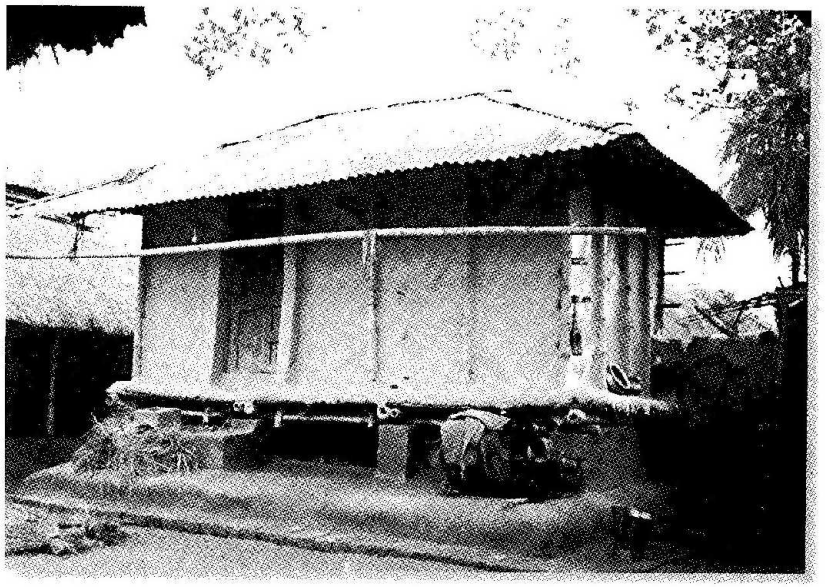

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IMPROVING RURAL HOUSING IN BANGLADESH: CONTEXT, ISSUES AND PRIORITIES

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Introduction

The social, geograhical and climatic factors which make Bangladesh's housing stock especially vulnerable to natural hazards are well-known (see, for example, Lewis and Chisholm, 1999). Those factors bear disproportionately on the homes of the poor and a major re-evaluation is needed now at both Government and NGO levels to develop an overall strategy for improvements to rural housing.

This paper deals specifically with issues pertaining to the improvement of kutcha housing (that is, houses made from bamboo, thatch and mud in which most of the population lives.

Population increase

At 763 persons/km^2, Bangladesh's population density is among the highest in the world. Between the Census of 1991 and 1997, the country's population increased by almost 11 million, according to one estimate (BBS, 1991). That rate of increase by itself requires construction of 2.2 million homes annually of which 84% (1.8m) will be in rural areas.

As the population increases, so people are increasingly forced to live in low-lying areas vulnerable to floods and cyclones. At present, there are no major changes expected in the socio-economic profile of the country in which 75% are employed in agriculture producing 40% of the Gross National Product, Therefore, this state of vulnerability may be expected to persist for the forseeable future (25 years).

Ratio of Kutcha to Pucca construction

In 1960 it was estimated that 90% of houses in Bangladesh were rural and of kutcha construction (bamboo, thatch and mud). At that time that ratio represented 8.2 million dwellings. By 1993 the rural housing stock represented 83% of the country's total and 75% of those were of kutcha or sub-kutcha (temporary) construction. It might be noted that the rise in urban construction probably includes a significant quantity of temporary slum dwellings and could reflect a deterioration in overall housing stock.

Projecting those figures in association with the population increase shows that the actual number of kutcha and temporary housing constructions will continue to increase for some time even though these construction types may decline as a percentage (Fig. 1).

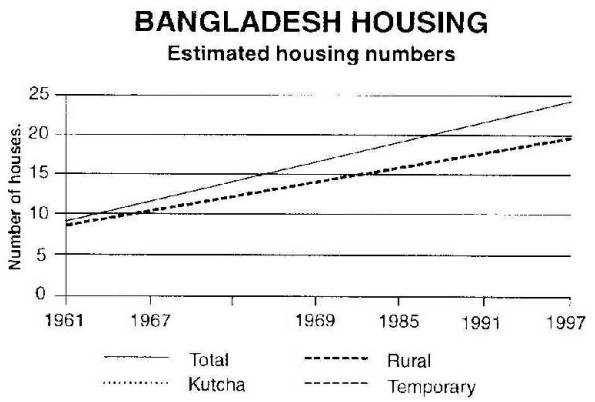

Figure 1 : Projection of house numbers

Forces of nature

The tropical monsoon climate gives between 55 inches of rain in the central border area and 200 inches in the north east, of which 80% falls between late May and late October. The rain is often accompanied by severe wind-storms.

Figure 2 illustrates the effects on housing of some of the more severe natural events to have struck Bangladesh in recent years. It may be noted that, generally, more damage is caused by flooding than by wind. Flooding can occur twice during a year. Winds (Cyclones and tornadoes) may cause very intense damage over their relatively narrow paths but the major devastation in such cases results from the associated storm surges which can be up to 30ft in height (1991).

To put these figures in context, the 1970 Cyclone killed 300,000 and the 1974 floods affected up to 36 million people over an area of 34,000 square miles.

As well as the mechanical destruction of houses, flooding saturates the ground, reducing foundation stability, erodes river banks and redeposits silt and sand, affecting agriculture and reconstruction activities. Prolonged periods of flooding may thus affect pucca buildings as badly as kutcha ones.

Other natural hazards which affect Bangladesh, although not so significantly as flood and wind, include:

- Earthquakes: potentially serious but no recent tremors;
- Fire, especially in densely packed urban areas;
- Hail stones: golf-ball sized hail stones have been known to cause severe damage.

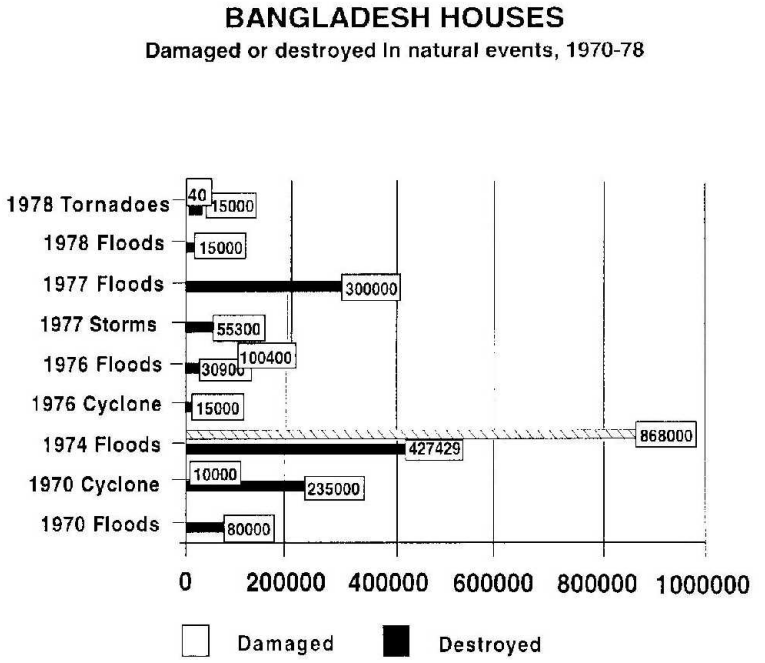

Figure 2 : Houses damaged or destroyed by natural events, 1970-78

In the face of such a range of hazards, it must be accepted that it will be impossible to make a house of natural materials that can completely withstand all these.

Regional vulnerabilities

Different areas are subject to differing intensities of hazards. This means that there is not one ideal solution to improving kutcha housing that can be applied in all places. However, it may be possible to transfer technologies from one place to other suitable locations. For example, the steeply curved thatched roofs used in high rainfall areas are very strong in relation to vertical loads and could be encouraged elsewhere.

Four broad classifications of hazard can be identified:

1. Subject to heavy rainfall with seasonal ground run-off;
2. Heavy rain with rising water and flash floods;
3. Heavy rain, flash floods, cyclones, tornadoes and Nor'westers;
4. Heavy rain, floods, cyclones, tornadoes, Nor'westers and storm surge.

These classifications may, in time, be subject to clarification or refinement.

Economic forces

Landlessness (75% of the rural population are functionally landless) and poverty force many people to migrate in search of income; the result is often movement to lower, more vulnerable ground in the chars and shifting deltaic areas. The existing distribution of power, income and assets is a major component of that vulnerability vulnerability, reinforcing the benefits of the power system for those already in control. Major changes to the processes that create vulnerability need to be addressed (Blaikie et al., 1994).

Any building programme would have additional benefits in creating local employment and demand for locally produced materials. The increased confidence of the rural communities as their housing stock improved should result in less mobility of families and create sociological continuity.

Disaster preparedness provisions

In areas most affected by extremes of climate, the creation of additional pucca housing can be seen as provision of communal safe havens. In such places, improved kutcha housing may have only limited benefit. Perhaps the "improvement" (say, a steel post) may be all that remains after the disaster. This could prove lifesaving if designed as an anchorage point or it might serve to identify the house location after the flood.

An important flood mitigation measure for kutcha housing is to raise the structure on a mound (killa) or stilts. Roads could be widened to provide stronger embankment s and raised areas for the construction of houses. This would be more cost effective than constructing many individual killas and the raised areas created could more easily be stabilised and protected by shelter belts of bamboos and trees. Such vegetation would also provide sustainable supplies of building materials. A recent report from Bangladesh (Ahmed, 1998) commented on the shortage of bamboo after the floods that year and noted that the cost of bamboo had risen by 150% as a result.

Appropriateness of improvements

Any suggestions for improvements to kutcha housing must take into account the appropriateness of the materials and respect for the local vernacular

building types. Figure 3 illustrates some of the many building forms in use in Bangladesh. Factors which influence the appropriateness of the material include:

- Affordability/cost
- Practicality of use
- Availability
- Transportability/location
- National/international and Donor culture

Respect for the cultural aspects of building needs to recognise:

- Location
- People and their experiences
- Traditional materials and methods
- Sociological aspects
- Historical factors
- Differences between rural and village/city dwellings.

The emergency period

Analysis of data available after the 1970 cyclone/surge wave showed that 83% of post-disaster shelter reconstruction were provided from within the affected populations. Outside assistance from the Government and NGOs accounted for only 17% of the new/repaired dwelling provision.

Within 2 days of the cyclone, people were rebuilding their homes. However, the emergency aid system was only just getting into action, hampered as it was by the damage to transport and communications networks.

It is inappropriate to try to introduce housing improvements in this emergency recovery period. Studies show that the ability to regenerate income is more a priority than shelter. Improved building methods take time to introduce and few can spare that time, even if the aid system has access. Improvements must be considered later. Unfortunately, by the time it is appropriate to consider buildingn improvements, most agencies will have expended their housing budgets and have no reserve for improving what they ahve already done. Thus the status quo remains.

Transfer and dissemination of knowledge.

Dissemination of information on improved building methods must take place at three basic levels:

- Between multi-disciplinary groups and international agencies;
- Between key players within Bangladesh, and
- Within the rual communities.

Given that 75% of rural workers are functionally landless, that adult literacy is 35% or less of the population, that 8 out of 10 live below the poverty level and that 45% of the population is under 15 years of age, the keys to developing building for safety programmes will include:

- training of educators;
- development of appropriate methods and
- practical (financial) support for programmes.

The last point above is important. Although improved building brings tangible results, lack of finance will often be an inhibiting factor and, for most rural families, income generation and improved health are generally higher prorities (Blaikie et al, 1994 and Hodgson & Whaites, 1993). It is not practical to enforce a recommendation or legislation that home-owners must spend an additional 5% on their homes, even if it were clearly for their betermen and safety! However, there is equally little chance of meaningful improvement without some form of government supplement and corresponding oversight or policing of the policy.

The following examples illustrate some of the problems encountered with technical transfer programmes in Bangladesh.

Example 1: Polythene sheet

Oxfam's experience and research during the 1970s showed that ultra-violet light degrades clear polythene into a brittle, non-waterproof material. The sheeting, when used for roofing, also causes increases in internal condensation with potential health risks. Nonetheless, there has been a limited transfer of this technology, originally used for emergency shelters, with local families copying the "sandwich" technique in their own, non aid-provided homes.

This example that improvements which are demonstrated locally, available and affordable and proven against the weather elements will be taken up. However, people will usually wait to see how the new material performs in comparison with their existing structure before deciding to use it themselves. In other words, any building development must be tested in many places to ensure rapid acceptance and hence ready availability of the materials.

Such demonstration buildings need to be placed in accessible village locations to ensure maximum exposure to the population and to remove any psychological barriers that might be created by a cold, isolated scientific test. Follow-up studies will need to ensure that good ideas are not lost in cases where poor buildings may be overwhelmed by disaster; there will be a tendency for onlookers to tar the whole structure with the same brush - "all useless".

Example 2: Protecting looms

Many home-made wooden looms, used in cottage industries, have their feet resting on brick or stone. Experience shows that this reduces the risk of rot and termite attack and the precaution is used widely throughout Bangladesh. Strangely, the adoption of this technology in buildings is a leap of transfer that is not often made naturally.

(Editor's note: Interestingly, one of the innovations proposed by participants at the H&H workshops in North Bengal was to do just this. It isn't clear why the technique is not widely used)

Example 3: Raised grain stores

Grain stores are commonly raised above ground level and strengthened with cross-bracing. These techniques are not often adopted by villagers when building their own living-houses. This raises several questions as to why this might be the case:

- who introduced these techniques originally, and when?
- could it be that the original builders understood the principles and died before passing on their knowledge?
- is the low literacy rate a factor in the failure to transmit principles?
- do people place more value on their food stores (and contents) than they do on dwellings that have always been temporal in the face of ravages of nature?

Problems of technology transfer and retention are exacerbated by the frequency of natural disasters, the casualty rates and the low life expectancy (51 years).

Some time ago (Chisholm, 1979) the idea was put forward that the life of bamboo in contact with the ground could be prolonged by charring the ends and treatment with alkatra (used motor-oil, etc.). This was proposed after discussions with rural house-builders (see Figure 4). Work is still needed, twenty five years later, to demonstrate scientifically the extent to which this does improve bamboo life. The effects of different types of oil also remains to be tested. Clearly, there is still much academic research to be done.

Timescale for change

In other fields, such as agriculture, medicine, literacy, healthcare and family planning, changes have occurred over periods of 25 to 30 years in small

incremental stages. One major step in the development of community health has ben the introduction of the village-level para-medic to disseminate essential primary health information.

If a parallel can be drawn between building for safety and comunity health, then it would be logical to introduce "para-architects" who would be local people given basic training to disseminate simple construction improvements in their neighbourhoods. Such para-architects would be the basic agents for change over a 20 to 25 year period. The approach must aim for consistency and an appropriate scale of activity over that period.

In parallel wih the field dissemination, scientific exploration of construction principles needs to be undertaken. Research into fast-growing varieties of bamboo and other materials appropriate to the soils of Bangladesh would also be beneficial.

Funding

All these suggestions, including a resource base and training centre, will require funding. However, the scale of the funding should be seen in the context of the damage caused to the national infrastructure and economy by natural disasters.

Currently, most of the resources applied to buildings are being put into pucca structures which acount for only 16% of the housing stock. While these can and do provide safe havens in times of disaster, the wide distribution of the population and their reluctance to leave home until the last minute makes this role one of only marginal value.

As a simple example, if just 1% of the damage caused by the 1974 floods had been saved then the cost of reconstruction would have reduced by $5.79 million (equivalent to over $15m today). Since nearly a third of the damage was to domestic housing, improved building technologies could save the nation considerable sums. Better housing also protects property so the savings might be greater, in practice. External aid to Bangladesh amounts to 5% of the GNP (and totalled $1,386m in 1993). 95% of the country's development programmes are financed from abroad. The National debt stood at $16.6bn in 1994 (New Internationalist, 1997-8). It could be argued that a small percentage of these sums put into improvements to Kutcha housing could improve the lives of the 84% of the population who live in them and might free up expenditure for other development activities.

Proposed strategy :

The insertion of improved technologies into the annual house-building/ maintenance cycle using indigenous materials and techniques and available funding.

Background

The dwelling is a costly family asset.
Repairs to kutcha buildings are needed frequently but are cheaper than the initial cost of a pucca house.
The main housebuilding season occurs after planting so there is little surplus cash in the home.
Income generation is a higher priority than shelter after a disaster so house repairs are put off.
Most people therefore cannot afford even simple improvements which might protect their main asset.

The costs of improvement amount to between 5 and 8% of the basic new house cost (Carter, 1997). A basic house can cost around 2000 taka (45 taka = $1, approximately, 1998) so the improved model will cost 2160 taka ($48). Improvements are more cheaply included in new construction than in repair programmes and should be seen as off-set by long-term benefits.
Appropriate improvements would include:

- Lower parts of posts charred and bitumenised;
- Wall and roof-frames cross-braced;
- Wire lashings at roof/wall/post junctions;
- Roof support frame strengthened;
- Roof strengthened;
- Lower parts of bamboo mat walls treated.

Possible sources for funds include:

1. Government: within change of policy towards rural housing;
2. NGOs : on-going programmes;
3. Disaster relief funds: within rehabilitation programmes;
4. House owners: own funds for new houses;
5. Bank/co-op loans: Local banking and micro-credit facilities.

Proposed alternative housing programme :

New housing programmes should be designed as a mix of improved kutcha and a small proportion of pucca homes which act as safe havens.

Rather than building 50 pucca homes, the same funds might provide 100 improved kutcha dwellings plus 10 pucca ones and improvements to ancillary

structures such as kitchens and tubewells to create general improvements in environmental conditions within the community. This would benefit a much larger number of people but could generate disputes as to who would get the pucca homes and what arrangements would be made for their use in emergencies.

Example : Comparative costs in Taka (45 Taka = $1, approx):
(note that land costs are not included)

Element	All pucca houses: 50 Pucca homes	Proposed alternative 100 kutcha, 10 Pucca + ancillary structures
NHBRI model concrete house	50 x Tk16,000 = 800,000	10 x 16,000 = 160,000
Improved Kutcha houses		100 x 2,160 = 216,000
Improve existing dwellings		600 x 200 = 120,000
Provide educational materials		82,500
Employ workers 10 weeks@Tk45/day		30 x 2,250 =67,500
Leaving balance for : Community preparedness/flood markers/etc		30,000
Raising tubewells above flood level		20,000
Planting bamboo as windbreaks, etc.		24,000
Investing in micro-credit fund for building		70,000
Contingency		10,000
TOTAL, Taka	**800,000**	**800,000**

This illustrates how it is possible, within the cost of 50 pucca houses, to provide new improved homes for 110 families and to upgrade a further 600 homes. Thus, up to 14 times the number of families will benefit. The community is involved in its own disaster preparedness and substantial employement is generated. Clearly, other mixes of activities in the alternative proposal are possible and may be appropriate, depending on the local circumstances; this example illustrates the principle.

The benefits could be spread even more widely by providing some of the funding on a credit basis. This could help to transfer ownership to the community and the revolving fund would be seen as a way of sustaining further improvements for others.

Conclusions

Since no major changes are predicted in the make up of the workforce, the population distribution or the ratios of pucca/kutcha housing over the coming 25 years, it can be argues that current funding and energy being spent on pucca housing improvements is inappropriate in terms of rural/urban housing ratios.

If improvements to the rural housing stock amounting to 8% of the initial construction cost (an additional $3.50 per house) could reduce disaster damage by 1% then $15m to $20m could be saved during major events.

Over 1.8 million new rural homes are needed each year just to cover the population increase; concerted action is needed now to ensure that these dwellings are safe and affordable. Past experience has mostly been of measures which have been too little, too late and not sufficiently scientifically founded. Housing must to be raised as a national priority area.

An old African proverb says "It's better to light a candle than to curse the darkness".

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