focused on post-SIDR cyclone housing conditions with the vulnerable households in the Mathbaria Thana, Pirojpur Division.

Virginie Peytoureau was selected as architect consultant to lead this assessment from the 6th of December 2007 to the 5th of January 2008.

The main objectives were defined as follows:

- To evaluate the level of housing damages of the vulnerable households, located in the worst affected areas (near the river and inland);
- To analyse strategies developed by the vulnerable households to rebuild their house;
- To propose appropriate and sustainable technical guidance of houses construction: different models which resist cyclones limit the risks of total destruction;
- To make strategic and technical recommendations for targeted groups of the future project, type of support, partnerships, etc.).

### I.1 The team and steps of the evaluation mission realised

The mission took place from 6 December to 5 January 2007 during (4 weeks) with a team of 2 persons. The first one, a French architect, Virginie Peytoureau, has a confirmed expertise in low cost housing in developing countries. And the second one, Apurba Kumar Podder, Bangladeshi architect, has a deeply knowledge of the Bangladeshi context.

The mission was organized in two parts: firstly, one period of 10 days on the field in Thana Mathbaria and secondly, back to Dhaka, to contact resource persons and write the report.
During the whole assessment, we worked closely in collaboration with the Gonoshto Kendro, our partner on the field.

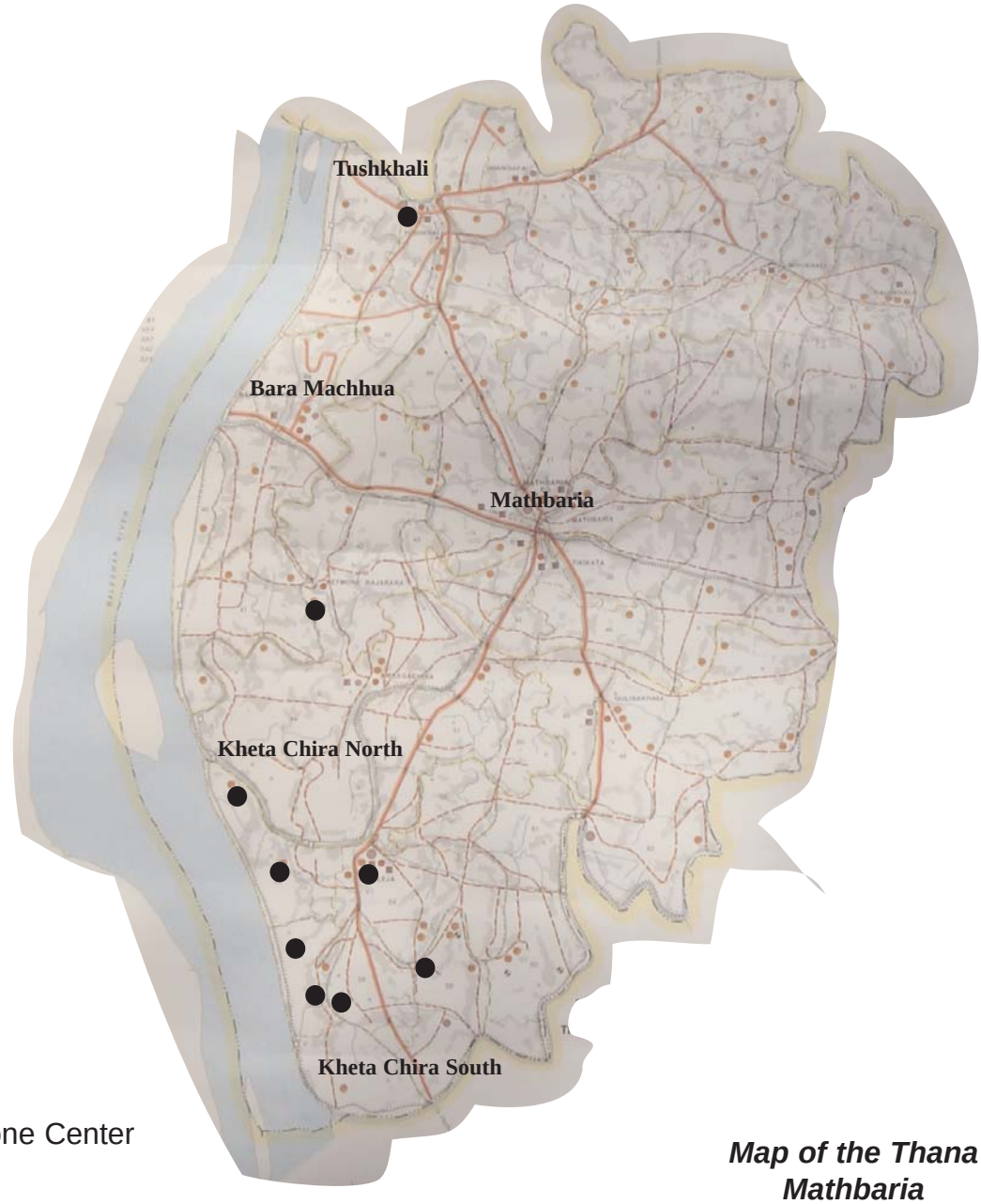
During the first period of field visit, the team covered 4 selected Unions in the Thana Mathbaria in order to analyse the housing situation of the most vulnerable households affected by the cyclone SIDR.

The team took part in a workshop at Barisal Sadar, organised by SIDR Shelter Cluster a coordination platform, held by the representatives of District and Upazila administration. International, regional, local NGOs, donors, rural communities and civil society were the main participants.
The second period in Dhaka has been useful to gather information from other organisations or resource persons strongly implicated in the shelter/housing construction in the south of Bangladesh (public agencies, platform of coordination, etc).

### I.2 Methodology and information source

During the field visit in the 4 selected Unions (around 30 km), the team implemented the following methodology:

- Selection of appropriated persons for visiting places affected by the cyclone such as leaders of local government at Union, local construction supervisor and "Choukidar" (village policeman);
- Elaboration of a specific survey about housing and households situation;
- Visit of 250 houses and survey of 30 households;
- Assessment of the capacity of 4 local construction supervisors experienced in traditional housing (level of expertise, availability of local manpower, local technologies used…);
- Investigation on the local markets about the availability of local construction material, price analysis, cost assessment of local manpower;
- Analysis of several documents about the district and the Cluster Shelter platform.




● Shelter Cyclone Center

***Map of the Thana Mathbaria***

## II. General context of the investigation

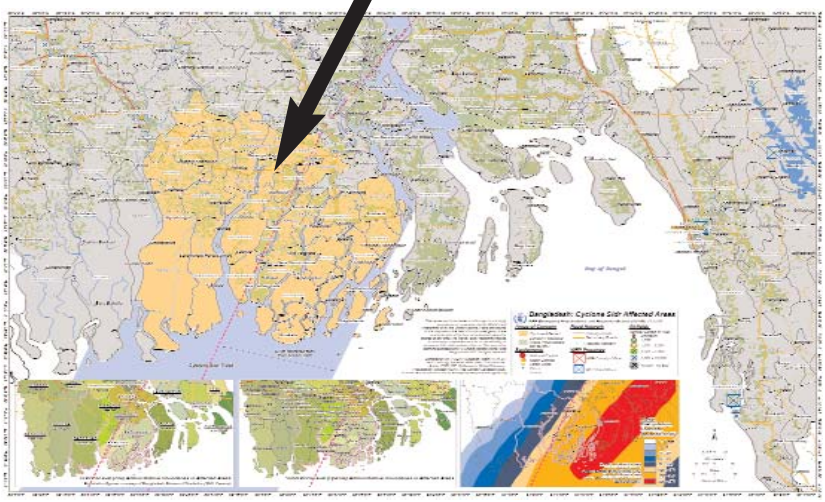
### II.1 Bangladesh context


Bangladesh is one of the world's most densely populated countries with estimated 150 million people. It has made important strides in reducing poverty and improving economic performance. However, the gap between poor and non-poor is not reducing and the percentage of extreme poor remains high (20 to 25%). The causes of rural poverty are complex and multidimensional. The scarcity of lands due to population growth, unequal distribution of resources, lack of access to services and markets as well as the frequent disasters are the main cause of poverty in this country.

In fact, Bangladesh is one of the least developing and most disaster prone country in the world. Over last 30 years different scales of cyclones have been affecting the country with loss of valuable lives and property. It was estimated in 1996 that about five million people currently live in "High Risk Areas" (HRAs) along the western, central and south eastern coasts of Bangladesh. Of these, 4 million live in "Very High Risk Areas". Approximately 9 million more shelter places were needed in the three cyclone-prone zones by the year 2001.


In Addition, a large proportion of the countryside as well as the majority of urban areas in Bangladesh is flood-prone. During heavy flood, more than 60% of the land is inundated. A recent flood in 2004 has destroyed many houses and about 1 million people became homeless.

Different programmes undertaken in this sector do not adequately support housing projects for low-income, flood-vulnerable communities. The houses are mostly owner-built without proper technical guidance. The usual tendency is to apply the same model irrespective of context - for example, the same house design is built on highland and low-lying flood prone areas. As consequence, the housing in the low-lying flood prone areas, are very often suffered a lot of damage and in case of cyclone as the SIRD destroyed 80 % of housing.



### II.2 The cyclone SIDR in Bangladesh and its consequences

The cyclone SIDR, Category IV, hit Bangladesh on the evening of 15 November; with wind speeds of up to 250 km/ph. Approximately 31 of Bangladesh's 64 districts were affected by the storm mainly within the administrative divisions of Barisal and Khulna. The storm caused extensive damage to the southern districts as it moved north across central Bangladesh.
The Government of Bangladesh (GoB) official reports indicated that Cyclone SIDR affected more than 8.5 million people, with a death toll of 3,268 people. Material damage is severe, with over 563,877 houses destroyed and a further 885,280 houses were partially damaged.
The GoB estimates more than 2 millions acres of crops are damaged. Over 1,252,344 livestock are confirmed killed, which represents loss of critical household assets, with an associated loss to wealth and income, as well as a loss in milk production for own consumption. The twelve most affected areas include Bagerhat, Barguna, Barisal, Bhola, Gopalgonj, Jhalkhati, Khulna, Mandaripur, Patuakhali, Pirojpur, Satkhira and Shariatpur districts.
Based on its assessments, the United Nation and government have identified food, shelter and cash as the three highest priority areas for immediate assistance, although sanitation, drinking water, electricity, livelihood assistance and early recovery are also urgently needed.

Different programmes are actually operating as the following:

- **Food Cluster**: The Ministry of Food and Disaster Management (MoFDM) allocated 10,890 metric tonnes of rice and 27,000 food packages have already been distributed by government and other organisms such as WFP, UNICEF, Save the Children, The Bangladesh Red Cross Society (BRCS) BRAC, CARE etc.
- **Water and Sanitation (WASH)**: The Department of Public Health Engineering (DPHE) is in the process of repairing public water sources. Many ponds require clearing and were damaged by saline inundation. The DPHE provided already 3.5 million water purification tablets (WPTs). 500,000 water containers are currently in the pipeline, including 200,000 from the IFRC - BRCS, 100,000 from UNICEF and approximately 200,000 from other WASH partners, including CARE, CRWRC, BRAC and Muslim Aid along with Global Medic.
- **Health**: Two emergency health kits containing medicines and supplies were provided to meet the basic needs of 20,000 people for three months. A total of 690 medical teams are working in the affected areas, these include teams from GoB, WHO, BRCS, IFRC, BRAC, CARE, Health Care services, Muslim Aid - Global Medic and the United States of America.
- **Emergency Shelter**: The Emergency Shelter cluster is currently gathering organisation information on needs and planned coverage to provide a map indicating Who is doing What and Where. Linkages are being established with related clusters including WASH and Early Recovery. The GoB established a special fund of BDT 507 millions taka for housing reconstruction grants for families affected by Cyclone SIDR. The MoFDM has distributed 16,454 tents and 13,000 bundles of corrugated iron sheets, in addition to contributions from WVI and CRWRC. Shelter Box Trust is distributing 624 shelter boxes as temporary shelter for those who lost their homes.

### II.3 Key specifications of 4 Unions Parishad in Thana Mathbaria selected

**Geographical context**

- This district is composed mainly of low-lying land areas, considered as high-risk areas. During a normal monsoon season, those areas are not so affected by flood notably for the households leaving near the river. At opposite, the risk is more potential for the households leaving in the inland in case of heavy rain. In fact, in case of cyclone as SIDR, the coastal area was affected by tidal surge and tornado (local impact), destroying around 90% of the houses (first line), and around 60% of the houses on the inland (second line).

- Coverage of forest is remarkable with high density of tree plantations (road side plantation, within villages). Indeed, instead of considering as an advantage, this density of trees has created a lot of damages on the houses. 30 to 40 % fall down due to the strong wind. However, the tree plantations along side the coast (green belt project etc.) as well as on emerging chars (most of them occupied by forest dpt.) had a positive impact on reducing the swiftness of the wind protecting even the houses.

- Ponds abundant throughout the division, part of almost every homestead constitute an element essential of households' homestead. They are using for different purposes such as drinking water, fishing, washing etc. After the cyclone, most of them are infected by salted water, leaves from trees and divers other materials (animals), so unusable, at least for drinking.

- Soil condition composed of clay and clay loam is adequate in the rice production up to 2 seasons. Vegetable is partially cultivated in homestead. Certain crops like, spices, groundnuts are also produced in sandy loam. The clay soil constitutes also an advantage for building the base of house and eventually in the construction of bricks.

**Population and housing**

- 4 to 6 persons per unite is the family size, quite high in comparison with the overall Bangladesh (4.5 members / household).

- The household typology of the district is defined as the following.
  - About 25% of extreme poor (nor or to 0.49 acres).
  - 35% of poor marginal households (0.49 to 1.49 acres).
  - 25 % small farmers (1. 50 to 2.49 acres).
  - 15 % rich farmers (2. 50 to 7.49 acres).

- According to the investigation, there are 5 % of female-headed households, considered as very poor, most deprived persons. Alone, a woman has a lot of difficulties to sell her labour or selling products to market (it is not allowed).

- 2 ethnic and religious minorities are represented in the selected areas Hindu and Muslim population.

- Village and housing pattern are divided in two parts:

1- Along the rive side (first line), most of households got a plot of land from the government, without a real formal agreement.

2- Inland calling the second line is characterized by isolated homestead with a densely

grown/planted tree (timber, coconut, and betel nut). Land tenure in this case is very different from households to households, at least 50% of owner of their homestead. Generally, the houses are made with traditional design and techniques with modern materials. In Fact, at 70 % the housing has been build in CI sheet including roof. The thatched roofs are located in remote areas with poorest households. Most of them had technical problems due to the using of local technologies not appropriate for resisting to violent cyclone such as not enough foundation, too tiny wood section, structure inadequate, wrong position of house, etc.

- The furniture of households are mainly in wood such as bed, cupboard.

**Infrastructure and transportation**

- Road network. considerably improved in the last years with the construction of bridges and culverts, only some bridges have been damaged as well as some part of the roads due to the breaking trees. In the rural areas, many small dikes are still available for rickshaw, motorbike. Some of them were spoiling but very quickly the local authority tried to repair them with food for work. Nevertheless, the dike along the main river was badly damaged in many parts, important access to all villagers.

- Water based transport system has been completely destroyed. Many boats have disappeared. This lack of transportation has increased the cost of transport.

- Schools. There is not a homogenous concentration of school mainly for primary education in the district. Fortunately, the main schools building inside the area have been used during the cyclone to protect them. Only a few percentages of roofs have been gone out.

- Electricity coverage. Before the cyclone, 50 % of the area was covered by electricity supply. Today the overall district is without electricity supply since the cyclone SIDR.

- Cyclone Shelter Centres. Government and the European Union undertook this initiative.

Fortunately, those centres were used efficiently during SIDR allowing protecting a large number of persons. It seems that the population did not believe the announcer at the beginning of the cyclone and went very late to the centre. For others, either it is too far from their home or they have the fears of stealing their assets were another reason explaining their enthusiasm to join the centre.

**Local and International NGOs intervention**

Generally, the local NGOs are well established in rural areas, managing different development projects in heath, social, and agricultural sector as well as in micro finance which are providing loans for households for micro business, health etc. based mainly in Grameen Bank system (weekly payment). The network is quite strong everywhere. In addition of that, there are different international NGOs involved in rural areas, very often in partnerships with local NGOs which address their support to same sectors, depending of their specialization (children, women, fisheries). Some of them work in disaster preparedness, which has contributed to limit the damage.

At field level, there are two public organizations, one is more thematic, involved in particular sector such as fisheries, agriculture and livestock for instance and the second entity is in charge of local administration, playing even in role in local governance "the Union Parishad".

After the cyclone, the central government has mobilized the both parties above for ensuring the relief distribution (food, medicine, water, etc) with an additional support from army. The local and international NGOs established in the selected areas have also replied quickly to the demand of households, in the context of first emergency. All the families received clothing and bedding, personal hygiene items and new cooking and eating utensils. Even, the extreme poor got some shelter material like plastic, CI sheet.

Other international NGOs as Solidarités came also in the context of emergency, providing kits and technical support for cleaning the ponds for instance.

A lack of Coordination has been identified at district level in which the government has tried to mitigate in establishing a SIDR Shelter Cluster platform. This enable to coordinate the activities, identify needs and sharing information.

The table shows the summary of loss and damages of the cyclone "SIDR" in Thana Mathbana.

| **Types** | **Thana Mathbaria Upazila** |
|---|---|
| Total areas (sq. km.) | 353 |
| Total areas affected (sq.km.) | 126 |
| Total union | 20 |
| No. of affected union | 8 |
| Total  of population | 259 000 |
| Total of severely affected population | 60 000 |
| Total  of family | 55 000 |
| Total  of affected family | 15 000 |
| Total of houses damaged | 16 000 |
| Life loss | 95 |
| Injuries | 380 |
| Total of cattle died | 72 000 |
| Total Agriculture land (in hec) | 24 497 |
| Total crops damaged (In hec) | 322 |
| Total of sanitary latrine | 6 050 |
| % of Latrine damage | 75% |
| Total of tube well | 2 408 |
| Total of Tube well damage | 170 |

Sources: Assessment of damage and loss (according D-Form) conducted by DRRO office of Pirozpur and Bagerhat Districts and Assessment report of Uttaran-Shatkhira, Rupantar-Khulna, ICZMP (16 & & 17 novembre 2007).

## II.4 Detail description of the 4 selected areas


Within the district, the selection of the areas of investigation was done based the following criteria:

- High percentage of housing damages,
- Presence of extreme and poor households in large number,
- Diversify types of housing situation (along the river, inland, occupation of households etc…).

The team met almost 30 households, organizing an interview for each of them and visited 250 houses, which have been badly damaged by the cyclone. One week after the cyclone, the majority of the people, which the team met, are leaving under a shelter.

*Embankment from Kheta Chira to Kachu Baria*

### II.4.1 Kheta Chira North (first line) Union Parishad

The study area is located in the riverbank of the Baleswar River, considering as a major river of the Upazila.

Embankment (locally called "offda"); it is a main protection against flood and waves. The habitants are using even as an access of communication by rickshaw. As the photos show, it was been badly damaged by waves (at least 7 feet). None protection was done on the embankment (with grass, cement etc). That explains that the house and paddy field settled front of the river and behind the embankment were completely destroyed.

Most of those households leaving in this area are landless (land belonging to government), selling their labour every day notably man (e.g. fisherman), classified as extreme poor households. They have mainly one source of income per family. The housewife mostly stays at home and looks after the family. She manages generally few domestic animals such as goat, hen, duck and even cow for the less poor supporting also the livelihoods of family. The families could not afford three meals by day around the year. Generally, those had a small house (1 to 2 rooms) in dry grass materials (straw, bamboo), CI sheet for the roof and wood.








Among them, few have a better economical status with productive assets and business activities.

Because they were very far from the cyclone shelter centre (at 3 km), and they were not really about the gravity of the cyclone SIDR most of the families stood in their place during the cyclone. Some of them climbed on trees and others took the chance of staying into improved houses (e.g. permanent and semi permanent house).

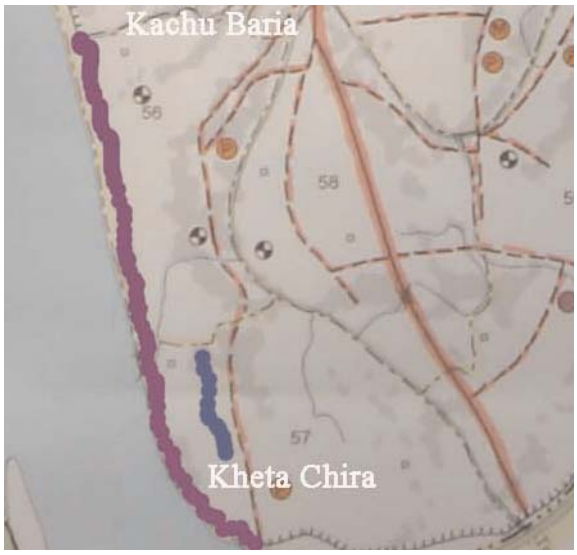
About 95% of the people have lost completely their house and have become homeless, including all their assets (kitchen items, livestock, boat, fishing net etc.) and the majority (90%) of the people were under shelter of emergency. At present, those households gave an estimation of the price for new house about 20000 BDT, in using CI sheets more convenient for them in term of durability.

Thanks to the support of government and NGOs, most of them received help after the cyclone (water, cooking utensils, clothes), which could not be sufficient. Moreover, most of them, they have borrowed money from NGOs or moneylenders increasing their precariousness regarding the repayment of their loan. In addition of that for certain, who built their house on the embankment have lost their land.

After the cyclone, those households either have joined their relatives or have set up a shelter on the damaged embankment. They made that with available local materials like wood, polythene or the material they could collect from the affected area. The living condition is below the standard.



### II.4.2 Kheta Chira North (second line) Union Parishad

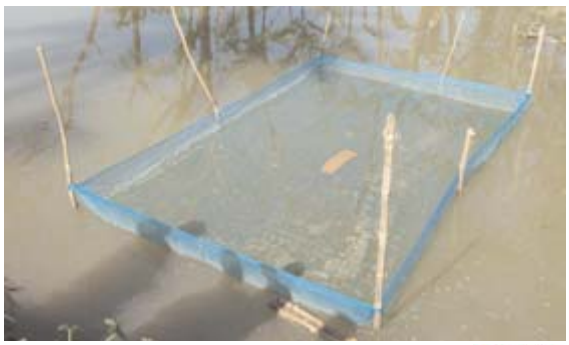



Typology of the inland

Typically, calling Inland area, this zone is interrupted by field rice at 70 % and raising places, in which the households have settled their houses. Those places can take different shapes and sizes depending of field rice and distance with Main River (from 50 to 150 metre). The difference of level between field rice and those places are not so high between from 50 to 70 cm.

Generally, in addition of their house, they have a small plots of land (homestead), where they cultivate different products for their own consume (vegetable, spices, fruits, etc.) and the surplus are sold to market, ensuring a minimum of income. For some of households, they have invested in tree plantation covering a large part of this area such as "Rentry, Mahogany and Shil koroi".

Within those places, the government has also allocated some places for the extreme poor households in which they could organize tree plantations.
This site plan shows a group of families, which have pond, vegetable garden and places for domestic animals (cows, goats, sheep, poultry...).
Almost of the families settled within those places, at least no so far from the river (50 to 500 meters) are professional fishermen with their own boat.
They have even other activities in agriculture, exploiting their homestead described above. Categorized as marginal poor, they have further assets, than the poor fishermen from the first line. They can rent or buy a plot of land for instance (25 000 BDT / 50 000 BDT per year). Some of them have a pond near their house where they can do fish breeding.










Three type of boat were identified:
- Bigger one (trawler) with motor, used for fishing in ocean, can carry seven to ten fishermen.
- Moderate size: used for fishing locally. Can afford the fishing net.
- Smaller one: also used locally and can afford borshi.

In fact, most of them have lost their boat after the cyclone.

Due to its location, protected by the embankment, this area was not directly hit by the waves but it was nevertheless submerged for a short time. Indeed, it was the strong wind in which has created more damage. At least 50% of trees are fallen down, crushing 20% of houses. Then, the huge storm has accelerated the process. Within this area, 85% of houses have are collapsed and turned over.

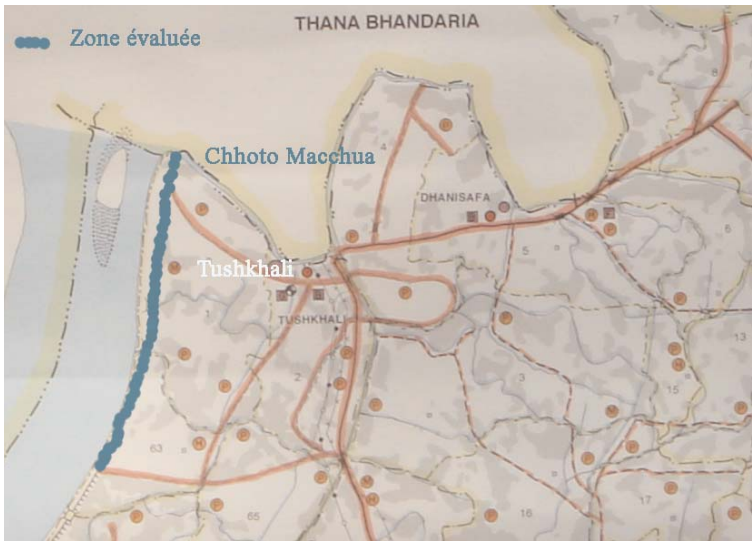

Landslide and houseslide

It is important to notice that the technique of building their house on a clay base, has limited the damage from flood. At opposite, due to the wind, the houses have moved from their base because generally were not enough fixed on it. So, the bigger house with a wood structure have resisted and moved from their base without collapsed. Then, for the rest of houses, which were not so well built, they fell down from their base, and were broken.

For this case, a majority of households have built shelter with their previous material available. They are ready to stay in this condition at least 6 months in waiting the high season of fishing. They are hoping to receive some support during this time.



### II.4.3 Tuchkhali Union Parishad




The area is located in the north of Thana Mathbaria. The villagers leave in very particular place between the main riverside and the embankment. Generally, they have settled their place in high land within the field rice as the second line described above.

Chhoto Macchua the long of the river

The communities are composed of mix group, certain owner of their land and other landless having received the authorization from government for staying here without formal paper. About 60% of them are fishermen, 30% of daily labour and 10% have developed business activities. The well-off people, landowner (homestead, fish pond and field rice) and businessman, have build solid houses with 2- 3 rooms. Even those families' rear poultry and cow as well tree plantation. The remaining households are similar to the first line described above (landless and extreme poor, etc) therefore very vulnerable.








The households (landless) are leaving quite close to the main river suffered a lot from the cyclone damaging their house due to mainly the strong wind. Those made without any protection with trees for instance were more affected than the people with organized trees plantation around their house.
In case of well-off people, the damages are similar from the second line described above, the house shifted or collapsed from their base according to the solidity of structure.

Due to an easy access of this area, those people who lost everything received more supports that the rest of areas from the government and NGOs, notably in repairing the affected roads. Other people as the fisherman restarted their activities in repairing boat and fishing net. Most of them were bound to moneylenders in borrowing money, increasing again their vulnerability.

Most of them tried also as the second line group to rebuild their house or shelters as they could with one or two rooms. Some of them made a complete house, but being aware that the techniques used are not so appropriate for resisting to other cyclone.




### II.4.4 Bara Machhua North Union Parishad


The last area of this investigation describes the zone of exchange of commodities and people, with an easy access to river. Numerous ferries and boats come from the north of Bangladesh and the sea. In this part, there are tows which separate under zone, one is a concentration of very small houses made in dry grass and the roof in CI sheet near the small port, where are living mainly day labour, rickshaw man etc. They are mainly extreme poor as the first line described previously.

Bara Macchua North

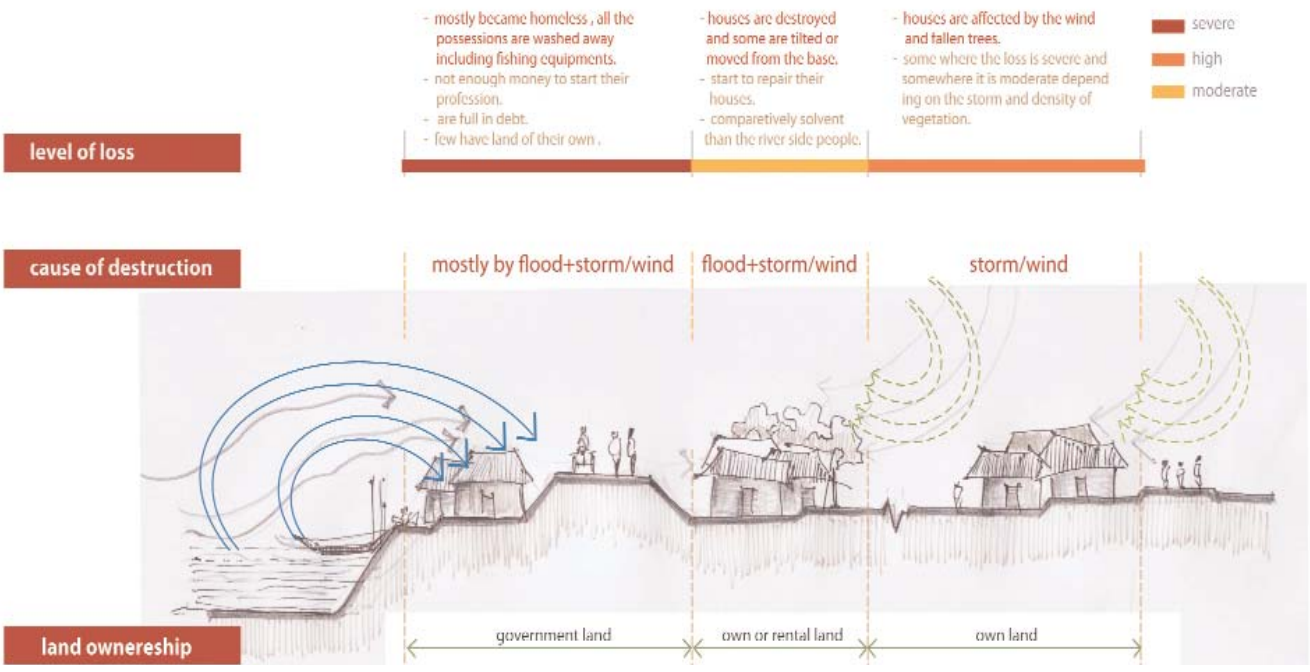
A second place, very near river, without protection (trees or embankment), a set up of house have been established, which are completely destroyed after the cyclone. Most of families went to the small port or migrated to other places, where their relative may welcome them.
As the previous case (first line), most of the families living near the small port as well as near the river have lost their houses and assets and are completely dependency from external supports.
It is somehow one particularity of this place, those households have benefited of support from private sector and well off people.








90% of those have built shelters and wait for further support. It is currently impossible in their case to collect material because they have lost everything through the river. They have estimated their needs at least from 60 000 BDT to 80 000 BDT for building a new house, but without guaranty of longevity.
This group is worried for their future: they do not know if they have to stay or migrate, that will depend of supports.



## III. Existing situation of the housing's households and homestead

### III.1 Existing typology and traditional organisation of housing

Within the four selected areas, there are generally 3 types of traditional housing identified, which depend on the economic status of households and the location of their settlement. Labours / landless as well as farmers-fishermen are the main category in this area. Part of them live in inland and behind the embankment (second line) and another part near the river (first line). In average between 4 and 6 persons live in one house for all the categories.

**"Kutcha" house:** 40%
- Floor area: 15 to 35 m2
- N° of room: 2/3 rooms + 1 kitchen outside + some latrine rebuilt + 1 veranda + 1 cowshed
- Water and sanitation: access to public and private pond, or river
- Condition of the house: Base in mud, wall in organic materials, jute stick, catkin grass, straw, bamboo, mats, etc, timber or bamboo frame, roof in thatch - rice or wheat or maize straw, catkin grass, etc with split bamboo.

**"Semi-pucca" house:** 50 %
- Floor area: 15 to 35 m2
- N° of room: 2/4 rooms + 1 kitchen outside + latrine rebuilt + 1/4 veranda + 1/2 cowsheds
- Water and sanitation: access to private pond
- Condition of the house: Base in mud, sometime a circle of bricks and cement around the base in mud, wall in CI sheet and wood, timber in wood, roof in CI sheet

The upper floor is typically used for storage facility and guest room. They used wooden steps for climbing. The upper floor is airy. It works as an insulator during the day and at night it is airy because of the height. Comparatively these houses are more stable worked as an informal local house during the cyclone.

**"Pucca" house:** 10 %
- Floor area: 15 to 35 m2
- N° of rooms: 3/5 rooms + 1 kitchen inside or outside + latrine outside + 1/4 veranda + 2/4 cowsheds
- Water and sanitation: own pond
- Condition of the house: foundations in bricks for stabilization of the base, wall in CI sheet or bricks, timber in wood, roof in CI sheet.

**Common materials generally used in the three types of house**

Usually, there are several parts of houses as follows:

- "Vita" the base is usually made in mud (1).

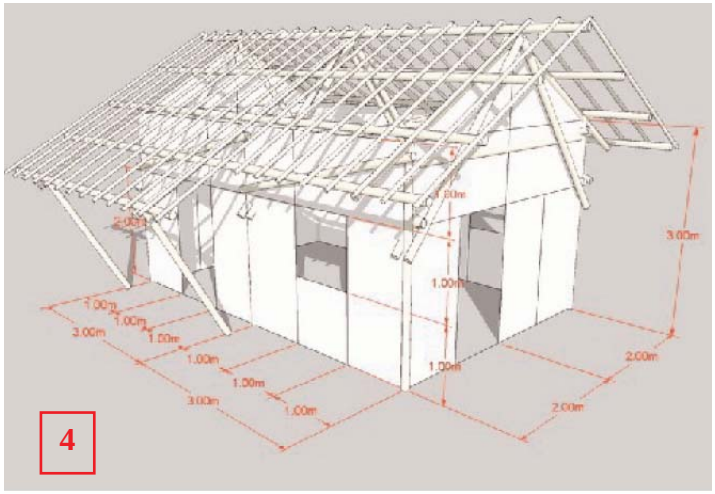

- "Deoal": the walls are made in different type according to the economic status of the households (2).

- The extreme poor made the frame with bamboo and put "hogla" (one kind of dry grass) between of them.

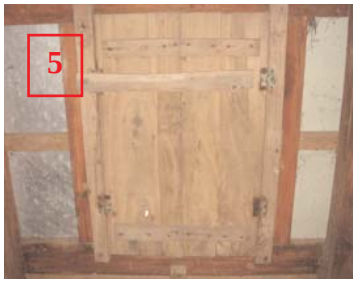


- The marginal households build the frame with wood and put either CI sheets or wood to fill up with plank.

- "Khuti": the pillars are mainly in timber trees (with "y" corners at the top) or in wood column (3).


- "Dia": the beam is both in square and circular section, made in bamboos or wood.




- "Chaal": the roof is made mostly in CI sheets with two formats, one is do-chala (slope in both side) (4), another one is chou-chala (slope in four sides).

- Doors and Windows: they are typically in wood, which is made in the site (5).

Labour and construction:

The construction is usually executed in two ways.
- By daily payment 200 BDT per day for each labour.
- By making a contract with the craftsman.

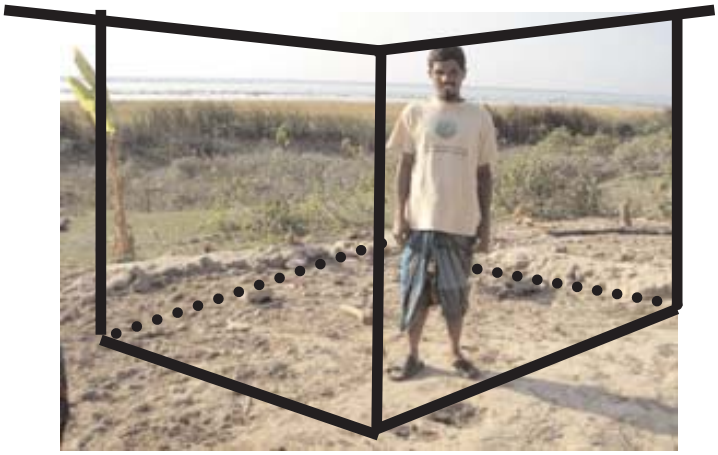
### III.2 Existing situation of housing initiated by the poor households after cyclone

**80% of households built a Shelter with material available on the place (both type "kucha" and "semi pucca" house).**

For the households who had their house partially or completely destroyed, they made a shelter in using local materials available on the place like thatch or leaves from coconut trees as well as old CI sheet. They prepared a frame and just put leaves on the frame. Sometime, they used fishing net or polythene plastic either as roof or putting on the floor.

Two types of shelter were built generally, one with flat roof and other sloped roof. Usually the sloped one takes few efforts to construct but it provides less space. Directly on the ground, 1 room and 1 kitchen outside as well as latrine rebuilt (area: 9 to 16 m2) were generally the standard shelter.

In regard of water and sanitation, the access to public and private pond was possible, but most of them were damaged after the cyclone and so unfitted to drink.



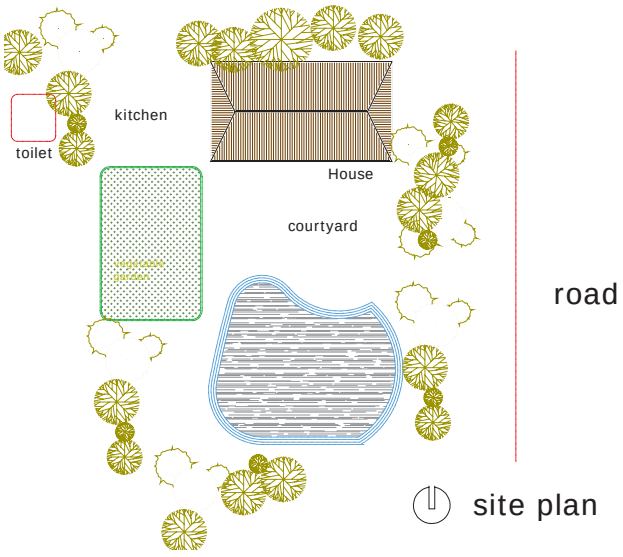
*This man had a small size of government land, he lossed his house and rebuilt a shelter near his first house*

*This family was living along the river, she looses all their tools, house and boat. She is settle now on the dike and try to find a solution for the futur.*

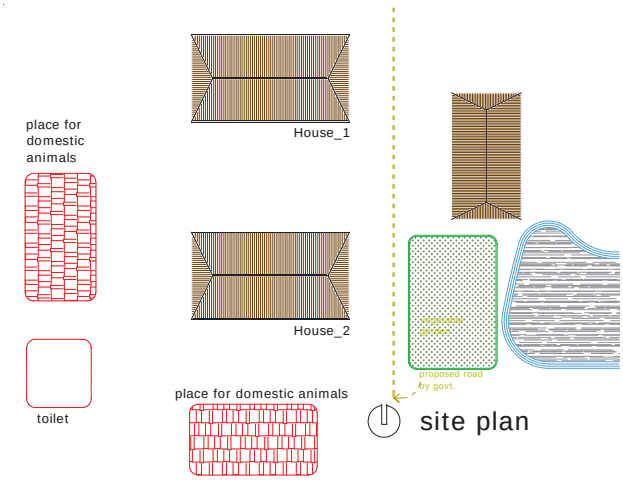
**20% of households consolidated their previous house mainly the type of "semi-pucca" house.**

10% of the 20% households used wrong and not appropriate technical methods which could be dangerous for their life. Fortunately, the remaining households used standard technical rules. Nevertheless their rebuilt houses could not resist to another cyclone.

*This family rebuilt but she is afraid on the futur*




*Typical site plan 1*




*Typical site plan 2*

## III.3 The non appropriate technologies of building house and technical solutions

During the assessment, the team identified non-appropriate technical methods to maintain a strong house against next cyclones. In this part, the non-appropriate technologies used are presented as well as some technical solutions.

### III.3.1 Base problem

#### a. Pillars or beams affected by termites

The percentage of pillars and beams affected represents more or less 70% of the housebreak in the inland.
The households do not change the sick pillars or beams. They presently add a new one near the affected wood which pass parasites on to the new one.

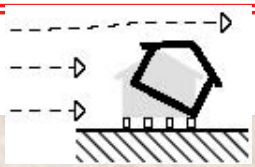

**The simple solution is to ensure the treatment of the wood every year with the following products:**

**1. Treatment with molten bitumen, Mobil or sump oil, or a combination of these can be used as soon as the beginning of the house construction.**

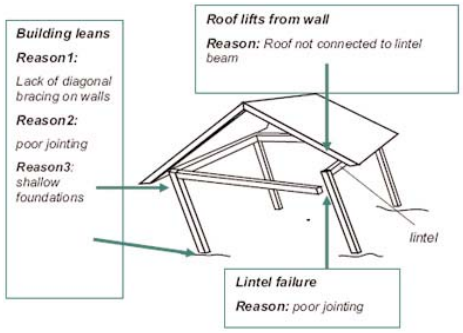
**2. When one beam is changed, we shall take out the damaged beam or pillars.**

#### b. No fixing the house with the base

Houses are built on the base without any hooks into the house foundation. Furthermore the corner pillars are placed very often close to the base border called "pira", which weakens the house. If the "pira" is built longer, the roof should be extended as well, which would be costly. Households show their unwillingness to make it longer because of cost.

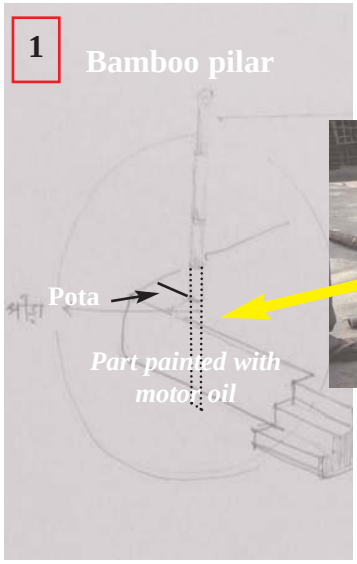



If they put the foundation inside the mud, the "khuti" (pillar) will be damaged within one year. The pillars are only attached with the frames/wall ("kase"). Nevertheless in certain houses the interior pillars fit into the mud as a fixing system. It is not such an effective system in case of cyclone but at least it could resist againt strong winds.


Building collapse due to poor foundation, walls or roof

1

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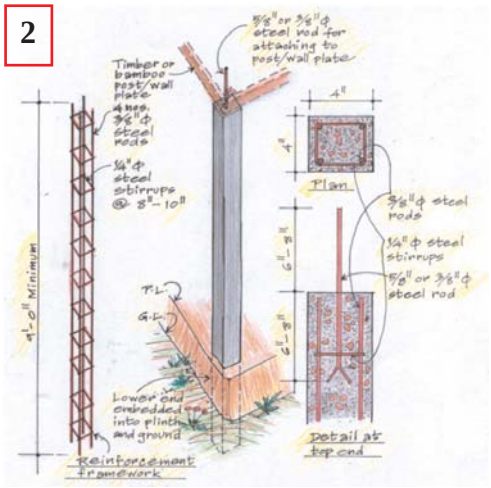



**Regarding technical alternatives, it is possible:**

**1. To protect the wood, if we paint lower part of the pillars (bamboo or wood) with motor oil or bitumen.**

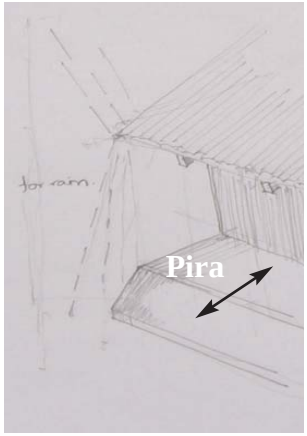
**2. To fit up pillars in concrete in order to have a structure more sustainable against cyclone and not so much expensive in a long term way. The concrete pillar has to be deeply gone in the soil as well as in the base.**

**3. To fit out the corner pillar with sufficient space between the base border at least of 30 cm.**

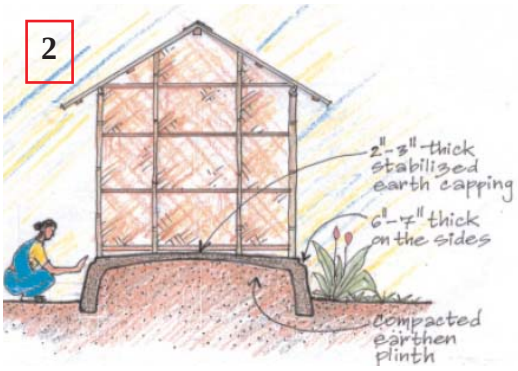
### c. Weak compacting of clay soil of the house's base

**The base (pota)**

The quality of the soil in those places formed by clay is quite good to build base or wall. The "pota" (base) is made by clay and straw, which plays a significant role in the stability of the house and requires a regular maintenance every week.

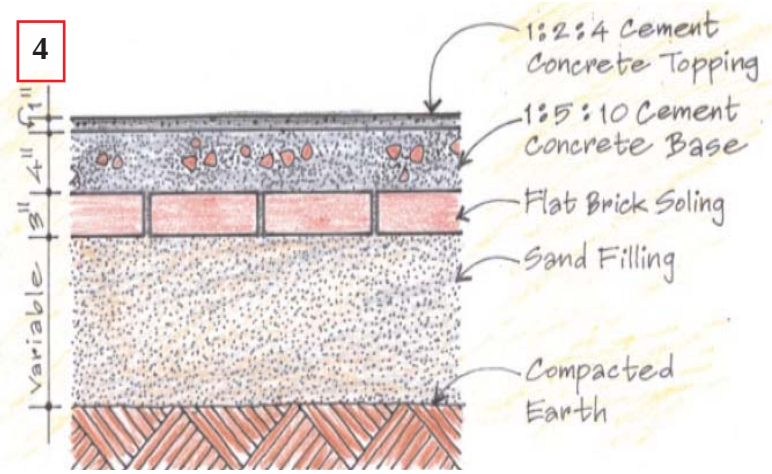




1- The compacting "pota" method organised by households is generally good but the level should be improved in order to ensure a better protection from flood at least of 3 or 4 feet.

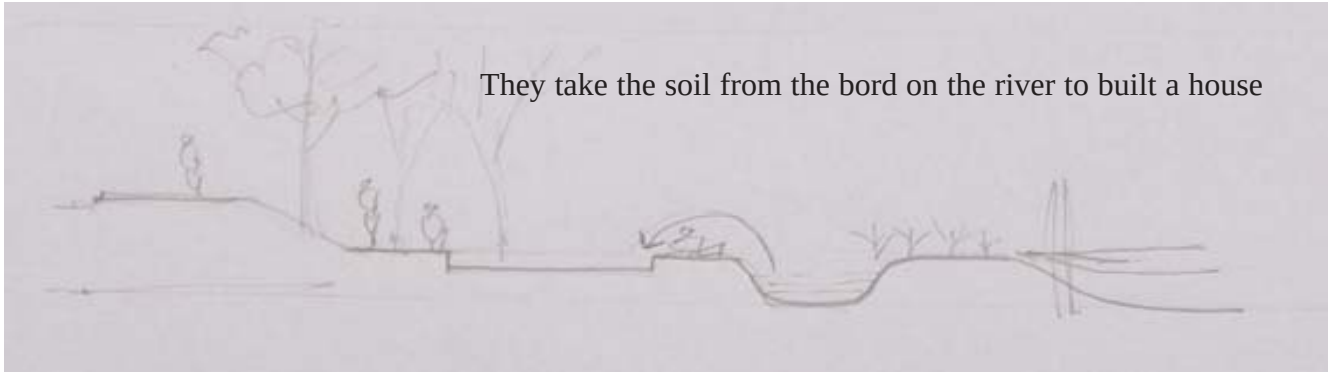




2- In order to stabilize this base, a cover, mixture of ground and cement can be carried out. The proportion of cement depends on the nature of ground, which can easily be tested on the site.

3- A brick perimeter wall around the typical earthen plinth can be done to resist water erosion. It is certainly more expensive but constitutes a good protection against flood and other animals (mouse, snake…).

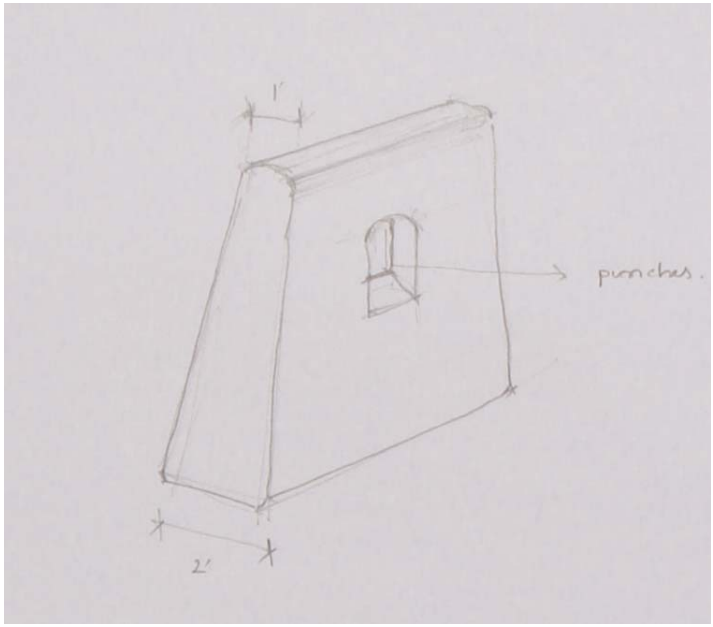

4- In addition of that, it is possible to do a floor in bricks and flagstone in concrete, then put a plastic sheet under the line of bricks, which will more effective against humidity.



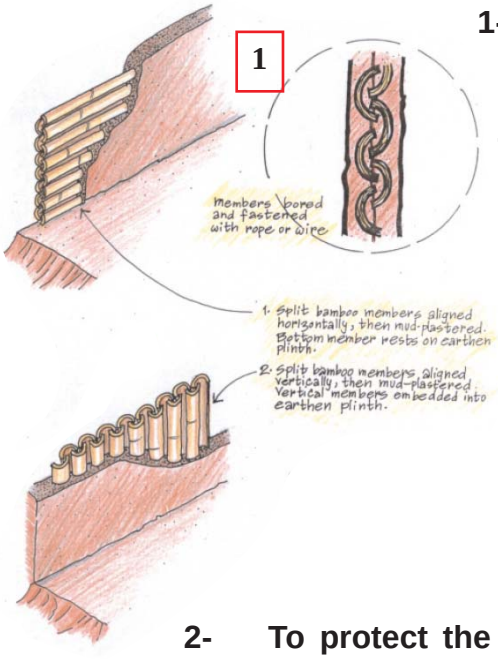
**The wall**

The walls were usually built with mud. The CI sheets currently replace mud walls at 95%. Some of the households, who were still using the mud construction, were very surprised when their 15-years house was totally destroyed by the cyclone. Mud construction is usually more strength than CI sheets construction.

In this case, they don't have anymore traditional materials to rebuild a shelter (see photo).




*This family loose his house old of 15 year and leave now in a very small shelter*




**1- In order to consolidate this mud wall, there are different alternatives as follows:**

**- To incorporate bamboo inside as the sketch present;**

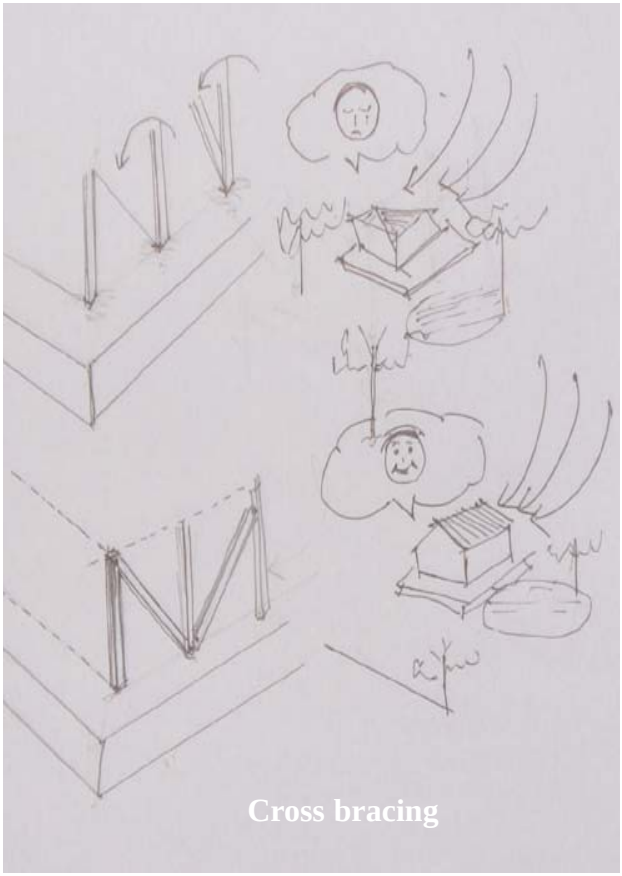
**- To use concrete pillars at the corner.**


**2- To protect the wall by a roof extension (see photo).**

### III.3.2 Weakness of house structure

In most of cases, structure problems are typical in all houses visited by the team. Households invest low money for materials, they don't really take care about the strength of the house. Used materials are not well-estimated and not well-appropriated for the house against cyclones and high winds. Moreover, quality is also very low without any technical standard. A not-dried wood quickly breaks clean off under powerful cyclones or winds, for instance.

Furthermore lack of low-ties and joints between house structure materials make easier bracing failures. For instance, the distance in length between two pillars is quite too long to well consolidate the house. Tilted wood sections within two pillars (e.g. triangulation) could therefore guarantee a good stability for the house structure. Households lose a technical know-how over the years.



Cross bracing

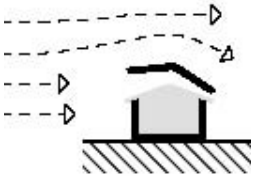
**In order to strengthen the frame and structure of houses, material purchase and house construction households should make sure that wood is really dry before using it for construction:**

**1- Material (wood, bamboo, etc) is suitable according to its use (timber frame, pillars, beam, plank, etc) particularly concerning section which should be very well measured. A technical support should be provided to advise households.**

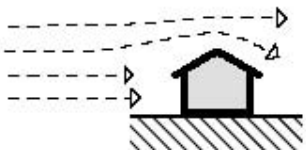
**2- The wooden ties/joints should follow the 1/3 rule of carpenters. Those ties/joints have to be tidy in order to avoid lack of technical strength of the house structure.**

**3- The triangulation is another technical skill which needs a good expertise. In most of the cases, this technical system is never applied. Bracing cross with wooden sections should be built to strengthen stability and wind resistance of the structural frame;**

**4- Number of pillars and distance between them must be respected to ensure the stability of the structural frame;**



**5- The roof frame should be stronger with thicker CI Sheets which is a well-guarantee not to lose its roof.**



### III.3.3 Land management and infrastructure maintenance

Houses, either homestead or houses group, don't have any protection and/or plan in anticipation of next floods and tornados, which does not seem as a priority for the population.
Some simple technical solutions could be used to protect houses and to reduce risks of total destruction:

**1- To use other timber trees, which fixes firmly the ground with roots (vetiver, bamboo, etc);**

**2- To develop a sketch of homestead/houses group to improve the drainage as well as to slow down strong wind with for instance hedge trees, etc;**

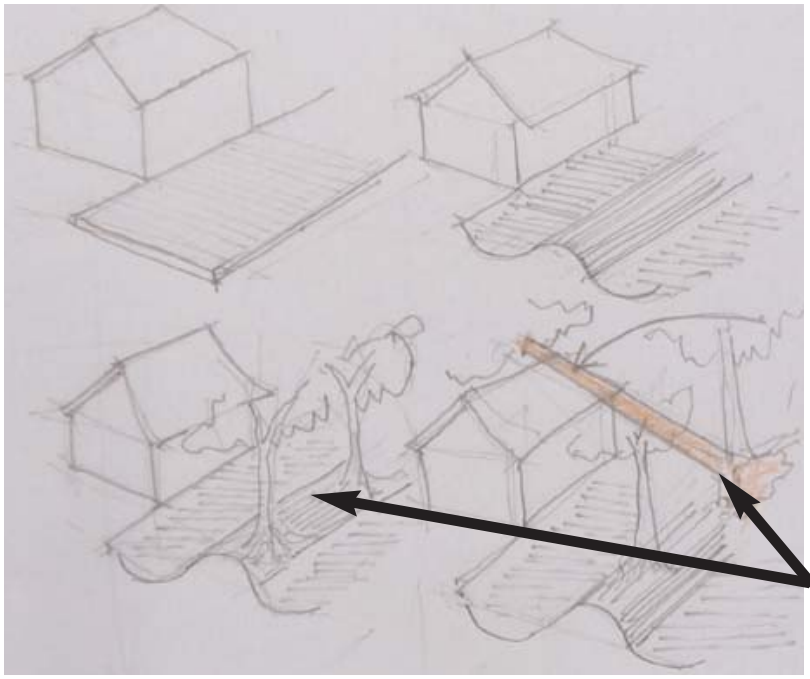
**3- To be sure that ground around houses is on a slant outside-facing.**

A regular maintenance was not provided by the Union for infrastructures as embankment or road, which increased damages during cyclones.

**4- To protect the embankment / road with folders, vetiver, which consolidates them.**

**5- To promote daily workers to repair quickly all infrastructures damaged.**

The cyclone SIDR attacked the area from the north side. Not well-protected house places by sufficient trees on the north/ northeast side were more strongly disaster.



Different kinds of trees were planted around houses with a surrounding canal to give more ground into the base of trees. Consequently, tree roots were not well-anchored in the earth and trees were less strong to resist cyclones as SIDR. Most of these trees were uprooted and fell down over houses during the storm.

## IV. Strategy of interventions: proposal and recommendations

### IV.1 Proposal for a housing project supporting the extreme and poor households after the cyclone

The assessment team suggests two strategic objectives depending on the targeted population and major identified issues.

The extreme poor households are mainly landless and work in unsafe economical status as daily labour. Due to the cyclone, they lost everything, their assets and complete house. Most of them are located in the first line near the port and they presently live in shelter.

The poor are marginal or small farmers mainly located inland. Most of them are owner of some plots of land (0.49 to 1.49 acres) or landlord. They built sturdy house in wood for instance. One part of them are well-established fishermen with their own boat and the second part of them are rice and vegetables producers. They lost partially assets and house but everything is not completely destroyed. Due to their economical status, they are able to restart quickly activities.

For the first group, the team proposes the following specific elements to support those households to rebuild the housing:

1- A plan with one piece and the appropriate structure (frame);

2- To provide a basic Kit of material as grants (at least cement pillars and fixations). If necessary an additional support could be provided for the most vulnerable households (e.g. women) as cash for work for example;

3- To access to "kash land" belonging to the government and to support the administrative regulations to get official document.

For the second group, either they have enough assets to rebuild / rehabilitate housing according to the appropriate technical methods as before described or they borrow the financial amount and take a loan with Micro Finance Institutions (NGOs).

The proposal is as follows:

1- A plan / design for new house with one piece, integrating all the potential extensions as other pieces, stored room by using improved technical system;

2- Or a plan / design to rehabilitate their house with appropriate and improved technical system;

3- To facilitate access to micro finance institutions and by supporting them to develop a business plan.

For the both groups, general support and accompaniment will be provided as below describes:

- To organise awareness sessions about low-cost housing technical methods and its potential;

- To promote organisational development at village level in order to create further solidarity and self-help group between the households. Furthermore this approach will enable to organise in group certain events training or general information;

- To train and to support the appropriate and improved technical way to build. Suitable maintenance in the climatic context will be developed with households;

- To introduce during the campaign preparedness disaster, the concept of low-cost housing adapted to cyclone and floods;

- Additional support could be provided in the reorganisation of their homestead in order to protect house against flood / cyclone etc such as drain, hedge trees;

- To work more closely with local administration in order to find common solution for helping extreme poor in accessing housing (land tenure and housing) and to simplify the administrative process for regulation of land tenure;

- To develop collaboration with micro finance institutions to promote innovative financial products for accessing house (loans with low rate of interest).

In parallel of that, a set up of activities would be done with the masons, which local persons experienced in this field of housing and are already selling their services as service providers. The idea would be to develop their capacity about those new low-cost technical methods in order to ensure them as project liaison.

Regarding the intervention areas visited and often not too much accessible, it would be simple at the beginning to concentrate the activities of project in specific areas in order to ensure a quality of training and a better control of activities as well as to provide closer follow up of households. As it is innovative project, the front line and inland zone have to be considered. At least two unions will be selected for starting the project. Those have to be dynamic and showing their interest to do something in this matter for helping their population, notably the extreme poor.

The use of low-cost technical rules will be a principle of the project; which the extreme poor can afford those. As low cost technical rules the team suggests to use available local material (wood, CI sheet) as well as to use the know-how from the masons. Low-cost technical rules is even simple in the sense of already used by the households, but the way of using it by the combination of different traditional technical use improved the sustainability of the house: it is case for example of the plinth in brick around the foundation.

Due to its innovative character; the project should start progressively with a first step of one-year initiative in order to test the technical method; the methodology; training and tools. If we consider that one house can be built in one week and 60 local masons will be trained by the project; it would be possible to build or to rehabilitate 500 houses during one cycle of 4 to 5 months. More or less 1 500 houses and 6 000 to 9 000 persons would be targeted during this phase. A second phase could be planned for at least 2 years in multiplying the numbers of local masons trained; playing a role of service providers selling their services to households between 4 000 to 5 000 houses could be addressed in this way.

<u>The development of Partnerships is key factor of success of the project; there are different levels as described below</u>:

- Local NGO as Gonoshto Kendro, will play a role of facilitator; keeping contact with the beneficiaries; supporting them in their process of construction; ensuring linkage with local administration as well as by providing the technical support to train the masons for how to use low cost technical

rules etc. The selection of this partner is fundamental: it should have at least a good knowledge on the selected areas and the targeted groups as well some experiences in this type of project.

- The development of partnerships with Local administration at Union level has to be developed to ensure synergy with the project in combination of the efforts to support the extreme poor notably during the phase of construction. At the present time the local administration has already a lot of activities addressing to extreme poor with grants in which the targeted group can benefit helping them in their efforts. Otherwise, the role of local administration is essential for getting access to land in formal way. Therefore; their involvement during the key step of the project is required to give further legitimacy to the project. At least a coordination platform should be organised including all partners of the project.

- Micro finance institutions are well established everywhere in Bangladesh. It is not necessary even to create specific section in micro credit with the project. It is better to work with the existing MFI to develop partnerships. At present those are not so innovative in regard of credit: mainly a weekly repayment with high rate of interest 24% to 36%. That it is not at all suitable for housing credit. So a system has to be developed with them to provide flexible credit appropriate to housing. Certain organisms as PKSF (refinancing those MFIs) are interested to innovate in this sense. With selected MFIs a partnership can be developed eventually to propose a share of the risk if it is necessary.

A coordination platform has to be developed between those partners and as well the representative of masons.

The team of project would be composed of one team leader who will coordinate the project to ensure the human and financial management as well as ensuring the follow up of partnerships with stakeholders (Union parishad, MFI etc...). He/she will ensure the monitoring of the project with frequent field visits.

Two type of technicians would be recruited, one to ensure the role of social facilitator; to keep contact with the households meanwhile promoting organisation development and empowerment process and the second one specialist constructor; able to train the masons and to control the quality of work.

If two unions will be selected at the first stage 3 socio facilitators and 2 technicians per union would be helpful with a strong motivation.

## IV.2 Ideas about the methodology for implementing the project

### IV.2.1 The implementation process at household level

#### a- Detail assessment of household's conditions

In order to select the households, a study will be organised in two unions selected based on the following criteria:

- To be causalities from the SIDR cyclone,
- To live under a shelter or into a risky house,
- To be extreme poor or poor according to the targeted group defined,
- Etc.

For each household, the information above will be collected:

- Description of household: family number; assets; economic activities; incomes, loans on going; etc,
- Housing conditions and a set up of available materials;
- Type of household and supports considered (why? which goal?).

This investigation will be done mainly by Socio Facilitators (SF) with the support of the constructor supervisors. During this investigation the SF will explain also the process of selection and will facilitate the organisation of a small committee at community level; who will be in charge of the communication with the project's team and the organisation of the works.

**b- Selection of households by special committee at Union level**

In order to ensure a better transparency and legitimacy in the taken decision a committee of selection will be formed with different stakeholders from the civil society (local NGO; team of project, resource person from Union Parishad, and leader of community's committee) to select the beneficiaries of the project support.. In addition of that, it will decide about the type of supports provided by the project depending on its category (extreme poor or poor; etc).
In order to organise and facilitate the process of decision the project's team will prepare a folder for each household based on the first step described above.

**c- The preparation and accompaniment of the selected households.**

After the agreement from the selection board, the Social Facilitator organise a visit to the households and the community's committee for informing on the decisions taken.
During this phase the project's team will explain in details the process; the duration and the condition of project in term of participation; grants; rules and the role of community's committee; masons Unions and the project team. The first plan will be presented as well as the house cost.
This first meeting constitutes a key step of building mutual confidence between the project and the households.
At the end of meeting; an action plan will be elaborated by fixing the key dates and the commitment of each partner. This will be presented to local committee.

**d- The socio accompaniment process of the households selected**

The Socio-facilitators will ensure this role during the whole process with the household selected. This will include the following roles:

- To support them on the development of suitable housing proposal according to their economic status and rights such as access to kash land or social services (VGD card), development business plan in case of credit, etc.
- To ensure linkage with local administration and micro finance institutions.
- To monitor the progress of activities while informing the community's committee
- To provide human and institutional development at community's committee (development of action plan, controlling masons, development of committee's organisation, lobbying to Union, etc).

The role of the Socio Facilitators is essential to keep close contact with households in order to avoid deviation from the initial project and discouragement of households.
In case of beneficiaries of loans, it is recommended to separate the functions between the socio facilitators described above and the person who collects the instalments.

### e- Technical feasibility study a key step in the process

After the first introduction of the Social Facilitator, the Construction Supervisor (CS) will undertake the groundwork regarding the housing project, developing work details. Firstly, he/she will make a rapid inventory of fixtures of the current dwelling. This consists of a simple technical feasibility study (realization of sketch, catch of notes, questionnaire and fast assessment of future work to be realized) After the agreement of households about the plan of house, he/she will revise the action plan developed previously, help them to ensure a control of mason and form households about the maintenance of house how, when etc.

### f- The process of building housing

The stage consists in three steps as described below:

#### 1- Design and preparation of material

The following activities will be undertaken by CS in close collaboration with the households:

- Realization of all detailed designs for building house as well as an action plan of the schedule of work;
- Estimation of materials needed, (volume, etc) and cost;
- To help material purchases with the household (quality, location, etc);
- Estimation of labour provided by household;
- Preparation of the technical documents needed for the request of permit building (if necessary).

#### 2- The building construction

First step will be to sign the contract between households mason and the project based on the design, house quotation and action plan:

- Regular follow up by Construction Supervisor to control masons in the technical method used as well as the on going work;
- Monitoring ensured by the socio facilitator (e.g. the participation of household).

#### 3- The end of housing project

- A technical visit is organised with the persons in charge of the project (team), households, mason and Union legal representative.
- To sign the final acceptance of work.

### IV.2.2 Capacity building for masons

The idea is to promote the local masons close to the community who will able to provide service to the households. With the community committee a selection will be done by it according to their expertise and involvement in the community as well their trust.

Based on this list, the project will organise a range of trainings for them on the low cost technologies and improved technical methods described in this documents.

A tripartite contract will be established with masons, project/ households and Solidarites/ GK in order to fix the conditions and rules, in order to control them. A system of payment by attachment will be applied (according to the quantity of work completed) for instance.

The follow up of mason is a key role of the CS to implement improved technical way.

### IV.2.3 To support the regularisation of administrative papers

The regularization of administrative papers notably access to land property is one important step of the process to guarantee the rights of households and to secure them who want to invest in their housing in sustainable way. Generally, it is a long process which creates a certain demoralization of the households to go until the end.

In coordination with the Union administration representative, the project will provide support for the following key aspects:

- Regularization and obtaining administrative papers: cadastral map, obtaining the building permit (depending of the country and the specific system);

- To resolve complex legal situations, such as the joint possession in the event of heritages, litigations of division...;

- Organization and dialogue with the authorities in order to support the steps with the suitable organizations;

In case of extreme poor, financial support to resolve a complex situation may be considered for a group of persons for instance.

## IV.3 Alternative techniques

### IV.3.1 The structure kit mainly in wood

#### a. Tools and materials necessary

Tools. Claw Hammer - Sledge hammer - Broom head - Gloves - Wheel Barrow - Adjustable spanners - Dust Mask - Cement bucket - Flat bar - Chisel and point pick axe - Long handled shovel - 5m tape measure - Trowel - Hack saw - Pack of 10 Hack saw blades - Builders Line (25m roll) - Builders level

Description of the components (materials) of the house.

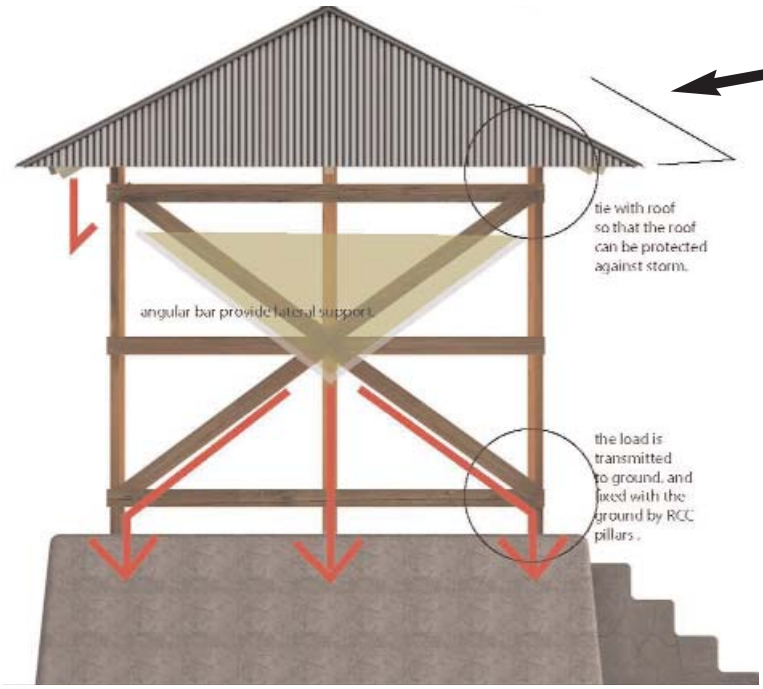
Length and width: 3.1 x 5.1 (around 15.7 m2)

a) Plinth / Fondation: The plinth or floor of the house is raised at 4 feets above the ground level. It is built with compacted clayish earth of good quality.

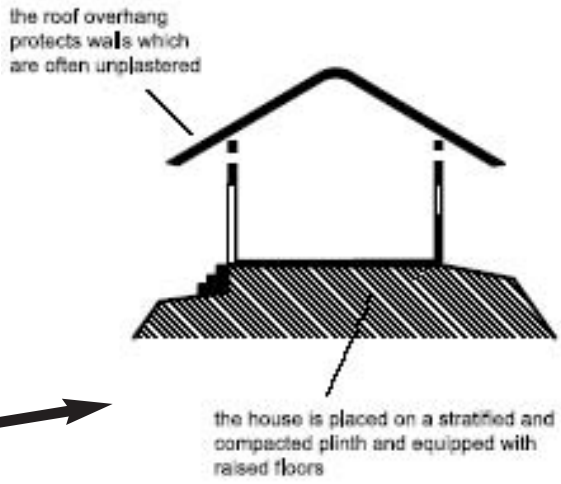
b) Pillars and structural frame: 10 wood post + 10 R.C.C. pillars. These R.C.C. pillars are the basic structure and are into the ground. Then, Wood X bracing and frame constitute the final structure (attache pillars and frame, nails ...).

c) Wood truss and Corrugated Iron  Sheet Roof: Wooden rafter and purlins, wooden beam and wall plate are used as roofing frame. CI Sheet are fixed on wooden frames by nails (hole twisted clamp, nut-bolt with washer, screw with GI and rubber washer) in order to construct the roof. Four sides of sloping tin shed roofs should be made. All the wooden frames are treated for long durability.

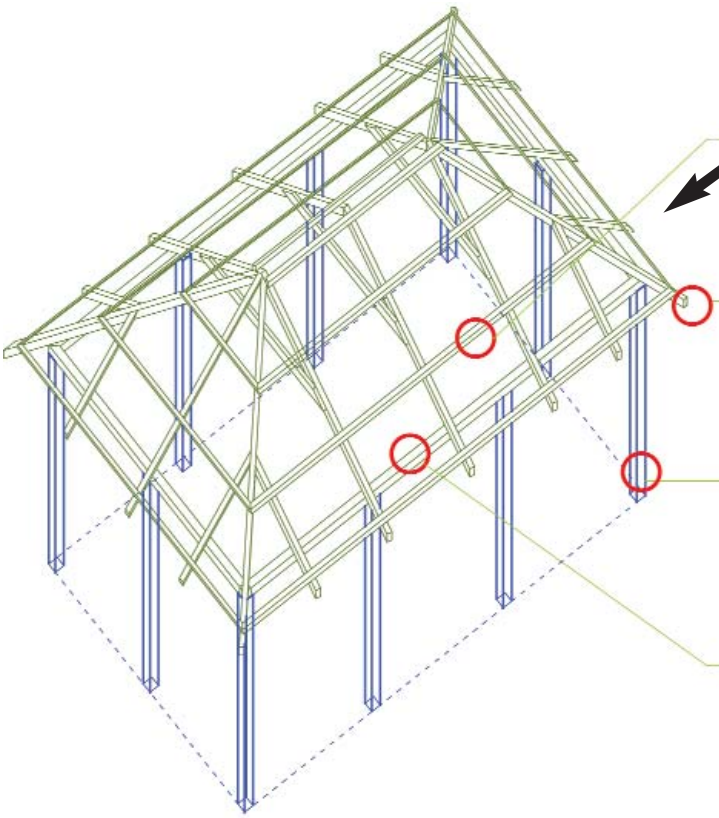
#### b. Design / Pictures




Crossing bracing and slope of roof (30')




Plinth and roof protection



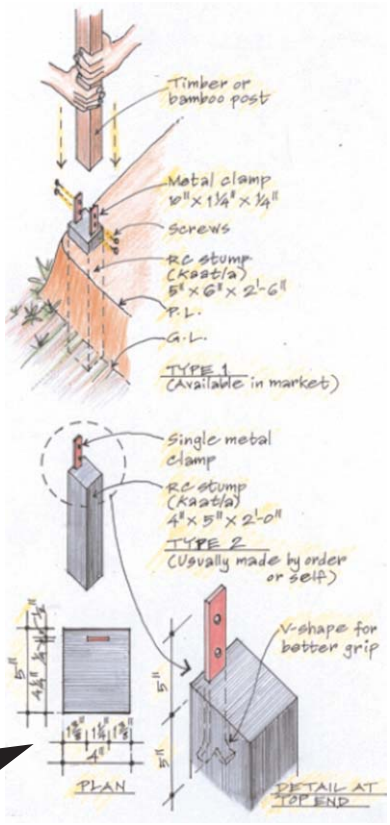
Wood Roof Frame

**CHAYRA**
( usually of 2"*1" wood section.the wood chosen should be RENTRY or CHAMBOL )

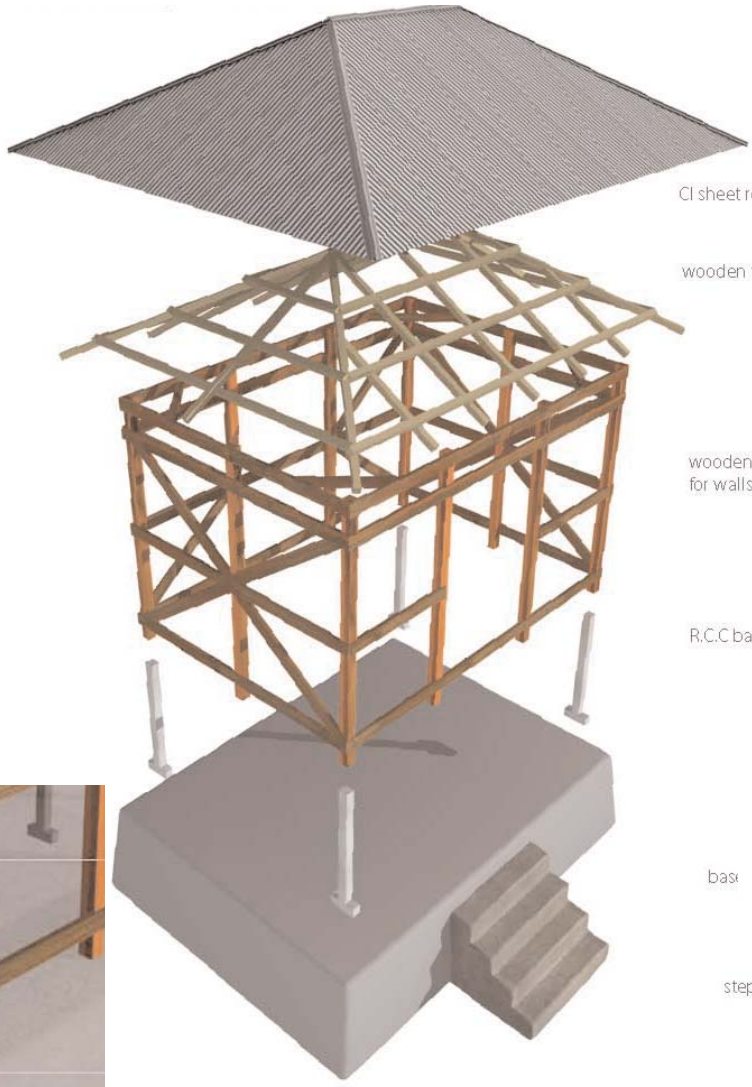
**BORENGA/ RUA**
( usually of 2"*2" wood section.the wood chosen should be RENTRY or CHAMBOL )

**KHUTI**
( usually of 4"*4" wood section.the wood chosen should be RENTRY. beacuse it is stable and durable for years )

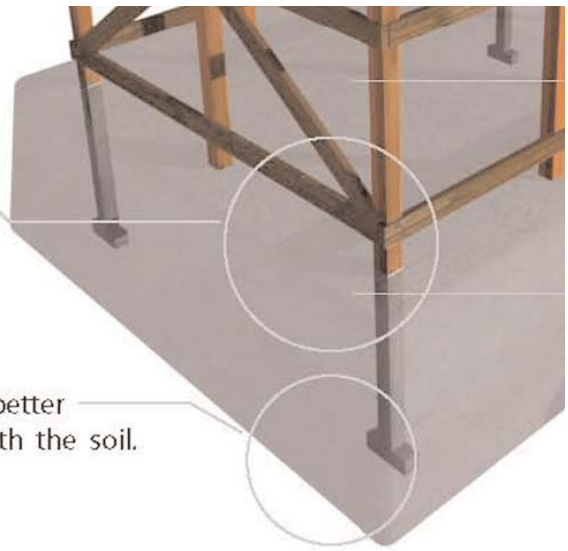
**PAAIER**
( usually of 2.5"*1.5" wood section.the wood chosen should be RENTRY and one through the length )




Basic structure between RRC Pillar and Wood Post




wood joint by
metal clamp
with concrete.



'T '- joint for better
anchoring with the soil.

### c. Estimate Cost

| | |
|---|---|
| Pillars and structural frame | 11.000 BDT |
| Wood truss and CI Sheet | 16.000 BDT |
| Labour Cost | 1.500 BDT (for 1 carpenter + 2 labours = family) |
| Other | 3.500 BDT |
| **TOTAL** | **32.000 BDT** |

### d. Advantages and disadvantages

**Advantages**

- The usage volume is appropriate for constant use (height under the roof).
- The foundation, the structure and the roof have a moderate durability, between 5 to 15 years depending of the maintenance and the climate. The structure is securely anchored to the ground (foundation), as well has with a roof connected to the lintel.
- The training on the assembling structure should be delivered to masons by the Constructor Supervisors with the help of handbooks (design, details, etc.) for instance.
- With the help of professionnal carpenter, the structure would be easy to built.
- The construction can be quickly done with only 1 carpenter and 2 labours in 5 days.
- This approch enable to use local service providers while contributing to the local economy.
- The maintenance and repairs can be made easily without professional and specific equipment. A kit of tools would be provide (hammer, shovel, saw …) to the household.
- The structure, which is proposed, can be adaptable: extention of the house with another room or with a veranda.

**Disadvantages**

- The privacy is limited due to the proposal of one room and even it is difficult to divide it.
- Usually weekly maintenance is required due to the frequent utilisation.
- The walls, window and door are not integrated in the kit, the family need to find this type of materials (bamboo fence walling, CI Sheet …).
- 2 helping hands (labours) are coming from the family during 5 days.

### IV.3.2 The whole housing proposal

#### a. Tools and materials necessary

Tools. Claw Hammer - Sledge hammer - Broom head - Gloves - Wheel Barrow - Adjustable spanners - Dust Mask - Cement bucket - Flat bar - Chisel and point pick axe - Long handled shovel - 5m tape measure - Trowel - Hack saw - Pack of 10 Hack saw blades - Builders Line (25m roll) - Builders level

Description of the components (materials) of the structure.

Length and width: 3.10 x 5.10 (around 15.7 m2)

a) Plinth / Fondation: The plinth or floor of the house is raised at 0.30 feet above the ground level and is built with compacted clayish earth of good quality with a wall brick perimeter and then a floor in bricks and concrete (sand, cement, bricks, crush bricks, iron oxide).

b) Pillars: 10 RCC pillars. R.C.C pillars are the basic structure of the house. Each pillar is 10 feets long. These R.C.C. pillars are made of cement, sand, brick chips and steel. In addition a wood frame (attache pillars and frame, nails ...) completes the structure as the first proposal.

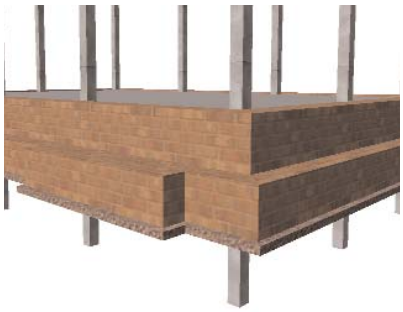
c) Wood truss and Corrugated Iron Sheet Roof: Wooden rafter and purlins, wooden beam and wall plate are used as roofing frame. CI Sheet are fixed on wooden frames by nails (hole twisted clamp, nut-bolt with washer, screw with GI and rubber washer) to construct the shed. Four sides of sloping tin shed roofs. All the wooden frames are treated for long durability.

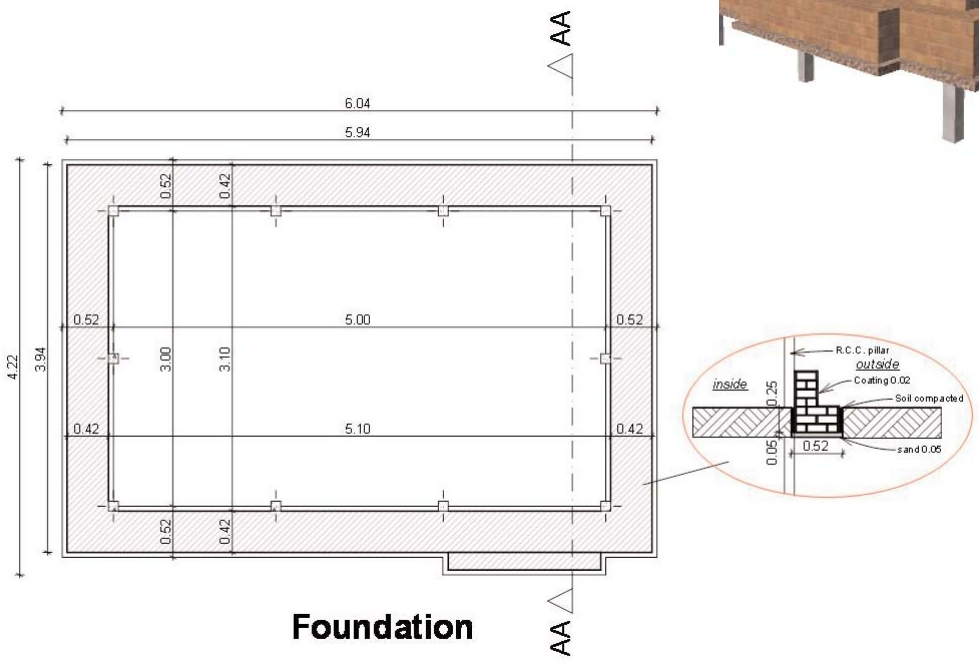
d) Croos bracing: Steel hook and X bracing.

d) Wall fencing: Locally available Bamboo fence (nails ...).

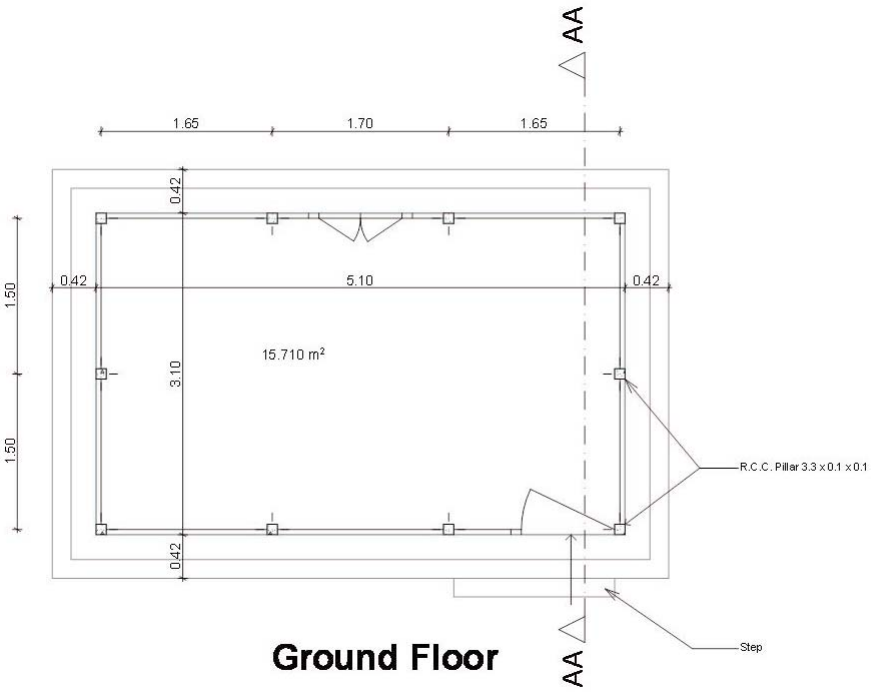
e) Door and window: Bamboo and items.

#### b. Design / Pictures

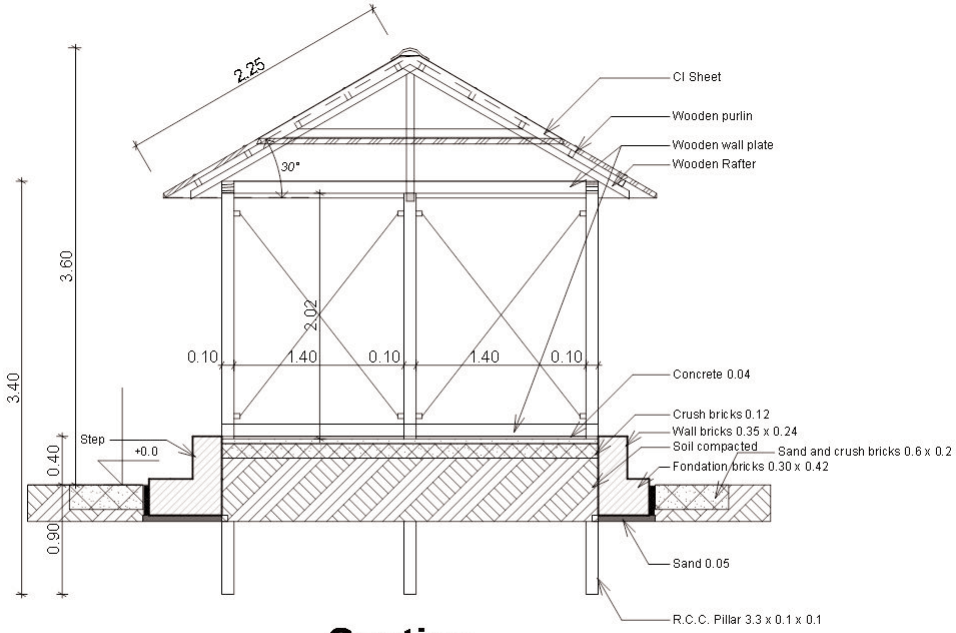




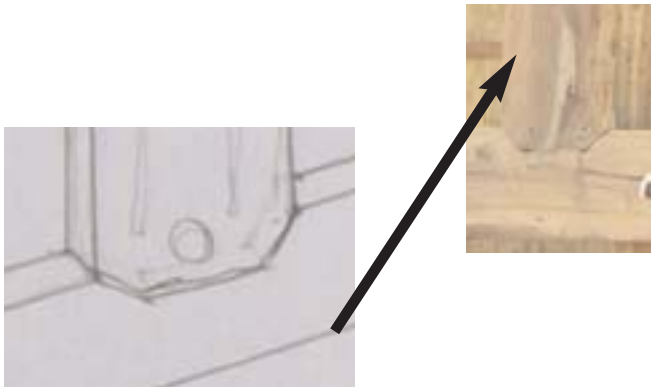

Foundation

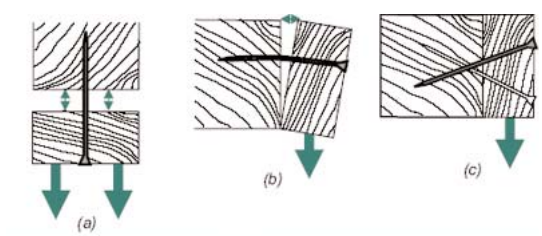



**Ground Floor**



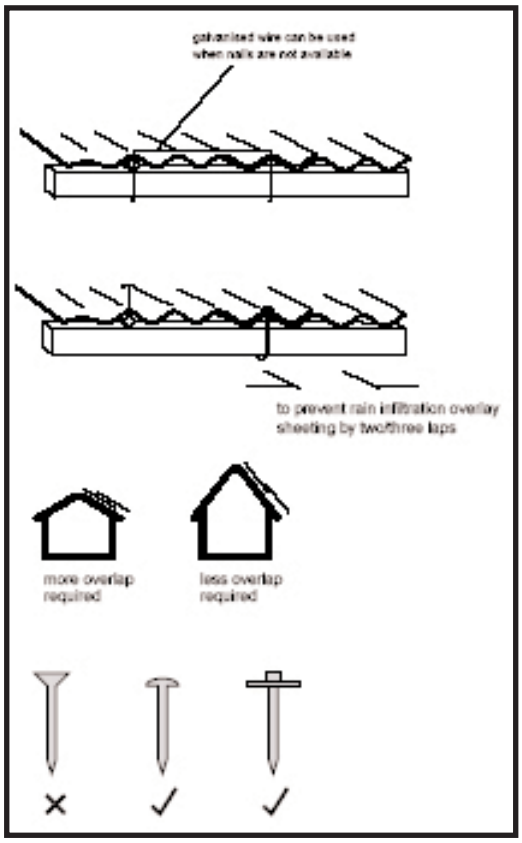

**Section AA**

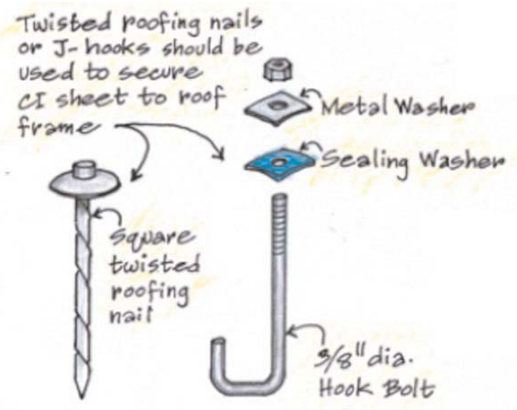


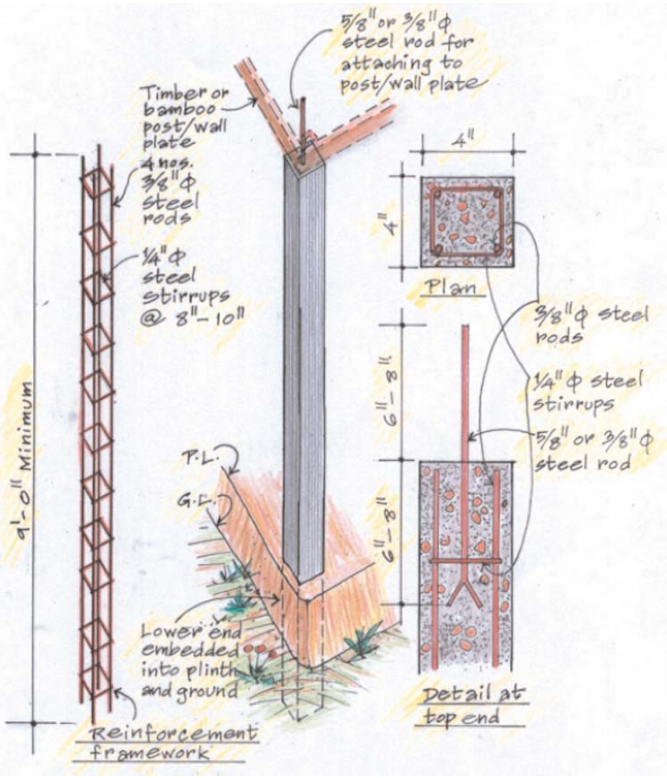



*Nails have least grip lengthwise (a). Structures should be designed so that the forces do not "pull nails out".*

*In (b), a single horizontal nail is not enough to hold the load, whilst multiple angled nails (c) are.*




### c. Estimate Cost

| | |
|---|---|
| Plinth / Fondation | 14.000 BDT |
| Pillars and structural frame | 12.000 BDT |
| Wood truss and CI Sheet | 19.000 BDT |
| Wall fencing | 8.500 BDT |
| Door and window | 2.500 BDT |
| Labour Cost | 4.200 BDT (for 2 craftsmen + 1 labour = family) |
| Other | 4.800 BDT |
| **TOTAL** | **65.000 BDT** |

### d. Advantages and disadvantages

**Advantages**

- The usage volume is appropriate for constant use: 6.6 feets
- The foundation, the structure and the roof have a good durability, more of 25 years. That will depend of the maintenance and the climate. The structure is securely anchored to the ground (foundation) as well has a strong roof connected to the lintel and using bracing. The ventilation is appropriate due to the window and the door.

- The training on the assembling structure should be delivered to masons by the Constructor Supervisors with the help of handbooks (design, details, etc.) for instance.

- The construction can be quickly done with only 1 carpenter, 1 mason and 1 labour in 7 days.

- The maintenance and repairs can be made easily without professional and specific equipment. A kit of tools would be provide (hammer, shovel, saw …) to the household.

- The structure, which is proposed, can be adaptable: extention of the house with another room or with a veranda.

**Disadvantages**

- The usable area is not enough for a number of people above at 4 (17.5 m2 for a room for a family of five, 21 m2 for a room for a family of six).

- The privacy is limited due to the proposal of one room and even it is difficult to divide it.

- For this case, that necessites a budget which can be coved by credit or with the saving of the household.

## V. Conclusion

The evaluation shows that the needs are tremendous, in the 4 selected areas. The extreme poor and poor households which have lost all their housing and assets, are clearly in surviving situation.
In the past, after a similar catastrophe as SIDR, supports provided by NGOs or the government were systematically applied in using one model, which consisted in promoting cheap shelters, without taking care of the difference between households and their settlement.
In fact, the actual figure of 80 % of housing destroyed by SIDR cyclone proofs somehow that the previous approach was not all effective in long term run.

Instead of continuing this approach, the proposal describes in this evaluation, takes another angle, more innovative. The analysis of the specific context (e.g. front line, inland, land tenure, etc ) where households are leaving and even the assessment of their economical status and livelihoods strategy are the preliminary steps of the process, enabling a common understanding between households and the project.

Based on that, the idea is to respond to the households selected, not with one model but accompanier them to think on their own model of housing according to their resources and assets, would be the second step. Then, guiding households in using appropriate and improved techniques for resisting against cyclone or flood would be a third step as well as the training in housing's maintenance for the households. Hoping that these households supported could be changing their housing's practises.

Furthermore, strengthening local masons in using appropriate and improved techniques is also an innovative idea, for consolidating a local dynamic. Those masons can ensure a real relay of the project in providing quality services to households for the improvement of their housing.

These innovative ideas constitute the key successes of the project proposal, enabling to improve the housing's situation of households in sustainable way.

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