THE IMPACT OF THE 'BUILDING FOR SAFETY PROJECT' ON EARTHQUAKE RISK REDUCTION IN DEVELOPING COUNTRIES

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SUMMARY

The paper reports on a survey concerning the effectiveness of a five year international research and dissemination project called: '*Building for Safety'*, which was conceived as a contribution to the International Decade for Natural Disaster Reduction (IDNDR). This project formulated the first comprehensive set of guidelines for the training of indigenous builders in hazard resistant construction of low-income dwellings and settlements. The particular emphasis of this paper concerns the effectiveness and impact of these guidelines on seismic risk reduction.

The project was undertaken by an international multi-disciplinary team of researchers under the direction of teams based in Cambridge and Oxford Brookes Universities. The authors of this paper led these teams and were part of the editorial team who produced the four volume set of publications.

This project was the culmination of about two decades work in various countries, which had attempted to devise ways to reduce risks to non-engineered vernacular buildings. The work presented a major challenge to devise building improvement measures that would satisfy some very demanding criteria with approaches that are:

- technically sound in terms of hazard resistant design,
- based on *existing* building materials, construction skills and local building traditions,
- culturally acceptable to the recipient communities,
- affordable to very poor families with minuscule incomes,
- capable of being communicated within community based training sessions.

Whilst the survey does not report on widespread 'take-up' of the advice contained in the guidelines

it does provide some useful insights concerning the conditions needed to enable such programmes

to take place with any degree of effectiveness.

CONTEXT OF PAPER

This paper presents the results of a survey on the effectiveness and impact on seismic risk reduction of the ***Building for Safety Project,*** which was conceived as a contribution to the International Decade for Disaster Reduction (IDNDR). This project was funded by the Engineering Division of the British Government's

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Overseas Development Administration (ODA) and was undertaken by an international multi-disciplinary team of researchers under the direction of teams based in Cambridge and Oxford Brookes Universities. The authors of this paper were leaders of teams of researchers/ authors who wrote the four volume set of publications that documented the results of the project.

The four sets of guidelines are as follows:

- Dudley, Eric and Haaland, Ane; ***'Communicating Building for Safety'*** (1993) London: Intermediate Technology Development Publications

- Coburn, Andrew; Hughes, Richard; Pomonis, Antonios and Spence, Robin; ***'Technical Principles of Building for Safety'*** (1995) London: Intermediate Technology Development Publications

- Clayton, Andrew and Davis, Ian; ***'Building for Safety Compendium'*** (1994) London: Intermediate Technology Development Publications

- Aysan, Yasemin; Clayton, Andrew; Cory, Alistair; Davis, Ian and Sanderson, David **'Developing Building for Safety Programmes'** (1995) London: Intermediate Technology Development Publications

This project was the culmination of about two decades work in various countries which had attempted to devise ways that reduced risks to vernacular, non-engineered buildings. The work presented a major challenge to develop building improvement measures for non-engineered building, one of the most demanding issues in effective disaster mitigation. The project was conceived to make a significant contribution during the initial years of the IDNDR , In 1996 Ian Davis was awarded the United Nations Sasakawa Award for his contribution to International Disaster Prevention. The citation commented on this project :

> *"Dr Davis' current project initiative "Building for Safety" is an invaluable contribution to practitioners and users in those developing countries facing geological and hydrological hazards*"

However, it is considered important to determine whether the award assessors were unduly optimistic in their expectations of the impact of the project on practitioners and users. Therefore the authors consider that it will be particularly appropriate to present the results of this work as a 'stocktaking exercise' at the conclusion of the IDNDR which coincides with the 12WCEE

The paper is based on analysis of the survey of the individuals and groups in nine countries who contributed to the project. The survey will examine the impact of the documentation concerning *Building for Safety* in the four volumes listed above. This evaluation is particularly important since the project marked a watershed in the subject of hazard resistant low indigenous building. Therefore before further studies / research / project implementation are undertaken in this area of concern it is necessary to understand the 'lessons learned and applied' from this project.

SURVEY METHODOLOGY

One of the key concerns of the sponsors of this project was the dissemination of the guidelines to bodies that needed the advice and were able to contribute to building safety programmes. Therefore this survey needed to find out how the advice had been used.

Two approaches were adopted: firstly to conduct a broad survey of the recipients of the sets of the four books which were provided free of charge to two hundred and twenty carefully selected groups. Therefore the first part of the survey was to send questionnaire to each of the two hundred and fifty groups that received the books. However the response to the request for detailed feedback was disappointing in that only fourteen completed forms were returned. (6.3 percent) *(See Appendix 1)* In addition six letters were received (2.7 percent) which noted that the books could not be found, or that the staff that had been the recipients about five years ago but were not now working for the organisations.

The second approach was to approach a number of experts in this field who were familiar with the project with a series of open-ended questions or interviews. The 'experts' covered those with internationally recognised technical skills and experience as well as expert *users*, or *implementers*, who had taken the guidelines and adapted them to suit local projects. *(See Appendix 2)*

SURVEY RESULTS QUESTIONS ANSWERED USING A NUMERICAL SCALE

A numerical code was used for the following questions, answered by all the respondents listed in Appendix 1:

Excellent	**(extremely useful)**	**5**
Good	**(generally useful)**	**4**
Average	**(of some value)**	**3**
Poor	**(not very useful)**	**2**
Very poor	**(no use)**	**1**

The results from the completed assessments have been averaged as follows:

- *Overall **Effectiveness** of the Guidelines* **4. 5 (Good to Excellent)**

- *Overall Effectiveness of the **Dissemination** of the Guidelines*
  4. 0 (Good)

- *Overall Effectiveness of the **Technical Information** contained in the Guidelines*
  4. 6 (Good to Excellent)

- *Which **hazard** was your concern*
  11 Earthquake
  4 Windstorms
  1 Floods

1 Unstable land conditions

- *How effective was the information on the **Organisation** of 'Building for Safety' Programmes?*
  4. 6 (Good to Excellent)

- *How effective was the information on **Communication** in 'Building for Safety' Programmes?*
  4. 3 (Good to Excellent)

- *How effective was the information on **Training** in 'Building for Safety' Programmes?*
  4. 3 (Good to Excellent)

CONCLUSIONS DRAWN FROM THE SURVEY

Since there is insufficient space available in this paper to fully cite the comments made by the respondents to the various questions that were asked concerning the guidelines, the paper will confine itself to the broad findings to come from the survey.

(The full text of their comments can be obtained from the author: i.davis@cranfield.ac.uk)

GENERAL EVALUATION OF THE VALUE AND EFFECTIVENESS OF THE GUIDELINES

The guidelines have been well received, with unanimous appreciation of their general clarity, layout, relevance and importance as a practical contribution to disaster mitigation. However, with certain rare exceptions (such as projects in India, Peru, Albania and Bangladesh), the respondents to the survey have **not** identified any places where the results have been applied to initiate or support new *'Building for Safety'* Programmes. The explanation as to why they have been used in these countries, and not in other contexts is not fully clear. It probably lies with the project leaders who used the material in support of their own extensive knowledge backed up with high levels of motivation as well as having local leaders wanting to initiate building programmes. One of the experts consulted in the survey, Gustavo Wilches-Chaux from Colombia has perceptively commented

> *" My experience with written training materials is that they are most useful if they flow through formal or informal networks and if they go to people or groups which are directly involved with the topic of the material, but in their native language"*

DISSEMINATION OF INFORMATION

The survey sample was too small to gauge where the guidelines have penetrated. Some are in libraries in universities and government agencies and at least one set is being used within an international NGO. The letters from agency staff that *had* received the material but could not find it five years later is a reminder of the haphazard way in which technical data is indexed, stored and used. The issue also highlights yet again the problems of institutional memories when there are patterns of high staff turnover. There were useful comments made concerning the difficulty with keeping information up to date with suggestions for the use of the INTERNET or CD ROMs to assist in regular updating, which is obviously impossible with the static text of books.

USE MADE OF THE GUIDELINES

The most common practical use of the material is in support of teaching within training courses and university courses. This was certainly not envisaged as a primary audience when the guidelines were written. The manner in which they are used may be a reflection of the paucity of teaching materials in many developing countries.

CHANGES NEEDED IN FUTURE GUIDELINES

- **ARE REFINEMENTS NEEDED IN THE *TECHNICAL ADVICE* THAT WAS OFFERED IN THE PROJECT?**

There was no criticism of the technical material. One of the authors suggests that advice is needed concerning building in volcanic areas as well as the need to develop video films to demonstrate the processes described in the book of technical guidelines.

- **HAS THE ADVICE ON *PROJECT ORGANISATION* BEEN APPLIED, WHAT CHANGES NEEDED TO INCREASE THE NUMBER OF PROJECTS BEING UNDERTAKEN?**

The survey provided little comment on ways to increase the number of such projects, however it did reveal some useful information concerning the 'take-up' of information. The survey appears to suggest that guidelines 'on their own', without being introduced within a 'conducive environment' such as by experienced leaders or within training programmes stand minimal chance of being adopted. One of the experts consulted suggested that the guidelines would need to accompany the finance needed for a building programme

An example of a supportive context for the application of this material took place during the reconstruction of Latur in Maharashtra, following the 1993 earthquake. A set of these guidelines was provided by one of the authors, Ian Davis to the District Collector of one of the areas being reconstructed. They were passed to him with an explanation concerning which sections would be applicable to which aspect of the reconstruction process in the area. In the following two years the guidelines were extensively followed and this was possibly due to this original personal contact, endorsement and guidance in their use. However, this was a rare opportunity and it is important to remember that the aim of books is to share information in the model of a cascade *without* the need for the author to be present

- **HOW EFFECTIVE WAS THE ADVICE ON *TRAINING AND COMMUNICATION*, ARE CHANGES NEEDED TO IMPROVE COMMUNICATION OF ADVICE ON SAFETY?**

Special mention has been made of the value of the volume concerning communication. One of the experts consulted believes this book to be the best study he has ever seen on this theme. In Bangladesh, the advice on Training strategies has been followed and subsequently modified. There was a repeated request for the books to be translated into key languages in many hazard prone areas such as French, Arabic and Spanish

WHAT DOES THE SURVEY REVEAL ABOUT *GENERAL PROGRESS IN RISK REDUCTION* OF INDIGENOUS BUILDING IN DEVELOPING COUNTRIES?

As already stated, tangible results of new building improvement projects emerging from these guidelines are exceedingly slim. But nevertheless building improvement programmes to reduce hazard threats ***are*** proceeding in a number of countries. In some cases these guidelines have provided support to such projects whilst in other contexts they have not been used and excellent results have followed based on other technical advice.

On the negative side there is certainly no evidence from this survey that governments are interested in actively promoting the training of local builders in safe design. However on the positive side these guidelines, which attempted to link social and physical sciences as well as project management and training have helped to bridge some well-established divisions. One of our expert respondents, Dr Robert Hodgson the Director of the *Housing*

and Hazards Group, a body that has been promoting safe building in Bangladesh for over five years commented on the:

> *"…. big gulf between those who are technocrats –most engineers- and the social sciences. We need to bridge that gap and this set of books shows how to do that. I am very grateful that you produced them because in 1994 I thought I was starting from scratch and I was relieved to have them as a foundation for our efforts."*

WHAT DOES THE SURVEY REVEAL ABOUT THE CONDITIONS THAT NEED TO PREVAIL FOR EFFECTIVE *'BUILDING FOR SAFETY'* PROGRAMMES TO OCCUR?

As already stated not many building programmes, (as envisaged in the guidelines), have taken place in the past five years. However, from the comments provided by the respondents to the survey it would appear that effective action to reduce seismic risks to non-engineered building ***only*** takes place when:

- The problem to be addressed is recognised and well defined;
- There is a belief that something politically acceptable can be done;
- There is a technical solution which policy makers regard as practical, or feasible;
- There are energetic and informed policy advocates;
- The building programme is accompanied with community earthquake preparedness programmes;
- The project has the full backing of local community leaders;
- There is a window of opportunity to introduce change through a building improvement programme, (such as in the aftermath of a recent earthquake);
- The safety measures do not impose severe financial, social or environmental costs on the affected community.

APPENDIX 1
RESPONDENTS TO THE SURVEY

Sergio M. Alcocer (SA) Head,	Structural Engineering and Geotechnical Engineering and Geotechnical Area National Centre for Disaster Prevention	Mexico
Stephen Basdeo (SB)	Coordinator, Planning and Research National Emergency Management Agency (NEMA)	Trinidad
Dr. Edmund Booth (EB)	Principal, Edmund Booth Consulting Engineer	UK
Dr. Paul Burton (PB)	Reader in Seismology, School of Environmental Sciences University of East Anglia	UK
Amilcar Galindo (AG)	Director of Technical Support, Ministry of Communication and Transportation	Mexico
Hui Gao (HG)	Associate Professor, School of Architecture Tianjin University	P.R.China
Xia Jingqian (XJ)	Institute of Engineering Mechanics, China Seismological Bureau	P.R.China
Raul Francisco Nanas (RN)	Director , Centre for the Investigation of the Rationalisation of Vernacular Architecture (CIRCOT)	Argentina
Elizabeth Padilla (EP)	Coordinator of Education Service for Multiple Appropriate Technology (SEMTA)	Bolivia
Dr. Salek M. Seraj (SS)	Professor of Civil Engineering, Bangladesh University of Engineering and Technology	Bangladesh
Theo. Schilderman (TS)	Senior Shelter Specialist Intermediate Technology Development Group (ITDG)	UK
Dr. Lazar Sumanov (LS)	Advisor/ Conservator Republic Institute for the Protection of Cultural Monuments	Macedonia
Dr. N.O. Uduku (NU)	Lecturer, School of Architecture and Building Engineering, University of Liverpool	UK
Dr. Syed Tanvir Wasti (SW)	Professor , Civil Engineering Department Middle East Technical University Ankara	Turkey

APPENDIX 2
EXPERT OPINION, LIST OF RESPONDENTS

Dr. Edmund Booth (EB)	Principal, Edmund Booth Consulting Engineer	UK
Dr. Robert Hodgson (RH)	Director *'Housing and Hazards Group'*	UK
Fernando Masaya Marotta (FM)	Programme Officer, UNDP	Guatemala
Raul Francisco Nanas (RN)	Director , Centre for the Investigation of the Rationalisation of Vernacular Architecture (CIRCOT)	Argentina
John Norton (JN)	Director of *'The Development Workshop'*	France
Gustavo Wilches-Chaux (GWC)	Manager of Government Earthquake Reconstruction Programmes	Colombia