PROCEEDINGS OF THE SECOND DHAKA HOUSING & HAZARDS INTERNATIONAL SEMINAR ON *AFFORDABLE VILLAGE BUILDING TECHNOLOGIES : FROM RESEARCH TO REALISATION*

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SALEK M SERAJ
Department of Civil Engineering
Bangladesh University of Engineering and Technology, Dhaka, Bangladesh

ROBERT L P HODGSON
Housing & Hazards Group
School of Engineering, University of Exeter, UK

JAMILUR R CHOUDHURY
Department of Civil Engineering
Bangladesh University of Engineering and Technology, Dhaka, Bangladesh

The Seminar was hosted by the Bangladesh University of Engineering and Technology (BUET) in association with the Housing & Hazards Group, University of Exeter, UK and incorporated ***Dhaka's first Workshop on Testing of Full-scale Vernacular Structures***

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About the Seminar Partners :

BUET and Department of Civil Engineering

Bangladesh University of Engineering and Technology (BUET) is the apex institution for engineering education at undergraduate and graduate level studies in Bangladesh. Every year about 600 students graduate from BUET in various engineering disciplines.

The Department of Civil Engineering, the largest department of the University, offers both undergraduate and postgraduate programs in civil engineering and currently has over 1000 students in enrolment. There are highly qualified faculty members specializing in structural engineering geotechnical engineering, transportation engineering and environmental engineering disciplines. The current faculty strength of 60 includes 48 having doctoral degrees.

The University of Exeter and the Housing & Hazards Group

The University of Exeter, located in the South West of England, continues to be one of the most popular universities in the UK. It enjoys an excellent reputation for both research and teaching across its six faculties. The University has around 7,400 students of which about 1,700 are postgraduates. University of Exeter fosters wide-ranging interests and expertise across the various disciplines.

The interdisciplinary Housing & Hazards Group includes academics and non-academics with an interest in improving the safety of the built environment in developing communities. It is based within the multi-disciplinary Department of Engineering which houses a full range of teaching and research facilities for 375 undergraduates, 40 postgraduate students and fellows and 40 academic staff.

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University of Exeter :

Dr. R. Hodgson

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We are indebted to all the honorable guests who got the seminar off to such a good start with their kind and encouraging remarks. Head of the Civil Engineering Department, Prof. M Hossain Ali welcomed all the participants. Dr. Simon Kay, of the British Council, congratulated the link programme on its work for Bangladesh's people and Dr. Robert Hodgson replied on behalf of the international guests. The Vice Chancellor of BUET, Prof. Nooruddin Ahmed, introduced Professor Jamilur Choudhury who provided us all with a most stimulating key-note address and Dr. Salek Seraj proposed a vote of thanks to all inaugural speakers which we echo here.

The workshop could not have taken place without its sponsors. We must record the contributions of the UK Department for International Development (DFID) who fund the BUET-Exeter link through the British Council-managed Higher Education Link programme, Shelltech Ltd who sponsored the Workshop on Testing of Full Scale Vernacular Structures, the Grameen Bank who hosted the field visit and Prof. Nooruddin Ahmed, Vice Chancellor of BUET, who hosted the Seminar farewell dinner.

Lastly (or is it firstly?), the event could not have taken place without the participants. Thank you to all who came and participated so enthusiastically. We hope the following pages will be a testament to all contributors, some of whom are shown on page 160 and 162 pictured during the seminar.

INTRODUCTION

Objectives

It is two years since the First International Housing and Hazards Workshop (Dhaka, December 1996) introduced the concepts of Building for Safety in Bangladesh. During that time the collaboration between BUET and the University of Exeter has developed and become established as a formal Higher Education Link funded by the UK DFID and managed by the British Council. The first pilot field studies have been completed and evaluated, increasing our understanding of rural housing issues. Laboratory tests on appropriate materials and on physical models are underway in both BUET and Exeter and awareness is growing of the need for more resilient housing for Bangladesh's rural poor.

The Second International Seminar *Dhaka 99* has come at an important stage in the development of Building for Safety in Bangladesh. It consolidates much of the initial work and provides a platform from which the wider applications of the techniques and methods can proceed. It started to create the networks of people and organisations which are essential to promoting understanding of the concepts at all levels from government to the individual citizen. Most importantly, the updated recommendations contributed by the many informed and experienced participants will help to guide the future course of the Housing and Hazards consortium both in Bangladesh and in other hazard-affected countries.

Although the International Decade for Natural Disaster Reduction closes this year, *Dhaka 99* will help to ensure that its spirit and aims will live on.

Seminar format

Dhaka 99 was, in reality, a series of three events on consecutive days. The first Dhaka workshop on the testing of full-scale structures outlined the initial progress of a new BUET programme to develop techniques for the testing of typical full-sized village houses. Two bamboo-framed houses had been constructed under cover to enable static loading in controlled conditions, including flooding.

The second day of *Dhaka 99* was devoted to formal presentation of appropriate research into technologies and dissemination practice aimed at reducing village-level vulnerability to hazards. International contributors outlined experiences from India and UK as well as those from Bangladesh and the day wrapped up with a review and extension of the *Dhaka 96* recommendations.

Since one cannot talk for ever in the abstract, the third day whisked participants out of the city into rural Dhaka District to visit Housing programmes managed by the Grameen Bank. Grameen model houses and a

concrete post casting yard were inspected to put the formal contributions into perspective. Finally, an excellent lunch gave lie to the old adage that "it's tough in the field".

Editing notes

This volume has been divided into two principal sections and a postscript. Section 1 includes formal contributions which relate principally to technological research and development while Section 2 covers sociological and economic factors which influence the house-builder. The Postscript section reports discussions held throughout the event, including the Workshop on Full-size testing and the field visits. Lastly and most importantly, it provides the output: the Recommendations.

We hope that this editing layout will add to the readability and hence usefulness of this book.

Enjoy!

We think that this volume contains something for everyone. It includes both the methodologies used in and preliminary observations from initial Housing and Hazards socio-technical fieldwork plus first fruits of the technical programmes at BUET.

This diverse collection of research and fieldwork presents both the learned mathematician and the sociologist with nuggets to inspire and encourage him or herself. Now read on and enjoy!

ISSUES AND OBSERVATIONS

The Seminar presentations were not themed in any particular way. However, issues of particular concern to participants did emerge from time to time and the following notes attempt to encapsulate them.

Following up H&H96

The 1996 Workshop, "Implementing Hazard-Resistant Housing" produced a clear set of implementable steps for developing building for safety in Bangladesh. A recurring question during the 1999 Seminar was "what have we done since then?"

The BUET-Exeter link is starting to coordinate research and to raise awareness of the issues. This Seminar was a practical demonstration of that. By drawing in outside organisations, such as the Grameen Trust and Sheltech Ltd which have supported Housing and Hazards research, a start has been made on assembling the Working Groups envisaged in the first H&H96 recommendation. Review of available information and translation of appropriate texts into Bangla is one of the Link objectives; so is the seeking of further funding for development of the activities. Until the national government puts its weight behind efforts to help the rural poor, little can happen. Jamilur Choudhury, in his keynote speech, reported that the recently adopted five-year plan includes considerable emphasis on rural housing and proposes to set up a special fund to provide soft loans. As he says, when this is implemented it will provide a considerable boost to building for safety in Bangladesh.

Thus, while a few solid achievements have been completed since 1996, much remains to be done. This Seminar showed that a vital start has been made and all were aware that there is still much to be done if everyone in Bangladesh is to have a secure, healthy home environment in the next millennium.

The usefulness of full-size testing

The first session was devoted to BUET's plans for testing a full-sized village house structure. This programme is the first of its kind in Bangladesh. Rural artisans had been brought from Comilla to Dhaka to construct two bamboo-framed houses using authentic materials and methods at a sheltered test site. Participants could inspect the test houses and to observe the effects of controlled flooding on the mud plinth of one which had been built in a shallow tank.

Opening the test house, Jamilur Choudhury commented that he had been interested in non-engineered construction for over 30 years. One might think that "folk wisdom" would by now have led to a resilient structure but a glance at these examples showed this was not so! They did not even contain adequate bracing. Salek Seraj explained that many of the details of village houses, such as

joints tied with jute cord, could not be analysed accurately and full-sized testing was the only practicable way to assess complete structures. Direct observation of actual deformations would provide better understanding of the behaviour of these non-engineered structures than any analytical modelling could.

One limitation of the test arrangements at this site was that they would allow only static load testing of the frames and many of the hazards expected in Bangladesh have significant dynamic components. Jamilur Choudhury's suggestion to tow a building mounted on a trailer along a runway (as a simulation of wind loading) gave some food for thought. Mehedi Ansari provided a more immediately practical alternative with his description of a forthcoming model test programme to be conducted in the wind tunnel at Exeter's School of Engineering.

One participant pointed out that the resilience of structures like this reduces markedly with age as the effects of weather and insects take their toll. It would be important to test old buildings as well as new ones. Salek Seraj commented that the test programme would in time be extended to the field testing of real houses; first, some calibration of the methods was necessary to ensure that the results would remain non-destructive!

The characteristics of Bangladesh's rural housing

The full-size test examples provided a good introduction to the nature of the kutcha (non-engineered) housing which formed the main subject for discussion. However, there are many other forms of kutcha housing which, as Malcolm Chisholm points out, together amount to more than 60% of Bangladesh's housing stock. Malcolm's figures demonstrate that although that proportion is falling slowly, the total increase in the country's housing needs due to the inexorable rise in population mean that the number of kutcha buildings could continue to rise for many years into the next millennium.

Several other contributors, including Iftekhar Ahmed, Robert Hodgson and Samantha Magne, described the particular vulnerabilities of different building forms. Housing & Hazards fieldwork has shown how simple improvements in building methods can significantly improve building performance for a marginal cost of as little as 8% of the unmodified costs. This is in line with Malcolm Chisholm's conclusions reached 20 years ago (see H&H96) but it was good to see that current work confirms it still to be true.

Socio-economics

Disasters strike the poor much harder than they do the rich. The poorest families are constrained by lack of resources to build substantial parts of their homes themselves, using whatever skills and materials they may have. Samantha

Magne reported several examples of people who had been unable so far to reconstruct homes destroyed during the 1998 Floods, even some six months after the event.

In such circumstances, it is hard for rebuilders to pay even an extra 8%. Grameen Bank's presentation reinforced the point that there remains a big need to examine appropriate ways of increasing the affordability of better housing. This Seminar's recommendations extended those of 1996 to include the option of insurance for rural home-owners since the floods of 1998 had shown how the collateral for a loan can be swept away overnight.

Recent Disasters

1998 had been a particularly bad year for flooding in Bangladesh with more than 25 million rendered homeless and some 60% of the country affected. Salek Seraj's team had surveyed the effects of the flooding as it progressed and Iftekhar Ahmed reported a short study he had made of post flood recovery work in Manikganj. To illustrate the magnitude of the disaster, Dipal Barua showed a video made by Grameen Bank.

All who had witnessed this tremendous natural disaster agreed that the rural communities affected by it had, in general, appeared to recover surprisingly quickly. However, Iftekhar had found that the costs of construction materials had inflated greatly and participants noted the level of indebtedness this must have caused.

Amir Khan outlined other regional experiences in his overview of Indian Government recovery programmes following recent earthquakes in that country. He reinforced the need for careful management of aid after disasters to ensure its appropriateness and timeliness. Each recovery programme should include community-based training and mitigation measures.

One of the quandaries facing the many organisations which become involved in disaster relief is to decide what is appropriate to the beneficiaries and at the same time practicable and affordable to the donor. Al-Hussaini and his colleagues provided an elegant methodology for evaluating the various options which incorporates quality and cost factors. They demonstrated that simple solutions such as donation of CI sheets or tarpaulins give the best overall scores. Sometimes it can be beneficial to anticipate likely rehabilitation needs and J B Alam contributed a useful paper on the use of Neural Network models to predict damages caused by cyclones. A full disaster management programme needs tools such as this which can be used in tandem with less sophisticated groundwork.

Technologies

BUET's researchers have been enthusiastically studying appropriate village building technologies since 1996 as witnessed by the contributions of Kabir, Rouf, Roy and their colleagues. This preliminary work will play an important role in introducing a philosophical basis to the study of "non-engineered" construction. It will be vital, as Housing and Hazards programmes develop, that proposed improvements to technologies are well understood and researched. If we don't understand what we are proposing then experience shows that the village communities will not do so either and the take-up of the ideas will be slow.

Graham West and Sue Harding presented research and practical data from the UK where traditional mud-built houses have escaped from their low-income rural image to become very sought-after homes for rich folk. This type of construction, known in Devon as "cob", has not been practised for nearly 100 years and now companies such as Sue and Graham's are relearning the old techniques in accordance with modern building control codes. There must be a useful lesson there!

Dissemination strategies

Building for Safety messages are of limited use if those who need to hear them, the low-income rural families, either do not receive them or cannot understand them. Robert Hodgson's presentation described the first Housing and Hazards' field study which Matt Carter had been planning at the time of the Dhaka96 Workshop. Following this, Samantha Magne and Iftekhar Ahmed both provided many suggestions regarding strategies for involving villagers in the process of disseminating good practice to the grass roots. Samantha's contribution was particularly instructive as she had investigated the impacts of the first H&H study programme.

Malcolm Chisholm suggested the establishment of "para-architects" in each village who would play a role similar to that of para-medics in the health field. This suggestion was taken up by several commentators. Malcolm's pertinent examples illustrate how we can always learn from experiences in other fields and his calculation shows how a low-key improved self-build programme could benefit most of a village for the cost of a handful of well-built pucca houses.

The discussion and the many learned contributions showed that dissemination of the technical research to those who need it remains our biggest challenge. The recommendations, drawn up at the conclusion of the Seminar, draw attention to the need to learn from other mass-awareness programmes when conducting motivational activities. Such awareness campaigns should include the regeneration of natural (and hence sustainable) building materials grown withing the community.

The Recommendations

As in 1996, the final session drew up Participants' suggestions for further action. The 1999 recommendations do not supplant the recommendations of 1996; rather they augment and clarify those. Things have moved on since 1996 and, as noted at the start of this section, steps are being taken to implement the first set of recommendations. Therefore, it was particularly fitting at this moment, half way through the BUET-Exeter Link programme, to revisit the 1996 recommendations and to update them.

Lighting the candle

An old African prorerb says "Better light a candle than curse the darkness". We feel that a candle has at last been lighted and we look forward to reporting further progress at our Millennium Conference in 2000!

Salek M Seraj, Robert Hodgson and Jamilur R Choudhury, Eds.