

Part III: A GRASS ROOTS IMPLEMENTATION PROJECT

Development of the Project

From September to November 1996 an initial survey of the housing in Sundarban village was carried out and the issues behind the building practice were discussed with villagers, builders and members of Chetonar Dak. On 3rd-5th December 1996, the first International Workshop on Housing & Hazards was held in Dhaka hosted by the Bangladesh University of Engineering and Technology (BUET). The workshop looked at such topics as the function of a dwelling, hazard prone building details, the organisation of building trades and appropriate routes for disseminating safe building practice and included a paper by Hodgson & Carter (1996) on the initial findings from Sundarban village. The author and the director of Chetonar Dak attended this workshop and afterwards an implementation project was developed in consultation with the Chetonar Dak committee. This project drew on the issues discussed in the workshop and also on the initial findings in the village. The project had a budget of 30,000Tk (£450) and was funded by the Grameen Trust, starting in Sundarban in April 1997. The project aimed to motivate villagers to consider the state of housing and to assess and implement affordable innovations.

Project Outline

The project had three main activities:

Activity 1: Workshops *April/May 1997*

A course of 7 workshops was run to explore the social, financial, institutional and technical aspects of the current vernacular building practice. The feasibility of various low cost innovations was assessed as well as the role of credit. The workshop themes were:

1. Welcome
2. Hazards
3. Building with Mud
4. Building with Bamboo
5. Roof Construction
6. Credit & Maintenance
7. Conclusion

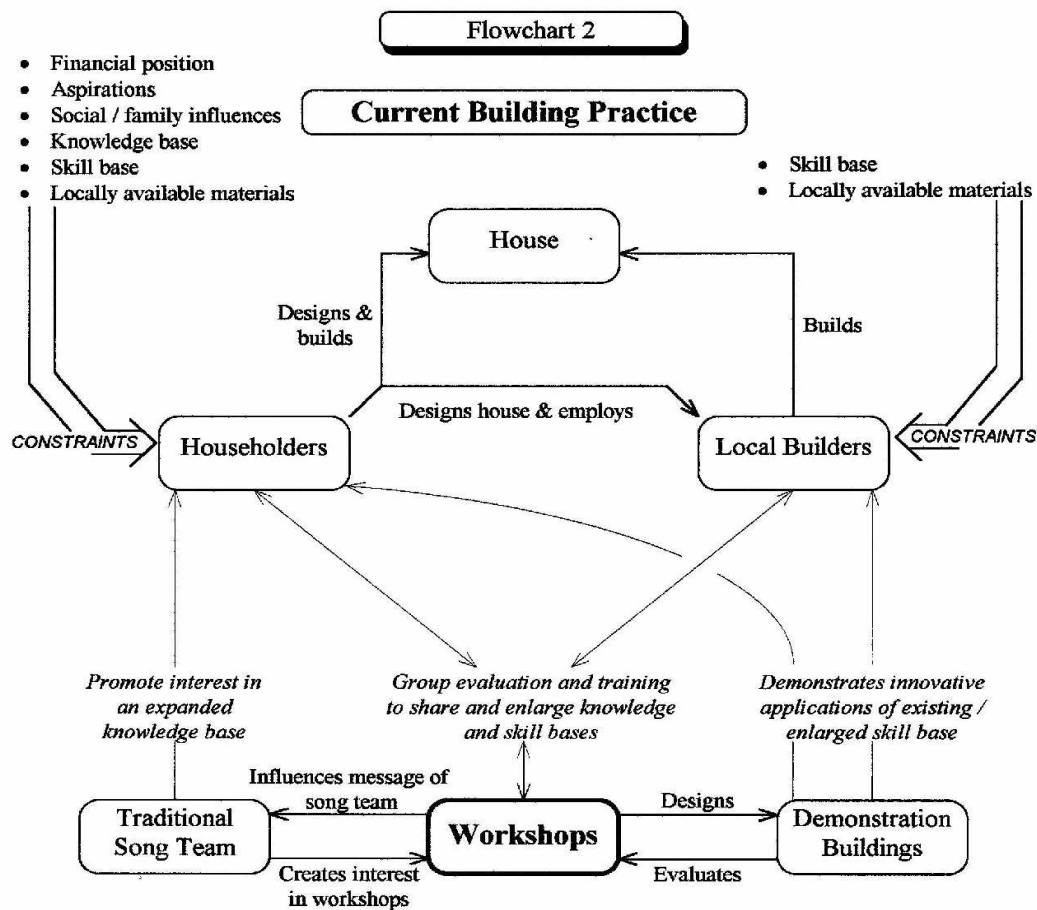
Activity 2: Demonstration Building *May 1997*

A new sewing training centre was built using the innovations which were judged most appropriate by the workshops. This building provided on-the-job training, a visible demonstration of innovation and will be a long term evaluation of the effectiveness of these innovations.

Activity 3: Traditional Song Team *June 1997 - March 1998*

Traditional cultural activities were identified as appropriate media for communicating to an illiterate and dispersed population. A building for safety song was developed, focusing on awareness raising rather than specific innovations.

Links of the Project



Grass Roots Implementation Project

Flowchart 2 shows the internal and external links of the project. The top half of the flowchart is the same as Flowchart 1 showing the constraints on building and the relationships between the householder, the local builder and the house. The bottom half of the flowchart shows the three activities of the project, how they interrelate and how they relate to the current traditional building practice.

Internal links of the project (referring to Flowchart 2)

The workshops are the core activity of the project and they have a two way link with each of the other activities. The information generated by the workshops influences the messages that the traditional song team is advertising. At the same time the song team is also advertising the workshops and creating interest in them so that householders will be motivated to attend. The workshop participants also play a key role in the design of demonstration buildings by evaluating the various low cost innovations available. Only those innovations which participants believe are effective and viable will be used on the demonstration buildings. The participants also evaluate demonstration buildings which have been built, rethinking their views on the innovations once they can see them in place. This rethinking works particularly on financial grounds, the demonstration buildings provide a crucial "as built" cost evaluation of the innovations.

Some of the internal links assume an ongoing project with the workshops being repeated and demonstration buildings being built periodically (e.g. annually) and the song team continuing (e.g. one or two contracts a month indefinitely). This need not necessarily be in the same area. For example the song team might develop its song using results from workshops in one area then go on to advertise in another area. Similarly the design of demonstration buildings could draw on the results of a previous workshop course, and then be evaluated by current participants. Alternatively participants might be able to make a field visit to a previous demonstration building, evaluate it and then on return to their own village design a building suitable for them.

External links of the project (referring to Flowchart 2)

Again the workshops are the core activity of the project. Working with both householders and local builders the workshops are a mix of group evaluation exercises as well as an opportunity for practical experimentation and training. This serves to expand both the knowledge base and the skill base of the participants. With an expanded knowledge base householders are in a position to consider an increased range of housing options and decide which they prefer given the various other constraints acting on them. With an expanded skill base the local builders will be able to implement the increased range of housing options if specified by the householders. Those householders who build their own houses will benefit from the expanded skill base in exactly the same way.

The traditional song team targets the householders by promoting interest in an expanded knowledge base. By raising awareness that there are cheap, viable improvements to housing the song team motivates householders to find out more. They can do this by attending the workshops, looking at the demonstration buildings and most importantly by informal discussion with other villagers, for example previous workshop participants.

The demonstration buildings target both the householders and local builders. The buildings are a motivational tool, displaying the possibilities of innovative house building, and also a technical tool from which local builders and self-build householders can learn the detailed aspects of the implementation of these innovations.

Activity 1: Workshops

Implementation

The implementation of the workshops and indeed the project as a whole was predominantly characterised by the fact that it was carried out by a grass roots community development NGO with staff who are all local to Sundarban village. This greatly eased the elements of community participation since the project was essentially implemented by "insiders".

Interest had been generated in the theme of housing by the period during which the author had been carrying out initial research associated with this project. Volunteers to be workshop participants were collected by Chetonar Dak staff. Female participants came from the Chetonar Dak savings groups and were collected by Komidini Roy, the female savings group coordinator. 18 male and 20 female participants attended the first workshop together. After that they attended separate but parallel courses.

The main teaching tools of the workshops were a manual in English describing the activities that would be done each week and a flipchart in Bengali which was used to present these activities to the participants and also to record the results of the workshops. These tools were developed to use participatory methods described by Theiss & Grady (1991) and Pratt & Loizos (1992). The manual and flipchart form Volume 2 of this report and should be referred to for greater detail of the workshop activities. The original Bengali flipchart is presented alongside an English translation.

Each week the workshop was rehearsed by the Chetonar Dak training staff who familiarised themselves with the flipchart, ran through the manual to understand the themes and activities of the workshop and practiced any practical training elements.

The workshops were run by two training staff with a third person working as a recorder, keeping a record book in addition to the results recorded on the flipchart. The workshops took place in a shaded Chetonar Dak outdoor training area. The "Building with Mud" workshop required a large area for practical training which was carried out on land kindly lent for the purpose by a local farmer.

The workshop course was carried out on one morning each week (for each set of participants) running from approximately 10am to 1pm. A simple fish or vegetable curry was provided for participants and trainers at the end of each workshop. Having a week between each workshop allowed time for the participants to think about and discuss the various themes of the workshops. This was believed to be more likely to result in them remembering and implementing the things learnt than if the workshops had been in an intensive daily course. It was also more practical for the logistical organisation of the workshops and the villagers were more easily able to spare one morning a week from their ongoing work activities.

A finishing party was held for male and female participants together shortly after the workshop courses were completed. This consisted of the presentation of certificates to participants followed by a good goat curry for lunch.

Workshop themes & results

The following section presents an outline of the workshops week by week. The more pertinent of the points raised by the participants have been recorded. It has generally not been felt necessary to record both the men's and women's responses for the same topic but it has been indicated which gender's workshop are being referred to.

Workshop 1: Welcome

Outline: This first workshop formally opened the course and introduced participants to what was to come. Female & male participants attended together in order to give a feeling of unity to the workshops. After opening speeches and introductions the participants' expectations were surveyed and workshop objectives reviewed. Participants then split into sub groups to discuss and comment on the main house types in the village.

Housing assessment

House type	Good points	Bad points	What do we want?
Thatched & mud walls	<ul style="list-style-type: none"> • Cold in hot weather, hot in cold weather • Low cost to build • Mud is available nearby for free 	<ul style="list-style-type: none"> • Sometimes rats and termites burrow into the walls • Floods destroy the house 	<ul style="list-style-type: none"> • We want sapraCI sheet roof or hipped CI sheet roof if there is more money • It's better to have a side verandah (bao dial) to protect the walls from rain • Make the base of the wall brick to protect from floods, rats and termites
Sapra CI sheet & mud walls	<ul style="list-style-type: none"> • It needs less CI sheet than hipped roof • Less expensive to build 	<ul style="list-style-type: none"> • Needs a lot of bamboo • Strong wind blows away the CI sheet • Cold in cold weather and hot in hot weather 	<ul style="list-style-type: none"> • A mud ceiling is good for insulation • Hipped CI sheet is better • It is better with a verandah
Hipped CI sheet & mud walls	<ul style="list-style-type: none"> • Long lasting • Protects from cold in winter • Protects from cyclones and rain • You feel the wind less • Everyone sees it as a good status symbol 	<ul style="list-style-type: none"> • Rats and termites easily destroy the house • Flood easily destroys the house • If there is no ceiling it is hot • Rafters & battens are easily broken 	<ul style="list-style-type: none"> • Make the base of the walls brick • Rafters & battens could be painted • We want to protect our house from rats and floods
Thatched & bamboo frame	<ul style="list-style-type: none"> • Comfortable in cold weather • Even though cyclones and rain can destroy the house it is not so dangerous because it will not kill people • Even though the bamboo posts are rotted quickly they can be easily changed 	<ul style="list-style-type: none"> • After 1 year the house is already damaged and old • The bamboo mat walls are easily damaged • The bamboo posts are quickly rotten 	<ul style="list-style-type: none"> • Paint bitumen on the posts so that they last a long time. Also protect the posts with plastic. • Make the bamboo fence a diagonal weave (dhara) using very thin bamboo sticks (pati) and paint with bitumen so that they will last a long time.
Sapra CI sheet & bamboo frame	<ul style="list-style-type: none"> • It protects from rain 	<ul style="list-style-type: none"> • It is difficult to stay inside during sunny weather • in winter you get condensation under the CI sheet • It needs extra bao dial around the house • The CI sheet is blown away when the strong wind comes 	<ul style="list-style-type: none"> • Instead of bamboo posts we can use concrete pillars • If we make a hipped CI sheet roof with a wooden frame then it will be good • An internal ceiling is good.

The results of the participants group discussions which are recorded in the table above showed clear aspirations towards hipped CI sheet roofing with sapra CI sheet being considered a more affordable compromise. The vulnerability of different house types to different hazards was recognized and the thermal aspects of housing were frequently mentioned.

Workshop 2: Hazards

Outline: From this session onwards two parallel workshops of male and female participants were ran. The participants were introduced to the concept of vulnerability. The paradigm that:

$$\text{Hazard} + \text{Vulnerability} = \text{Disaster}$$

was discussed in local terms and the vulnerability of different house types to different hazard types was assessed. Finally the relative importance of damage / destruction of houses compared to other losses in the disaster context was evaluated.

Vulnerability of houses (women's responses)

House type	Vulnerability to flooding	Vulnerability to cyclones
Mud wall	If water gets to the bottom of the house 'then it will be destroyed. If the house is built on low land then it is bad.	If the roof isn't good then rain water will come and damage the walls. If the house does not have side verandahs (bao chal) then strong wind will drive the rain onto the walls and damage them
Bamboo frame	The mud foundations will become soft and if there is a strong current the house will be broken. If the posts are not strong it will fall over. The mud foundations can be washed away and the posts will come out and the house fall over.	If the posts are not strong then the bamboo house will be destroyed. If there are not trees protecting the house then it will be easily blown away. If the house is in a high place then it will be easily blown away

These results show an understanding of the mechanisms by which hazards are damaging housing as well as some idea of the meaning of vulnerability.

Losses caused to owners of mud houses by flooding (men's responses)

Most critical loss:

- Animals killed
- Outbreak of epidemic disease
- Whole house destroyed
- Possessions damaged
- Windows and roof of house damaged
- Crops damaged
- Roads and paths damaged

Least critical loss:

- Outhouses damaged
- Sand deposited on top of soil
- Transport problems means shortage of goods and high prices

Workshop 3: Building with Mud

Outline: Having discussed the context of housing in the previous two workshops the participants went on to look at practical improvements. The core activity of this workshop was to build sections of layered mud wall and to assess the value of adding unground rice husks or sand to the mud, as well as the effect of the water content of the mud. Sections of wall were built using different methods and then discussed. This was to be an ongoing evaluation. A week later the cracking of the walls due to drying and shrinking was looked at and discussed. At the end of the workshops the performance of the walls having been left exposed to the pre-monsoon rains was assessed. Other methods of improving layered mud wall construction were also discussed and evaluated.

Wall building practical

Seven different sections of wall were built using different mixes of mud. Some groups were told to work as normal whilst some were told to do a drop test⁴ to check the water content of the mix. Group 2 did not do a drop test but did cut the wall into lengths of about 2 feet using a wire. This controlled the shrinkage and prevented cracking beyond the cuts already introduced. These straight cracks are easily grouted and do not run between layers as uncontrolled shrinkage cracks sometimes do.

<i>Group</i>	<i>Mud mix</i>	<i>Working method</i>	<i>Evaluation after drying</i>	<i>Evaluation after exposure to rain</i>
1	12 baskets of mud	As normal	Worst	
2	12 baskets of mud	Cut to control	Good	
3	12 baskets of mud	Drop test		
4	10 baskets of mud 2 baskets of sand	Drop test	Bad	Bad
5	8 baskets of mud 4 baskets of sand	Drop test		Worst
6	7 baskets of mud 5 baskets of rice husks	Drop test		Best
7	7 baskets of mud 2 baskets of sand 3 baskets of rice husks	Drop test	Best	Good

Adding rice husks to this mud was found to be very effective both in preventing shrinkage cracking and also in protecting the wall from the effects of rain. The participants felt that cutting the wall as described above meant that the resulting shrinkage cracks were better than uncontrolled cracking although this did not have any effect on protecting the wall from the rain. Adding sand to this mud made it very vulnerable to rain damage. The mud used was highly criticised by the workshop participants. Good building mud was unavailable at that time of year because rains had filled in

⁴A small ball of mud is dropped to check the water content, fully described in Norton (1986).

the ponds where it is obtained. It was stressed to the participants that the specific results only apply to the mud that we used and that when the good building mud became available they should think about experimenting with that mud for themselves.

Improvements to layered mud wall construction (women's responses)

<i>Innovation</i>	<i>Cost</i>	<i>Effectiveness</i>
Add sand to the mud	Cheapest	Most ineffective
Add unground rice husks to the mud		Ineffective
Add chopped rice straw to the mud		Most effective
Add chopped jute fibres to the mud	Expensive	
Add bad rice to the mud	Cheap	
Use cows to help mix the mud		
Use bricks for the lower portion of the wall	Most expensive	Effective

Workshop 4: Building with Bamboo

Outline In a similar practical workshop bamboo framed construction was looked at. The effect of cross bracing was tested using a small scale bamboo frame. Improving bamboo posts by scorching them and then painting them with bitumen was practiced and discussed. Joint detailing was practiced and then other methods of improving bamboo framed construction were discussed and evaluated.

Bamboo post treatment

This was an innovation that the participants were particularly interested in, partly due to prior advertisement of it by the song team. A batch of posts was scorched together by the group as a whole. The painting with bitumen was done of individual posts by pairs of participants. A local builder who had earlier gained experience in the technique guided the participants.

Improvements to bamboo framed construction (men's responses)

<i>Innovation</i>	<i>Cost</i>	<i>Effectiveness</i>
Have a brick foundation and hold the bamboo posts with a clamp system	Most expensive	Most effective
Have a second horizontal frame at a low level within the plinth	Expensive	Most ineffective
Scorch the bamboo posts and paint them with bitumen	Cheapest	Ineffective
Add corner to corner bamboo (cross bracing)	Cheap	Effective

Workshop 5: Roof Construction

Outline The problems of the different roof options available were discussed. A sapra CI sheet roof was built (on short posts) incorporating a variety of innovations. The innovations were discussed and assessed. A budgeting exercise was carried out in sub groups with participants estimating the costs of different roofing options, how often they would require maintenance and how much this would cost. From this the total expenditure over a period of 10 years was calculated. The results were compared to see how some initially expensive roofing options quickly save money by reduced maintenance costs.

Sapra CI sheet innovations assessment (women's responses)

Painting exposed bamboo with bitumen

Protects from water and insects; Stronger and longer lasting

Alternative roof framing system

CI sheet wont be blown everywhere during the cyclone

We use a lot of wire with this system, that's why the CI sheet doesn't move

Uses less bamboo to build the roof but needs a little more CI sheet

Corner bracing

Frame will not move easily

Four comers will not open so the frame will be stronger and last a long time

Wire lashings

Lasts a long time, does not rot and insects can't eat it Does not quickly rust Isn't cut by CI sheet

Roof budgeting results (men's responses)

These figures were based on costings for a house 9 hands long and 6 hands wide ($13\frac{1}{2} \times 9'$) which is a typical size for a small single roomed house.⁵

Rice straw thatched roof - lasts 2 years

	<i>Rice straw</i>	<i>Bamboo frame</i>	<i>Total material cost</i>	<i>Labour</i>	<i>Total</i>
New cost	200	1012	1212	400	1612
Repairing	200	256	456	240	696
10 year total			3492	645	5092

Sugar cane cover thatched roof - lasts 7 years

	<i>Sugar cane caver</i>	<i>Bamboo frame</i>	<i>Bata Rope</i>	<i>Total mat. cost</i>	<i>Labour</i>	<i>Total</i>	
New cost	300	280	280	120	980	600	1580
Repairing				800	500	1300	
10 year total				1780	1100	2880	

⁵ A hand is a traditional measurement from elbow to fingertip and is roughly $1\frac{1}{2}$ ft long

Workshop 6: Credit & Maintenance

Outline Leading on from the budgeting of roofing options the participants then considered credit. A survey of who had taken credit and for what purposes was followed by a role play which explored some of the positive and negative aspects of credit. These and other issues were then discussed.

The importance of good maintenance in reducing the vulnerability of housing was looked at and the participants split into sub groups to devise an annual inspection routine for different house types.

The Chetonar Dak Credit Game

This role play game devised played to focus on some of the issues behind credit. There are two families in the game. Family no. 1 has a thatched house throughout the game. Family no. 2 has a thatched house originally but takes a loan to buy CI sheet. Each turn the families take two stones which represents their earnings from agriculture. One stone is spent buying food from the marketplace and the other is spent repairing the thatched roof. Family two takes five stones as a loan and buys CI sheet. For the next six years they pay their second stone to the bank instead of spending it on repairing their roof. After the loan is repaid they are able to save their second stone so they accumulate money.

The game was played twice, the first time showing the effect of a successful loan. One participant pointed out that the accumulating money would be spent on other things and indeed in one case a player instructed her partner who was going to the market to bring back bigger and bigger fish and then finally meat. The second time the game was played a flood came during the repayment period and the crop was damaged. The families were asked how they would cope. This was discussed within the context of the role play. Both families decided their priority was to buy food and then they discussed how they would cope with their second commitment which was to repair the roof (family 1) or to keep up their loan repayments (family 2). The results of the discussion are given below.

Family no. 1 - Can't afford to repair roof

- Do a simple repair on the thatched roof
- If rain leaks through the roof then shelter in a neighbour's house
- The husband and wife will quarrel a lot
- Try and find extra work

Family no. 2 - Can't afford to keep up loan repayments

- Take a loan from neighbours
- Apply to bank to defer repayments
- Mortgage some land to repay the loan
- Sell some land to repay the loan
- Sell a bull etc. to repay the loan

Sapra CI sheet Roof - lasts 4 years

	CI sheet	Bamboo	Wire	Rope	Wheat straw	Total mat. cost	Labour	Total
New cost	2200	500	45	45	60	2850	120	2970
Repairing	0	100	0	12	60	172	60	232
10 year total						3194	240	3434

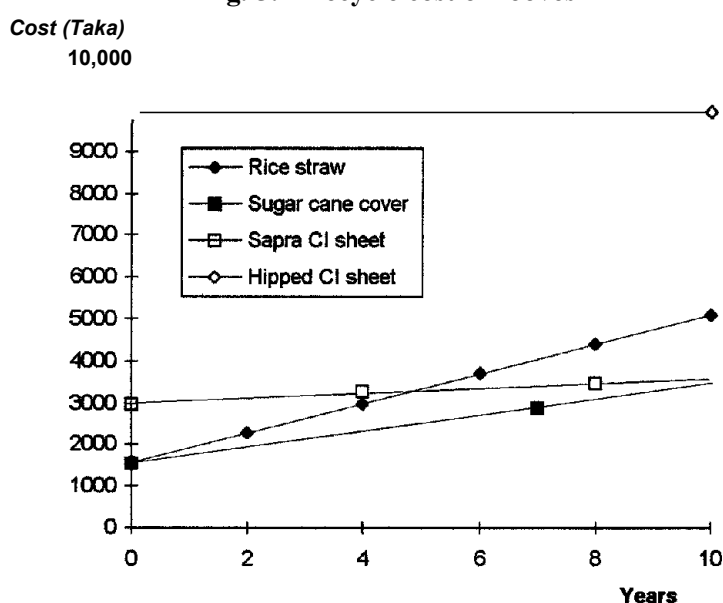
Hipped CI sheet Roof - lasts 80 years

	CI Sheet	Wood frame	Screws & nails	Ridge piece	Total mat. cost	Labour	Total
New cost	5950	2660	400	550	9560	400	9960
Repairing	—	—	—	—	—	—	—
10 year total				9560		400	9960

Fig. 5 shows the results of these budgets. Clearly the maintenance costs of rooves can quickly have a big impact in the total expenditure. A sapra CI sheet roof initially costs nearly twice as much as a thatched rice straw roof however after just 5 years the total expenditure is equivalent and after 10 years the total expenditure on the thatched roof is 50% more than that on the sapra CI sheet roof. In contrast it would take 24 years before the total expenditure on a rice straw roof reaches the initial cost of a hipped CI sheet roof showing that this is a very long term investment indeed.

It should be noted that these figures assume that all materials are bought and all labour is hired. A farmer who thatched his own roof with rice straw from his own fields would pay out very little cash towards the maintenance of his roof.

Fig. 5: Lifecycle cost of rooves



The different coping strategies in the two situations are illuminating. The family unable to repair the roof sees it as a problem which will cause short term difficulties and suggests the positive response of trying to find extra work. In contrast the first response of the family who cannot afford to keep up loan repayments is to try and take *another* loan. It is easy to see why this kind of spiral of debt is notorious in Bangladeshi villages. If applying to the bank to defer repayments is unsuccessful then the family may be forced to take the drastic solution of selling land or property.

Credit survey (men's responses)

<i>Name</i>	<i>Loan</i>	<i>Purpose</i>	<i>Amount Opinion</i>
Udoy	—		Good
Houri	BRAC	House	3,000 Good
Kailash	—		Bad
Razzak	Grameen Bank	Bull	3,000 Bad
Mohon	—		Bad
Ananto	BRAC	Rice planting	5,000 Bad
Tusa	BRAC	Rice planting	500 Good
Tahidul	KrishiBank	House	20,000 Bad
Riazuddin	Krishi Bank	Daughters marriage	4,200 Bad
Toroni	Neighbours	Daughters marriage	2,000 Bad
Rahini	BRAC	Bull	5,000 Good
Kimohon	BRAC	House	6,000 Bad
Horendro	BRAC	Business	1,000 Bad

Credit Assessment

Men's responses

- Credit is a very bad thing
- If you don't take a loan but work hard instead then it will be good
- Credit is good for small businesses
- It's bad to take a loan to repay another loan.
- A bank loan is better than a village loan because the interest is lower
- Getting a loan is good but don't be lazy whilst you're repaying it

Women's responses

- Credit is a bad thing
- If you have problems it's good to take credit
- Business loans are good
- You have to have a loan to pay for your daughter's marriage
- Taking a loan is easy, paying the loan is hard

The "opinion" of the credit survey was whether the participants thought credit was a good or a bad thing in general. Of the 10 respondents who had taken a loan 7 thought that credit was bad. Combined with the results of the credit assessment this shows that credit is a controversial issue. Many people felt that although credit is probably a bad thing it is easily available so you have to take it if you run into problems.

Annual inspection routines (women's responses)

Thatched. & layered mud wall house

- Check if the thatch is rotten
- Check if the bamboo sticks and rope is rotten

Sapra CI sheet roof& layered mud wall house

- Check if the sapra bamboo frame is strong or not
- Check if the wire ties are strong or not
- If the top bamboo is old it must be replaced

Thatched & bamboo framed house

- Check if all the bamboo posts are strong or not
- Check if the thatch is rotten

Sapra CI sheet roof& bamboo framed house

- Check if the bamboo posts and bamboo mat wall are broken or not
- Check if the bamboo frame and sapra bamboo frame is good or not
- If the bamboo posts are old they must be changed
- If the roof bamboo is rotten the roof will be easily broken
- Check if the mud plinth is good

Workshop 7: Conclusions

This workshop concluded the course. A final inspection of the mud wall sections saw how they had performed once exposed to rain. The demonstration building was evaluated with the budget being discussed and each innovation evaluated with reference to its cost. After a week by week summary of the workshops the participants discussed future plans; how they could work together with Chetonar Dak to implement ideas they had learnt about during the workshops.

Discussion of demonstration building innovations (women's responses)

Brick damp proof course 330Tk (bricks 2 50Tk, transport 80Tk)

- Bamboo mat walls will last a long time
- The bottom won't rot and termites won't eat it
- Money isn't lost, if you sell the bricks then you get halfback

Bracing bamboo 170Tk (bamboo 150Tk, transport 20Tk)

- The house frame will be strong
- The house will be protected from cyclones
- You don't have to pay for transport if you fetch the bamboo yourself
- Bracing system is very good

Bitumen painting 127Tk (*bitumen 40Tk, kerosene 7Tk, labour 75Tk, transport 5Tk*)

- Painted on posts and on the roof bamboos and bamboo sticks
- Where the rain will come bitumen has been painted
- Insects won't eat and the rain water will not cause rot

Wire lashings 60Tk (*wire 60 Tk*)

- CI sheet doesn't cut the wire lashings
- Rain can't rot the wire lashings
- It will be strong, even though it's a little bit costly it will last a long time

Bata roof framing system

- Less bamboo is needed so it costs less taka
- The wire lashings will be strong
- If the cyclone comes the roof won't be blown away
- The roof will last a long time

Workshops summary - favourite week

<i>Workshop</i>	<i>Men</i>	<i>Women</i>	<i>Total</i>
1. Welcome	I	I	2
2. Hazards	II	I	3
3. Building with Mud	IIII	IIII	10
4. Building with Bamboo	II	I	3
5. Roof Construction	IIII	III	8
6. Credit & Maintenance	I	II	3
7. Conclusion	II	I	3

The most popular week was the building with mud workshop. This included the most extended practical exercise which all participants seemed to enjoy. The roof construction workshop also stood out. The practical innovations for the sapra CI sheet roof were thought to be very useful by the participants. The budgeting exercise that week was very thought provoking, looking at the long term costs was a new idea to most participants and the result was very surprising to them.

Future plans (men's responses)

What ideas do you think you will use?

- We will use all of the ideas we have got from the workshops

How can you help each other?

- We can give each other ideas
- We can use these ideas ourselves in the beginning then we can help others
- We can encourage local people with these ideas

How can Chetonar Dak help you?

- By the call of the participants the song team can go from para to para
- Participants can borrow some of the workshop things like paintbrushes
- Chetonar Dak can give a place for the participants to have 2 meetings a year and can provide paper and pens
- Chetonar Dak's builder can paint bitumen on posts for 2Tk a post

What shall we do next?

- We will meet together again in the month of Kartik
- After that we will meet in the month of Boishak

Evaluation

The participants opinion of the workshops should be one of the most important indicators of evaluating their success. The participants were keen and showed high energy levels at most times. They all said that they enjoyed the workshops, found them useful and would employ the ideas they had learnt during them. Their extremely enthusiastic responses do however need to be taken with an air of credulity. A fairly unbiased indicator of their interest is the drop out rate of the workshops. Although pressures of work meant that not everyone could attend all the workshops only 5 out of the 38 participants dropped out of the course.

Workshopping was a new idea to the participants who were used to more formal teaching methods. It was particularly pleasing to see the groups develop over the course of the workshops. The level of debate became more involved and the participants started to take more control of the workshops. As an example, during group discussions in earlier weeks the trainers would have to give a lot of prompting to start the discussion and would have to decide on phrases to summarise the discussion. In later weeks open discussion would start with very little prompting and afterwards the participants would often tell the trainers what summary phrases to write down. Although leaders emerged from the participants the informal atmosphere allowed everyone to contribute and it was very rare for any individuals to go for a long time without saying anything.

This informal and relaxed atmosphere was crucial to the participants developing an active role in the workshops. The workshops were started with warm ups and the exercises were designed to promote participation but perhaps more important was the grass roots level of the workshops. Chetonar Dak has worked in the village for six years and is an important part of the community structure. Almost everyone in the area has some involvement with Chetonar Dak and the staff are all Sundarban villagers so have been known to the locals throughout their lives. Using local trainers made the workshops non-confrontational and an extension of the natural process of learning that goes on in conversation in the market place, in the fields and in the home.

The trainers also developed their skills over the course of the workshops. Few of the trainers had much previous experience, particularly in participative training. As the course progressed the trainers allowed the participants to talk more. They also became better at summarising what had been learnt during an exercise.

The technical ideas and issues were new to the trainers as well as to the participants which sometimes this caused problems due to a lack of understanding. It also gave the workshops a lot of energy and freshness since there was very little frustration on the trainers part or temptation to impose an assumed set of answers on the participants.

Although the philosophy of the workshops was to learn through group discussion and self evaluation there was a danger of neglecting useful secondary sources of information from outside the village or previous primary learning within the village. They might have been considered invalid within the context of the workshop. This could have restricted the progress made by the participants. A balance was sought and the practical training given was chosen from external sources but was evaluated by internal sources (i.e. the shared knowledge of the participants). When the workshops are repeated then the results of this workshop course can become an outside source which can be used in planning future courses of workshops.

For example, old and experienced builders said that chopped rice straw could be used to improve layered mud walls but that it was prohibitively expensive which was why it is not used in Sundarban today (it is used in other parts of the country). Because of this opinion it was decided not to assess this as an additive during the "Building with Mud" practical. However the performance of the rice husks revived interest in rice straw and many participants said that this was a better additive. Although villagers had before considered that rice straw was too expensive to be worth it, part of the point of the workshops is to teach good ways of evaluating the cost-benefit of known methods of improving housing as well as teaching and evaluating new methods. If the "Building with Mud" workshop were to be repeated it would be a valuable exercise to use both rice husks and rice straw and compare their performance and cost.

An illustrative example of teaching cost-benefit analysis was the roof budgeting exercise carried out as part of the Roof Construction exercise. For many participants this was one of the most interesting activities of the whole course of workshops. As mentioned above sitting down and calculating the total expenditure on an item over a period of time was an entirely new idea to most participants. Whilst they may have had ideas about the value of a CI sheet roof because they wouldn't have to pay for such regular maintenance if they know the figures involved they can obviously make a much more informed decision about whether the initial investment is worth their while. An easy and useful service which an organisation like Chetonar Dak could perform is to assist people with estimating initial costs and long term expenditure which are very difficult tasks for the illiterate or even the literate with very poor mathematical knowledge / experience.

The true test of the effectiveness of the workshops will be in the degree to which villagers take on board ideas which they learnt and also the extent to which they continue to question the fundamentals of house building and through pooling their resources work towards improving their housing. Between now and the 1998 house building season the song team will reinforce the messages of the workshops and the learned knowledge and techniques will disseminate itself by word of mouth to friends and family of the participants. We will have to see whether the villagers put these ideas into practice in the 1998 house building season and in later years.

Activity 2: Demonstration Building

Implementation

An 18' by 12' (12 hands by 8 hands) sewing training centre was built costing 9,500Tk. The building was of bamboo framed construction with a sapra CI sheet roof which is one of the most common styles of building in Sundarban village. Photographs 9 & 10 (Appendix B) show the building under construction and after completion. The following innovations were included in the building design which added just 8% to the cost of the building compared to construction :

- The lower part of the bamboo posts was scorched and painted with bitumen
- The bamboo frame was braced
- The bamboo mat walls rested on a damp proof course of low grade bricks
- An improved framing system was used for the sapra CI sheet roof
- All exposed bamboo of the sapra roof frame was painted with bitumen
- Strong wire lashings were used for the sapra roof frame
- Unground rice husks were mixed into the mud used for the plinth surround

The building was built by two local builders according to a verbal specification. The nearly finished building was evaluated by workshop participants in the final workshop.

Evaluation

The idea of using demonstration buildings to communicate building ideas is not new to Bangladesh at all. It is well accepted that a practical full scale demonstration is one of the best ways of illustrating a new building concept. Literacy barriers are stripped away and the building can be looked at as a whole and in detail to assess ideas in isolation and in context. The true cost of the building is known as opposed to estimated costs and the long term performance can be monitored.

Using an institutional building as a demonstration building has the advantages that it is seen by many people and there is a sense of community ownership which is lost when demonstration buildings are donated (or sold on credit) to individual householders. A disadvantage is that for practical purposes the building had to be much larger than a typical Bengali house. This means that it is apparently quite expensive (9,500Tk) but in fact the innovations could be easily used on any sized house which is why the 8% increase in price over regular construction is a fairer assessment of cost.

The demonstration building integrates well with the workshops. After having discussed the advantages and disadvantages of various innovations and tried them out practically it is an invaluable exercise for the workshop participants to see them together on a building for all the reasons described above.

Dudley & Haaland (1993) have identified the danger of a demonstration building being understood by the community to be a prototype building. A prototype building is intended to be copied exactly whereas a demonstration building presents one or more innovations which can be adapted as each individual sees fit. It is hoped that by

integrating the demonstration building with the workshops the purpose will be properly understood since the innovations were discussed one by one in detail

Initially it was expected that the demonstration building would be built after the workshops using a mix of innovations decided upon by the workshop participants as the most effective and suitable. By building the demonstration building at the same time as the workshops the initial design could be adapted by the results of the workshops but the building was almost complete by the final workshop giving the participants the valuable opportunity to evaluate it as a group. Future demonstration buildings could draw heavily upon the results of all previous workshops leading to a progressive and participative design approach.

Activity 3: Traditional Song Team

Implementation

The song team will be hired from time to time for three hour contracts which will allow them to sing a mix of traditional songs as well as the building for safety song. The song is a competition style with two main singers and a backing group. One singer represents the stuck in his ways traditionalist whilst the other tries to persuade him of the values of thinking about innovations to protect his house from floods and strong winds.

A set of instruments has been bought for Chetonar Dak which the song team will use for their set contracts. Any other time they may borrow the instruments free of charge if they include the building for safety song in their routine. It is hoped that this will mean that the song will be continued beyond the end of the project.

Some of the song contracts will take place in the market places where a widespread audience can be reached. The workshop participants have also been invited to ask the song team to visit their paras. This will spread the messages of the song team throughout the village and will also mean that interested villagers will be able to ask the workshop participants for more information about what they learnt. Singing in the paras will also reach women and other people who do not typically visit the market place.

Evaluation

The song team is an ongoing activity so cannot be fully evaluated at this time. It can be said that the workshop participants were keen to have the song team visit their paras so it is hoped that the song team will be a valuable link in keeping the ideas of Housing & Hazards alive in the minds of the participants.

An example of the effectiveness of the media was given in a programme prior to the specific project under discussion. The song team was sent to a market place to promote the treatment of bamboo posts by scorching and painting bitumen. About 200 people watched their 45 minute programme and in the weeks following a dozen or so people came to the Chetonar Dak office with enquiries about the treatment.

The Next Step

Chetonar Dak has gained funding from the Department for International Development through the Aid Management Office Dhaka to carry out a further course of workshops in Sundarban village as well as 5 more demonstration buildings and an extension to the song team programme. This will consolidate the training of the local staff and reinforce the ideas of the programme within the village. The Grameen Trust has also indicated plans to develop the project further with Chetonar Dak.

If further funding were available to extend the project in other villages or regions then it would make sense to utilise the large existing NGO community. There are many grass roots NGOs in Bangladesh who have, like Chetonar Dak, strong links with their local communities. Many of the larger NGOs are seeing the benefits of working in partnership with these grass roots NGOs in order to more easily reach beneficiaries. This project showed the benefits of using local staff working with people they know, particularly for the workshops. Working in other communities an experienced trainer from Chetonar Dak could co-host the workshops with a trainer from the local grass roots NGO. The experienced trainer should run through the manual and flipcharts and rehearse the workshops with the local trainer beforehand and then as much as possible allow him / her to run the workshops. This would encourage a relaxed atmosphere and make it more likely that the workshops could open up and explore new ground rather than repeating the path of previous workshops. An initial extension would be easily practical through the Association of Rural Private Organisations for Networking (ARPON). ARPON is a network of grass roots NGOs operating in Dinajpur District of which Chetonar Dak is a founder member. These NGOs all have close contact with the communities in which they work and are interested in the ideas of Housing & Hazards.

Replication Issues

Future workshops will need to be adapted to take account of both season and locality. Availability of building materials is dependent on season, a point which was demonstrated when it was realised that the ideal building mud was unavailable for use because rainwater had filled in the ponds from which it is dug. On the other hand, whilst it would be impractical to hold the workshops during the monsoon, the pre-monsoon rains were very useful in subjecting the sections of layered mud walls to a test. During the driest part of the year an artificial water test would have to be devised.

The effect of locality is more profound. Many of the exercises of the workshops were based on different house types, often splitting into subgroups of people living in the different types. It was chosen to classify the housing into layered mud wall type and bamboo framed type with different divisions for roof type, it was not felt that the wall material of bamboo framed housing was particularly significant as it was all different variations of bamboo matting. Although this was appropriate for Sundarban village, in many regions of Bangladesh CI sheet is a common walling material whether on a bamboo or timber framed house. This house type could not be ignored and the subdivisions of housing would have to be adjusted accordingly. Similarly the roof types vary from region to region, for example sugar cane cover which was used for the roof budgeting activity is not found in all other regions. Not only do varieties in the house types mean the classifications

used by the workshops must vary but also that the innovations chosen for practical training should also vary, if not the themes of the workshops themselves. In certain areas mud housing is not found and the Building with Mud workshop would be singularly inappropriate! It should also be noted that some of the Bengali of the flipchart is in local language and would need adaptation for other regions of Bangladesh.

The workshops were carried out after a period of extensive research into the materials and methods of local housing. In other areas a short period of initial research, if only for a few days or weeks, would be necessary in order to determine what adaptations to the workshops are necessary. In different parts of North Bengal the adaptations would be minor, in different regions of the country the adaptations could be extreme and require skill to identify and carry out.