Proceedings

Workshop on Safer Shelter in Vietnam

Hanoi, Vietnam
4-5 September 2002

Organized by

Asian Disaster Preparedness Center

Ministry of Construction

Vietnam Red Cross and

the International Federation of Red Cross and Red Crescent Societies

Disaster Management Center

With Support from

United States Agency for International Development

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Asian Disaster Preparedness Center
Bangkok, Thailand www.adpc.net

The **Kathmandu Valley Earthquake Risk Management Project** was launched in September 1997 under the Asian Urban Disaster Mitigation Program. The objective of the Nepal national demonstration project is to reduce earthquake vulnerability of Kathmandu valley by establishing appropriate earthquake risk management policies. Developing an Earthquake Scenario and Action Plan was one of the initial steps undertaken by the project. Other components of the project are improving school earthquake safety, increased public awareness, and building capacity of local institutions and professionals. The project, implemented by the National Society for Earthquake Technology-Nepal in association with GeoHazards International, USA, has successfully institutionalized an annual Earthquake Safety Day as a mean to raising public awareness, in addition to organizing masons' training and demonstrating successful retrofitting of selected schools in the valley.

This paper is published under the Asian Urban Disaster Mitigation Program for sharing knowledge and experiences from national demonstration projects on disaster mitigation in target countries of Asia. It is made available by the Asian Disaster Preparedness Center, Bangkok, Thailand, with minimal editing. The opinions expressed herein are those of the author and do not necessarily reflect the views of Asian Disaster Preparedness Center or the U.S. Agency for International Development. Publication of this paper was made possible through support provided by the Office of Foreign Disaster Assistance, United States Agency for International Development, under the terms of Cooperative Agreement No. 386-A-00-00-00068.

Preface

It is with great pleasure that ADPC presents the proceedings of the "Workshop on Safer Shelter in Vietnam: Towards Designing an Urban Disaster Mitigation Project" organized during 4-5 September 2002 in Hanoi, Vietnam. The workshop was organized by ADPC in collaboration with the Ministry of Construction, the Vietnam Red Cross and the International Federation of Red Cross and Red Crescent Societies, as well as the Disaster Management Center, Central Committee for Flood and Storm Control.

The workshop aimed to provide a forum for participants to review, analyze and discuss five main issues pertaining to the impact of flood and typhoon on housing; existing shelter options and approaches; methodologies for transfer of these options or solutions through awareness promotion campaign and capacity building workshops; innovations on developing a techno-financial mechanism for the delivery of disaster-resistant shelters; and existing government housing policy relative to disaster reduction.

Another important objective of the workshop was to develop an ADPC urban disaster mitigation project in Vietnam under the Center's Asian Urban Disaster Mitigation Program (AUDMP). The project aims to reduce the vulnerability of Vietnam's shelters to flood and typhoon by building on the experiences and lessons of existing reconstruction and mitigation projects collaboratively undertaken by the Vietnamese government and many organizations such as the Vietnam Red Cross and the Federation, Development Workshop, the Catholic Relief Service and the Canadian Centre for International Studies and Cooperation.

Furthermore, the project focuses on identifying standard designs for structures to be built in flood and typhoon prone areas, promoting safer shelters and implementing sustainable shelter delivery systems. It will also develop partnerships with Vietnamese government agencies, local and international organizations with experience in local housing and housing finance, and local authorities in a pilot geographic area. To maximize its impact, the project is designed with the objective of replicating the good practices and lessons learned from the pilot to other flood and typhoon prone communities in Vietnam

The workshop was divided into four sessions, based on the four identified components conceptualized from an over-one-year extensive consultative process prior to the workshop. These included Risk Assessment; Shelter Delivery Options and Systems; Public Awareness and Capacity Building and; Techno-Financial Approaches for Shelter Delivery. The four components advocate for an integrated approach to sustainable disaster management in Vietnam.

We are grateful to the Ministry of Construction, the Vietnam Red Cross and the International Federation and, the Disaster Management Center for their active contribution to the workshop. The information and suggestions gained from this workshop will be incorporated into a proposal for a Safer Shelter Project in Vietnam to be implemented by AUDMP, which is expected to commence by early 2003. Also, we sincerely hope that the workshop was successful in contributing to the work being undertaken by other various agencies in Vietnam to reduce the impacts of future flood and typhoon disasters.

Dr. Suvit Yodmani
Executive Director
ADPC, Bangkok

List of Acronyms

ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
AUDMP	Asian Urban Disaster Mitigation Program
CBDP	Community Based Disaster Preparedness
CDPC	Commune Damage Prevention Committee
CDS	Community Development Societies
CEA	California Earthquake Authority
CECI	Canadian Center for International Studies and Cooperation
CHPB	Centre for Housing, Planning and Building, Sri Lanka
CIDA IHA	Canadian International Development Agency, International Humanitarian Assistance
CIDB	Construction Industry Development Board, Singapore
CIDC	Construction Industry Development Council, India
COPE	Community Organization of the Philippines Enterprise Foundation
CRS	Catholic Relief Services
DDMFC	Department of Dyke Management and Flood Control
DMC	Disaster Management Committee/Center
DP	Disaster Preparedness
DSWD	Department of Social Welfare Development, the Philippines
DWF	Development Workshop France
HUDCO	Housing and Urban Development Corporation Limited., India
IBHS	Institute for Business and Home Safety
IFRC	International Federation of Red Cross and Red Crescent Societies
IIASA	International Institute of Applied Systems Analysis
KUDFC	Kerala Urban Development Finance Corporation, India
MARD	Ministry of Agriculture and Rural Development, Vietnam
MOC	Ministry of Construction
NAREDCO	National Real Estate Development Council, India
NASA	Neighborhood Association for Shelter Assistance, the Philippines
NBRO	National Building Research Organization, Sri Lanka
NSDF	National Slum Dwellers Federation of India
OFDA	Office of Foreign Disaster Assistance
PRC	Provincial Red Cross
UCDO	Urban Community Development Office, Thailand
UNCHS	United Nations Center for Human Settlements
UNDP	United Nations Development Program
USAID	United States Agency for International Development
VNRC	Vietnam Red Cross
VUDMP	Vietnam Urban Disaster Mitigation Project
WV	World Vision

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Workshop on Safer Shelter in Vietnam:
Towards Designing an Urban Disaster Mitigation Project
Hanoi, Vietnam, 4 – 5 September 2002

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08:30 – 09:00	Registration	
09:00 – 10:00	**Opening Ceremony** Welcome Remarks - *Mr. Nguyen Van Lien, Vice Minister, MOC* - *Ms Suthira Suwanarpa, Project Manager, ADPC* Challenges Ahead - *Mr. Nguyen Hai Duong, Vice President, VNRC* - *Mr. Bo Backstrom, Head of Delegation, IFRC* Disaster Situation in Vietnam - *Mr. Tha Tran Dinh, Deputy Director, Department of Science, Technolog and Environment, MOC*	
10:00 – 10:15	Break	
10:15 – 10:30	About ADPC, AUDMP and Objectives of the Workshop	Mr. N.M.S.I. Arambepola, ADPC
	<u>Session 1: Risk Assessment</u>	
10:30 – 11:00	Risk Based Mitigation Planning: Experiences from AUDMP	Mr. N.M.S.I. Arambepola, ADPC
11:00 – 11:30	Group Work: Risk Assessment in Vietnam (Identify and rank disasters, identify most vulnerable districts, impact of disasters on shelters, coping mechanisms)	VNRC/IFRC and ADPC
11:30 – 12:00	Presentation and Discussion	
12:00 – 13:30	Lunch	
	<u>Session 2: Shelter Delivery Systems</u>	
13:30 – 14:15	Options and Approaches in Shelter Delivery in Asia	Mr. C.H. de Tissera, ADPC Consultant
14:15 – 15:00	From Rehabilitation to Mitigation: Policies and Practices for Safer Shelters in Vietnam	Dr. Nguyen Huu Huy, ADPC Consultant
15:00 – 15:15	Break	

15:15 – 16:00	VNRC/IFRC Experiences in Reconstruction and Recommended Next Steps	Ms. Vu Minh Hai, IFRC
16:00 – 16:45	Group Work: Needs Assessment for Shelter Delivery for flood and typhoon prone areas in Vietnam (Look at three or four design options, discuss strategies and methodologies for their delivery, institutionalization in MOC and INGOs and capacity building for these options, policy issues and land use planning)	
16:45 – 17:15	Presentation and Discussion	

Thursday, 5 September 2002

08:30 – 09:00	Summary of Day 1 and Review Agenda for Day 2	
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10:15 – 11:00	Retrofitting and Micro-Financing in Central Vietnam: Experiences from Development Workshop	Mr. G. Chantry, Development Workshop
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13:30 – 14:00	Presentation and Discussion	
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14:00 – 14:15	Capacity Building and Social Marketing for Safer Building Construction	Mr. V. Suresh
14:15 – 14:45	Promoting Flood and Typhoon – Resistant Construction in Central Vietnam: Lessons Learned from Development Workshop	Mr. G. Chantry, Development Workshop
14:45 – 15:15	Group Work: Tools and Approaches for Awareness Promotion and Capacity Building (Possible target audiences, effective media, capacity building needs, mechanisms and tools)	
15:15 – 15:30	Break	
15:30 – 16:00	Presentation and Discussion	
16:00 – 17:00	**Concluding Session**	
	Summary of Recommendations Discussion of Overall Proposal Next Steps	Mr. N.M.S.I. Arambepola, ADPC

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Hanoi, Vietnam

REPORT

Introduction

The Workshop on Safer Shelter in Vietnam held from 4 to 5 September at the Vietnam Trade Union Hotel, Hanoi, Vietnam, aimed to gather inputs, suggestions and ideas for an Urban Disaster Mitigation Project in Vietnam as part of Asian Disaster Preparedness Center's Asian Urban Disaster Mitigation Program.

The two-day workshop was divided into four half-day sessions to review, analyze and discuss:

(1) the hazards, vulnerability and risks in Vietnam
(2) shelter delivery systems in Asia and Vietnam
(3) techno-financial mechanisms in Asia and Vietnam for the delivery of safer shelters
(4) promotion of safer construction through awareness raising and capacity building

This workshop provided valuable inputs towards the design of the Vietnam Urban Disaster Mitigation Project proposal.

This report provides an overview of the issues discussed and the recommendations made during the two day workshop. Papers developed by resource persons at the workshop that substantiate the recommendations, as well as the workshop agenda and participants list, are included in the proceedings.

DAY ONE

1.1 Opening Ceremony

Presenting at the opening ceremony were:

1. Prof. Nguyen Van Lien, Vice Minister, MOC
2. Ms. Suthira Suwanarpa, Project Manager, ADPC
3. Mr. Nguyen Hai Duong, Vice President, VNRC
4. Mr. Bo Backstrom, Head of Delegation, IFRC
5. Mr. Tran Dinh Thai, Deputy Director, Department of Science and Technology, MOC

Opening Ceremony of the Workshop presided over by Mr. Nguyen Van Lien
Vice President of the Ministry of Construction

Prof. Nguyen Van Lien, Vice Minister, MOC in the opening address stated that Vietnam is affected by many disasters and therefore he warmly welcomes this initiative by ADPC and the collaborating institutions in organizing this workshop on the very important topic of safer shelter. Recently there were heavy rains and flooding in the Mekong River Delta and droughts in Central Vietnam. Natural disasters cause great losses to life and property. People have a limit to handling these disasters themselves. Government therefore has to assist. The MOC is one of the government organizations responsible for prevention and protection of disaster prone areas and tackling the housing problem of affected families. Research and studies on construction standards and codes of practice have been designed to reduce the damage and costs. Damage and cost to life and property calls for the whole society to respond to the needs. International assistance is also needed in this effort.

Ms. Suthira Suwanarpa, Project Manager, ADPC delivered a speech on behalf of Dr. Suvit Yodmani, ADPC's Executive Director. Dr. Suvit conveyed his apologies for not being able to be present at the workshop. Dr. Suvit thanked the co-organizers and participants for supporting ADPC in this endeavor. Participants were encouraged to join hands to better protect Vietnam's shelters and inhabitants from future disasters, which have occurred more frequently and with increased magnitude, through improved structure design, sustainable delivery system and replication of the successful models. This is in line with ADPC's vision to create safer communities and sustainable development through collaboration with partners to reduce disaster risks. A brief explanation of ADPC was given. This presentation was followed by the screening of a documentary film on ADPC and its activities.

Mr. Nguyen Hai Duong, Vice President, VNRC observed that in recent years natural disasters have been occurring frequently in Vietnam. Flash floods, storms and typhoons have been experienced in many parts of Central Vietnam. VNRC has been able to help by its housing development program. During 1998 to 2002, they were able to build 11,000 houses for affected families. Flood and storm resistant housing has become very important for Vietnam. Developing internal capacity for this effort is also important for Vietnam. With the present commitment of VNRC in this work, he welcomes the initiative of ADPC to organize this workshop. The outcome of the workshop will be very helpful for Vietnam.

Mr. Bo Backstrom, Head of Delegation, IFRC in his presentation stated that they were pleased to be one of the co-organizers of the workshop which is aimed at the confirmed need to build strong housing in disaster prone areas in Vietnam. This debate will no doubt generate more tangible results that can be applied in disaster prone areas. The questions that have to be addressed are, who is responsible to help Vietnamese people to live in safe housing, who will design, who will build, who will assist and fund. There is also a question as to the strategy of asking the affected people in destitute situation to build housing by themselves. Answers to these have to be found. Safe housing for vulnerable people should be a high priority of Government. IFRC's role as an humanitarian organizations is to show by example what is possible and assist in resource mobilization. IFRC expects that other humanitarian organizations will do the same.

Mr. Tran Dinh Thai, Deputy Director, Department of Science and Technology, MOC stated that he would take this opportunity to report on the functions of MOC in disaster management. As floods, storms, and major disasters are frequent in Vietnam, the MOC has been conducting the following programs to mitigate these disasters:

- Research and planning for flood resistant construction
- Work with research institutions to design houses suitable to local conditions
- Collection of research and designs from other ministries engaged in similar work
- Development of a flood-resistant house design that was piloted in Central Vietnam
- Training for communes
- Introduction of advanced materials, that is suitable for construction in disaster prone areas
- Development of construction standards for the Mekong River Delta
- Adaptation and translation of international materials, with support from the Australian Embassy and other organizations, and dissemination to provincial governments
- Development of handbooks for flood control activities
- Preparation of master plans for flood prone areas
- Intend to replicate lessons from Central Vietnam to other parts of Vietnam

1.2 Session 1- 1045hrs to 1200hrs - Risk Assessment

This session was facilitated by Mr. Tran Dinh Thai, Deputy Director, Department of Science, Technology and Environment, MOC.

1.2.1 Presentation: An Overview of the AUDMP and the Program's Experiences on Risk Assessment and Risk Based Mitigation Planning by Mr. N M S I Arambepola

The AUDMP was developed in 1995 with core funding from USAID's Office of Foreign Disaster Assistance (OFDA) to address the need for safer cities. The goal of the AUDMP is to reduce disaster vulnerability of urban populations, infrastructure, lifeline facilities and shelter in Asia. AUDMP aims to demonstrate the importance of and strategic approaches to urban disaster mitigation as part of the urban development planning process.

Some of these approaches include development of building monitoring system in Indonesia, school earthquake safety programs in Nepal, development of emergency and response plans in Sri Lanka, and community-based flood mitigation in Bangladesh and Cambodia

AUDMP supports this demonstration by building and enhancing the capacity of local authorities, national government, development agencies, civil society groups, non-government organizations, businesses and other stakeholders in establishing mechanisms for urban disaster mitigation as part of the development process. AUDMP also facilitates knowledge sharing and dialogue between key stakeholders to promote replication of AUDMP approaches to other cities and countries worldwide.

AUDMP approaches have been introduced and sustained by national partners in targeted cities of Bangladesh, Cambodia, India, Indonesia, Lao PDR, Nepal, Philippines, Sri Lanka and Thailand. Vietnam is the next target country. Other regional programs with projects in Vietnam include the Disaster Reduction Program – Cambodia, Lao PDR, Vietnam, and the Extreme Climate Events Program.

Mr. Arambepola in his presentation on "Risk Assessment" described the fundamentals in defining a hazard, hazard mapping and risk assessment. The concept and practice of risk-based mitigation planning, risk management, the different types of hazard mapping and the use of risk and vulnerability assessment in urban land use planning were also detailed.

1.2.2 Group Work: Risk Assessment in Vietnam

During the group work, the participants were requested to discuss three questions:

Question 1: Identify the type of disasters in Vietnam
Answer 1: flood, typhoon, storm, flashflood, drought, landmines
Flood and typhoon hazards carried the highest risks.

Question 2: Identify the most vulnerable provinces to flood and typhoon
Answer 2: Central Vietnam – provinces of Binh Dinh, Da Nang, Ha Tinh*, Khanh Hoa, Phu Yen, Quang Binh, Quang Nam*, Quang Ngai, Quang Tri *, Thanh Hoa * and Thua Thien Hue* (* = Provinces selected for ADB Urban Development Project in Central Vietnam).

Question 3: Select the most vulnerable provinces to flood and typhoon. Lowest income provinces, and those with the most severe and frequent incidents of disasters should preferably be included.
Answer 3: The order of importance, based on voting by the participants were as follows (number of votes in brackets):

Quang Tri (5); Thua Thien Hue (5); Quang Nam (4); Phu Yen (1); Ha Tinh (1)

Dr. Vo Dinh Vinh, VNRC and Ms. Vu Minh Hai, IFRC facilitated the Group Work

Other questions from the participants during group work included:

- How should the impact on housing be assessed?
- What are the coping mechanisms?
- Criteria should not be based on damage alone but character of hydrological and climate conditions of the area.
- How must an area be classified as urban for the purpose of the project? Some suggests that the classification must come from the people.
- Some people in Hue are homeless. Boat people and fishermen in urban areas are homeless. Should they also be the beneficiaries of this project?
- Should this project be aimed at the poorest of the poor or the lower income group?

In view of the nature, and frequency of natural disasters in Vietnam, and the vulnerability of certain areas, there was consensus among the participants to target Central Vietnam in the demonstration project, with focus on mitigation flood and typhoon hazards. Provinces identified as most vulnerable by the participants were Quang Tri and Thua Thien Hue. Selection of one district from each province was recommended to implement the AUDMP.

Participants identified the following critical issues that need to be addressed in the demonstration project:

- Technical- Introduction of methods to carry out hazard based risk assessment.
- Policy- Need to link hazard maps with the physical planning process
- Societal-Actions to be identified for mitigation of risk for vulnerable communities who have been identified through risk assessment.
- Institutional-Options and actions necessary to reduce vulnerability

1.3 Session 2 - 1330hrs to 1715hrs – Shelter Delivery Systems

This session was facilitated by Mr. Tran Dinh Thai, Deputy Director, Department of Science, Technology and Environment, MOC.

1.3.1 Presentation: Options and Approaches in Shelter Delivery in Asia by Mr. Conrad de Tissera

Mr. Tissera's presentation was in two parts. In Part 1, the following topic were covered: an introduction to the topic and the Asian context; historical development of the shelter delivery systems in Asia; examples of different approaches to shelter delivery in Asia; concepts for flood proof housing and options for shelter delivery in flood prone areas in Vietnam.

The earlier approaches to housing delivery systems such as government built housing, government supported and beneficiary built housing, and the more recent enabling approach to housing delivery were presented. The concept of a 'design flood' to be determined from past experience and by agreement with stakeholders, for planning and establishing human settlements in flood prone areas was also discussed.

Under Part 2, the main issues to be covered in the proposed Urban Disaster Mitigation Project in Vietnam were covered under the following topics: assessment of disasters, occurrences in national and regional context; policies and strategies related to physical planning; housing delivery mechanisms; planning and technology; capacity building including training needs assessment; monitoring and evaluation; information dissemination and networking; and the role of stakeholders in shelter delivery.

1.3.2 Presentation: Policies and Practices for Safer Shelters in Vietnam by Dr. Nguyen Huu Huy

The presentation focused on the existing housing situation in Vietnam; the existing flood control activities; natural disaster mitigation programs in Central Vietnam; recommendations for policies and practices to resolve housing issues in Central Vietnam; a range of designs in different parts of Vietnam developed by MOC, international NGOs, and VNRC together with IFRC. Issues of housing design (their frequent inappropriateness to the environment and the local culture, and their vulnerability to disasters), materials used (their appropriateness, availability and affordability), construction methods, and replicability were discussed. Houses built by local people using local materials, e.g. bamboo and other garden/reused wood and the need for more relevant technology applications for these options was emphasized. Dr. Huy believed that the damage to houses may not be due to lack of funds to construct and strengthen/retrofit houses but more so due to the lack of knowledge and effective application of technology.

House in Nam Hoanh after flash flood and typhoon of 1989

Dr. Nguyen Huu Huy, Deputy Director of CDC Corporation demonstrated the use of bamboo for safer houses

A type of house commonly found in Vietnam with little protection from flood and typhoon

Source: Dr. Nguyen Huu Huy

1.3.3 Presentation: VNRC/IFRC Experience in Reconstruction and Recommended Next Steps by Ms. Vu Minh Hai

Ms. Hai in her presentation highlighted the concept of a "Starter House" designed with MOC. Two designs options are available viz. Hue model and ABC model, with provision for mezzanine (joist in Hue model and brackets in ABC for safe haven) floor.

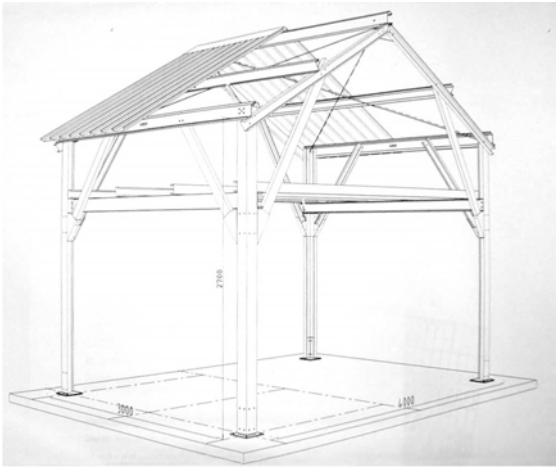
Under achievements, the following was noted: Good idea, selection procedures good, design very strong and last many years.

As challenges: Starter house idea is fine but not well understood by stakeholders, requires modification of the existing design/development of alternatives, need to develop a sustainable house that is replicable by other organizations/households

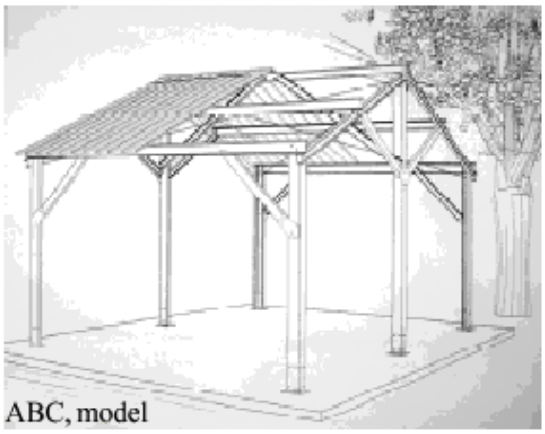
What people thought: Confident that houses would withstand storms/flood, all felt was too small, a house this strong can only be built using expensive and foreign materials

What should be done next: Stakeholders need to understand key concepts (e.g. starter house) through training and public awareness

Future approach: Must be replicable and sustainable, prototype must be modified, materials must be locally available, cost of starter house core structure must be reduced.



Technical Aspects of Hue Model
Source: IFRC



Technical Aspects of ABC Model

1.3.4 Group Work: Needs Assessment for Shelter Delivery for flood and typhoon prone areas in Vietnam

The participants working in two groups. The first group addressed issues connected with design and technology options and roles of stakeholders. The second group discussed the selection of appropriate housing delivery options.

Group 1 reviewed issues relating to, selection of design options, technology options, material supply methods, construction and finance. It was agreed that the process adopted for selecting design options should include: development of guidelines for selection; consultation with local people; use of local materials; use of affordable materials; encouragement of local production of materials; and use of compression machine for producing roofing materials based on UNDP and Oxfam's experiences. There was consensus that the role of Government should be to provide technical support and assistance, to conduct advocacy program and to raise awareness of local people. Construction guidelines should be issued at the central level. External support – it is important to have support from outside sources – but it must be suitable to local conditions and customs. Active participation by community members and other stakeholders should be promoted.

The participants were informed about an encouraging initiative by the Government of Vietnam on a loan program targeted at poor households. This initiative by Government was taken on 2 August 2002, under the decree no.105/2002/QD-TTg by the Prime Minister of Vietnam. The Government made a decision to provide support through a soft loan program for poor households in 7 provinces of the Mekong River Delta. Maximum loan amount of VND10million per household for elevated land (with 0% interest rate) and VND 7 million for house (with 3% interest rate) can be repaid in-kind. The maximum duration of loans is 10 years with five years moratorium. Fifty per cent of the fund is from the Government budget. The balance is mobilized by the Development Support Fund. This is considered to be a good strategy for promoting safer housing.

The Group 2 reviewed issues related to housing delivery systems. The following observations were made by the members of the group.

Options available for the Housing Delivery System:

Government agency built houses: Government has many commitments and therefore faces difficulties in building houses for all vulnerable families in rural Vietnam. There is a need to develop a policy regarding the target group eligible for this facility. This has to be supplemented by other options for the balance families.

Government agency supported self-built housing: Government needs to support with plans, designs and technology, land lot and infrastructure. Households have to contribute labor. Questions on how much support and the support for whom, have to be resolved.

The Enabling Approach: This method should be employed as the general approach particularly when the target beneficiaries have the capacity to mobilize resources. Complex land issues and acquisition of a bank loan under the system have to be studied. Only in the case of the poorest section of society, government built housing option should be adopted by way of direct intervention by relevant government agencies or by technical support and advice for self-building with affordable options.

In summary, the issues that need to be considered in the demonstration project include:

- Responsibility for preparing guidelines for selection of design options
- Use of locally available materials - preparations of guidelines for selection and use
- Manufacture of building materials using local raw materials for construction by beneficiary families – including training and skills development of target groups
- Capacity of local organizations to provide technical support for safer shelter
- Need for training in preparing manuals and guidelines for construction of housing in flood prone areas by local officials
- Need to recognize the capacity of families with permanent incomes to repay loan finance for housing
- Need for research to determine the feasibility of setting up a banking system to cater to this need
- Research studies on policy initiatives and strategies on disaster mitigation and human settlements development in flood and typhoon prone areas
- Lack of knowledge in communities to participate in policy-making actions by government agencies
- Give effect to the Government decree to help poor people to borrow funds. This initiative has to be supported by resources and systems, to put the policy into practice

DAY TWO

This session was facilitated by Dr. Vo Dinh Vinh, Director, Social Work Department, VNRC.

Mr. Arambepola, AUDMP Program Manager, ADPC presented a summary of Day One.

2.1 Session 3: Techno-Financial Approaches to Risk Mitigation

2.1.1 Presentation: Techno-Financial Approaches to Risk Mitigation in Asia by Mr. Vasudevan Suresh

Mr. Suresh covered the following topic areas: the disaster situation in the Asian region; disasters related to Vietnam and cost of disasters; need for techno-financing interventions; objectives of a techno-finance strategy; methodology to evolve a techno-financing regime; financial sources for investment; differentiated financial matrix; costing options for housing; insurance; quality control; evaluation of Vietnamese housing construction; disaster resistant building, financial incentives for hazard resistant housing; and application of techno-financial systems in Vietnam. The presentation had reference to linking financial support with the adherence to standards required for disaster resistant construction.

Different financing mechanisms based on a categorization of the families into income groups and arranging the financial assistance under pure subsidy and a subsidy-loan-own contribution in suitable mixes, depending on the repayment capacity of the beneficiary family were highlighted.

In the ensuing discussion, the following responses from the participants were noted:

An appropriate housing finance mechanism for Vietnam would be a system which includes state/provincial government grants, loans from an available credit system, contribution from beneficiaries, and contributions of funds from NGOs. However a matter to note would be that NGO activities are driven by a donor mandate. Thus, many NGOs are doing the work with a relief focus. There is therefore a need to consult with donors to prioritize mitigation intervention in addition to relief work in Vietnam. Donors also shift focus based on government priority.

2.1.2 Presentation: Retrofitting and Micro-Financing in Central Vietnam - Experiences from Development Workshop by Mr. Guillaume Chantry

Since 1999, CIDA IHA has supported Development Workshop by a grant through Alternatives to carry out a three-year program "Assisting the Development of Popular Capacity to Prevent Typhoon Damage to Housing, Central Vietnam". The program aims to reduce vulnerability and damage in houses and secure family investment in shelter. The program works to stimulate short and long term awareness of the need to take preventive strengthening in building and rebuilding. The project targets 100,000 inhabitants in 10 communes in Thua Thien Hue Province, where poverty and vulnerability are extreme.

DW promotes hands-on demonstration

Strengthening houses headed by women is one of DW's priority

Source: Development Workshop

The program combines four forms of action:

- getting the message across through animation and mobilization – concerts, theatre, lotteries, posters, fans with message, clothes, TV, press, working with schools by introducing the theme of strengthening into local school curricular, training for teachers, drawing competitions about typhoons and parades in the community about typhoon damage prevention
- civic capacity building – establishment of a project management committee on storm damage prevention in each commune

- developing practical skills and debate about safe building – theory and practice workshops are held in each commune
- demonstrating accessible preventive strengthening on existing houses.

DW also provides funds and low interest loans to poorer households who cannot afford to construct typhoon-resistant houses. A mix of subsidy and grant is provided to beneficiaries to strengthen houses to withstand high winds and flood damage. The project selects the beneficiary family in consultation with the community. Support is received from the local authority (Provincial and District People's Committees).

Mr. Chantry made references to: establishing community capacity to reduce vulnerability; getting the message ("Vaccinate your Home Against the Storm!") across; developing social and institutional environments that support preventive strengthening of shelters; training; demonstration; financing mixes - grants and credit.

The following observations were made of the project:

- There are masons and carpenters at village level. Each village/commune has its own housing model but no building code
- A local credit systems known as "Hui", where a group of people in the village contributes to a rotating credit system is existing. Every week/month people put together money and one person takes all in rotation, to invest
- There are private money lenders from rich families. Their interest rate is high – from 10% to 100% per month
- Government organized system has low interest rates, but it is mainly for start of business/economic activity
- In Development Workshop's model, no income is generated from the loan except a new feeling of "security". Loan is dedicated only to housing reinforcement

2.1.3 Group work: Needs Assessment for Techno-Financial Approaches to Flood and Typhoon Mitigation in Vietnam

The following needs were taken up for discussions:

- Institutionalization of subsidy/grant systems and provision of loans for both new housing and strengthening of existing houses, for the families with repayment capacity
- A mechanism to coordinate the funding from different sources - government, local authority, NGOs, civil societies, donor agencies and individual families - to finance house construction/improvement
- Identification of the type of technical assistance to the borrower
- Identification of the target groups. Boat people in lagoon area may not want to pay for land, because they live in boats. The housing loan system has to be suitably designed to take into account such specific needs of target groups. In the Development Workshop project, priority is given to disabled, the elderly and women-headed households
- Application of an affordable rate of interest below the market rate for the loan component and to the extent to which it should be subsidized by the government
- Possibility of activating informal sector micro-finance institutions
- Introduction of a system of insurance hitherto not practiced in Vietnam in the housing sector. Studies are necessary to ascertain the feasibility of insurance in housing loan programs. Adequate social marketing would be necessary to introduce the concept, possibly as a medium or long-term prospect

2.2 Session 4: Awareness Promotion and Capacity Building for Safer Building Construction

2.2.1 Presentation: Capacity Building and Social Marketing for Safer Building Construction by Mr. Vasudevan Suresh

Mr. Suresh in his presentation outlined the concept of the Building Center Model and the importance of having Do's and Don't Manuals. Methods followed in awareness creation, application, and appreciation aspects in financing a housing delivery system in a disaster prone situation was described.

An institutional arrangement such as a network of building centers as a means of achieving this was encouraged. Other proposed activities for Vietnam include artisan training and other training systems designed for construction industry personnel, as well as awareness creation for personnel at policy-making level and at implementation level on the importance of safer building construction.

2.2.2 Presentation: Promoting Flood and Typhoon – Resistant Construction in Central Vietnam: Lessons Learned from Development Workshop by Mr. Guillaume Chantry

Mr. Chantry explained the different awareness tools for different target audiences including manuals for building, posters, banners in front of villages, pamphlets and brochures, piloted by Development Workshop. Strategies for obtaining support of the local authorities for implementing the project, and community education and awareness creation were shared with the workshop participants.

Mr. Ngo Tuan Minh, supplementing Mr. Chantry's comments, outlined the method followed in beneficiary selection and mobilizing community support for housing development using awareness creation.

To maximize the effectiveness of a project, select target groups in line with project objectives. Invite people to a meeting. Invite representative of people's committees. Invite different community groups to attend meeting.

Below are the four main criteria Development Workshop used for beneficiary selection:

(1) Family must be enthusiastic to protect their houses
(2) Houses can be reinforced/retrofitted. No firm standards are imposed. The community will themselves select who should receive the funding
(3) Household can repay the loan
(4) Household can participate in the process

2.2.3 Group Work: Tools and Approaches for Awareness Promotion and Capacity Building

There was general agreement among participants on the following:

- Effective tools for awareness raising include: loudspeaker systems, demonstrations, television, broadcasting, prototype houses, and community education
- Gender and cultural issues need to be considered. In Development Workshop's project, 40 per cent of the beneficiaries were female-headed households
- Capacity to incorporate participatory approaches to assessment, planning and implementation with the communities need to be built among designers, contractors, consultant companies and flood and storm control committees at central, provincial, district and commune levels

- Training can be provided by schools, technical colleges and universities on building technology. However, as some local masons and low-income groups cannot afford to learn from schools, there will be a need for informal learning centers where free technical assistance will be available
- Central Committee for Flood and Storm Control can develop capacity to promote awareness and develop awareness campaigns at provincial, district and commune levels through TV and radio programs – both of which are important media for delivering messages
- In covering 61 provinces in Vietnam, the questions that have to be answered are – How to do training? Who will do it?
- While there are technical materials for engineers, there is a need for simpler materials for local masons. They require hands-on training, demonstrations and simple manuals
- There is a need for a long-term sustainable program – with appropriate decentralized vocational training centers
- There is a need for partnership building, from central to commune levels
- There is a need for effective enforcement: Standards and codes made at national level, local building by-laws, and convenient one-stop approval system

2.3 Concluding Session

The workshop was formally closed at 1715hrs on 5 September 2002, with closing remarks summarizing the recommendations of the workshop by Mr. Arambepola on behalf of ADPC to which there was general agreement from the participants.

The recommendations include:

- Focus on disaster mitigation initiatives in cities of Quang Tri and Thua Thien Hue in Central Vietnam
- Focus on flood and typhoon hazards
- Implement options for mitigation of risk for vulnerable shelters identified through risk assessment
- Review existing systems, structures, mechanisms and practices for shelter delivery
- Study on existing techno-finance policies and mechanisms
- Conduct a survey to understand affordability level of households for reconstruction/ retrofitting vis-a-vis need for an appropriate micro-credit mechanism
- Institutionalize and promote techno finance facilities to low and middle income families
- Implement a shelter delivery system incorporating proposed institutional changes, propose policy changes/ amendments, proactive and easily accessible micro-credit mechanisms, environment-friendly and easy to use guidelines for use in construction, use of locally available materials, promotion of local building material production units, etc. in the identified project demonstration sites
- Focus on an enabling shelter delivery approach
- Develop a capacity building strategy for a range of target groups for the effective implementation of the shelter delivery system
- Develop a disaster risk communications strategy for (1) awareness creation of the importance of safer shelters; (2) an effective shelter delivery system; and (3) replication of VUDMP to other cities in Vietnam. Issues of target groups, media used, accessibility and sustainability need to be considered.
- Develop policy / strategy for integration of risk component in urban development planning framework

A proposal will be developed for the Vietnam Urban Disaster Mitigation Project based on the inputs gathered at this workshop.

RISK BASED MITIGATION PLANING PROCESS

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1. Introduction

Developing an action plan based on an analysis of information on natural disaster risk involves a preliminary assessment of the type and frequency of hazards, the vulnerability categories of community elements within the hazard prone area, and an estimate of the exposure (value or number) in the hazard prone area. Risk identification will help to focus on the hazard management initiatives on those issues that generate the greatest potential losses for the community. Typically, there will be a necessity to obtain or generate a considerable amount of information to adequately describe risks in the community. The use of an informal or formal ranking schemes help to sort risks, to determine where additional resources should be spent to collect more information to better describe the risk and to determine which risks should be addressed in the action plan on priority basis.

Risk is defined as the probability that a hazard will occur multipled by the consequences. Risk is composed of three elements:

(1) Hazard
(2) Vulnerability
(3) Exposure

A high risk may be identified for an infrequently occurring hazard if the vulnerability and exposure of community elements to that hazard is very high. Similarly, a frequently occurring hazard may not pose a significant risk if community elements have a very low vulnerability to the hazard and if the exposure (number or value of community elements exposed to the hazard) is very low.

The first step in preparing an action plan will be to define the risk management program goals and objectives. Then risk control options can be selected that best help achieve the plan objectives. For example, if the primary objective is to reduce loss of life, then based on the risk analysis carried out in the exercises above, the first priority would be to identify risk control options related to managing a particular hazard type which has the highest impact to loss of lives. Other hazards that may result in significant loss of life also should be considered in a comprehensive risk management program although it may be of secondary nature. The use of risk assessment data helps to broaden the focus from immediate, more frequent losses to less frequent, but potentially catastrophic losses.

A Risk Matrix may be used to determine the risk potential and to compare the impact to the community. The most probable, high frequency events may address on priority basis for which some times costly risk control measures would have to be initiated. Risks that plot in the high consequence, but low frequency part of a risk matrix may be best addressed initially with lower cost options, such as public awareness information and emergency plans. Medium risks may merit additional options related to new development. High risks will require the additional options related to reducing the severity of losses within areas of existing development.

The community should define goals and objectives for the risk management action plan. After defining the goals and objectives, identifying appropriate risk control options, and evaluating their potential effectiveness will be essential. The next step will be to develop an implementation schedule, which indicates the roles and responsibilities of stakeholder institutions, timeframe for implementation and source of funding. Initial tasks may focus on those risk control options that can be implemented without an increase in the existing budgets.

These options may focus on relatively low cost tasks such as improved maintenance and inspection procedures. Other relatively low cost tasks include the development of information for specific target groups, such as construction practices to lower the risk for contractors. More expensive prevention and mitigation measures may require multiple years to plan and funding from outside sources for implementation of the action plan.

2. Involvement of the target community in the process

Sudden onset and slowly emerging natural hazard events together interfere with the capability of a community to achieve the essential goals and objectives that embody the vision of what they want the future to be. Nothing can be achieved if the community does not realize the fact that although the natural disasters are calamities, which are initiated as a result of a natural phenomenon, the impact could be reduced through appropriate preparedness measures.

One might sight Japan as an example. Japan, which is a disaster prone country that has an in-built machinery to mitigate natural disaster through preparedness for any type of disasters, could not prevent earthquake disaster losses due to Kobe event. On the other hand, no other country in Asia would have established the normalcy within such a short time after a disaster of the magnitude of Kobe without external assistance. Therefore the most important thing is the management of natural disasters to have the organizational mechanisms established to force any eventualities following any phase of the disaster cycle. The other important aspect is to convince the community to believe in themselves and install confidence in the creation of an organizational structure for risk management to serve their interest.

One of the strategies, which can be adopted to obtain community support for implementation of an action plan, is to make the participation of the community in all aspects of the project activities, as an essential element. The success or failure of any project depends on the degree of usefulness of contributions made by the different stakeholders of the project and on the commitment of the stakeholders to achieve the project objectives. The technocrats in most instances forget the aspect of the social acceptability and compatibility with foresighted community and social ethics in decision making. The initiatives to include community representatives in developing an action plan for the community at risk can be regarded not only as a good strategy for smooth implementation of mitigation options, the process can also be used to educate them on the impending risk and what can be done to reduce the impacts.

Normally, in any community various associations exist and it may be formal groupings such as elected bodies like local governments, peoples committees etc. or non-formal groupings such as farmers societies, women societies, welfare associations etc. If such a groping or groupings can be converted into a Disaster Management Committee (DMC), it can serve as a vehicle to obtain necessary information to formulate the community goals for risk management process.

The establishment of a DMC is done with the foresighted objective of having a continuous dialogue with all stakeholders, politicians, professionals, administrators and community representatives. The DMC is expected to continue to serve as a nodal point to integrate the efforts of all stakeholders in reducing the natural disaster vulnerability of the community, monitoring and evaluation of the initiatives and to upgrade the risk management plan when required.

3. Plan Development process

Developing an action plan based on an analysis of risk involves a preliminary assessment of the type and frequency of hazards and vulnerability of community elements within the hazard area. The categorization of vulnerability is derived through an estimate of the exposure in the

particular hazardous area. Risk identification provides a method to focus on those issues that generate the potential losses to the community in a hazard management work plan.

The development process of such an action plan commences with the risk identification exercise. There typically will be a considerable amount of information for an adequate assessment of the risk in the community. The most important risk categories have to be extracted from the available information. Direct approach for identification of risk is determination of such events through the participation of the involved community. In this exercise, in order to make use of the experience of the targeted community, an attempt has to be made to line up the past events of natural disasters and sort out the degree of risk and vulnerability to facilitate determination of risks, which should be addressed in the action plan. This will be possible through a direct dialogue with the members of the target communities and through the involvement of DMC. The DMC can identify the disaster types as the major concerns to their community and lined up the issues in the priority order using informal ranking scheme in a certain manner as given in the example below.

- Floods
- Landslides
- Bank failures
- Environmental and health hazards etc.

The next step is to define the risk levels and developing a risk matrix. The intermediate actions involved in this process are:

- Assessment of hazard likelihood
- Assessment of vulnerability
- Exposure assessment
- Development of a risk matrix

The assessment of the hazard likelihood is based on the information on hazard data. It can be hazard zonation maps developed by specialized institutions or hazard maps developed by communities. The hazard maps developed by specialized institutions will contain the information pertinent to various events within a time scale. For example a flood map generated by a specialized institution can give the flood contours on annual floods, and flood levels to indicate various return periods. But the maps developed by the community will reflect their perception on the flood hazard. During community mapping initiatives, involvement of senior citizens who have lived in the area for longer time as well as people who have served the area for a considerable amount of time will help to increase the accuracy of the map data. The maps developed by specialized agencies contain more details needed for a comprehensive risk assessment but it will not be possible to get such maps in all cases, due to various reasons. Cost of mapping, ability of communities to obtain the services of specialized and competent professionals are some of the issues to be considered in obtaining such map information in hazard assessment process.

The risk assessment can be done through overlay of hazard information over settlement and infrastructure map of a similar scale. When using the maps developed by the community, the community will be able to indicate the most vulnerable exposure elements through community knowledge. When the exposures are known, then next step will be to deal with the selection of risk control options as appropriate to existing development and also for future development.

4.Prioritization of risk management options

The risk control options that will be selected are the initiatives that will help to achieve the objectives of the target community to reduce the impact of future hazard impacts. Primary objective of some of the selected options can be:

- Avoidance of hazard impact
- Prevention of hazard occurrence
- Loss reduction/mitigation
- Risk reduction/preparedness

This approach will help to broaden the focus from immediate more frequent losses to less frequent, but potentially catastrophic losses. Also it will help to look at risks, for which control measures with higher cost involvement are essential.

Prioritization of options is important to achieve the cost effectiveness and optimization of available resources. For example, the risks that plot in the high consequences, but low frequency part of matrix may be best addressed initially with lower cost options such as public awareness information. It also helps to conclude that medium risks merit additional options related to new development and high risks require implementation of additional options related to reducing the losses within areas of existing development.

The identified risk control measures can be weighted using three front selection criteria.

Priority factor: Using an informal ranking scheme to identify the priority of implementation of the options

Cost factor: Low, Medium, High

Period factor: Short term, Medium term, Long term

The weightages assigned to cost factor and period factor will depend on the expectations of stakeholders and may be defined using their own experience, judgment and intuition.

The next step is to select a rationale for selection of options. In these process guidelines to select a decision criteria developed by social science researchers with international repute can be of use to certain extent. The basic intention in selecting the strategies is to take into account all the issues and arriving at risk reduction options to be included in the action plan to reflect the reality of the community. These issues considered can be of social, technical, administrative, political, legal, economical and environmental nature.

In selecting the objectives and goals of the risk reduction plan, it is necessary to reflect the following essential characteristics:

- To reflect the reality of community and its unique circumstances

- To clearly direct the plan to specific target audiences (e.g. the organizations expected to provide funds, the leading institutions identified for execution and other organization which are expected to support the activities)

- As much as possible to provide maximum benefits to all (to keep everybody satisfied by creating an opportunity to present a win-win situation)

After defining the goals and objectives, appropriate risk control options can be selected to achieve the particular objective and evaluate their potential effectiveness. The implementation schedule is very essential. But it is desirable that the initial action plan focuses on those risk control options that can be implemented without an increase of existing budgetary provisions of the local government institution where the target community is located (e.g. improved building approval procedures, routine maintenance and inspection, development of information

database). More expensive preventive and mitigation measures that are listed in the plan which may require multiple years to plan and implement through central government

funds. Such options will have to be listed in the implementation schedule as the long-term measures (e.g. storm water drainage master plan, sewerage disposal system, diversion of a major stream, flood regulatory reservoirs in the upstream widening of narrow gorges along the main river etc).

The implementation of this plan is only possible if the political leadership and the community believe that this plan has been developed to serve their interest. In the meantime it is essential to have a commitment from the officials involved in disaster management activities and also the technical guidance of the professionals.

5. How risk and vulnerability assessment can actually be used for urban land use planning in practice to reduce risk?

A study completed recently by the Institute for Business and Home Safety (IBHS), shows that few (US) communities – including those that recently experienced a catastrophic loss – have comprehensive land-use plans that consider natural hazards risks" (Natural Hazard Observer, July 2002). IBHS in particular wanted to learn whether community comprehensive plans incorporated safety elements that could help lower catastrophic risks. This study determined that the ideal comprehensive plan would address eight elements. The elements underlined were represented in over 50% of the plans reviewed and indicate that most comprehensive plans in the study provide a good basis for future growth and development (taken from the Hazard Observer 2002):

- Plan basics – a general or comprehensive plan supported by professional planning staff;
- Quality data – factual data and maps;
- Identification of issues – natural hazards and other community issues;
- Community support and involvement;
- Policies that specifically address hazards;
- Coordination – consistency with federal, state, regional, and internal community plans;
- Implementation – goals linked to specific actions; and
- Organization – a plan that is readable, comprehensible, and easy to use.

Obstacles to addressing all elements in the IBHS ideal comprehensive plan noted in the Observer article include the need for public demand, additional funding, support from elected officials, and technical assistance. This can serve as a good guide for the cities in Asia when an approach for integration of risk reduction measures is employed in developmental planning to make their cities safer.

A number of cities in Asia under the Asian Urban Disaster Mitigation Program (AUDMP) executed by the Asian Disaster Preparedness Center (ADPC) through funding assistance from OFDA/USAID has developed such plans and is in the process of implementing their respective risk management action plans. The AUDMP is an eight-year program being implemented with an extensive coalition of partner organizations, including local and national government agencies, non-governmental organizations, academic institutions and others. It is designed to provide working examples of urban disaster mitigation in selected cities in ten countries such as Bangladesh, Cambodia, India, Indonesia, Lao PDR, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.

In a selected urban area in each country, a set of risks will be assessed, followed by the design and implementation of appropriate disaster mitigation measures. From the experience of the AUDMP hazard mapping is found to be one of the effective tools for risk assessment that can be used at national, provincial, city and community levels.

The AUDMP project in Sri Lanka has influenced the national government to integrate disaster risk mitigation options in city level structure planning process. These components have been included in the draft National Physical Planning Policy and the final National Land Use Policy through project initiatives. The partner institutions of the Sri Lanka project attempt to achieve it through their respective roles in urban development process. The Urban Development Authority provides necessary technical inputs for expansion of urban areas to reduce the risk due to natural hazards and to develop structure plans for urban development. The National Building Research Organization is responsible for creating hazard zonation maps for landslide and flood prone areas and also for promotion of appropriate technology for construction in disaster prone areas. Similarly, the Center for Housing, Planning and Building, addresses the issues of training and capacity building. The Sri Lanka project has already demonstrated the feasibility of the risk based planning process through the demonstration projects in Ratnapura and Nawalapitiya.

A similar approach has been adopted by the Naga City Urban Disaster Mitigation project in Philippines. The GIS maps developed under the project delineates the risk due to floods and typhoons and the city government is taking measures to reduce the vulnerability of population through structural and non-structural measures identified in the action plan.

One of the initiatives of the Kathmandu Valley Earthquake Risk Mitigation Project is to develop a simple hazard map for flood and fire hazards in one of the communities (Ward 34) in Kathmandu Metropolitan City, by community volunteers. This map indicates streets that are too narrow for fire trucks to pass in an event of urban fire outbreak, earthquake or otherwise. Now the community insists the authorities to take adequate measures to remedy this type of shortcomings. So the municipality has to consider remedial measures in the development plans generated in the near future. In addition, the community volunteers conduct awareness programs, collect information at household level and assess their own capacities using the self-generated maps. For example, they have the data on medical personnel (doctors, nurses, health workers living within the community, blood groups of members etc.) to be used in case of any emergency situation to enhance the response mechanism.

As per the government standing orders, the municipalities in Bangladesh have Disaster Management Committees at municipality level. The AUDMP project in Bangladesh has established such committees in two demonstration cities in Tongi and Gaibandha municipalities. They have developed hazard maps using community-based approach. City level disaster mitigation action plans and preparedness action plans have also been developed and approved by the respective DMCs. Now they undertake the mitigation options identified by communities living in flood prone areas through a community participatory implementation process. It demonstrates the effectiveness of such initiatives and will serve as a good example for not-so- resourceful local government bodies in developing countries in Asia to initiate mitigation initiatives without waiting for the intervention of donors or central governments.

AUDMP's major aim is to promote replication and adaptation of successful mitigation measures within target countries and throughout the region. This is achieved by providing a range of opportunities for showcasing and sharing knowledge, experiences and lessons learned, including electronic networks, newsletters, case studies, workshops and conferences. In addition AUDMP carry out national and regional level capacity building programs for the benefit of a range of stakeholders.

In some developed countries, serious natural disaster risks are, to a certain extent, addressed through risk financing approaches, such as insurance, incentives etc. But these are new tools for developing countries in Asia. The AUDMP in the coming years will try to promote this type of techno-financial tools for risk distribution and loss reduction. The methodology developed and demonstrated up to now to assess the risk also can be used to offer financial assistance for reducing the risk. Lending institutions can use the risk assessment data to implement risk

reduction programs in human settlement development since people need financial support from lending institutions for building houses. In a similar way the insurance can be of help to lending institutions if they initiate appropriate and affordable schemes for such constructions. The technical institutions can help in designing appropriate housing options for disaster prone areas. Many of these measures will be significant in the reduction of potential for larger risks to vulnerable communities. Therefore, the desired results can be achieved through the risk-based mitigation planning process only when all associated components can contribute to each other positively, in their areas of responsibility.

6.Conclusions

A comprehensive community risk management program provides the framework for developing and implementing sustainable and effective risk policies and interventions to manage the adverse multiple effects of natural hazards. Hazard mapping and risk assessment establish the foundation of the risk management system by providing information essential to (a) understanding the nature of the community's risk, (b) identifying risk management strategies, and (c) assessing the effectiveness of actions taken to address risk. The developmental planning can incorporate the risk management initiatives and when it is done through a community participatory approach the effectiveness of interventions can be enhanced. Techno-financials tools available for loss reduction can be used to control as well as to enhance the cost effectiveness of risk management initiatives.

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OPTIONS AND APPROACHES TO SHELTER DELIVERY IN ASIA

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Contents

ABSTRACT

Access to safe and healthy shelter is essential to every person's physical, psychological, social and economic well being. Providing adequate human shelter should be a fundamental part of national and international action. The urban population of the developing world currently rising by 50 million a year with majority of them of incomes below the respective poverty lines lives under inadequate shelter conditions

Historically, the shelter delivery mechanisms followed by countries of Asia have shown a uniform pattern of development. This development sequence followed respectively, 'The Public Works tradition of Government built housing and slum clearance identified with the period up to the 1960s in Asia', 'The organized or aided self help approaches adopted in the 1970s and the 'Sites and services and slum upgrading programs', that followed thereafter

The current concept followed by most developing countries in Asia is a government led enabling strategy, for support-based partnerships between government, the private sector, communities, partner organizations and individual householders. There are many examples in countries of Asia documented as best practices, which demonstrates the viability of the concept in contemporary terms.

Concepts for flood proof housing must first of all include an assessment of the flood hazard. A flood becomes a natural hazard, when floodwater breaches a threshold. It becomes a natural disaster, when human settlements become exposed to the hazard without warning and/or without means of taking defensive or evasive action and the community suffers loss of life, assets and livelihood. A human settlement becomes vulnerable when it is prone or exposed to physical damage or injury due to the communities' inability through lack of resources or knowledge to anticipate, cope with, or resist the impact of floods.

A policy response has to be agreed upon regarding flood danger for administrative, financial and land planning purposes. Consequently a 'flood of danger' will be termed as a 'Design Flood'. It is this Design Flood, against which land use, civil engineering or architectural decisions have to be made, if risks from inundation flooding and vulnerability to flooding are to be reduced.

Many countries in the developing world have rising populations. Many of them are at early stages of urbanization and urban growth. Unless the settlement trends are carefully planned and

managed, the roads, railways, riverbank defenses, spread of housing and industrial areas will all aggravate flooding as natural land drainage is disturbed.

It is necessary to conceptualize the shelter delivery system in flood prone areas in relation to; policies and strategies for physical planning, adoption of flood resistant building techniques, and institutional and financing mechanisms for shelter delivery. When there is a need for human settlements to be sited on lands prone to floods, then the mitigation of the effects of floods become the determining tasks in settlement planning, building design and construction.

Vietnam has a surfeit of proposals formulated by government with external assistance and expertise in disaster related housing. Vietnam also has inherent domestic capability and resolve to overcome flood damage and survive flood related disasters. Applicable systems therefore have to emerge from an analysis of good practices and lessons learned. The delivery system must contain a concept and strategies for shelter in flood prone areas, delivery mechanisms both institutional and financial, technology options, capacity building and a procedure for monitoring and evaluation.

1. Overview of Existing and Planned Practices of Shelter Delivery Mechanisms in Asia

1.1 Introduction

This subject is best introduced by first looking at some of the recent global initiatives in the area and the commitments made by the global community to the shelter sector. The most prominent of these, was at the meeting of all nations – "The Earth summit" in June 1992. This summit, more widely known as "Agenda 21- The Earth Summit Strategy to save our Planet", had in the agenda, 'The Management of Human Settlements' as the fourth central theme. This forum of Heads of State endorsed an eleven point program of activities for the countries to follow, underlying the acceptance that:

"Access to safe and healthy shelter is essential to every person's physical, psychological, social and economic well-being. Providing adequate human shelter should be a fundamental part of national and international action."

It was also noted at this forum that despite the right to adequate housing enshrined in the universal declaration of human rights, an estimated one billion people do not have access to safe and healthy shelter.

1.2 Background

In the beginning of the 1990s, nearly a third of the population of developing countries remained homeless or without decent shelter. In the so-called third world cities, squatters comprised up to 35% of the inhabitants. The urban population of the developing world currently rising by 50 million a year in now estimated at around two billion. The vast majority of them with incomes below the respective poverty lines live under inadequate shelter conditions. That is without adequate privacy, space, security, lighting, ventilation, basic amenities, poor structural condition, impermanent materials and location. The fact that an increasing number of middle-income group families have to live under inadequate shelter conditions adds to the problem.

1.3 Asia

Asia is the largest continent. Its peoples account for three fifths of the world's population. The year 2000 population of Asia is estimated to be around 3688 million, which is also about 60 percent of the world's total population. The growth rate for 1995-2000 has been 1.38 percent.

By 2020, about half of the Asian population will be living in urban areas whereas in the world as a whole this will be by around 2005. Year 2000 saw about 37.6 percent of the Asian population living in urban areas compared to 47.4 percent in the world.

The peoples of Asia are more diverse than those of any other continents, and they are highly concentrated in a small portion of the total land area. The density of population per 1000ha in 1995 was 1114 persons, which is at least 2.5 times the population density in the world in that year.

1.4 Historical Development of the Shelter Delivery System

A review of the historical development of the shelter delivery mechanism shows a uniform pattern of a three-staged sequence. This change in the strategies can be described as:

- The Public Works tradition of Government built housing and slum clearance identified with the period up to the 1960s in Asia
- The organized or aided self-help approaches adopted in the 1970s.
- Sites and services and slum upgrading programs that followed thereafter

The Public Works tradition of government built housing and slum clearance turned out to be too expensive and inefficient. The quality standards were too high considering the target group. A major consequence of this system of housing was that many houses originally intended for the low income group were sold by the allottees to the higher income groups who had a higher priority to terms of use and investment of capital in housing. At the same time governments saw as their responsibility to rid the cities of unhealthy and unsightly slums and shanty settlements. These relocations from slum clearance programs used up a large portion of government built housing and the slum clearance itself effectively depleted a large portion of the urban housing stock.

The Aided Self Help housing system employed the future inhabitants to build their own home following the rules and plans given to them. The purpose was to attempt to reduce the building cost to government by using the beneficiaries to do the building. In addition, it was thought that the overheads and profits charged by contractors would be avoided by the use of government agencies to supply building materials. The participation by inhabitants in the building process fostered ownership and commitment to the house building process and many unskilled simultaneously learned a useful trade skill.

The Sites and Services and Slum Upgrading approach entailed a division of responsibility whereby governments provided components such as land and basic infrastructure, while households built or upgraded the dwellings. The role and importance of the informal sector was recognized and the housing areas as locations for manufacturing and commercial activities became appreciated. It was believed that given the security to land, household savings and surpluses, however small, would be invested in building or upgrading of the home.

The serious failure of the system was the assumption made of the ability and the willingness of the low-income households to pay for housing. In general, around 15% of income of this group would be employed on housing investment, while up to 80% is spent on food and clothing. Many households could not spare the funds from the earnings to build on the land they were awarded.

Although this system had a major departure from the government built housing, having given the decision- making power to the beneficiaries, they still had no choice over preferred locations, size of land, or level of services to which they had access. It was not uncommon for public utilities to deteriorate rapidly.

The current concept followed by most developing countries in Asia is a government led enabling strategy, for support-based partnerships between government, the private sector, communities, partner organizations and individual householders. The underlying reason for this development trend was the compelling demand on governments to respond to the ever-increasing requirement for housing facilities from the low-income groups. Characteristically the low-income groups of countries in Asia, is the majority population group with a tendency to seek shelter in urban areas.

In the Enabling Approach, governments were required to facilitate action by their citizens, private sector and non-government organizations to provide for themselves such services and at such standards as people themselves might choose. The capital investment was replaced by a program of technical assistance and enabling, supplemented by a housing credit mechanism. This concept was first enunciated in the UNCHS Global Strategy for Shelter to the year 2000, adopted by the UN General Assembly in 1988.

The strategy stated that governments should concentrate more on creation of incentives and facilitating measures so as to enable housing and other urban services to be provided by the householders themselves, community organizations, NGO, the private sector, and less on actual implementation. In this way, the full potential of all the actors in shelter production and improvement would be mobilized. Governments became facilitators rather than providers. There of course were limits to the enabling approach. Housing for elders, ill and disabled and other vulnerable groups could not be provided by this means.

Future shelter delivery systems will see an increasing part taken by the private sector in building mortgage financed housing and rental housing for the middle income groups and self built housing by the lower middle income groups, to supplement government initiatives through the enabling approach for the low income groups. These approaches will rely heavily on a dynamic housing finance system.

All housing finance systems have to reconcile with partially conflicting objectives, which look at, affordability to borrower, viability to lenders and resource mobilization for the sector as a whole. Affordable housing finance systems turn out to be unsustainable, while viable systems tend to exclude the poor.

The average share of household incomes allocated to housing increases with rising incomes of the population. The availability of mortgage finances and subsidies strongly influence housing demand. Promotion of income generating activities among low-income families in housing settlements therefore will make these programs more viable.

2. Examples of different approaches to Shelter Delivery in Asia

2.1 Within the enabling approach followed by most countries, there are several examples of different shelter delivery systems in Asia with community participation. Some of the best practices as documented by UNCHS (Habitat) are illustrated below.

2.1.1 Community-based Initiatives for Housing and Local Development (CoBILD) – Indonesia (ins/00/013)

Background: The CoBILD Project, designed as a pilot to test the viability of a housing-finance mechanism based on market rates of interest, is now mid-way through its 30-month project period. The project aims to meet the needs of low-income households by lowering the costs of housing provision through incrementally built, sequentially financed housing. It relies on community-based initiatives for further reducing the costs of housing through collective acquisition and development of land and infrastructure.

Results: Operating within a system of supports in the form of organizations at the community and neighborhood level through to the city level, CoBILD is a national program, initially being tested in 12 cities. The primary mechanism consists of decentralized revolving funds in each city, managed locally by a Board comprising of representatives from civic society, NGOs, CBO, academics, professionals and local government. In this way the CoBILD project will assist 10,000 households build new homes or improve those that are inadequate.

2.1.2 Kampung Susan Pekunden: New Housing for Slum Dwellers in Samarand Indonesia

The problem: Kampung is an Indonesian term, which refers to an informal low-income settlement with a variety of housing types catering to the needs of the urban poor. While some kampungs have been upgraded and improved, other kampung can, for various reasons, not be preserved, in particular if they are located in the centre of the city. For such kampungs, an alternative approach has to be found to improve the living conditions of the inhabitants

The approach: The development of Kampung Susun Pekunden was a pioneering form of urban renewal in Semarang, one of several urban renewal solutions which are being applied to deal with the slums in the city. The term *kampung susun* literally means medium-rise kampung, a unique type of walk-up apartment building which has the ambiance of a kampung, with its variety of housing units, its mixture of housing and shops, and its other social and economic facilities.

The development process was a combination of top-down and bottom-up planning. The role of the government was significant. The government provided around one-third of the funding for the construction of the building. When construction started, the community had the right to choose the design that it wanted and the project manager tried to accommodate as much as possible the wishes of the community without ignoring the architectural requirements.

2.1.3 Rural housing improvement and conservation in Penglipuran, Bali, Indonesia

The Problem: Penglipuran, a village in the southeastern part of Bali, has 716 inhabitants and covers an area of 112 hectares. It is located 500-600 m above sea level on the way to Kintamani, a famous recreation spot near Lake Batur and a volcano. Like most places in Bali, Penglipuran and its surroundings is a tourist destination where recreational facilities tend to develop without much consideration for their impact on the local tradition and culture

The approach: In Bali, culture and religion have a strong influence on the daily life of the population and the patterns of development tend to follow the traditional rules, manners and customs of the community. The informal laws, known as *awig-awig* and the formal laws and regulations of the government usually support each other.

The district head plays an important role in every development activity. He is both the informal and the formal leader of the community. Sectoral policies follow the traditional institutional arrangements under his leadership. The local government and the traditions and laws of the community have been brought closer together by the occasional organization of traditional ceremonial gatherings.

The impact: Following the success of the approach in Penglipuran, the local government is following the same approach in its work with communities in other places. The development model used in Penglipuran has proved a good way to ensure that the traditional culture and architecture is retained and enhanced through the use low-cost construction methods and cheap renewable materials like bamboo.

2.1.4 Community based Low Cost Housing Movement - Indonesia

Problem: Many low-income households do not have access to institutional housing finance, because their income-earners work in the informal sector without a fixed income. As a result, they cannot improve their housing conditions.

The approach: The Government of Indonesia has adopted a community-based housing strategy with the aim of providing an alternative to the formal housing delivery system, to increase the flow of funds from outside the government sector into housing and to lower housing costs. The strategy is based on the following guiding principles:

- The promotion of informal and community-based housing delivery
- The active participation of communities in the mobilization of resources (including finance and labor) to lower housing costs
- The development of innovative credit policies, taking into account the limited loan absorption capacity of low-income households, so that these can also share the benefits of the institutional financial system which is being developed in the country
- The active participation of the government as an enabler of the housing process by providing access to land and tenure security, credit and income opportunities
- The introduction of flexible housing standards for low-income housing programs which take into account the needs and the affordability of the low-income population and do not overlook safety and environmental concerns

To serve as catalysts for housing development, the community-based housing program has institutionalized the function of "development consultants" who serve as intermediaries, partners and catalysts for community-based housing projects. The development consultants must have the commitment to enable community to develop their own housing and they must have the skills to work in a team. The work of the development consultants includes community organization, land development, project management, financial management and planning. Development consultants from several cities have organized themselves into a network, The Association for Cooperative Housing (ASPEK), which serves as a partner in the development of community-based housing in Indonesia.

In order to ensure that low-income communities gain access to institutional finance, the State Savings Bank (BTN) has, with the assistance of the community-based housing program, introduced a new loan package: the *Kredit Triguna* or Triple Function Loan. The loans in this package can be used for land purchases, housing construction and income-generating activities. The *Kredit Triguna* is meant for households, which do not have a fixed income or work in the informal sector and have difficulties gaining access to institutional finance.

The *Kredit Triguna* is only granted to a community and not to individual households. The community has to show its commitment by providing a counterpart fund (*Dana Mitra*) in the form of cash savings or equity (i.e. land). The *Dana Mitra* is evidence of the commitment and the discipline of the borrowers and shows that they have a track record of their ability to pay. The loans are disbursed in stages according to the progress of the building process: provision of serviced plots, foundation, masonry and frame, roof and trusses, finishing).

2.1.5 The De La Costa Low Income Housing Projects - Manila, Philippines

The Problem: The Philippines has a glaring and basically unsolved housing problem, with an estimated one-third or more of the nation's families ill housed. The situation is most serious in and around Manila, the nation's primate city, where government and private sector have failed

to adequately address this glaring social and economic problem. Manila's estimated housing need amounts 200,000 units annually, mostly for lower-income families.

In-migration and internal urban growth continue primarily because the primate city-- as in other nations-- is the major location of employment in the nation. Jobs are more readily available, even in the informal sector, but inadequate attention has been given to housing. The poor learn to cope with the problem by squatting, by room rental, by congestion and by homelessness itself.

The earliest endeavor of Freedom-to-Build, a non-governmental organization, in the government's Dasmarinas Resettlement Area was deliberately an articulation of; "if dwellers participate in the design, construction and management of their housing, the process and environment thus created, stimulate individual and social well-being." Freedom to build did not build houses in Dasmarinas but assisted and supported the efforts of people to build their own houses.

Freedom to Build, in the De La Costa projects, built only minimal starter houses in order to make these houses affordable, but as in Dasmarinas, perceived the "beneficiaries" as the major architects and builders of their own homes. Most families were able to make at least some significant improvement within the first year.

The Approach: The "beneficiaries" of the De La Costa (DLC) projects were the urban disadvantaged until they were able to achieve home ownership and security in one another of the DLC projects. The De La Costa approach has housed some of those in need and has presented a workable solution, which can be emulated by both government and the private sector to house thousands more. Home ownership and security of tenure have been achieved by the combined efforts of the Freedom to Build Corporation and the new homeowners themselves.

The "solution" includes: an individual family gains a decent home, initially of 20 - 49 sq.m. complete with toilet and shower, kitchen, electricity, a place that is theirs: an address on a street. The house is located on a 60 sq.m. lot, where home expansion, improvement and beautification can be easily accomplished by the "self help" energies of the family itself, sometimes individually, sometimes by communal self help. The starter house is financed through a government mortgage program in which the monthly amortization allows the new found opportunity for ownership to be no more expensive than earlier payments for room rental.

For the community, basic communal facilities are initially provided, such as easy access to transportation, school buildings, a community center, a student library, playing fields, parks, etc. A difficulty in the approach is that the project is open to any lower-income Manila family who wishes to apply and, therefore, the new home owners entering the project have had no previous experience of having lived together earlier. In response, the developer, i.e. Freedom to Build, has organized social seminars and further assists in the initial formation of a community association which manages the affairs of the community and undertakes on-going development of community facilities.

Some of the other examples of community based housing initiatives are illustrated below:

2.1.6 Mumbai- India

The National Slum Dwellers Federation of India (NSDF) negotiated an agreement with the Mumbai Municipal Authority and the National Mumbai Airport Authority to re-locate slum dwellers in affordable housing, to facilitate expansion of the airport in to inhabited areas. Their agreement reflects a new, collaborative relationship between non-governmental organizations

and municipalities based on the increased capacity of the organized poor to negotiate a better future.

2.1.7 Thailand

The Urban Community Development Office (UCDO) operates a loan facility for poor urban communities. Funding is provided for small-scale projects that strengthen the capacity of the poor to earn stable incomes, have access to appropriate housing with secure tenure and improve the quality of the infrastructure. Local communities manage the fund, loans are given out for community identified priorities and the communities themselves guarantee repayment.

2.1.8 Co-operative Housing

As a concept, this system has been operating in many countries. Housing co-operative societies build houses on a large scale in the form of planned housing estates for the members. They facilitate the acquisition of the house by individual members. Government housing finance institutions provide long-term loans to the housing co-operatives to purchase land and for building. While the individual owns and maintains the home, the co-operative owns the shopping, commercial facilities and the common amenities in the estate.

2.1.9 The Partners in Development Programs – Naga City, Philippines

This city has over five thousand families residing as squatters in government or private land or living in slums. They are actively engaged in the city's informal economic sector. The major problem related to their housing, is security of land tenure. The community organization of the Philippines Enterprise Foundation (COPE), a non-government organization has been involved in organizing the poor communities as active partners in the development process. In 1989, the Mayor of Naga City organized the movement called 'Partners in Development'. This program is a tripartite partnership of local government, the urban poor and the private landowners. This partnership was empowered to respond to the two main problems of absence of land tenure and lack of basic infrastructure facilities.

The partners for local government included the Mayor's office providing directions and general supervision, the Urban Poor Affairs Office providing basic technical and managerial skills, financial management, land survey, negotiations, community mobilizations, City Planning and Development Office and City Engineer's Office handling the support of urban upgrading and livelihood programs.

The Urban Poor Federation, the partner representing the urban poor, undertook the responsibility for obtaining participation and commitment from the families, negotiations, and community organizations and provides labor and raises equity.

Private Land Owner Partner cooperated through willingness to explore alternatives to ejection of squatters.

Options explored:

- Purchase of land directly from land owners by local government
- Land swapping – exchange of occupied property with another unoccupied property of equivalent value. The occupants amortized the cost of their home plots to the new owner.
- Land sharing – working out a mutually acceptable arrangement, for a single property, that allows both the private landowner and the poor occupants to share the land.

2.1.10 Other community-based systems for facilitating housing delivery have been practiced in India, Sri Lanka, Pakistan, Indonesia, Bangladesh and Nepal. The modalities such as micro-

credit systems, NGO participation, community-based organizations etc. defer to suit each country. Significantly, the community based low-income housing approach has also been implemented in Japan by the city of Kitakyushu in southern Japan, under the Kitagata Area Environmental Improvement Promotion. Similarly, in Korea the Urban Samuel Undong Movement, a part of the new community movement started by the government in 1970 has attempted improving the housing condition in slum and squatter settlement in cities.

2.2 The Formal Private Sector Participation in Housing Delivery

In free market economies and in countries in transition in Asia, the most important formal sector actor in the housing delivery mechanism is the real-estate developer. They cater to the needs of the rapidly growing urban middle-class and the upper-income groups. Real-estate investment is safe and often gives good returns to investors. The houses are purchased or rented by the middle and upper-middle income groups.

The removal of global barriers to the movement of capital as part of the new economic reforms in most Asian countries has created high activity in this area. This in turn has led to large-scale land purchases by the developers. In some instances, lands are obtained by relocation of squatters by voluntary or involuntary means.

Some examples of large-scale housing projects by private developers are seen in Korea, Malaysia, Singapore, Thailand, Japan and Indonesia.

2.3 Public Sector Housing

2.3.1 One of the public housing success stories in Asia is found in Singapore

The Singaporean Housing Development Board (HDB) accommodates about four fifths of the total population of Singapore in the lower and middle-income groups. HDB had completed over half a million units of public housing flats plus a substantial volume of related facilities. Besides the legal framework, land laws, building codes etc., one of the policies, which has supported this success story, was the high contribution rates towards the Central Provident Fund and the use of this fund for financing of housing development.

A recent HDB policy change is the conversion to condominiums and HDB building of owner-occupied apartments. This change is supported by the following policies:

- Homeowners are allowed to use their Central Provident Fund saving to pay for their houses.
- The quality of house design and facilities are continuously upgraded within a visually pleasant environment.
- The selling prices of houses are fixed, not merely on the basis of cost but also considering the affordability of the applicants as well as the practical limit of government subsidy.
- Attention is paid to providing not just a good physical environment but also good social community living.

2.3.2 Housing supply system in China

In China, an approach for housing supply to the working population is in the old system, where Chinese state-owned enterprises setting aside enough funds to build or buy houses and rent them to the salaried employees at an affordable low rent. The housing expenditure of an average two-wage earning family is fixed as low as 3 to 4 percent of family income.

In 1998, China announced a housing policy, which will gradually abolish the current housing distribution system and replace it with a more commercialized housing system where all citizens can buy their own houses. This new policy allows enterprises to raise money by selling their real-estate holdings to their employees and lend money to workers to acquire new housing. The objective and advantages were:

- Ownership of housing by citizens
- Boost to mortgage business
- Development of real estate market.

The financing process lays out about 17 % down payment by buyer, 50% loan from Mortgage Bank and 33% low interest loan from employer. This policy combined with the creation of a national pension fund which finances housing development has increased China's housing production in recent years.

2.4 Owner Built Housing

This is another system where the private enterprise of families is directed to the housing effort. Housing plots are purchased by the family using own resources or by mortgage finance and construct a house of chosen design and standard, once again by resorting to mortgage finance. This system relies on a strong housing finance system and loan repayment capacity of families. This also lends itself to incremental house building by permitting families to develop their home in stages.

2.5 Core-Housing and Sites and Services

This delivery option is often employed in relocation situations. The affected families are either offered a serviced site to construct their house or a core-house having a basic enclosure, kitchen and wash area with provision to add or improve by them thereafter.

3. Issues and cost implications in delivery of construction materials using locally available raw materials

It is widely acknowledged that access to affordable building materials is one of the principle constraints to the ability of the poor in developing countries to provide adequate housing for them. An indicator for adequate supply of building materials is their price change over time in relation to the average cost of living.

Cost of building materials in house construction varies from about 45% to 55% in low cost housing, while it is in the range of 50% to 60% in high value housing. Shortfalls in domestic production of key building materials such as bricks, cement, steel, tiles, concrete blocks, sand, lime, crushed stone and timber contributes to rising prices This in turn pushes up the cost of housing. Further, when shortages occur, the need for imports or imported substitutes arise, putting heavy strains on national economies of these countries.

The domestic building materials industry of these countries is structured into formal medium and large scale manufacturing units and a large number of small-scale enterprises using indigenous resources. Some of them in the latter group operate seasonally or periodically with or without legal status. They often use manual processes requiring low levels of skills. Often the products are of low quality.

In reviewing the domestic building materials industry, the following considerations also merit attention. Domestic building materials production has an irreversible impact on the

environment of the countries. Mining, quarrying, logging and firing in the manufacture of building materials contributing to this. Materials such as cement, steel, plumbing items, paints,

and electrical items, although they are manufactured locally, have high import content. Due consideration therefore has to be given to these aspects when housing delivery mechanisms are being formulated with the domestic building materials industry in focus.

While building designs and codes of practice may specify use of building materials manufactured from locally available raw materials to keep in check costs and import bill, simultaneous actions to expand the production capacities of these enterprises have to be taken to eliminate shortages and contain the spiraling building materials prices.

4. Capacity Building for Shelter Delivery in Asia

Governments of these countries have found that provision of housing to the population by the traditional method of building and supplying was too expensive for the national budgets. When such housing was provided at cost, it proved to be unaffordable by the beneficiaries. The inability of governments to sustain these ambitious programs for the low-income groups resulted in their gradual withdrawal, occasioned not only by governments' inability to meet the targets but also in response to changes happening in the housing delivery system. The emerging system was characterized by the *enablement* method of support-based partnerships between governments, communities, non-government organizations, private sector and the individual households. This also called for more local level participation giving a bigger role to local government bodies.

The local government bodies therefore need to acquire know-how for the emerging role and at the same time be given the authority and financial independence. They should also develop their human resource capacity for the new role. This also requires expanding the revenue raising capability of local governments to finance housing development and maintain services in low-income areas.

Also required is the institutional infrastructure to mobilize domestic savings and introduction of innovative credit mechanisms to give those in the informal sector with irregular incomes, access to credit for shelter development.

Capacity building therefore involves methods for achieving above and the development of the ability of government agencies, local authorities, communities and support agencies to effectively participate in partnership, in the delivery process. Government agencies need to develop appropriate systems and procedures, train the staff for the new systems, develop appropriate codes of practice and manuals of procedure.

The development of the domestic construction sector and the building materials sector, community mobilization through interactive dialogue, awareness creation and establishing partnerships through partner organizations are also needed in capacity building for the total process. The specific modalities to suit the particular situation in a given country have to be carefully selected.

5. Concepts for Flood Proof Housing

5.1 Flood as a Hazard

A flood becomes a natural hazard, when floodwater breaches a threshold. It becomes a natural disaster, when human settlements become exposed to the hazard without warning and/or without means of taking defensive or evasive action and the community suffers loss of life, assets and livelihood.

A human settlement becomes vulnerable when it is prone or exposed to physical damage or injury due to the communities' inability through lack of resources or knowledge to anticipate, to cope with, or to resist the impact of flood.

A flood may be high water flow above a designated level established by a water management authority. What constitutes a flood includes over-bank flow from waterways and inundation of land, which is not normally submerged or is only annually lightly submerged in accord with annual river regimes of over topping banks

Inundating floods are the extreme versions of the normal action of nature in which rivers cannot be contained within the banks and retention areas and overflows into plains and into adjacent water bodies. These natural processes are aggravated or modified at human settlement levels by actions of man. Thus, an understanding of these natural processes and patterns of human actions are important in this situation.

On the other hand, annual river flood is lived with. This flood is expected and sometimes needed. They top up fresh water supplies and bring in water and nutrients to the agricultural lands.

5.2 Human Settlements in Flood Prone Areas

Floods of danger arise in flood plains and delta areas where settlements are intensive, since it is these areas that offer many advantages for human settlements. Similarly, in mountain areas human settlement is intensive in river valleys, which offer settlement advantages although they are close to flood danger.

A conceptualization of the of causative processes and patterns and sequences of events that lead to 'floods of danger' assists in the initial assessment of type of risks and the responses needed in human settlements

Once a policy response is agreed upon regarding flood danger for administrative, financial and land planning purposes, a 'flood of danger' has to be termed as a 'Design Flood'. It is this Design Flood, against which land use, civil engineering or architectural decisions have to be made, if risks from inundation flooding and vulnerability to flooding are to be reduced.

The Design Flood is the central concept in land-use planning against flood risk. It may be defined in terms of speeds of water flow, water height above sea level, period of flow and time taken to drain away to the normal seasonal water level. It may be zoned by area in accord with recognized degrees of risk, for example, in river corridors, in flood plains and in valley bottoms to name a few.

The recognition and/or formal setting of the Design Flood figures provide officials and planners with the necessary parameters to add to the understanding of the regional and local climatic conditions and water regimes and of the natural landforms and urbanized landscapes.

Design Flood is a figure reached by agreement. It is based upon scientific data and upon careful evaluation of past flood inundations and their causes. An initially desired degree of flood resistance may have to be reduced once affordability calculations are made and the Design Flood adjusted accordingly. A choice has to be made for planning and design purposes, to manage a specific level and character of flood that is forecast for a particular frequency.

Once a general area design level is agreed for planning purposes, then specific risk zones and built structures will be given their own performance level. In practice, this is often determined

by initial cost plus the cost of the maintenance program that is entailed by a structure or drainage system.

The fact that flood control measures do not entirely remove the danger of floods is perhaps the most difficult aspect of flood management policy for public officials and communities to grasp. Education and awareness creation both for officials and public are necessary. There is always the risk that flood control measures based upon the Design Flood will paradoxically lead to increased vulnerability in settlements. An assumption is made that once expansive flood control works are completed, that low-lying areas are now 'safe'. Unauthorized squatting may take place on such lands by low-income earners or unplanned building may take place in the area, reducing the retaining and absorptive capacity of these lands, much needed at the time of high flood. Initially those living in the overbuilt areas will be affected and thereafter the flood threat reaches those within the flood design programs.

A sustained approach to land-use management and building on areas subject to flood risk, even when control works have been carried out is required. One cannot plan, build and 'go away' for nature comes back without exception. Sediment will pile against water control structures, and river beds of embanked rivers, embankments will gradually erode, detention and mop up areas diminishing as human activity increases and solid waste collects. Therefore, sustained maintenance and management of flood prone areas are essential.

Many countries in the developing world have rising populations and rising expectations of housing. Many countries are at early stages of urbanization and urban growth. Unless the settlement trends are carefully planned and managed, the roads, railways, riverbank defenses, spread of housing and industrial areas will all aggravate flooding as natural land drainage is disturbed.

New towns and planned town expansions with a national or regional urban growth plan are unfashionable approaches today. They introduce a new dimension into urban growth, that of structured determinism, where urban growth will take place as opposed to incremental development, which is the result of developer initiative and rural urban migration. However at times of rapid urbanization and where decisions have to be taken concerning environmental protection, irrigated land protection, and human settlement location, some positive proactive decisions are required. Where flood is a hazard over an urbanizing region, then this only underlines the necessity for a more planned approach.

When existing urban settlements stretch along riversides, estuaries and the coast, and are prone to frequent floods, then relocation of those who live in the most exposed areas have to be considered. This of course is a policy of last resort because of the legal, administrative and practical difficulties of relocating an existing community that has assets tied to a particular location. Where a location cannot be defended because of major causative factors, then relocation is the only option. For some riverside communities in delta areas, the need to move back from the ever-eroding riverbank is a fact of life.

Some rural communities in Pakistan, India and Bangladesh who farm and live on low lying land are used to evacuating each flood season for a period of seven or eight weeks to a second home in a village on higher ground far away from the good agricultural land. This re-location is tuned to a seasonal event. In other rural communities on marginal land, the family of a farmer lives in a safe but unprofitable area, while the farmer and farming sons migrate to unsafe but good growing land. Some may stay in portable houses on reeds or bamboo.

Concept of flood management is one difficult in practice to apply. There are many complex environmental and ecological systems to recognize and understand. The way that a system - of climate and seasonal river flows behaves and interacts with hills, valleys and plains is intricate.

Alteration in one system precipitates changes in many others bearing upon the interaction of land use and water flows.

Despite these issues and challenges engineers, planners and social scientists have to move with unwavering commitment to mitigate, and reduce the impact of flood disasters in human settlements, particularly in low-income settlements.

5.3 Siting, Designing and Building in Flood Prone Areas

When there is a need for human settlements to be sited on lands prone to floods, then the mitigation of the effects of floods become the determining tasks in settlement planning, building design and construction. The task is two pronged:

- The reduction of flood risk
- The reduction of vulnerability in the face of risk

In design work, decisions are based on building and environmental science & technology. Design principles are influenced by social, cultural, or aesthetic factors.

The overarching concepts of design are:

- Fitness for purpose - i.e. the use when positioned in place and which materials are to be employed
- Fitness to the building design – i.e. reflects a balance of scientific, technical, practical, constructible, aesthetic and social influences.
- Fitness over a longer term - i.e. sustainable and maintainable, given that there is desire that the built work is so managed.

Within the design approach and the context of flood loss protection, the designer can approach technical literature having distinctive insight, and analyze with his/her field experience against criteria derived from the consideration of a broad spectrum of siting, design and building issues.

Rapid urban settlement growth is witnessed in most developing countries. Much of this happens without planning interventions. This leads to congestion and has a serious impact on vulnerability to flooding. Any mitigating solutions adopted will be difficult to maintain and sustain unless the new expansions in urban settlements is shaped so as to lower flood risks and reduce vulnerability to those risks. The approach adopted has to be compatible with the flood policy chosen for the wider region. That is:

- Flood control by defenses or
- Living with floods

There are two distinct approaches to arriving at physical planning decisions. The first is that which historically has most prevailed - the character of social relationships and the balance of influences between the contending parties for the land use. In the second form, planning decisions are made to reflect the agreed rules and development needs in areas subject to controls.

Therefore, a concept for flood proof housing must include both issues and guidelines for siting as well as building. This concept has to define the:

- Flood risk and each area at risk is subject to specific types and combinations of risk.

- Recognition of the flood hazard - Technically the problem of flood poses issues at the level of the wider landscape and urban region rather than at that of the individual building, although the latter is not without design problems particularly where impermanent materials are used.

- Strategies for flood loss reduction - The selection of policies and programs appropriate to particular locations can contain a mix of strategy that relate to zones, areas, communities, buildings and people's use of buildings.

- Building codes - Control of construction through the employment of building standards that seeks to protect buildings, occupants, neighbors and passers-by with particular emphasis on site drainage and foundation design.

- Appropriate designs - These may include site selection, site protection, house or cluster of houses on raised mounds and on raised plinths, safe floor levels, buildings on stilts, foundation types etc.

- Appropriate technology choice- This should illustrate the focus on 'fit for use' methods with particular reference to low income group housing, technical performance standards and technical solutions that relate to social and cultural context of the community in order that there will be minimum alterations to structures by dwellers during use. Anchorage, stiffness and cross–bracings etc are standard techniques for flood and wind resistance.

- Materials for use- although it's not practicable to list building materials for use applicable to all countries and all situations, guidance on appropriate use of available local building materials is the objective. Selection of water resistant building materials, use of floor and wall materials that dry out speedily with receding flood water and other technical performance aspects that assists in selection of materials for use particularly by the low income groups.

- Inclusion of flood-safe lofts in dwellings- where foundations and walls are built of water resistant materials and the Design Flood is above floor level, flood-safe lofts under pitched roofs provide short terms flood refuge.

6. Shelter Delivery in Flood Prone Areas in Vietnam

6.1 Background

The 'silver lining' in this disaster related situation is that Vietnam has a surfeit of proposals formulated by government with external assistance and expertise. Vietnam also has inherent domestic capability and resolve to overcome flood damage and survive flood related disasters.

Applicable systems therefore have to emerge from an analysis of good practices and lessons learned. The delivery system must contain a concept and strategies for shelter in flood prone areas, delivery mechanisms, both institutional and financial, technology options, capacity building and a procedure for monitoring and evaluation.

6.2 Concept & Strategy

Given the country-wide disparity and the regional and seasonal variation in flood risk in different areas and settlements in the country, it is necessary to conceptualize the shelter delivery system in flood prone areas under:

- Policies and strategies related to physical planning in flood prone areas

- Adoption of flood resistant building techniques.
- Institutional and financing mechanisms.

The initial conceptualization has to deal with what has to be done. This may include:

- Identifying a range of options before selecting a particular flood mitigation strategy for the area.
- The need to relate the choice of strategy by scale considering region, zone or particular settlement
- The need to relate the choice to other considerations such as sustainable development, conservation of natural environment, international dimension in river basin management etc.

6.2.1 Selection of a flood mitigation strategy

The following actions may need to be undertaken in respect of the region, zone, or settlement.

- Flood hazard analysis
- A land survey and mapping of land use pattern
- A wetlands survey
- A vulnerability survey
- Professional views from specialists and planners

The options available for flood management strategies include:

- Seek flood protection through flood avoidance, flood delay, flood route diversion, and wetland protection.
- Seek protection through embanking, river control systems and structures
- Adopt flood loss reduction approach by reducing severity and duration through improving drainage and physically protecting high value installations, specified settlements areas and wetlands.
- Where necessary adopt 'live with floods' approach.
- Zone high-risk areas for specific types of land use.

These strategies may be adopted by themselves or in combination, to suit the locality. The implementation requires central government intervention & participation possibly with external assistance in terms of expertise and capital investment.

Whatever strategy is adopted for a locality it must earn acceptance among the beneficiaries and stakeholders and implemented with full commitment. As flood risk arises due to actions of nature with which countries have to come to terms, the strategies adopted will need constant monitoring and evaluation regarding their appropriateness.

6.3 Delivery Mechanism

Due to the nature and the magnitude of the implementation of a flood risk mitigation strategy, a well-coordinated and integrated mechanism for participating institutions and actors is vital. The central government and its role, provincial and local governments and their roles, communes and communities and their roles, the partner organizations and their roles have to be carefully determined and stated. This intervention is applicable to the 'off dwelling site' actions. For the need for replicability, sustainability and acceptance, the 'on dwelling site' actions should largely be assigned to the target family.

Many experiences of NGO sponsored programs and pilot projects in Vietnam can be examined as case studies and a suitable mechanism for 'externally assisted- self build' type of system

adopted for the location. It has to be appreciated that a considerable effort in investigations, experimentation and analytical studies has been employed using best expertise in these pilot projects. This experience therefore has to be fully exploited before new technologies are investigated.

Perhaps the greatest challenge is the mobilization of financial resources for the effort. As every component in an integrated strategy is vital for its success, implementation and financing mechanism for each component has to be specifically determined. It is clear that "off dwelling site" actions being the responsibility of the government have to be financed from allocations from the government budget and from donor assistance.

Given the extreme impacts of flood disasters to the human population and the economy of the country, there is no doubt that this matter will receive very high priority in the contemporary government thinking and the possible resource allocations will be forthcoming.

Projects designed to fall within well formulated policy objectives and sustainable strategies, which conform to the social and developmental objectives of the multilateral and bilateral donor agencies, have every chance of being accepted for financing by them. It is obvious that flood mitigation projects fall within this category.

Building or strengthening of houses in the selected area may be enabled by Government to be done by the families themselves where possible external assistance may be mobilized. An effective and sustainable housing credit mechanism to support this self-build process will be necessary.

6.4 Planning and Technology

Land use planning is one type of adjustment to disaster risk. Against flood, it will be weak, unless accompanied by other strategies that were spelt out earlier. Planning gains credence when it is strong enough to lead and guide the location and type of development that takes place in the zone of concern. The effectiveness comes from the existence of appropriate planning laws and implementation mechanisms. These laws act as consciousness raising and standards setting backdrop, to advocacy planning.

There will be three modes of land-use planning:

- Development of a master plan or structure plan
- Adoption and administration of zoning, settlement expansion and building regulations
- Organized planning feed-back and impact assessment studies

Technology choice is influenced by social, cultural and aesthetic considerations and has to cater to:

- Fitness for purpose
- Fitness to the building task
- Fitness over a longer term

Technology also has to suit the location. Building in the rural heartlands, building on marginal lands, building on urbanizing rural regions, building in central urban areas and building in informal urban settlements should all have their specific technology choice. Choice of building materials, fitness for purpose, guidance for design, social acceptability, replication, clarity and simplicity of technique, owner-build adoptability are all important considerations in technology choice.

6.5 Capacity building

The total process of disaster mitigation in human settlements in flood prone areas involves the effective participation of central and local government agencies, communes, communities, partner organizations and beneficiary families. Their roles and responsibilities will have to be clearly determined. They need to have adequate capacity for intervention and participation. The capacity is in terms of knowledge and understanding, delivery systems, financial, materials and human resources. Capacity for planning, management and delivery, technological tools such as databases, design and practice manuals, standards and codes of practice and equipment all have to be in place.

These requirements have to be carefully evaluated and assessments made in relation to the particular program chosen for implementation.

6.6 Monitoring and Evaluation

These activities are complementary to strategy formulation, strategy review and implementation management. Without continuous appraisal, the degree of performance against the expectations of a particular set of actions, the sustainability and the realization of objectives will not be achieved.

In actions where flood reduction measures are implemented with long term impacts, evaluation will involve reviews to assess the continuing relevance of the strategy adopted and the degree to which progress is being achieved against the agreed milestones, etc. Regarding the more short term measures about flood warning systems, flood resistant construction, community education and awareness creation, and assessment against the agreed indicators have to be constantly made. This helps in incorporating suitable modifications to the strategies and implementation systems on-stream.

Monitoring involves the measurement or assessment of the performance against the indicators of performance. Suitable monitoring tools and field level enumerations have to be employed for this purpose.

7. Some aspects related to Housing in Cyclone Prone Areas

7.1 Cyclone Resistant Housing

Cyclones with high winds originate when high temperatures prevail over the sea surface with other necessary conditions and enter the land through coastal areas with devastating consequences.

Cyclone damage to housing can vary from blowing-off of roofs, to complete collapse of the structure. The common failure modes due to cyclone forces are:

Lateral movement of a part or the whole structure
Lateral collapse of the structure
Overturning
Material failure
Failure of joints or connection

Design codes for structures provide for normal houses and cyclone resistant houses. A further classification in respect of cyclone resistant housing is:

Houses located in open areas
Houses located in areas with permanent obstruction to wind such as trees and topographical features

7.2 Selection and planning of site

Houses located in flat coastal areas are more vulnerable to wind damage. In hilly terrain houses should be located in valleys so the wind does not directly blow on the structure. Orientation of the structure should be such that the wind force on them is the least, ie the shorter side facing the wind direction.

7.3 Design aspects

Low-pitched roofs are vulnerable to suction forces from rushing winds over the roof. Roof pitch of 45 degrees is the best for this effect. Fasteners and ties from roof to structure are employed to resist blowing-off. In framed buildings wind load is resisted by, providing diagonal bracings, infill panels or incorporating rigid joints.

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TECHNO-FINANCIAL APPROACHES TO RISK MITIGATION IN ASIA

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Key Words : Risk Mitigation
Techno-financing regime, Financial Institutions,
Insurance, Techno-legal regime, Down marketing
Credit, Savings-Credit, Micro finance Institutions,
Quality Assurance, Interest

ABSTRACT

With massive damages to lives and properties as a result of natural disasters there is an imminent need to recognize the risk perceptions and its impact on national economy and develop appropriate strategies for risk mitigation. The analyses all over the world clearly bring out the strength in pre-disaster preparedness, prediction, prevention, publicity and protection as against the current efforts in post-disaster actions of relief, rescue, rehabilitation, reconstruction, repairs, renewal and retrofitting.

It is therefore imperative to evolve suitable and sustainable techno-financial systems where massive investments in financial resources in nations development agenda is harnessed effectively with a view to provide disaster-resistant construction and to that extent provide for much needed risk mitigation.

This would cover the package of technology options, its sound transfer system to the field linked with housing delivery, and appropriate training to the community and construction workforce. The above package has to be made an integral part of any financing mechanism for housing or other public asset building from a basket of financial resources from the governmental, institutional, individual and societal sources. The housing finance mechanism should be responsive to the needs of all economic strata with affordability as the key for sustainability with suitable incentives and a variety of lending products. This would cover both formal and informal housing credit delivery. Insurance as a tool has a major potential to be developed in the developing countries for risk mitigation.

1. Introduction

1.1 Natural disasters due to floods, hurricanes, cyclones, typhoons, earthquakes, landslides, etc. cause irretrievable losses to human lives and properties. It derails the very economic base of regions and countries from where it takes anywhere around 5 to 10 years to recover to re-build life and reconstruct and build the lost economy and rehabilitate the massive number of people affected by such disasters. Asian region is extremely prone to such disasters. The developing countries with its increasing demographic growth has affected the region much more. Floods from Asia to South Pacific have broken records. Over 300 million people were affected by storm surges, torrential rains landslides and tidal waves. The massive damages caused due to flood in China, Bangladesh, Vietnam, India, Papua New Guinea cross loss to over 2000 human lives. Over the decade, natural calamities have brought miseries that "around 80% of the Yangtze river basin's forests have been logged, clogging waterways with silt and debris, and increasing run-off during torrential rains. Following the devastating floods in China last year, which inflicted an estimated US$ 30 billion of damage, the government ordered all logging in the basin to stop, and all areas deforested since 1994 to be replanted" as

per Sherilyn Amy/International Federation, China, 1998. Even in August, 2002, one of the major flood in China has affected millions of population.

1.2 Overall, many Asian countries have witnessed the cyclic rotation of cyclones, floods, tornadoes, hurricanes etc. The death toll in the nineties due to bad floods cross the damages in the last 100 years. Asian region continues to have murderous assaults on human settlements due to floods. Even in the decade spanning 1986 to 1995, more than 45 per cent of all recorded floods and storm surges in the world occurred in Asia and over 90 per cent of flood related deaths have also taken places in Asian region. World over, floods account for more than a third of all the natural calamities and windstorms, hurricanes, typhoons, tornadoes account for 34% of the damage. However, analysis clearly shows that of all the natural catastrophe, floods account for half of all statistics while hurricanes, cyclones, and other wind storms account for 9 per cent of the damages.

1.3 Vietnam is a very high disaster prone country of which the Central Vietnam is most vulnerable as compared to other regions, with population of nearly 8 million people located in the poorest region. Over the last 20 years, the region has suffered up to 70 per cent of damages due to floods and storms. Two major floods and storms surges in November and December, 1999 have recorded highest level rainfall in 100 years since 1886.

1.4 Nearly over 100,000 families were left homeless in Vietnam while hundreds and thousands of families have lost their property and livestock. Bumper crops food reserves have been heavily damaged. It is estimated that over 70,000 hectares of paddy were rendered useless and washed away due to submergence. Bangladesh and India have witnessed every year the massive damages due to cyclonic storms and flooding. All of these clearly indicate the need for major intervention for risk mitigation in Asia against various natural calamities in general and flooding and windstorms related damages in particular.

1.5 While there are substantial higher order structural and non-structural interventions that are required to be done to combat risks due to flooding, it is also an area where appropriate techno-financing intervention could largely alleviate the suffering and the economic losses.

1.6 Considering the fact that natural disasters represent 85 per cent of the insured catastrophe losses globally, the nineties have seen triple the number of natural catastrophes as against the sixties costing the world economy 9 times as much. It is estimated that natural disasters alone have caused over US $90 billion economic losses as per estimates of Munich Re, one of the world largest insurance company. Therefore, it is very clearly becoming evident that considering the substantial loss to economy and lives, there has been an growing demand for designing global strategies with techno-financing intervention to combat and minimize the damage due to these natural disasters. This is more so felt in the context of developing countries where disasters affect the poor most. It is also noted that while in developed countries, insurance is a major element of disaster preparedness, the same is not true for developing countries where insurance is still considered as an unaffordable luxury.

1.7 The large scale damages to lives and property would need massive intervention in many cases through national / provincial / local level efforts, international donor agencies, and most importantly by participation of local community. There are substantial actions needed at the level of the Government alone such as the major structural intervention for the strengthening, clearing and training of the hydraulic paths, providing protection from major rivers, dyke protection, coastal revetments, and shelter forestry. Rebuilding of the lives of the people can only take place at the local level including reconstruction of houses, public asset building like schools, health centers, community centers and other areas through local initiatives.

1.8 Powerful techno-financing interventions in such investments are needed. It is essential that the new investments made to provide to the right level of asset creation should withstand the next onslaught of natural disaster which would necessarily have to make the houses, public asset building and other infrastructure, flood protected, cyclone/typhoon resistant, earthquake resistant, landslides protected etc. It is in this context that the techno-financing mechanism would assume significant importance. While creating safer human settlement has become imperative, it is clearly seen that the 100% additional cost involved in post-disaster reconstruction to set right the collapsed buildings and structures can be saved with the right level of techno-financing intervention at the pre-disaster stages by strengthening structures with just a 5 to 10% cost increase in the early stages. Scientific analysis has clearly estimated that additional costs for ensuring basic safety features of anchorage, bracing, connections, detailing and ductility, and environmental protection for structural stability would cost just additional 5% to 10% over the conventional construction cost without taking into account the safety resistant feature with massive investments needed in any case to create human settlements.

1.9 Such a techno-financing strategy is essential for:

a) saving of precious lives of people and livestock
b) saving of limited costly and scarce resources of building materials and money for the loss of building, infrastructure more so in the developing country context
c) reduction in economic losses and its negative impact to the community on economic/industrial activity and social and welfare areas like health, education and community well-being.
d) Reduction in huge loss of time in the planning, designing and pre-construction phase
e) Reduction in trauma; and
f) Creating safe, strong and durable houses, health centers, office complexes, commercial establishments etc.

2. Methodology to be evolved

2.1 There are many structures that can be evolved to provide much needed safe construction where massive investments are forthcoming, where nation's wealth and resources are to be utilized. Depending upon the economic strata (poorest of the poor, Economically Weaker Sections, Low Income Group, Middle Income Group and High Income Groups), the nature of support needed for the groups will undergo change. The financial contribution can come from:

a) Grants/subsidies from Federal/Provincial/Local Governments
b) Contribution in cash, kind and labor from the people (affected families) through savings, sweat money.
c) Affordable financing through Financing Institutions (formal and informal sector)
d) Subsidy/loan from civil society (local, regional, national and international organizations, NGOs and donor agencies)

It would therefore be a combination of the financial resources from the following sources:

a) Governmental contributions as grant and subsidy
b) Individual contribution
c) Institutional (Financial) assistance
d) Societal contribution from local/regional/national/international organizations, donor agencies and NGOs.

Depending upon the economic strata to which the problem is to be addressed, the financial contribution would have different degrees of applicability. The broad indication for such a differentiated approach can be gauged from the following matrix:

	Income Category	Family Income	Recommended Approach
a)	Poorest of the poor (Below Poverty Line) (BPL)	< US$ 30 per month	100% grant/subsidy (Cannot afford to take any loan)
b)	Economically Weaker Section (EWS)	< US$ 60 per month	60% grant / subsidy up to 40% loan up to 10% cost by family
c)	Low Income Group (LIG)	Up to US$ 170 per month	40% grant / subsidy up to 60% loan up to 20% cost by family
d)	Middle Income Group (MIG) And High Income Group (HIG)	Up to US$ 300 per month > US$ 300 per month	Up to 80% loan with possible support from government in land and infrastructure Family savings upto30% of cost.

HOUSING COSTING OPTIONS

	Contribution/ Options	I	II	III	IV	V	VI	VII	VIII
COST OF HOUSE SHARED BY	State Govt. / Provincial Govt. - Grant								
	Central / Federal Govt. - Grant								
	FI/ HFI / MFI - Loan								
	Beneficiary Cash/Kind/ Labor (Sweat money)								
	NGO/ CBO/ Donor Local/ National/ International -Grant								
Target Group		BPL	BPL	BPL EWS	EWS	EWS LIG	EWS LIG	EWS LIG	MIG HIG

Classification based on Household's monthly income:

EWS - less than US$ 60 per month	LIG - up to US$ 170 per month
MIG - up to US$ 300 per month	HIG - more than US$ 300 per month

2.2 For sustainable development and more coverage, a balanced decision would be needed to cover the requirements of the community. Otherwise it will be seen that immediately after any calamity of grave nature occurs, certain financial/logistic contributions from national and international sources come in; but quite often they take up small representative projects, mostly grant based. These do not leave a substantial impact to ensure replicability covering the total community. What is needed is a shift from "tokenism" to "total coverage".

2.3 It is here that right strategies require to be adopted which are replicable and which will ensure partnership bringing in investment and physical construction participation of the family and the community through its contributions in costs (saving), kind (material, components to the new house from old units / trees available and more importantly sweat money of labor of either skilled or unskilled nature). The Government(s) could render the enabling support with as much support as possible for covering other resources - be it land, infrastructure, building materials, and techno-financial resources which are cost-effective and affordable to the community. We also require right level and approach for effective delivery system for implementing the same.

2.4 While appropriate role of regulatory intervention through a techno-legal regime to ensure the right level of technical inputs in the planning, designing and construction stages which can only take care of the compliance of regulatory stages on behalf of regulatory machinery, local bodies, communities, etc.

Equally important and the more powerful intervention, this can be ensured through techno-financing regime for promoting safe building construction.

3. Techno-Financing Regime

3.1 All building construction done by the public sector, private sector, corporate sector, cooperative sector, joint sector, community sector and individual sector do depend upon funds to be raised from either government, financial institutions, micro-credit organizations, housing finance companies, banks, mortgage backed loaning institutions, savings including provident funds, insurance etc. The financial institutions are equally keen when funds are advanced to ensure that the safer building construction is promoted so that not only a good product of a safe building is constructed but will also ensure the safer life of the building for a long period of at least 15-30 years depending upon repayment cycle for housing or building loan. With this in view, depending upon the location of construction and its vulnerability of the location to any or many of the disasters, the financial institution would insist as a condition to ensure incorporation of disaster-resistant features in the actual construction before the loan is sanctioned/disbursed. This has proved to be extremely useful in the case of Housing and Urban Development Corporation Ltd. (HUDCO) of India where the techno-financing regime is strictly insisted upon for proposals for building construction in vulnerable locations. International financing institutions such as the World Bank, Asian Development Bank, JBIC, KfW, etc. are also ensuring that with massive investment in the sector, the appropriate technical safeguards are insisted upon from the conception through the construction to the implementation stages.

3.2 Insurance as an Intervention for Risk Mitigation

Equally important is to use the instrument of building insurance. Many insurance companies and financing institutions have good tie ups for ensuring risk mitigation against all natural disasters through the payment of appropriate premia as a percentage of the cost of the house either as a one time payment or annually for ensuring appropriate risk mitigation in case of damages due to natural calamities. Obviously, as a result, many of the insurance companies who have tie up with the financial institutions (who already have a good techno-financing regime) are able to see the positive aspect of safer building construction features incorporated in the buildings and the premia for such buildings are substantially lower and the insurance companies are also increasingly coming forward to cover disaster related risks during the repayment period of 15-20 years. In many mass housing programs for the poor and the low income categories, the insurance against natural calamities is incorporated right in the beginning with a very small premia to be paid for covering risks. The very fact the insurance companies also have come forward to cover damages due to calamity risks or disaster risk also brings in additional layer of checks and balances.

The financial assistance is used as a leverage in ensuring compliance with the guidelines for disaster-resistant construction. In many cases, the incorporation of disaster-resistant construction features is insisted upon as a pre-condition for the sanction of the loan. Further, the provision of relevant features for ensuring safety of habitat is insisted at every stage of design and construction before the release of money to the beneficiaries in stages with supervisory checks for quality control.

The insurance sector could insist on a techno-financing regime by linking their decisions for fixing the insurance premium / tariff with the incorporation of disaster-resistant features in construction. It is also necessary to develop special disaster linked insurance schemes, which could be used as a means of mitigating the risks to individual households during disasters.

3.3 California State Earthquake Insurance Program

On account of the heavy burden of compensating for damages due to earthquakes involving large payouts, the insurance companies often insist on large premiums which are unaffordable to the general public. It is in this context that the State of California established a government-supported program to provide earthquake insurance to homeowners. The innovative insurance program was based on a bill passed in 1995 for the formation of California Earthquake Authority (CEA). The legislation authorized the State Insurance Commissioner to establish a State agency to provide the insurance cover with private financing and public management.

The funds are provided by participating insurers, insurance premiums, reinsurance, debt authority by the State administration and equity provided by the private investors. The policies procured by the homeowners from private insurance companies would be transferred to the CEA for the payment of claims. In case the benefits paid by the CEA exceed the available capital of the authority, there is a provision for the State treasurer to issue revenue bonds or secure other debt financing up to a limit of US$ 1 billion. The debt would be repaid through assessments on existing premiums. The CEA could also assess the participating insurance companies up to US$ 2 billion for the payment of claims.

The CEA legislation of 1995 provides for setting aside 5% of the revenues every year for an Earthquake Loss Mitigation Fund, which may be utilized to extend grants, loans or loan guarantees to home-owners for retrofitting of their dwelling units to reduce potential damages due to earthquakes. The owners would be provided a discount in premium as an incentive for promoting such retrofitting investments.

As per the estimates of Department of Insurance, with the establishment of CEA, the average earthquake policy would become affordable with a premium of US$ 3.29 for every US$ 1000 coverage, with deductibles equal to 15% of the value of the home. The CEA would be managed by a governing board with the State Governor, Treasurer and Insurance Commissioner as members. The advisory panel to the board would consist of representatives from insurance companies, building code experts and general public.

3.4 Insurance- Linked Savings-cum-Credit-cum-Subsidy Scheme, Kerala (India)

In order to ensure that the families in distress are not disadvantaged in regard to making regular repayments, a novel mechanism was worked out and implemented in the State of Kerala in respect of the schemes implemented through involvement of Community Development Societies (CDS). A Memorandum of Understanding (MoU) was signed for Insurance linked Savings-cum-Subsidy Scheme for provision of housing for women headed households in Kerala. This first ever initiative in India linking savings to credit, envisaged extending comprehensive insurance coverage for houses of weaker sections, covering 0.1 million houses to be constructed by community action through the network of Community Development Societies (CDS) of poor women established in all the 58 municipalities and corporations in Kerala.

Kerala Urban Development Finance Corporation (KUDFC) acted as the nodal agency at State level to avail loan amount from the financing institution Housing and Urban Development Corporation (HUDCO). The assistance would be passed on to the beneficiary through the CDS. The State Government of Kerala would guarantee the repayment of loan by the concerned Municipal CDS to KUDFC to repay the loan to HUDCO. The beneficiaries of the scheme were to be identified by the CDS. The technical advice for these houses was assigned to be provided by an NGO viz. COSTFORD, Thrissur which would also support the setting up of community construction centers at selected locations.

As per this innovative scheme, for a nominal one time premium of Rs. 150 (US$ 3.4) per house, equivalent to the cost of a bag of cement or a masons daily wage, the houses were insured for Rs. 25,000 (US$ 568.2) against damages due to the risk areas of fire, lightning, flood, storm, tempest, cyclone and inundation, subsidence and landslide (including rockslide damages), explosion/implosion, riot, strike, malicious and terrorist damage, impact by accidents, earthquake, fire and shock, and aircraft and other aerial and space devices or articles dropped there from. In addition, the joint owners (two persons) are also covered for another Rs. 25,000/- each against death due to accident for a continuous period of 15 years The scheme would be operated through the 'Graha Mitra' policy of the New India Assurance Co. Ltd. In the event of death due to accident the compensation would be given to the legal heirs or nominees through the respective CDS/KUDFC after adjusting the liability of loan against the beneficiary. In the event of destruction, the company would pay to the CDS, the value of the building at the time of occurrence of calamity or the amount of such partial loss or damage, subject to a maximum of Rs. 25,000/- in respect of each building, thus discharging the liability of the beneficiary as well as the financier KUDFC. The insurance premium of Rs. 150/- per house will be paid in the beginning of the insurance period by KUDFC, out of the first loan installment disbursed by it to the concerned CDS from HUDCO loan. The savings in HUDCO's Public Deposit Scheme equivalent to 15 per cent of the house cost, ensures substantial growth during the repayment period besides acting as a cash security. The recovery is done from the beneficiary family through the CDS network at the grass roots.

3.5 The South Asian Initiative of the World Bank[1]

The low level of insurance penetration in South Asia can only in part be related to income levels given that other similarly poor regions have higher levels of insurance penetration. India alone has a significant middle class population (in absolute if not relative terms), which would normally be sufficient to make that country a leading insurance consumer, and there appear to be significant market inefficiencies. While the lack of fully competitive markets (and in India's case until recently a fully nationalized industry) for insurance in South Asia has no doubt contributed to this situation, there may be cultural and historical issues at work as well. With the recent and proposed opening up of insurance markets in South Asia, there may now be an opportunity to consider market or market linked solutions to the transfer and funding of disaster risk and losses. The prospects of liberalization and increased efficiency of insurance markets has development significance because delays in obtaining compensation for loss financing are harmful to prospects of prompt economic recovery, particularly when fiscal resources become severely stretched and critical infrastructure has been affected.

The World Bank Group stands ready to offer technical advice and supplementary financial resources to the countries of the region that are interested in building national disaster risk management programs. It now offers through either IBRD or IFC stand-by contingent credit facilities to finance semi-working or catastrophe layers of reinsurance programs placed by either government-sponsored pools or private insurers and reinsurers in emerging markets. The Bank is also currently evaluating its potential role in facilitating countries' access to the capital markets to hedge their exposure to natural disasters.

As part of its development mandate in the region, the World Bank has recently initiated a study to assess the scope for the application of funding instruments to natural disasters in India, Pakistan, Sri Lanka and Bangladesh. For this purpose, an analysis will be undertaken to assess the frequency and severity of natural hazards in the region, in particular cyclones, earthquake, and rainfall extremes. Information will be collected to estimate risk exposures according to hazard event frequencies as well as overall vulnerability of country assets at risk. In conjunction with this, the financial exposure and estimated value of such assets will be estimated. This work will yield some preliminary loss exceeding curves and the resultant implications for contingent risk protection requirements. Preliminary inquiries indicate that detailed exposure and vulnerability information will be difficult to obtain and, initially at least, some broad estimation techniques will be required. The Bank has developed such techniques in carrying our recent similar studies for Central America.

The study will then determine to what degree the region's exposure to natural hazards is covered by the current insurance market and predictable donor funding, including the cost of such coverage, both present and historical. Ultimately, the study will present recommendations as to the selection of hazards and locations which are amenable to modern funding and hedging instruments in South Asia Region. In addition, it will include a financial feasibility assessment of the most appropriate institutional and financing arrangements for national catastrophe risk management programs in the countries of the region.

[1] * Managing Catastrophe Risk Exposures in South Asia
The Role of the World Bank by Eugene Gurenko and Rodney Lester, World Bank

A similar effort[2] for estimating chronic risk for disasters in developing countries in general and in the context of Honduras in particular, have been done in June 1999 by the World Bank, Swiss Reinsurance Company (Swiss Re), the International Institute of Applied Systems Analysis (IIASA) which has attempted to project the storm and flood peril over a ten year, 50 year and 100 year period and make an estimate on capacity to absorb loss and evolve investments for the following:

- Replacement investment of infrastructure is undertaken by the government sector, replacement investment of non-infrastructure capital stock is undertaken by the private sector; The government increases spending on relief efforts for the poor in proportion to their losses in income;
- As incomes fall, the propensity to consume wage income rises to maintain consumption at pre-catastrophe levels;
- Exports decrease proportionally to the loss in total output and imports increase to replace lost food production and to replace lost capital goods;

Developing counties can improve their ability to absorb the cost of natural disaster events if they incorporate an analysis of the chronic economic impact of catastrophes into their planning process. The methodology created by the IIASA, World Bank, and Swiss Re partnership represents one tool to measure the long-term impacts of catastrophic exposure and macroeconomic vulnerability and identify those countries for which focused attention on disaster planning should be a significant tool in promoting economic growth and reducing poverty.

4. Quality Control

4.1 Quite often when major reconstruction programs are taken up for rehabilitation/new construction/retrofitting, to provide for appropriate natural calamity risk mitigation features one of the important issues that is missed out is related to the quality of construction. This is more so felt with large programs across regions, states, villages, cities taken up simultaneously in the construction programs. While it is needless to emphasize the imperative for introducing appropriate cost-effective and disaster-resistant technologies and construction features, the major constraint that is faced is the transfer of technology to the field level. The existing construction artisans, be it the masons, the carpenter, the bar bender, the tile or roofing sheet layer or concrete workforce, they are normally expected to have skills to deal with "conventional" construction systems and do not have any exposure on the alternate and disaster-resistant technologies. Therefore, one of the prerequisites in introducing a techno-financing regime is to ensure that the stage-wise implementation of the housing or public asset building construction at the stage of foundations, work up to plinth level, super structure including walling, columns, beams, bracings, and roof construction are carried out with the strict of quality control measures.

This would cover not only in the selection of the basic building materials be it brick, stone, cement, sand, steel, timber, or water for construction but also in the actual construction practices with the necessary codes of construction practices fully ensured. There are any number of natural calamity linked rehabilitation and reconstruction programs done in many parts of the world, all of them suffering from the lack of good quality control measures.

[2] Estimating chronic risk from natural disasters in developing countries: A Case study on Honduras by Paul K. Freeman

In a major cyclone/flood rehabilitation program taken up in 1970 in the coastal districts of Andhra Pradesh (India), while the technologies for cyclone resistant and flood protected features have been incorporated, the major problem in reconstruction has been on the quality of water used. With most of the cyclonic/typhoon related disasters, the causality is in the quality of surface water due to the tidal wave in to coastal water sources which makes water saline even up to 30 kilometers of depth from the coastal lines. If appropriate precautions are not taken, this can lead to much larger calamity after few years of construction due to the chloride attack and attended corrosion. In the instant case the problems due to poor quality construction and the use of saline water started surfacing 5-10 years after construction. Similar problems have been faced in many earthquake rehabilitation programs, due to the difficulties faced in getting fine and coarse aggregates and also in the provision of the strengthening of the corners and junction of walls for earthquake-resistant features.

4.2 The detailed evaluation on disaster and mitigation in housing and community infrastructure program in Vietnam carried out in March 2001 on behalf of CRS Vietnam have also clearly brought out the nature of construction related problems faced in far flung areas, even when the manuals and guidelines are available. The major areas where deficiencies were noticed include:

- The initial construction up to foundation stage by beneficiary family
- The casting of ground floor slab
- The size and fixing of steel reforcing bars
- The construction and erection of shuttering for concrete work (with material for shuttering of appropriate quality and standards not available in many scattered plots)
- The fixing of roof members (steel or timber) and roof coverings with tiles or sheets

- Internal and external rendering
- The installation joinery
- External and internal painting
- The details for bracing and anchorage between horizontal and vertical members

Therefore, as part of the evaluation among the major recommendations offered, the need for imparting training and skill upgradation for the construction artisans with hands-on training for various elements of construction has been considered as an imperative need. How do we go about it? Depending upon the socio-cultural education systems available in the ancient region appropriate vocational training and skill upgradation would seem to be essential. This can be done in the formal and informal sector for unskilled, semi-skilled and skilled workers. The small contractors who deal with the construction also need exposure. Quite often funding institutions or donor institutions bring in appropriate technical inputs by making available services for competent contractors and suppliers.

4.3 Social Marketing and Capacity Building

The evaluation clearly brings out the gap in the need for social marketing of all relevant technologies to households so that they could clearly appreciate the importance of the technologies which can contribute safety and at the same time relate it with respect to the prevailing traditional and vernacular construction practices and use of local materials. This is so that the households can consciously decide on the use of the technologies not only for the starter construction for the core house but also for the subsequent additions which normally has to be done by the beneficiary families with their own resources and local materials and practices. The social marketing needs are therefore important so that the beneficiary families are fully aware of the strength and durability of some of the local practices and to the extent

needed provide technology upgradation and not blindly use only modern construction options using steel, metal, cement, concrete etc. Where needed, these modern material options and

construction techniques could always be used to take care of the necessary structural strength and disaster protection.

Equally important is the nature of capacity building to be provided not only to the beneficiary families and the communities but also the local artisans who are the masons, carpenters, bar benders, tile layers, concrete work force, welders, fabricators etc. The skill upgradation and training needed at the local level assumes importance in the context of the right application of disaster-resistant technologies as brought out in Vietnam Red Cross's House Rehabilitation Program Evaluation.

4.4 In this context, the construction workers training schemes through national network of Building Centers (Nirmithi Kendra/ Nirman Kendra) in India has some potential for replication. The whole program of building centers started in India as an important input for delivery system in the 1986-88 period when massive rehabilitation program was undertaken in the state of Kerala affected by 1985 heavy floods in the plain areas landslide in the hilly terrain and sea erosion and cyclone damage in the coastal areas. When program for reconstruction of 150,000 houses were to be taken up all along to state in 14 districts, one of the major bottlenecks noticed was the lack of trained delivery system using cost-effective and disaster-resistant technologies. Hence the birth of building center movement. Over the past 14 years (1988-2002) over 640 building centers in different parts of the country and helped to train over 225,000 construction artisans of various trades on all relevant technologies and more importantly on the disaster-resistant construction features as needed for the local context. These centers have primarily contributed to:

- Technology teamster center from 'lab' to 'land'
- Skill upgradation and training center for the construction artisans on cost-effective and disaster-resistant technologies
- Building materials and component production center using these technologies
- Construction center using the trained work force and the building material products manufactured at the local level for various building construction like houses, schools, health centers, community centers etc.
- Housing guidance, information and counseling center for the local population on all aspects of cost-effective and disaster-resistant technologies

The national network of building center in India has played a very major role in disaster rehabilitation programs of Uttarkashi earthquake (1991), Latur (1993), Orissa and Andhra Pradesh floods and cyclone (1996-98), Jabalpur earthquake (1998), Gujarat cyclone (1999), Chamoli-Rudraprayag earthquake (2000), Orissa super cyclone (2000) and Gujarat earthquake (2001). The concepts behind the working of the building center has been also very well utilized by many non-governmental organizations and technology transfer agencies and new initiatives in Gujarat have come up for propagating disaster-resistant technologies in actual applications.

4.5 Equally significant in the Core Shelter Housing Project implemented in the Philippines by Department of Social Welfare Development (DSWD) with ADPC technical assistance in 1991-1992. The flood preparedness and community action through Neighborhood Association for Shelter Assistance (NASA) has helped in large participatory involvement. The technical features covering sequential guide to the construction, erection and modular upgradation from the basic core shelter, quality control and maintenance issues has been imparted through training to the local art sans and the community. Initiatives in Vietnam, Nepal, Bangladesh, and Sri Lanka with different degrees of capacity building and training for the local building constructions deserve emulation, adoption or adaptation.

4.6 The local bodies should permit only builders and agencies with high rating to carry out construction activities in urban areas. In this regard, institutions such as National Real Estate

Development Council (NAREDCO) and Construction Industry Development Council (CIDC) in India have brought out rating scales in collaboration with rating agencies such as ICRA and CRISIL for assessing the real estate developers, construction agencies, projects and contractors based on their performance record of quality, safety and timely delivery. The potential home-buyers and investors in construction have to ensure that their investments are sustainable in the long run, by selecting builders and contractors with assured rating and credible track record.

4.7 The Construction Industry Development Board (CIDB) of Singapore has developed the CIDB Construction Quality Assessment System (CONQUAS) in 1989 to assess the quality of building construction agencies. The CIDB also adopts a strategy to encourage contractors to continuously upgrade their quality management system so that even better construction quality work could be consistently achieved in the future. These cover:

- Supervision and Quality Control
- Training of Workers
- Proper Construction and Checking Techniques

The CONQUAS Rating system of CIDB and the ISO 9000 certification for architectural, engineering and quantity surveying services issued by CIDB-SISIR ISO 9000 certification scheme has elevated the construction quality and capability system of the builders and the building projects in Singapore.

4.8 The Construction Industry Institute of Australia has been playing a very major role in the field of "constructability" which is the optimum integration of construction knowledge and experience in planning, engineering, procurement and field operations to achieve overall project objectives. They have also evolved a scheme for '"Benchmarking" as a process of establishing standards and goals for improvement by identifying and adapting the best practices currently employed elsewhere in business. Although benchmarking has been adopted by many industries, the construction industry has been rather slow in applying this technique.

5. Maintenance and Asset Management

5.1 Creating assets is comparatively easier provided the right level of building delivery system is in place. However, housing and public asset community buildings have to last at least 30-50-100 years considering the nation's investments for the same. One of the powerful tools that is emerging is on the maintenance and asset management systems needed for either housing or community asset buildings, more so if these are related to natural calamity-affected areas. The annual visitation on flooding, cyclonic conditions, tornadoes, etc. demand that the asset created is continuously kept under good condition for structural elements and also for the non-structural finish items and renderings which are to functionally perform for the life cycle variations in weather of heat, cold, rain, air exposure, humidity including bio hazards of termite attack etc. Therefore, there is need for continuous vigil for the good maintenance and asset management. Who will pay? Many models are emerging where a certain maintenance corpus funds can be created to provide for the same and also right level of exposure to the user agency (the families housed, the teachers and students using the schools, the doctors, nurses and the patients using the health centers) and also with backup technical support for the periodic maintenance and upkeep. Inspection checklists for periodic (monthly, half yearly, annual including five yearly checks) for various items would become necessary with the detailed guidelines for what to look for and how to rectify a deficient situation. Community ownership for such asset buildings has proved the sense of belonging and care for such structures. It is strongly recommended that maintenance and asset management can be incorporated as an essential element of the techno-financing regime.

6. Financial incentives for hazard resistant housings

6.1 One of the prerequisite to make sustainable impact for a long time period and also along the length and breadth of any country is to have a sustainable financing system that is equitable, affordable and also replicable. Since communities from different economic background and different levels of affordability are to be taken into account in any massive reconstruction program with hazards resistant features, it is desirable that the total package of financial assistance (grant / subsidy / loan) are affordable to the families, the governments as well as servicable by the financial institutions.

The possible nature of incentives that can be made available are broadly identified below:

1. From the poorest of the poor (below the poverty line) to the economically weaker sections, low income groups, middle income groups and high income groups, a differentiate approach seems desirable in respect of grant/ subsidy or loan assistance. Possibly the incentive for the lowest strata of poor is to give 100% subsidy and for the middle and high income groups no subsidy. For the EWS and low-income groups it can be combination of subsidy and affordable loan.
2. The loans from housing finance companies, banks, mortgage finance companies, MFIs etc. could consider a differential approach for lending terms. Affordability is the key for the same. Many countries in Asian region have adopted the policy of lower rates of interest and longer repayment periods for the EWS and low-income groups (LIG) in comparison to slightly higher rate of interests and shorter repayment periods for the MIG and HIG. The repayment period for full reconstruction could be between 10-25 years whereas in the case of home loan improvement program (HLIP) to provide for repairs, renewal, retrofitting and addition (in space accommodation, specifications and services – water, sanitation, and electricity supply) the repayment periods could be from 3-10 years. The key to success lies in the fact that the overall loan burden through monthly installments of repayment is not more than 15-20% of the monthly family income for the EWS, 20-25% for the LIG, 25-35% for the MIG and HIG groups.
3. In addition to the lending policies of financial institutions, many state governments also come forward in contributing certain interest subsidy to the beneficiary families. In order to promote disaster-resistant construction, interest rate incentives may have to be provided either directly by the financial institutions or indirectly by the States as interest subsidy. In the State of Kerala / Karnataka (India), the State (Provincial) government(s) offer an interest subsidy of 5 per cent for rehabilitation housing for people affected by disasters such as landslides, floods and sea erosion, thus reducing the effective interest rate applicable to the beneficiaries.
4. The major incentive could be in the form of assembled land with services which can be initiated by the government at various levels and also make available tenural rights to the categories up till low income groups who may not have legal title to land for the sake of availing loans from financial institutions. This is specially needed in respect of savings cum credit groups covered by MFIs on the lines of Gramin Bank of Bangladesh, Sewa Bank of Gujarat. The securities also require to be simplified through group / community guaranteed and not mortgage of assets.
5. The incentive in respect of techno-financing package along with appropriate user guidelines, manuals, do's and don'ts with well publicized awareness program will be one of the crucial components for successful housing delivery. Otherwise there is a tendency for availing additional market loans from local moneylenders at exorbitant interest rate which will cripple the beneficiary families.
6. Supply of some of the building material components through decentralized production cum retail outlets would also be of great help. This could cover supply of roofing sheets, cement, steel, joinery items which can be fabricated / precast / assembled with local entrepreneurial initiatives.

7. The contribution of appropriate housing guidance, monitoring, and supervision for quality control would also go a long way in sustainable housing development.
8. The government and the construction industry (major, medium scale, small scale, a tiny sector) should evolve joint programs for capacity building, skill upgradation and training for the local construction workforce of various trades and supply of such trained workforce itself would be a major incentive to the home builders.
9. An appropriate research and development budget to the extent of up to 1 % on all construction activities will also create a corpus of funds for major technology development, dissemination, propagation, and application through various conventional and non-conventional methods for the formal and informal sectors.
10. Insurance schemes would be a major incentive with affordable premium either one time or annual which will also bring substantial confidence levels among the beneficiary families to take care of any latent risks for future disasters.

6.2 New Initiatives for Institutional Finance in Vietnam

1. The Government of Vietnam has come up with a new initiative to encourage people to settle in safe sites with protected locations for the Mekong River Delta project. The safe sites are provided as a result of many structural mitigation measures through dykes, embankments and other protection features from the floods and inundation. In addition to this, Government of Vietnam has brought out Government Ordinance through the office of the Prime Minister notification No.105/2002/QD/TTg dated 2-8-2002 on the policy for giving soft loan (lower interest rates and longer repayment periods) for purchase of developed sites and for house construction in the Mekong River Delta. These loans are made available to the people likely to be settled along Mekong Delta. The salient features of the loaning scheme are :
    a. Soft loan for land purchase up to VND 10 Million at 0% interest rate.
    b. Soft loan for house construction up to VND 7 Million at 3% interest rate
    c. Maximum duration of loan is 10 years with moratorium for the first 5 years, 20% payment from the 6^{th} year for the next 5 years

    The funding needed for the same will be met from the Government Budget for 50% of fund needs. The balance 50% is to be mobilized from Development Support Fund. The beneficiary households will have to sign contracts for soft loans with the Bank for the Poor. The Government will cover the balance interest and bank charge of 1% on the outstanding loan to the Bank for the Poor. This will cover 7 provinces of An Giang, Ding Thap, Long An, Vinh Long, Kien Giang, Tien Giang, Can Tho in the Mekong Delta.

2. In addition recently the Housing Bank has been set up in Ho Chi Minh City, primarily to give housing loans to middle and higher income groups. It is not expected to give funding to the poorest group, weaker sections and low income group, who could have access funds from the Bank for the Poor.

3. The Development Workshop in their demonstration project has been able to tie up part loan facilities for the housing repairs, reconstruction program through Micro-credit institution set up under the Women's Organization. The rate of interest for such loan range from 3.5 to 4%.

7. Application of techno-financial systems with reference to Vietnam

7.1 The Government with various stakeholders could emerge joint natural disaster mitigation partnership, pooling the resources of the Government (federal, provincial, local), financial institutions (formal and informal along with national and international institutions), the community, the donors/ NGOs. In all the programs what is absolutely essential is to ensure that any finance from any source would be made available only and only if the techno-

financing parameters for cost-effective, strong, durable, disaster-resistant, construction features are compulsorily introduced.

7.2 It is also imperative that the various programs implemented by VNRC, IFIRC, DDMFC, MARD, CECI, CRS, DW, WV and other national and international partners over the last five years is evaluated together and the combined national program initiated for the larger problems of housing and community asset building and infrastructure development program taken up on a holistic basis.

7.3 Major effort would be needed to energize and strengthen the micro finance lending, which had showed reasonably good impact especially for the HLIP schemes and for retrofitting. The rules of the game for such informal sector lending have to be realistically designed and implemented using global best practices for down marketing credit for the poor.

7.4 Appropriate technology transfer mechanism with linkage for social marketing and capacity building with a host of initiatives for effective cutting edge level applications is an important facet of the techno-financing systems. This will cover publicity, awareness, training, capacity building, support from the local levels for effective housing delivery. The skill upgradation and training for the construction artisans with appropriate institutional mechanism would seem desirable.

7.5 Looking at from point of view of financing institutions it seems absolutely desirable that the technological dimensions are appropriately disseminated to the financing executives dealing with the processing of home loans and its effective delivery including the timely repayment. This can only happen if the product generated (be it house or other public asset building) is put well and lasts well.

7.6 The marginal additional expenditure incurred on provision of disaster-resistant features would considerably help in minimizing the extent of damage in the event of disasters and ensure optimal life-time costs, occupational safety and structural stability of the construction. The motto of "Caring today for a safer tomorrow" has to be the driving force, in ensuring that Preparedness along with Prediction, Planning, Prevention, Protection and Publicity becomes the key to disaster management as against the post-disaster actions of Relief, Rescue, Rehabilitation, Reconstruction, Repairs, Renewal and Retrofitting.

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RISK ASSESSMENT AND MANAGEMENT FOR A SUSTAINED SHELTER DELIVERY SYSTEM IN VIETNAM

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ABSTRACT

The need for safer shelters against typhoons and floods in the central coastal region of Vietnam to ensure a sustained delivery of system that corresponds with local social-economic-material-techniques has recently been realized. However, there are several problems in achieving this objective.

One of the most serious issues is sustainability of people's houses against typhoons. The majority of typhoon victims has low income and lives in poor condition houses, which are generally constructed with locally available building materials and techniques. According to a structural analysis, cross-frames and longitudinal strengthening are introduced as features to enhance the houses' capability to resist typhoons.

To identify and manage a sustained shelter delivery system in typhoon and flood prone region of Central Vietnam, a strong collaboration among all disciplines and stakeholders is necessary.

1. Introduction

Every year over 80 tropical typhoons occur in the tropical ocean areas. One third of tropical typhoons strikes countries of the East Sea region, including Philippines, Vietnam and China. Annually, typhoons claim approximately 20,000 lives with losses amounted to US $12 billion worldwide.

Located in a naturally vulnerable area, Vietnam, especially North and South Central Coastal provinces are always threatened by typhoon disasters. Not only do storms destroy buildings, harvests, infrastructure and people's lives, they delay production and cause many other socio-economic problems that take a long time to recover.

There have been many activities initiated in the country in an effort to improve flood disaster preparedness and rehabilitation. Unfortunately, these investments have not brought about sufficient effects for the low-income victims in typhoon-affected areas. One of their most inextricable problems is lack of safe shelters. Due to a lack of knowledge and guidance, they do not know how to build their house stronger, how to repair and strengthen them with locally available materials so as to adequately protect themselves from typhoon disasters.

In response to the demand of social-economic development and in an attempt to offer a sustained shelter delivery system to cope with disasters in the central coastal region, the paper will focus on:

- Reviewing emergency housing programs being undertaken or proposed in the high-risk areas of Vietnam.
- Investigating design, technological and methodological options and providing recommendations for sustainable post-disaster housing.
- Making recommendations on integrated programming to address the need for disaster mitigation.

- Making Recommendations on how to create a smoother transition from emergency relief to long-term, sustainable development.

2. Impact of floods and typhoons in Vietnam

Typhoons destroy houses. Rainstorms cause floods, destroying foods and farming products. Waves damage embankments and threaten people's lives and public facilities. Recovery work may be required for many years.

Hereinafter, the two main problems of housing and agriculture are considered:

According to Gross Domestic Product (GDP) values in Vietnam, Ha Tinh, Quang Binh, Quang Tri and Thua Thien Hue are the poorest provinces of the coastal central region. Industry, agriculture and export gross value is only as equal as 60-67% of average value of coastal typhoon-affected provinces. When the climate is harsh the situation becomes much worse and more serious. The reason is that the economic structure is mainly based on agricultural production. The gross value of agriculture is over 50% of GDP.

Houses are significant symbols of socio-economic condition in each particular area. The real picture of the economy was assessed when 350 houses in Ky Anh, Thach Ha and Phuc Tho in Ha Tinh province were examined. The result shows that only 59 houses (6.8%) are built with brick masonry and a tile roof. In all coastal districts of Quang Tri and Thua Thien-Hue, over 80% of families are threatened by homelessness when typhoons strike. Nearly 50% families are too poor and cannot repair their houses by themselves after each typhoon.

There are many pubic works, which helped urban areas to develop, but in long term have aggravated flooding in coastal areas, particularly on the river bank and lagoon area in Quang Tri and Thua Thien-Hue. The railway lines and trunk roads create barriers to water run-off. In this context of accelerating vulnerability, there is a critical need to search and select suitable re-settlement zones with appropriate urban planning for tens of thousands of habitants.

Economic activities are directly affected by typhoons, especially agriculture, which takes up 70 % of the overall labor force. After floodwaters had receded in the central coastal region, thousands of hectares of paddies were rendered unworkable by salt water or sand. Countless farm animals drowned and hundreds of fishing boats lay shattered. Critical public facilities and infrastructure succumbed to the floodwaters and were seriously damaged.

3. Current status of shelter construction work in typhoon area

The term "house" is widely used in Vietnam for accommodation, but often also includes separate facilities such as kitchen, shop, workshop and livestock pen. Types of houses can differ as below:

- Traditional houses
- Modern solid houses
- People's houses built with a mixture of different materials and by different techniques.

This paper presents some opinions about construction techniques, typhoon sustainability and their close relation with socio-economic conditions in each particular area.

3.1 Traditional houses

Vietnamese people have a long tradition in building typhoon-safe houses. A study of the affected regions shows that a traditional house design called “Tu Tru (four posts)” is found in Nghe An and Ha Tinh. In Ky Anh, Ha Tinh and Quang Binh (Northern Gianh River) a

traditional style of house called "Ron" is found. Traditional designs called "Roi" and "Ruong" or a combination of both are also found in Quang Tri and Thua Thien Hue.

In general, specific styles of these houses are expressed in the plan. Roof structure includes trusses and is connected with supported columns. All these houses (except the "Ron", where the posts are deeply buried in soil to strengthen capacity against storms) are simply placed on the ground and are easy to remove (by connection release) to store and reinstall in new ground. The shapes of the trusses differ between regions. However, the basic structural concept is consistent; main posts with transverse and longitudinal struts, connected to form a rigid frame using tenon-and-slot connections. On the transverse strut (bottom strut) it is possible to make a stable inlaid floor. This floor is a useful space for rice and food or other valuable possessions, or temporary residence in case of flood. Therefore, the "Ruong" house in Quang Tri is also called "Hom" (Trunk) while the "Tu Tru" house is called "Chan" (larder/pantry) in Huong Khe flood area (Ngan Sau River), Huong Son (Ngan Pho River), Duc Tho of Ha Tinh province and Nam Dan of Nghe An province (between the La and Lam River).
In structural terms, the transverse and longitudinal struts and stable floor form the core of the house while the other components are of minor importance. According to the width of the house, there are three to seven main posts. The function of the enclosure walls is to protect from rain, wind and sun.

The traditional wooden house demonstrates moderately good typhoon resilience using the truss system and rigid core. In fact, some "Ruong" houses in Cat Son near Cua Tung and Vinh Linh in Quang Tri Province have remained intact for 150 years. The truss system and rigid core of a house for family worship in Quyet Thang, Nghi Loc in Nghe An Province survived while the roof tiles were destroyed by typhoon. The main reason for poor typhoon survivability of this type of house is due to lack of connection between the posts and the foundations. This was a valuable lesson learned from two communal houses in Nam Hoang and Nam Trung, Nam Dan of Nghe An province affected by 3 storms (storm No. 7, 8 and 9 in 1989). One corner of Nam Hoang communal house collapsed when high water broke an embankment as a result of heavy rain. As the repair did not come in time, the remaining structure was completely destroyed by the following typhoon.

Nowadays, very few of such traditional wooden houses remain. They are not suitable to be used a building model under developmental approach.

- ***The modern solid houses***

Basically, the structure plan is like that of the traditional house, but there are some changes. The walls are of load-bearing masonry and the roof, or part of roof (eaves), is reinforced concrete. In general, these houses are typhoon resistant. However, the level of typhoon resistance depends on construction quality. Inadequate design and technical supervision may lead to a waste of valuable materials such as steel and cement.

For many reasons, a heavy flat roof is not suitable for the tropical climate in Vietnam where there is a small temperature difference between day and night. These houses often have no thermo-proof layer. The outside air is mild in the afternoon, but the temperature under the roof remains uncomfortable. After a few years, with periodic changes of sun and rain, this kind of roofs exhibit many defects. A salty climate and variable construction quality exacerbate the problems.

Load bearing walls made from cobble without band and bind are very dangerous, as shown by the collapses at Ky Anh in Ha Tinh Province.

These houses are relatively expensive to build and are not affordable for many inhabitants in the typhoon-affected areas, especially in the North Central Coast. With the exception of 38

families which were beneficiaries of the "A Heart of Gold" fund, only 2 families (one a driver, the other a trader) out of 378 in Ky Nam could afford to build this type of structure from their own resources. On the whole, solid flat-roof houses are not suitable to develop for construction in typhoon-affected areas.

3.3 People's houses built with a mixture of different materials and by different techniques

Most houses in the typhoon- or flood-affected areas are constructed by using a mixture of different techniques and different materials. These types of houses have been built since early post-war period up to present.

Provinces in North Central Coast are most affected by typhoon as well as devastating consequences of the war when a lot of villages and towns were burnt and leveled. After the war people re-started their lives at the beginning with 'empty hands'. A lot of houses and public facilities such as hospitals, village clinics, and schools needed to be re-built. The construction demand exceeded the technical and economic ability. These people built their own shelters, using locally available materials and applying traditional building techniques. Due to inadequate building materials and techniques, over 80% of these shelters collapsed or were severely damaged when struck by typhoons, leading to many socio-economic problems. The following reasons can be identified:

- Socio-economic conditions

Most houses in the central coastal region, especially those owned by poor families do not have the capability to resist typhoon and flood. People are living under a mono-culture scheme. They cannot afford a traditional house with wooden structure or a modern house with brick walls and RC roof. They are only able to build houses from locally available materials, such as cheap or freely and easy to obtain materials like bamboo, unused wood, thatch etc. When a typhoon comes, their lives are again disturbed. In this area, during their lifetime, people have to rebuild their houses several times.

A Vietnamese proverb says "one year to build a house, three years to pay the debt". Once a house is damaged it is therefore impossible to break the cycle of debt and susceptibility to events. Minimal low-cost repairs are carried out without adequate technical guidance, so the possibility of further damage is unavoidable. This, in itself, explains why people living in this area lead a poor and miserable life in very simple conditions.

The only way to break away from the cycle of recurrent losses that hovers over low-income victims is strengthening and supplementing the connection details of their houses against typhoons. The cost must be kept low (equal or lesser than their current house re-building cost). A big change in the typhoon preparedness and mitigation policies specific to support and develop a safe shelter delivery system is required.

- Technical Error

Planning

Planning has a significant effect on the wind impact on buildings. Unfortunately, people are not advised, supported or encouraged to apply technical knowledge in the design of their houses. The basic problem is the selection of a suitable place to locate houses.

Firstly, houses are often located in unfavorable places, for example, exposed to wind, in open fields, at the fringe of villages, at the shore or mountain pass etc. In villages, houses are sitting in disorder, L shapes or U shapes, which form an unfavorable bag, which attracts winds, eddies and tornadoes. Consequently, the impact of the winds on the houses increases. All of these

problems are understood in many typhoon prone areas. Similar houses with the same simple structure, but with a quick-set hedge around are safe from collapsing. It is fortunate that quick-set hedges indirectly contribute to typhoon sustainability of the houses. Those working in the construction industry are grieved for the ravages faced by people. They have to bear poverty due to lack of knowledge.

Implementation

People are confused whether they should choose traditional or modern houses to ensure economic construction conditions and ease of repairing damage in event of typhoons. Meanwhile professional organizations do not embrace the construction situation prevailing in the regions where no construction laws and construction requirements are enforced. People make do by themselves with a hope to stabilize their lives. Their houses are expensive, not typhoon-resistant and cannot protect their lives from disaster.

The result of investigations reveals many flaws, which include:

- Connection/bracing between bracing trusses is missing
- Trusses are not firmly connected to the wall or the column
- Walls are not strong enough to transfer loading to the foundation
- Columns and walls are not held down to the foundation;
- Lack of vertical and horizontal binding for the walls
- Lack of bracing for the roof
- Foundations are not strengthened /tied up continuously
- Doors and windows are not properly fixed to the walls
- Detailing is not appropriate, especially for low quality materials
- Construction works were not carried out properly. Neither inspection nor supervision was made.

In terms of socio-economic conditions and current construction management activities in typhoon prone areas, a study to develop a disaster-resistant house model based on low-cost local materials should be of focus.

4. Outline of research, design of safer shelters and typhoon preparedness and; mitigation activities

Living in the typhoon-affected areas, Vietnamese people have a lot of experiences in typhoon preparedness and mitigation. Due to the unequal development between socio-economic and environmental sections, knowledge and expertise in the new technology are not updated. Although the necessity of typhoon preparedness and mitigation measures is realized, the issue remains ignored or neglected, causing people to suffer severe damages each time a typhoon strikes. The following subjects should be considered:

- Refinement of design Standard – Load and Impact to buildings;
- Research to find a suitable house model for typhoon-affected area;
- Guidelines and technology transfer to encourage people to build typhoon-resistant houses.

4.1 Refinement of design Standard – Loads and Impacts to buildings

The temporary standard on wind load (01-61) is the first technical document focusing on typhoon resistance, which provides legal authority for designing and constructing typhoon-resistant buildings. After many years of researching, analyzing and synthesizing science studies, Ministry of Construction issued the 'Design Standard—Load and effects: TCVN 2737-78' in 1978. The first modification of this Standard was issued on 1990: TCVN 2737-90 and the second modification were issued on 1995: TCVN 2737-95.

According to the current standard, the impact of wind on houses or buildings is considered as the average value within 2 minutes of pressure of the wind measured at 10 meters from ground in open situation exceeded once in 20 years. These values are rather small in comparison with other countries in the region in terms of duration. Because wind velocity and direction change rapidly in a cyclone, the average wind velocity measured within 2 minutes is much smaller than one measured over a few seconds. According to the result of coefficient factors on the model building, it is found that the main impact of the wind gust speed is substantial in comparison with the average wind speed. This provides a basis for establishing the regulation to detailing the connections, which have not been correctly considered. This is simply one reason to explain why so many roofs are blown off in time of cyclones.

In conclusion, if we would like to reduce the typhoon damages, all of the above constraints should be taken into account. The following recommendations are presented based on practical experience:

- Identify wind gust speed for designing and detailing of building structures in regard to typhoon mitigation measures;
- Establish local coefficients to design the building envelopes and connection details, especially in the roof with which the coefficients verified by practice should be applied.

4.2 Studies of basis for design of typhoon sustainable houses

Given the importance for socio-economic issues of typhoon preparedness and mitigation activities, Ministries, professional organizations and institutes in Vietnam, in recent years, have attempted to establish a technical basis for assessing the wind impact on buildings and to develop technical solutions for typhoon preparedness and mitigation. In the construction aspect, the following activities have been carried out:

- Seminar on "Construction Houses in the Typhoon Areas" organized by the National Committee of Construction in August 1986;
- Workshop on "Construction of Typhoon-Safe Schools in Vietnam" organized by the Ministry of Education and UNESCO in Hanoi from 25 to July 1987;
- The state research program 26B (1987-1990) "Houses in Rural and Urban Areas" sponsored by the Ministry of Construction with two subjects:
  - 26B-01-02: "Research and Develop a Measures for Designing and Constructing Low-Rise Buildings in Typhoon Areas" carried out by the Institute for Houses and Public Building Design;
  - 26B-03-01: "Calculation Method for Buildings Design in Regard to Earthquake and Wind Load" carried out by the Institute of Building Science and Technology;
- The projects VIE/85/019 in Binh Tri Thien (now are Quang Tri, Quang Binh and Thua Thien-Hue provinces) and VIE/89/035 in Thanh Hoa, sponsored by UNDP as urgent relief assistance for recovery of the damages caused by the storms in 1985 and 1989;
- Project "Guideline and Technology Transfer for Typhoon Preparedness and Mitigation of Construction Works" conducted by the Institute for Houses and Public Building Design 1990-91;
- The state research program 06B (1990-1991) "Research on the Typhoon Preparedness and Mitigation in the Coastal Central Provinces" conducted by the Ministry of Water Resources (now is called Ministry of Agriculture and Rural Development) with the theme 26B-02-02 on the topic of "Research on Technical Solution for the Typhoon Preparedness and Mitigation for Houses and Buildings" carried out by the Institute for Building Science and Technology;
- Workshop on "Improving Cyclone Warning Response and Mitigation" sponsored by the Commission of European Communities CEC and conducted by ADPC in collaboration with the National Committee for IDNDR during 6-17 April 1992.

- In order to assist people in mitigating disasters, the Ministry of Construction conducted researches to identify house models in typhoon areas. The research numbered 02.15.14 - R54 and 02.15.14 – R55 covered house models in tornado area (Dac Lac). The research numbered 02.15.14 – 56 analyzed houses in frequently flood areas. This was a useful initiative of the Vietnamese government to help and empower people by transferring relevant knowledge and technology to them.

All of the above programs, researches are based on calculation and analysis of current situation in order to find out the reasons of failures, to systematize the experience and knowledge and; to provide technical solutions for typhoon preparedness and mitigation. Unlike the application of this technical knowledge to the invested buildings in urban areas, its application to the rural areas is difficult, as grass-root people are not given an opportunity to learn this knowledge. The participants of these workshops are only managers, planning officers, designers and technical officers of the provinces and some districts. Furthermore, although the knowledge about the building techniques has been transferred to technicians in the project area of UNDP/NGO, it, unfortunately, is limited to only some sample public buildings such as hospitals, schools, libraries etc. and expensive materials such as brick or wood are used.

Even though the government has invested heavily in typhoon preparedness and mitigation in recent years, people in these areas being only outsiders, have to build their house themselves, repair and rebuild it by themselves over and over again every time a typhoon strikes. The recurrent losses are still occurring. The main reason is due to the fact that nobody guides/teaches them how to make or repair safer/stronger houses by using locally available materials.

Construction work is part of the socio-economic development of a country. To enhance development process, people, who are the most valuable resource, must also have a stable life apart from the development of essential infrastructure. Unfortunately, their lives will not be stabilized if they have to rebuild their houses over and over again after each typhoon.

One way to mitigate the impact of typhoons is to provide not only financial support to people especially those with low income but also technical assistance in strengthening and reconstructing their shelters. For a better result in this regard, cooperation from all stakeholders is necessary.

4.3 Implementation of disaster mitigation project for safer shelters

A. Safer shelters by construction industry

- **Lightweight, solid and low-cost shelters by Bemse Production, Import and Export Co, Ltd.**
  Roof structure uses the space truss system supported on 150 x 150mm RC columns. Wall enclosures are made locally using available materials like bamboo, straw-mud mix or light concrete – ceramic. The structural system is not sufficiently stable. The 500 x 500 x 350mm footings without a longitudinal concrete bracing system cannot keep the columns restrained.

- **Shelters in central areas by Housing Management and Development Centre, Housing Management Bureau, Ministry of Construction**
  Angle steel truss supported on 150x 150mm reinforced columns is connected by longitudinal bracing system in the middle. But the structural system is not stable due to lack of bracing system on both lines of the columns. Enhancement horizontal stability for such a structural system is needed rather than using temporary anchoring system against storms or strong winds.

- **Disaster-relief shelters for inhabitants in Thuan An – by Hanoi University of Architecture for "Heart of Gold", VN Labour News**

  The structural system is basically similar to the sample provided by the Housing Management and Development Centre mentioned above. Metal sheets, steel purling and recessed RC 150x 150mm columns for erection of enclosed walls, corrodes in salty climate. Improvements to the structural stability and detailing in typhoon conditions are needed.

- **Integrated houses for Central Vietnam by Research Institute of Architecture**

  This form of house is designed based on assembling EVG 3D panel and pre-cast prestressed concrete elements.

  Prestressed concrete elements: Columns connected by bolts. Problem is protecting bolt in marine corrosive environment. It is a very sensitive structural system; easy to be deformed when the foundation is sunk. Therefore it is not suitable for soft soil or inhomogeneous, rugged terrain due to its possibility to slide. It is necessary to supplement technical solution for the whole system to ensure safety and stability for this form of house. It is a feasible option, which allows mass industrial production.

  EVD 3D panel technology is imported from Austria. Panel is made from high-strength steel mesh and sound-heat insulation polystyrene. It is a high technology solution using imported materials, therefore, not suitable for social-economic affordability. The wind resistance at speed of more than 300 km/h and seismic level of 7.5 Richter is over estimated for design criteria in the central region of Vietnam.

- **Low-cost typhoon sustainable core houses by Institute for Housing & Public Building Design (presently called Vietnam National Construction Consultants-VNCC)**

  Frame houses made from wood, bamboo and thatch with unstable structure and insufficient storm resistant option of core houses are strengthened. Based on the above analysis, it is possible to extend and improve the living condition in the core house (Fig. 1, 2).

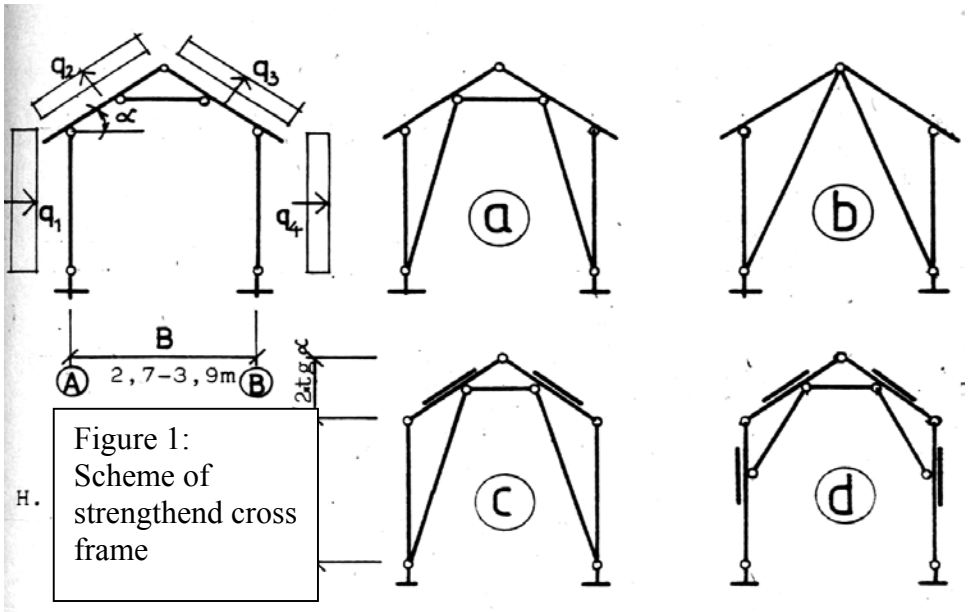

Figure 1: Scheme of strengthend cross frame

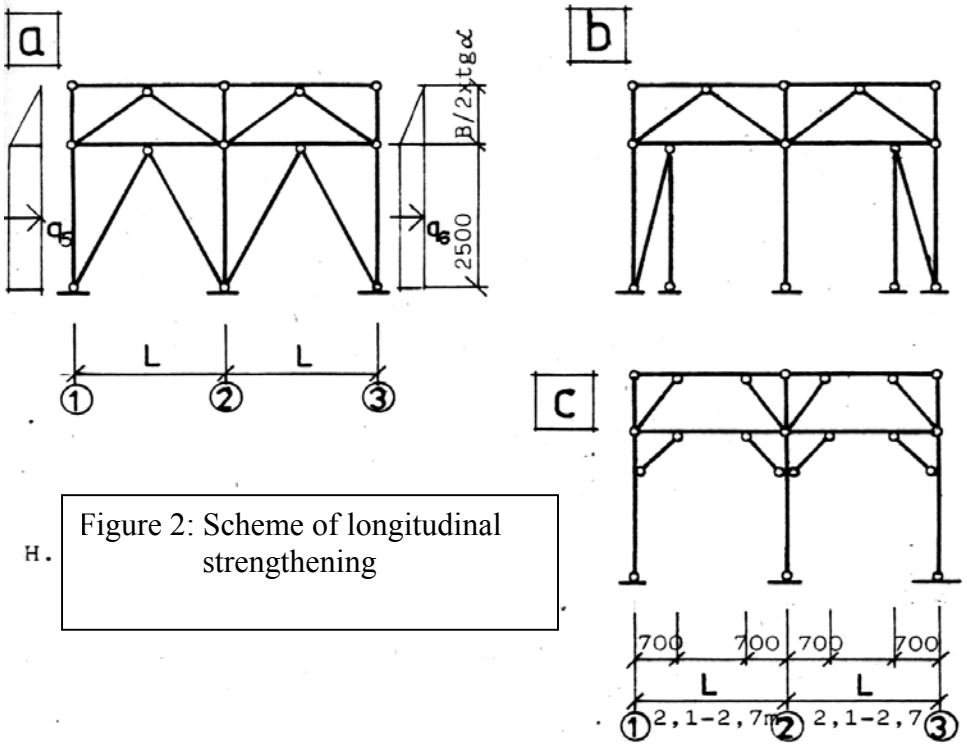

Figure 2: Scheme of longitudinal strengthening

The physical and mechanical properties of the materials used to construct the houses will directly affect the quality of the built environment. In terms of typhoon resistance capacity, there is a need to consider appropriate structural systems and connection solutions that take full advantage of the properties of the materials used.

To preserve the quality of materials and to ensure the houses' enclosure function (to protect from sun and rain, and to balance the thermal micro-climate) over a long period of time, selection of building materials, structure solutions and connection details need to be carefully considered. Based on an analysis, the low-cost core houses are designed to meet

these requirements, particularly the local economic-technical conditions and local material availability.

- **House in permanently flooded areas of Cuu Long River delta by Institute for Building Science and Technology – IBST**

  RC pile and columns are strong and durable although other components are not anchored sufficiently to ensure continuity of the whole connection. The feasibility depends on accuracy of component production as well as the transportation process. One disadvantage of this design is that its construction technique is highly technical, requires accuracy and is too radical for local labor. Moreover, the question of affordability arises as the price per unit is too high for low-income people (approximately 1.5 million VND/m2).

- **House in Mekong Delta by Cuu Long House Business and Development Company**

  This type of house is built from a pre-engineering steel frame with light components, which is easy to erect and disassemble and does not require high technology. A production line has been imported into Vietnam, therefore, it allows industrial production. It can be applied to emergency relief houses building. However, the horizontal stability needs to be enhanced for this design to withstand a typhoon.

B. Disaster - sustainable shelter project by International Assistance

- **International Federation of the Red Cross and Red Crescent- IFRC**
  - Rapid shelter assistance: 7,500 "stronger core houses"
  - Prefabricated light-weight steel frame, angle bracing in each corner
  - Double-pitched roof with diagonal wire bracing in both roof planes, profiled sheeting with an aluminium-zinc protective covering
  - Columns bolted to raised concrete pads; enclosure to the walls by beneficiaries;
  - Cost of the frame and roof covering for 12m2 is US$ 500
  - Saving lives, livelihoods and breaking the cycle of disaster for beneficiaries;
  - Need to adapt practical realization to local conditions: size of used space, options for enclosure and extension, available materials and building techniques.

- **Integrated Rural Schooling Project, OXFAM Great Britain**
  The project included building low-cost cyclone resistant houses for teachers in Ky Anh, Ha Tinh during 1992-93. Three types of house were designed by the Institute for Housing and Public Building Design; one with brick reinforced columns; another with compressed blocks of soil/cement or lime and the last one with wood or bamboo. However, these houses were not actually built due to lack of understanding and perception in technology transfer regarding sustained shelter delivery system in central Vietnam.

- **Emergency housing and infrastructure models in Central Provinces and Binh Thuan Province by Catholic Relief Services – CRS (USA)**
  - Activities developed in conjunction with local authorities.
  - Design and material solutions agreed with beneficiaries.
  - Open space, raised concrete slab, in-situ reinforced concrete columns, concrete block wall; steel truss with profiled metal roof sheet.
  - The average cost per unit is US$1,200 excluding all CRS administrative costs.
  - House 24 & 32 m^2 for medium and large-sized families.
  - 198 houses built in Thua Thien-Hue (Phong Dien, Quang Dien in Huong Tra District), 64 houses built in Quang Tri (Hai Lang District).
  - Two-story schools used as emergency shelter in the event of major typhoon and flood.

  In Binh Thuan Province:
  - 167 core houses built in Ham Thanh District following landslide and flash flood

- 20m^2 house: brick walls, piers, mono-pitched roof with fibrous cement sheets, roof structure hybrid timber joists and steel purlins.
- Detailing in regard to disaster mitigation solutions.
- Total grant causes reliance on subsidies and non-encourage for sustainable development.

- **Canadian Center for International Studies and Cooperation (CECI)**

  Activities included relocation of disaster victims to safer areas, beneficiaries mobilization through self-help construction and sanitary improvement and provision in the new areas, building water wells and latrines.

  Standard design:
  - Concrete blocks within a RC frame on a concrete slab base, mono-pitched roof and timber joinery.
  - Standard size 28m^2, total cost US$600 with beneficiary's contribution US$ 140-220
  - 400 houses built in Thua Thien - Hue
  - Criterion to select the construction types:
  - Resistant to the effects of storms (typhoon, floods)
  - Local material and local skilled labour: self-construction
  - Respect the regional culture and traditional infrastructure (usage and customs)

- **Alternative and Development Workshop, France - Canadian NGO**

  The objective was to assist the development of popular capacity to prevent typhoon damage to housing in central Vietnam - Thua Thien Hue. It was done by:
  - Reducing vulnerability and damage in building by preventive strengthening of existing buildings:
  - Improvements rather than repairs and reconstruction;
  - Strengthening as a central issue.

  Results:
  - Average strengthening cost adds 15-30% to the cost of a house or small school;
  - 222 houses and 16 public facilities strengthened in 10 communes;
  - Access to affordable credit for strengthening: 60% grant, 40% loan.

4.4 Evaluation – Challenges for sustained disaster shelter delivery system

- Inadequate performance, a decade of development washed away by 6 days floods in 11/1999;
- Severity of natural disasters, poverty and unsustainable development;
- Design, technical solutions, materials and construction methods are too radical, elaborate and inappropriate for low-income victims;
- Reliance on subsidies / assistance. Banks remain remote and lack of relevant technical-finance scheme for farmers
- Mitigation & relief measures do not ensure sustainable development and lack of stakeholder collaboration;
- Scarce public resources/funds for disaster preparedness
- How/when inhabitants of the Centre can protect themselves against typhoons

5. Disaster mitigation program

The construction work for residential urban area, including housing and public facilities in central coastal region need to consider:

- Impact of typhoon, flash flood, storm surge and coastal erosion or landslide;
- Economic capability, income and savings of inhabitants.

In order to solve these problems, Ministry of Construction issues concentrated tasks to:

- Assess and Adjust Settlement Planning of Population.
- Research on necessary population-removed areas and chose suitable re-settlement areas. Each province to choose one main district, each district to choose experimental population areas;
- Collect and chose construction plans, typical designs for dwelling - houses, schools, hospitals, building materials as well as civil construction supplying population demand suitable with areas affected by flood and cyclone, which has been investigated before, for the purpose of editing and disseminating, delivering technologies to provinces;
- Research and choose appropriate designs for dwelling-houses, schools, hospitals and health care units, palaces of culture;
- Research fresh water supply measures for each population area, and living water source protection methods as well as agriculture water supply sources;
- Select building materials and components. Set up production facilities in the Middle to support dwelling - house and civil construction program;
- Train and educate and; deliver building technology to management staff, technicians and qualified laborer resource in flood-affected areas in order to meet the requirements for dwelling-house and civil construction in those areas;
- Research the mechanisms and policies stimulating investment in the Middle of Vietnam. Research and supplement policy and methods for low-income persons so that they will have chance of borrowing money to get new houses. Seek relevant methods to mobilize civil capital for infrastructure construction in each area.

The Government of Vietnam plans to help urban development in central region. The Asian Development Bank (ADB) has agreed to provide Technical Assistance (TA) to prepare a project to improve the urban environment in selected provincial and district towns of this region. One of key issues is the TA will also facilitate the establishment of a sustainable, market-based system for the delivery of housing finance to meet the borrowing needs of low and middle income households.

The Government has approval the financing policy in the Decision No.105/2002/QD-TTg from 2 August 2002 to support and stabilize life in often-flooded areas in Mekong Delta. The soft loan includes non-interest for elevated land and low interest for the house. The installment will be after 5 years and last for 10 years. To ensure successful application, the appropriate collaboration of all stakeholders is required.

6. Recommendations

6.1 Establishment of broad collaborative efforts in disaster rehabilitation, mitigation policies and activities

An ancient Japanese proverb says, “None of us are as smart as all of us” precisely captures the power of collaboration. To enhance the effect of disaster rehabilitation, mitigation policies and activities, increased collaboration among all disciplines and stakeholders is needed. The collaboration includes a variety of activities, such as research and development, design and demonstration, etc. Organizations should seek for collaboration and partnership with each other when planning/designing and implementing a project in order to avoid duplication of effort and increase speed, quality and cost-effectiveness of their missions.

Collaboration should be evaluated for effectiveness both during and after a project is completed. Furthermore, organizations’ ongoing collaboration should remain flexible enough to adjust their activities and agreement to changing needs and goals. The completed projects should be assessed so that their success and challenges will be communicated to all stakeholders.

6.2 Cost-benefit analysis

- Cost-benefit analysis of disaster mitigation is not common practice;
- Cost of typhoon damage: housing, infrastructure, transportation and public facilities, employment, increased import requirements and export losses (including tourism); possibility of ecological degradation;
- Benefits of disaster mitigation projects: potential savings as well as other social-economic aspects, including life, property, cost of future relief, rehabilitation and reconstruction;
- Systematic cost-benefit analysis allows appropriate decision for sustainable development;
- World Bank: 10% on mitigation can stop recurrent losses.

6.3 International Assistance

- International assistance in post-disaster relief and rehabilitation operations were acknowledged and greatly appreciated in Vietnam;
- Formulation and implementation approach:
  1. Technology transfer: relevant, cost-effective, acceptable and affordable (low-cost, appropriate technology solutions)
  2. Local experts preferred whenever available
  3. Training opportunities to be provided
  4. Project focuses on long-terms sustainability.
- Local counterpart funds: inadequate allocations delay project implementation, a constraint also for operation and maintenance of projects.

6.4 Mitigation within rehabilitation

Principles for sustainable post-disaster housing:

1. Context analysis: identify the vulnerabilities and determine how to reduce them with durable solutions
2. Cost: economic acceptability at the local and national level
3. Appropriate objectives: perception of risk, appropriate stronger shelters for typhoons and floods;
4. Fitness for purpose: community is convinced with efficiency of the design and to adopted new building techniques; “seeing is believing”;
5. Social acceptability: design corresponds to local taste and traditions;
6. Replication: locally available materials, culturally appropriate styles, traditional building techniques;
7. Communication & training: effective modes of disseminating information & knowledge;
8. Effective leadership: identify existing leader or find a “gate-keeper”, whom everyone wishes to imitate;
9. Timing: attention of local people. Responsibility: individual home owner;
10. Involvement of beneficiaries at all stages to ensure above principles become practice and appropriate credit scheme to encourage low-income victims into disaster mitigation.

7. Conclusion

Generated by socio-economic emergent demands in directly typhoon-affected coastal areas, the paper’s objectives and scopes are:

- To assess the existing housing construction, disaster preparedness and mitigation measures, and vulnerabilities of farmers in central coastal districts and to develop relevant measures

including appropriate urban planning suitable for local technical, social and economic condition in each particular area;

- To point out the existing problems and new knowledge for defining a design against wind speed and local pressure coefficient and; composition and connection details of the house enclosure;
- To provide structural solutions for some typical low-cost core houses that correspond with the local condition;
- To share experiences and knowledge in the field of low-cost house construction from locally available materials;
- To create a basis for construction and strengthening measures using locally available materials, local labor and techniques with fundamental principles of the structural system of core house;
- To propose a guideline and policy, which encourage and support the housing construction program for the poor, who are often affected by disasters;
- To encourage the development of material production technology of local materials, with appropriate durability and microclimate;
- To enhance an awareness of natural disaster vulnerability in affected poor victims so that they will understand and be able to correctly apply the disaster-resistant house building principles, which, in a long run, could put an end to recurrent loss and other socio-economic problems.

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DISASTER RESISTANT HOUSE REHABILITATION PROGRAM MID-TERM EVALUATION AND RECOMMENDATIONS

Vietnam Red Cross & International Federation of Red Cross and Red Crescent Societies

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Program Background

During July/August 1998 a joint team from the VNRC and the Federation conducted a review of the relief and rehabilitation program undertaken by the Red Cross in the wake of Typhoon Linda (November 1997). The review team visited two of the southern provinces of Bac Lieu and Ben Tre that had been seriously affected by the typhoon. The main recommendation was that it is inappropriate for the Red Cross to distribute quantities of selected building material, such as metal roofing sheets and reinforced concrete poles, to families affected by disasters. This process was thought to reinforce failure, as it does not offer any better protection in future disasters. The review recommended that a better alternative would be some kind of affordable, enduring shelter.

Following the floods of November 1998, the Federation, VNRC, the Red Cross E5 Program team and the Ministry of Construction collaborated to further develop this recommendation by further developing prototype designs that could serve as the structural skeleton of a core house. These prototypes were designed to provide protection from all but the most severe floods and strong winds. They were to be easily constructed and replicated by volunteers and local artisans in the flood prone provinces. After a Red Cross procurement process, the successful bidder, BHP worked with the Red Cross and the Ministry to develop the two starter house core structures presently being used.

The starter house core structure consists of two basic parts: 1) a monolithic, steel reinforced concrete foundation and 2) a galvanized, high tensile strength steel frame with a highly wind resistant, galvanized metal roof system. A key concept of the design is that of a starter house that gives the household the ability to expand to a much larger, complete house later. The steel frame and roofing components are imported, rolled and fabricated, and then shipped to each district by BHP Building Steel Products Vietnam, an Australian company in Ho Chi Minh City. The beneficiary household provides and builds the walls, floors, doors, windows and all finishes. The Provincial Red Cross (PRC) erects the foundation, frame and roof of the starter house core structure for the household. Depending on the province, the PRC erects the starter house core structure with its cadres of trained staff, volunteers and local artisans, through direct contract labor or a combination of these. It is assumed that the vast majority of households will not be relocated and will therefore have access to necessary infrastructure and services such as water, sanitation, schools and markets. There are two alternate core structures. The “Hue” model has a 12 sm footprint, is 4.3 m to the roof peak and includes steel support joists for up to a 12 sm mezzanine. The “ABC” model has a 17.7 sm footprint, is 3.7 m to the roof peak and has brackets (but no steel joists) for up to a 17.7 sm mezzanine. The purpose of the mezzanine is to provide everyday storage and a safe haven during floods for the household, their critical possessions and sometimes their neighbors.

By mid-2000, over 7,400 households in the 11 Central Provinces of Quang Binh, Quang Tri, Thua Thien Hue, Da Nang, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Ninh Thuan and Binh Thuan have been or are just about to be provided with starter house core structures. Following the floods of November 1998, 2,450 structures were built in ten Central Provinces, from April to September 1999. In July 1999, following severe floods in Binh Thuan province, 300 structures were built from October to December 1999. Later that year, in response to the historic floods of November and December, 4,654 structures were built in seven Central Provinces, from January to May 2000.

The allocation criteria require that the starter house core structures are provided first to households whose house has been completely destroyed and second to households who represent the poorest and most vulnerable of the affected community who possess little, if any, means to rebuild. Among this poorest group, there is a special emphasis on allocating to single heads of households (especially women), the elderly and the disabled. Using detailed provincial "poverty lists" the Provincial Peoples Committee (PPC) in consultation with the PRC identifies a preliminary list of beneficiary households. This preliminary selection is then double-checked and finalized in a publicized process with each district peoples committee and commune.

Overall Achievement of Program Objectives

Taken as a whole, the first two objectives were fairly well described in written materials about the program and by those involved with the program from early on. They are more focused on short-term rehabilitation and represent the key focus of the last several years of program initiation. Broadly speaking, from the institutional perspective of the Federation and the VNRC, the initial objectives can be restated as follows:

1. Objective 1: to develop and *provide a starter house core structure for the poorest, most vulnerable households where their house has been destroyed* by floods or high winds that beneficiaries can complete incrementally over time to meet their basic, long-term housing needs
2. Objective 2: to develop and *provide a core structural system that is highly disaster resistant over the long term* that makes it possible for the poorest households to break the long-term, disaster related component of the poverty cycle

A third objective was less clearly stated and was not strongly pursued during program initiation. More recently, as experience with the program has progressed, this third objective has been more broadly considered and articulated from the institutional perspective by many in the Federation and VNRC and raised as well by some of the key donors. The focus of the third objective, stated below, is that of a long-term, development related objective. It is as follows:

- Objective 3: to develop a short-term house rehabilitation program that can be *replicated by government and other organizations and integrated into the normal, long-term community level housing development process* so the VNRC can eventually phase itself out of this program

Evaluation - Objectives 1 and 2: Generally speaking, to date, the program has substantially achieved the initial two objectives. Overall comments regarding the first two objectives are as follows:

- The initial focus on the first two objectives was appropriate and a good management decision that insured initial program success; this excellent track record will result in continued donor interest and confidence in responding positively to VNRC appeals for house rehabilitation funds; without this, long-term commitment from the donors, the VNRC could not continue the program

- The selection criteria has essentially been met; the success rate of achieving the selection criteria is about 85-90%; an impressive achievement considering the high value of the houses as compared to relief goods normally distributed by the VNRC; this high rate of success in meeting the allocation criteria is rarely achieved in housing programs in most other countries
- The core structure will withstand all but the most severe floods or winds for many years
- The frame's strength over the long-term to protect a household and its possessions is unprecedented compared to the strength of houses built of conventional materials and methods;
- The reliable long-term disaster resistance of the starter house core structures can make an important contribution to a gradual reduction of poverty of the beneficiary households
- The selected approach of providing a starter house core structures with incremental development by the beneficiary household works but must be better understood by and explained to the beneficiaries and their communities, Peoples Committees, the VNRC, PRC and the DRC

Evaluation - Objective 3: From a broad institutional perspective, this objective was not one of the initial objectives of the Federation or VNRC. Therefore it is inappropriate to expect it to have been achieved along with the other aims of the program. However, it is now time to begin to focus on this objective. This will require modifications of the existing design or development of alternative designs to achieve. See the section "Design of the Starter House Core Structure" (page 6) for specific issues that must be addressed in the prototype design that will make achievement of Objective 3 possible.

Recommendations: The third objective must now be vigorously pursued to ensure achievement of maximum program impact and development of a sustainable house rehabilitation process for the VNRC but that is replicable by other organizations. The following are the key recommendations that, if accomplished, would help to more fully achieve all three objectives, especially the third.

1) Prepare a long-term plan with clearly stated goals, objectives, and measurable results; the plan should be based on an overall consensus within the Federation and VNRC with input from the affected provinces; the plan should not linked to the seasonal disaster cycle and allow enough time for its achievement; the plan should address the following key areas:

    - Develop a new or modified, starter house core structure costing about VND 3.5 million (US$ 250), with a minimum 12 to 15 sm footprint, and that allows for construction of a mezzanine (note: one team member feels strongly the minimum size should not be below 22 to 24 sm)
    - Develop a range of alternative prototypes that primarily utilize familiar and locally available building materials and is fully integrated with varying provincial cultural norms, construction practices and dimensional characteristics of house construction used in the target provinces
    - Implement the planned competition; well designed, advertised, funded and implemented, it could go a long way towards achieving the above; inclusion of submissions from international and regional housing and disaster institutions should also be aggressively sought
    - Engage a quantity surveyor to establish a costing and bidding approach that allows a detailed cost comparison of alternative systems; low-cost housing costs *must* be calculated down to the most elemental material (ex. bolts) or labor component to achieve real cost comparisons
    - Develop a program that encourages the healthy growth of many alternative "competing" models outside the Red Cross program

- Develop a program that embraces the differences in provincial social/cultural housing norms and local materials and methods of construction

2) Establish a small team of experts to help develop and implement the above plan as follows:

- Request the Ministry of Construction, Director General, International Cooperation Department to identify ministry staff for this team to provide input and assistance in developing alternative prototypes or the modification of the existing prototype
- Recruit a delegate or advisor highly experienced with low-cost *and* disaster resistant housing programs in developing countries; the Federation should consider creative ways to recruit the most qualified person; for example: seconded from a housing or disaster organization or other Red Cross Society in the region with housing program implementation experience)
- Recruit another delegate experienced with community development programs focused on low-cost *and* disaster resistant housing in developing countries; consider creative ways to recruit the most qualified person (ex. seconded from a housing organization or other Red Cross Societies in the region that have also implemented housing programs)
- The delegates should work with Vietnamese counterparts who will remain with the program in the VNRC after departure of the delegates
- The team should have access to funds to draw on disaster resistant housing experts, engineers, quantity surveyors, social workers, public relations companies, etc. from Vietnam to assist in the implementation of the program

Whether the Red Cross chooses to pursue the objective three or not, the following recommendations should be incorporated as a key components of the future program.

- Continue with the present BHP starter house core structures improved as needed until it is clear to all involved that a better starter house core structure has been developed and is ready
- Focus on putting in place the organizational and institutional systems, especially training and public awareness, through VNRC in the targeted provinces that will allow a smooth switch from the existing system to a new one
- The E5 Program and other donors should be approached to support an expanded community based disaster preparedness (CBDP) program enabling the continued monitoring of and feedback from Red Cross provided starter house core structures; beneficiary feedback must be collected and incorporated into revised starter house core structure designs
- This expanded community based disaster preparedness (CBDP) program must be used as a laboratory to explore ways to do pre-disaster house retrofits and starter house core structure programs working as a feedback mechanism for the post-disaster house rehabilitation programs
- The CBDP program should also include a support program for follow-up after a post-disaster house rehabilitation program to ensure broader developmental needs are met such as provision of needed infrastructure and services (schools, water, sanitation, small mitigation projects)
- Also develop and implement a plan to strengthen the VNRC Relief and Disaster Preparedness offices capability; this will require a corresponding increase of *qualified* officers in these offices

Beneficiary Perspective
Other relevant issues and recommendations are presented in sections entitled “Achievement of Overall Program Objectives” and “Design of the Starter House Core Structure”.

Evaluation:

- Most beneficiaries are completely confident that the starter house core structure as presently designed will withstand almost all flood and wind conditions

- Most beneficiary households understand clearly that the Red Cross starter house core structure is provided at no cost and that it is very strong against floods and high wind
- The beneficiary selection process appears to be done as well as could possibly be expected and in a cooperative manner between the Red Cross Chapters and the Peoples Committees; this results in at least an 85 to 90 percent success rate of achieving the selection criteria
- A shortcoming of the beneficiary selection process is that the same percentages of beneficiaries, almost exactly 23% are identified in each province; this implies that allocations are based more on an attempt at *even-handedness* than on actual *needs*
- The great majority of beneficiary households believe that the footprint of the starter house core structure is too small and should be between 20 and 24 square meters; this is because there is a traditional Vietnamese core house that is normally assumed to be this size
- Beneficiaries do not understand that the *starter house* is different from a core house; the concept that a starter house could be expanded to become a core house is not understood nor is it a practical reality for reasons previously stated regarding cost and availability of materials
- Most beneficiary households do not understand the structural characteristics that make their starter house core structure strong; therefore, they do not use these principles in extensions
- In one province visited, beneficiaries were required to sign an agreement to use masonry construction in an attempt to ensure that the house would be strong; those who did not sign could not be allocated the structure
- Communities that received the starter house core structures were not adequately involved in the initial design process

Recommendations

- During the redesign process, there should be a major outreach to beneficiary households via surveys, target group meetings, etc. to get a clear idea what their needs and preferences are for the design of the Red Cross starter house core structure
- Detailed community level surveys should be done to determine in detail exactly what present beneficiaries believe or know about their structures; this effort should be headed by the DP office
- Outreach, monitoring and feedback should be managed by the DP office through experts in this subject area including social workers, architects, engineers, etc.; the information should feedback into the further development of the starter house core structure design
- VNRC should work with the Peoples Committees to ensure that future allocations of starter house core structures are more *needs* based; this is a difficult issue that will take a long-term concerted effort with the Peoples Committees and PRC to resolve
- Based on monitoring a major effort in upcoming short-term rehabilitation operations should be planned to inform beneficiaries through the local Red Cross how the starter house core structures can be extended;
- The Red Cross should not advocate any particular type of construction over another (ex. masonry over bamboo walls); strong room addition systems should be developed and explained to beneficiaries for all types of construction

VNRC/IFRC Operations, Logistics, Monitoring and Financial Management

Other relevant issues and recommendations are presented in sections entitled “Achievement of Overall Program Objectives” and “Future Design Considerations for the Starter House Core Structure”.

Evaluation:

- All Federation logistical and procedural rules have been followed; funds seem to have been handled carefully and correctly from an accounting perspective

- Due to the urgency called for to start the program the decision to continue to work with BHP, the lowest bidder, and develop both models was correct; this resulted in the timely development and delivery of houses that met the two initial objectives
- Funds are not being transferred quickly enough (especially in Binh Dinh); therefore, despite readiness at the provincial and district levels, there were unnecessary delays in construction starts
- There should be more extensive monitoring by or integration with Disaster Preparedness (DP) programs after the end of short-term house rehabilitation program
- In general, the delivery of steel components has been fairly reliable; where there have been problems, it is because BHP was unable to deliver the steel frames in a timely manner, therefore there were delays in the completion of steel frames; there were also indications of minor problems in receiving all components and parts in one delivery (ex. missing bolts or bracing)
- In Binh Dinh, the Ho Chi Minh City second office does not seem to have played a key role in implementation or monitoring; also, construction training and monitoring seems to be significantly weaker than in Binh Dinh other provinces visited

Recommendations

- After completion of any short-term house rehabilitation program by the Relief arm of VNRC, the IFRC and VNRC Disaster Preparedness (DP) program offices should take control and continue monitoring of the houses to ensure that there are no long-term major unresolved development issues (such as a need for services and infrastructure) and to serve as a feedback mechanism for improvement of the starter house core structure design
- A system that results in a faster transfer of funds from VNRC in Hanoi to the provincial offices should be put in place; provinces should not be delayed because funds have not been transferred
- The Ho Chi Minh City second office should be more involved in the implementation and monitoring in the southern provinces which depends administratively on this office

Institutional Considerations for VNRC and IFRC

The program has established that VNRC is capable of dealing with an unmet need in the development sector (disaster resistant houses). The lack of disaster resistant houses results in a substantial, recurring disaster response need. In Vietnam more disaster resistant houses will make an enormous difference in the relief and response needs that have arisen almost annually in recent years. An ongoing investment in the disaster resistance of the housing stock of Vietnam will gradually lessen the relief needs after floods and high winds.

Evaluation

- The program has made a large impact internationally and throughout Vietnam; it will become more and more visible to donors and development agencies especially if the competition is expanded to include international submissions; even if the benefits of the short-term house rehabilitation are ignored, the investment in long-term disaster reduction is wise in principle and will continue to attract funds after appeals
- It is appropriate that the core starter shelter structure be provided by the relief arm of the VNRC as a short-term rehabilitation program (in this case within four to six months of the disaster); presently the link to the Disaster Preparedness (DP) program seems weak
- VNRC and IFRC interface during the design process was weak at the national levels but strong during the implementation phases
- Interface by Red Cross with government & NGOs during the design process was weak but during the implementation phases it was very healthy

- The provincial and district level VNRC does not have a complete understanding as an organization of the implications of the program they are implementing (ex. the starter house concept, how to build a disaster resistant extension, etc.)

Recommendations

- VNRC and IFRC should step-up their efforts at engaging the government and NGOs involved in housing in a dialogue about the need for disaster resistant housing
- After each rehabilitation program there should to be a long-term program of monitoring or support of broader community based needs in beneficiary communities headed by the Disaster Preparedness (DP) program with a strong feedback into the improvement of the design of the starter house core structure
- IFRC should work hard to keep VNRC strongly in the loop as the further development of this program takes place
- There is a strong need to develop a training program that will ensure that organizationally VNRC understands and can "sell" the idea and methods of developing disaster resistant housing to beneficiary households, communities, provincial and district Peoples Committees and other NGOs

Future Design Considerations for the Starter House Core Structure

Substantial achievement of Objective 3 over the next few years would make the program more sustainable in a long-term, developmental sense. A decision to aggressively pursue Objective 3 would also mean that the prototype, as presently designed, must be modified or replaced by other designs. Important issues that must be resolved, related to the redesign of the prototype that will increase the chances of achieving Objective 3, are:

1. The starter house core structures must be reduced to about 50% of the present cost of VND 7 million (US$ 500); they should be affordable and available to low-income households whose incomes are somewhat *greater* than the target beneficiaries (in the most developed countries the threshold of toleration for additional construction costs due to disaster mitigation normally ranges from around 10% to no more than 20% over normal costs)
2. The approach of providing roofing, strong foundation and structural elements with no walls and no floor is correct even for a less expensive house because more beneficiaries can be reached
3. The steel frame cannot be directly copied using locally available and familiar construction materials and methods; it must be easy to literally copy the starter house core structure by any individual or organization in the target communities
4. The steel frame can send the dangerous and incorrect message that "a house this strong can only be built using expensive and exotic foreign construction materials"; technically speaking, the BHP steel frame is no more imported than so called soft Russian steel; however, it is perceived to be imported as compared to the other, much more familiar steel construction systems
5. Beneficiary households do not learn disaster resistant construction from the program and, for the most part, do not use disaster resistant construction methods of comparable or improved strength to complete the core unit or to extend the house; likewise, others in the community do not learn or use disaster resistant construction methods taken from the program
6. The imported steel frame is, effectively, not available to the beneficiary households if they wish to use it to extend the house, either on the basis of cost or local availability
7. Equally important for achieving long-term sustainability, the steel frame system for a single house is effectively not available to others in a community without taking abnormal measures to obtain it

8. The present starter house core structures are not well integrated with construction materials and methods typically used in low-income communities in the central provinces

The evaluation team also found some technical and cultural problems with the design of the present core structure (both models) that can be resolved fairly easily. Major issues and recommendations relative to achievement of Objective 3 are presented above.

Evaluation: Comments, regarding the design of the starter house core structure, are as follows:

- The starter house concept is poorly understood by the VNRC, Peoples Committees, the community or the beneficiary households; there is confusion about the difference between a starter house and a completed house because this has not been well communicated
- If the starter house core structures are culturally and socially understood as complete houses they will always be perceived to be too small; to date, the ABC model is seen by beneficiaries to be too low and too small; the Hue model is seen by beneficiaries to have a ground floor that is far too small for a complete house of adequate size but tall enough for a useful mezzanine; this is because the *starter* house concept is not understood; in Vietnam, a traditional *core* house (the central space of a completed house) is about 24 sm in area
- If the models are seen as *starter* houses they are more likely to be understood to be adequate in size with the understanding that a household can expand the house to meet their needs
- The starter house core structure is commonly criticized for being "too small"; the peoples committee and other organizations are giving similar beneficiaries grants of from VND 3-5 million or the equivalent in building materials to rebuild a destroyed house using masonry construction systems *perceived* to be stronger; these houses are normally larger since much less is actually spent on the disaster resistance of the house
- These alternate systems do not achieve the disaster resistance of the Red Cross core shelter; they are a) constructed like conventional houses, b) they are constructed with a preference for a large floor rather than disaster resistance, c) they consist of material kits whose structural characteristics are not understood by the beneficiary and/or d) most importantly, the strength of a grassroots institution like VNRC to insure quality of construction is not there
- The availability of funds relative to the number of beneficiaries is what limits the size of the house, not a pre-designed frame
- Due to cultural traditions in the central provinces, doors are not located in the middle of walls; therefore the corner bracing is too low on the ABC models to allow doors near the edge of walls
- The present foundation system design does not account for the very reasonable need, in some areas, to build a house's floor level above the annual flood level during *normal* flooding
- There are problems with the alignment of the long sides of the roofing sheets edge, the outside edge of the foundation wall and the typical exterior wall materials (especially brick or block) resulting in leaks where the walls meet the roof and the unnecessary exposure of the steel frame

Recommendations: Recommendations, regarding the design of the starter house core structure, are:

- A long-term plan must be developed to communicate *internally throughout* the VNRC and then externally *through* the VNRC to the Peoples Committees at the provincial, district and commune levels the concept of the *starter* house (not a traditional 24 sm Vietnamese *core* house) that is incrementally developed by a household
- All kits should allow a mezzanine to be added eventually (or temporarily) as in the ABC house; provision of joists is not required but the design should allow for their easy addition later

- Assuming the *starter* house concept is clearly understood by beneficiaries and communities as something to be expanded incrementally, the present size of the smaller 12 sm Hue model represents about the minimum starter house size; a *starter* house should be designed to be easily expanded to a traditional Vietnamese *core* house first, with additional lower level additions later
- A redesign should result in one basic starter house core structure design that allows a household to choose between a few basic variables that *very* simple modifications would allow; variables might include a) floor to roof height and b) grade to floor height (for normal annual flood areas)
- The foundation system is critical to retain in its present basic form; it is this system that makes the houses so resistant to floods; the monolithic concrete grade beam foundation is a system that consistently leads to high quality; conventional foundations of masonry stone set in mortar should be avoided since the common construction practices are poor
- In the present design, concrete corner pillars can be used to raise the lower floor level above normal annual flood levels; they can also be raised as short pillars to support the steel columns to a level above the floor level to effectively and inexpensively raise the ABC model frame and roof.

MORE TO LOSE: ESTABLISHING COMMUNITY CAPACITY TO REDUCE VULNERABILITY TO ECONOMIC LOSS CAUSED BY STORM DAMAGE TO HOUSES IN CENTRAL VIETNAM

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ABSTRACT

Vulnerability in domestic shelter in central Vietnam is a critical and under-addressed issue.

Families in Vietnam mostly are extremely poor. Despite this fact, they over the past decade have been investing their scarce resources in building better housing. Unfortunately, this investment is insecure because storm-resistant techniques are not applied. Too often, unnecessary damage is caused by the annual round of storms that hit the coast. However, this damage can be avoided if families make extra efforts to strengthen their homes by applying ten key but simple points of storm resistant construction. Preventive action to strengthen community and domestic buildings is an effective and cost efficient manner of reducing economic and material vulnerability.

This paper presents the results of a project designed and managed by Development Workshop France (DWF) in Thua Thien Hué province, Central Vietnam, since 1999. The project promotes preventive strengthening.

The project's objective is to reduce vulnerability and damage in houses through preventive strengthening of existing buildings. This in turn helps secure family investment in shelter and enables families to subsequently invest in improvement, not repairs to damage caused by storms.

DWF has developed an interactive program in each village that works to stimulate short and long term awareness of the need to take preventive strengthening in building and rebuilding. The project works with women's groups, local communitie, schools and local government with whom DWF has developed a strong relationship. It demonstrates how preventive action can realistically be applied with the exsisting practice of building houses and village, showing achievable, durable and affordable strengthening within the community that respects local habits and resources.

Through animation and demonstration, the project has been successful in changing grass roots and official attitudes.

The risk of storm damage to homes in Central Vietnam

The social and economic context

In the past decade Vietnam has been emerging from decades of poverty and strife, and opening up opportunities both nationally and domestically. Poverty[1] decreased from 60% to 37% between 1993 and 1998, and while levels of poverty in rural areas have remained higher there has nevertheless been a relatively steady improvement over recent years.

This encouraging growth and improvement in general conditions can in large part be attributed to the economic reforms launched by the Vietnamese government in 1986, *doi moi,* which moved Vietnam towards a market economy and contributed to a growth in family revenues. More families have been able to make small investments to acquire commodities such as bicycles, and the last decade has seen the start of formalised opportunities to borrow for income generation activities.

Nevertheless, despite this encouraging picture a significant proportion of families still live *below* the poverty line. A large proportion of families also lives precariously just above it. Many of the latter families are 'temporarily poor[2]', resorting to a variety of activities in order to survive with irregular incomes. In this context, *reducing vulnerability[3] is a key to reducing poverty.*

It only takes a small mishap for a family to return to conditions of near starvation, ill health and debt. Making sure that the home and its contents are not at risk is therefore a fundamental need.

The importance of the home

For most families their home is one of the largest investments that they will ever make. A decent and storm resistant home provides security to the family, for family health and family possessions, including those needed for income generating activities.

Achieving a decent and structurally resistant home has invariably required enormous effort and saving. But families also describe how this incremental investment has often been destroyed by typhoons and floods. Such destruction occurs largely because neither materials nor structure have been used in a manner that assures the security of the building. Many families tell of the repeated destruction of their home by storms.

Vulnerability: the risk and impact of typhoon damage

The risk of destruction is ever–present. Vietnam is one of the most disaster prone countries of the world. Major disasters occur at least every decade. There are indications that the severity of storms is increasing[4]: the floods in 1999 that hit central Vietnam were the worst in living memory; families still talk of the huge losses that occurred in the 1997 massive typhoon Linda when 300 000 houses were destroyed and many more damaged.

[1] Where a family cannot satisfy the bare necessities of life. Viet Nam Living standards survey 1997 – 1998, Hanoi 1999, Viet Nam General Statistical Office.
[2] Families whose income levels fluctuate above and below an acceptable minimum level during periods of natural disaster and economic crisis (Vu Tuan Anh, GSO Viet Nam 1999).
[3] World Bank report: "Viet Nam: attacking poverty", November 1999.
[4] Viet Nam country report, Climate Alert Volume 7, No 4 July-August 1994.

Although less destructive, the coast is hit annually by tropical storms at a rate of 4 or 5 a year or more[5]. What are in effect "regular" disasters cause extensive and often repeated damage to housing and infrastructure as well as losses to agriculture and fisheries.

In parallel with economic growth, *the levels of economic loss have climbed steadily* since 1985, reaching over 600 millions USD by 1996[6]. This reflects the increase in private and public investment that has taken place.

Dealing with annual disasters

Whilst it is more difficult to provide protection against massive typhoons such as those that hit central Vietnam in 1985 and again in 1997, *damage in the more frequent annual cyclones can and should be largely avoided.*

Avoiding damage can be achieved at a far lower economic and social cost compared to that of reconstruction by taking *preventive* action to increase the resistance of buildings and the resistance of their components to the effect of typhoons, high winds and floods.
DWF experience of working with hundreds of families in Thua Thien Hué Province since 1999[7] has shown that for an average house construction cost of 12 millions VN Dongs [8] for 49sq.m., an extra 15 - 30% needs to be spent on making the building typhoon resistant. The same applies to communal facilities such as schools and markets.

Housing in evolution: the renewal of housing stock has increased vulnerability to loss

It is a paradox that the very real improvements that have been made in building have contributed to increased vulnerability to loss, when this loss is considered in terms of the cost to the family of recovery and rebuilding a damaged or destroyed home after a disaster. Because more time and money has been invested in the home, this cost has become considerable. Vulnerability has in effect increased.

Fifteen years ago, the typical situation for villages in the centre of Vietnam was a cluster of houses with thatched roofs, a pole or bamboo frame, and bamboo mat walls. Most if not all of the materials came from the locality, and many of these materials could be gathered. Capital investment in the home was very low and few inputs were monetary, even though families have always set social importance on getting, if they could, a good timber roof frame. Although many houses were frail and easily destroyed by typhoons, recovery could be achieved at relatively low cost and depended significantly on family and neighbour support. Once the immediate effects of a typhoon had subsided, village reconstruction took place quickly.

By the mid 1980's change was taking place. Families had begun improving their homes. New and purchased materials, such as cement, fired bricks and roof sheets, came into more widespread use. But along with these changes in building practice many of the storm resistant features of traditional housing, that, for example, had tied the roof down and held the structure together, have been neglected.

[5] Tran Nhon, Vice-Minister , Ministry of Water Resources, Hanoi 1998.
[6] Disaster Management Unit, UNDP, Web site data.
[7] DW VN – database on house, improvement and strengthening costs.
[8] 1 US$ = 15 000 VN Dongs

There would appear to be four related reasons for this:

- Ignorance: families interviewed[9] often say that they do not know how to make their new house stronger.
- Poverty: shortage of resources encourages people to make economies.
- Belief in new techniques: people mistakenly place greater faith in new materials thinking they are inherently more storm resistant.
- Unfinished homes: the incremental process of building means that many homes have not been finished, leaving parts of the structure weak and exposed.

The result is that along with investments in improvement and new building, there is also more - materials, investment and effort - at great risk of being lost and destroyed.

What does this mean for a typical family with a monthly income of between 300 and 450 000 VN Dongs?

A home[10] with a floor area of 35sq.m. (5x7m) and a terrace of 14sq.m. (2x7m), represents an investment of between 10 and 15 millions VN Dongs. The family may well have made their own cement tiles and blocks. But they will have bought most of the other materials including cement and steel, clay roof tiles or roof sheeting if these are used, and doors and windows. Help from the family and neighbours is very important, but as well many families borrow money to cover the building costs, and often at extortionate rates from informal sources.

The effect is that, today, damage to your house costs much more to repair than it did before, and such loss has a major economic and physical impact on the family and its health. Loss of roof tiles - a frequent and avoidable occurrence in a typhoon - costs some 1,5 million VN Dongs to replace; loss of the whole house requires many hundreds of dollars.

To get an idea of the scale of this problem along the coastline of central Vietnam, visual estimates by DWF suggest that some 70% of provincial and rural housing in Central Vietnam has been replaced or renewed over the past 15 years. But sadly, of these, commune surveys in Thua Thien Hué indicate that despite this investment in new building about 70% of housing stock can only be classified as '*semi-solid'* or weaker, and thus very vulnerable to damage.

As such, families are very vulnerable to loss.

Failure to take preventive action to ensure that such damage does not occur has a major effect of diverting money away from economic growth, and family security and health.

What can be done?

In the face of repeated typhoons and disasters, the government and the international community has been active in both responding to emergency situations and the provision of relief and support for rehabilitation. The government assists where it can in the aftermath of each disaster, for example by handing out roofing sheets to those who have lost their homes.

When a disaster occurs, the donor community also contributes to the process of rebuilding, and organizations such as the International Federation of the Red Cross have been

[9] "Case studies of beneficiaries families" Lam Ngoc Mai, July 2001, and "External evaluation" Tran Minh Chau, June 2001.
[10] Not including the kitchen, and any annexes. This is a typical house in the area.

prominent in helping people acquire safe "core" houses. But given the scale and the repetitive nature of the damage, donor support for reconstruction or building core houses is inevitably limited in its impact and cannot reach out to a sufficiently large proportion of the population. Until recently, government policy and prevention programmes have also focused on strengthening and developing infrastructure, securing land and sea based productive capacity and protecting dykes and riverbanks[11].

Meanwhile, faced repeatedly with major losses, families and local communities have themselves to take on most the burden of rebuilding, with only exceptional support. The cost of rebuilding is considerable, and many families (a) have to borrow in order to recover, and (b) often find themselves living in houses that are at best no stronger than before, and at worst, considerably weaker.

What support there is does not necessarily make the best use of scarce resources. For example, in the aftermath of typhoons and floods in 1999 that destroyed 10 000 houses and damaged 470 000 in central Vietnam, the prime minister decreed exceptionally[12] that 1 million VN Dongs (+/- 70 USD) be given to each person whose house has been destroyed to help reconstruction: had this same money been used *in prevention* would have had a lasting impact on reducing vulnerability and loss. Again in 2001 after Typhoon Ling Ling, the province of Binh Dinh provided VN Dongs 3 millions to each family that had lost its house – a sum that would have gone a long way to preventing this loss[13].

It is in this environment that DWF has applied its strategy: to encourage people to take preventive action to safeguard the investment that they have already made in their homes and small local public facilities, by incorporating typhoon resistant details into both existing buildings and new construction.

A programme to promote preventive strengthening to protect the home and family investment

The DWF programme in central Vietnam demonstrates a strategy that channels resources, including each family's own resources, into prevention rather than reconstruction. A long-term aim is too see this strategy widely adopted.

Building on earlier experience in Vietnam between 1989 – 93, since 1999 DWF[14] has been working in the central Vietnam province of Thua Thien Hué with the population in all the coastal districts.

The strategy is to reduce vulnerability and damage in houses and community facilities. The focus is on encouraging and assisting families to reduce their vulnerability in a sustainable manner.

[11] See, for example, the Central Provinces Initiative for Natural Disaster Mitigation in Central Viet Nam, Second National Strategy and Action Plan for Disaster Mitigation and Management in Viet Nam, March 2002.
[12] Central Committee on Flood and Typhoon Control "Official report on the damage and response to flood and typhoons in the south-central and central highland provinces of Viet Nam." Hanoi , November 1999.
[13] Viet Nam News Agency, Nov 12 2001.
[14] DWF is supported by Canadian International Development Aid (CIDA), Alternatives (Canada), and the Viet Nam Canada Aid Foundation (FAVC)

The idea at centre of the project is to encourage families to apply the ten key points of storm resistant construction (see the box on the next page).

Ten key points of typhoon resistant construction

The ten points can be applied to almost any type of building in the communes, regardless of the type of structure or the type of materials that have been used. Each point describes a principle that when applied will reduce the risk of damage to the building or loss of materials. The practical training that DW provides makes sure that people know how to apply the ten key points to different types of buildings and materials, and the demonstration work on existing buildings shows people in practice what the preventive strengthening consists of. The project particularly encourages people families to strengthen existing buildings, but the same principles apply to new building as well.

But the project itself creates the environment that makes people aware of what should be done to reduce vulnerability, aware of how to do it, and how to put this into practice. The project creates the institutional, technical and financial environment in which this takes place. And in collaboration with families and the communes, it demonstrates how strengthening of buildings is done.

DWF's actions work at two levels:

1. The commune: convincing through doing – local partners who doubted that much could be done with a small budget are now convinced by the project strategy of support and mobilisation for preventive strengthening.
2. Decision makers: DWF collaborates with community and provincial leaders to encourage the adoption of the strategy of support for preventive strengthening of buildings in high-risk districts and communes. Local leaders are now taking the initiative to help expand the programme.

The DWF project comprises three groups of action in each partner commune[15] :

1. **Animation:** getting the message to the population that preventive strengthening is easy and important

2. Developing **the social and institutional environment** that supports preventive strengthening.
   - Encouraging the **formation of family groups** for preventive strengthening in hamlets.
   - **Building civic capacity** with the People's Committees to organise events, provide support to families and advice on prevention.

3. **Practical action and support** : training, demonstration and finance
   - **Developing practical skills** in the community and developing knowledge about safe building.
   - **Demonstrating** how preventive strengthening of existing buildings can be done.
   - Developing **access to small loans** to cover some of the costs of strengthening one's home.

[15] Rural commune : from 3 to 10 000 inhabitants

1. Animation - getting the message across

A major issue is that families do not know that preventive strengthening is possible. They need to be aware that prevention is essentially easy and affordable, and they need to know that it is much cheaper than rebuilding after a disaster.

To address this in each commune DWF organises a wide variety of animation and awareness raising events and distributes products with a prevention message. Each activity – a play, a concert - deals in its own way with the risk of storms, the damage they cause and the action that one can take to reduce vulnerability, and these events are accompanied by information handouts and house-to-house visits with practical information. The animation activities has been undertaken in diversified forms which encourage the participation of different groups of people (children, youth and families) in each commune.

Working with schools

DW works with primary and secondary schools and kindergartens ; introducing the theme of preventive strengthening into school curricula with teacher training ; developing activities such as painting competitions with school children, and strengthening school buildings.

Below: child's drawing of a strengthened house done in one of the project competitions

Many of the animation activities are designed to be "memorable" - events that one will recall maybe months or even years later. They include the organization of concerts with local musicians, singers and poets, many of whom perform their own material written for the project. There are theatrical pays (some written and performed by project staff). The project provides songs and text used on commune loudspeaker system, and it makes use of radio and TV. In 2001 during a special "damage prevention week" a decorated old Renault bus toured each commune to distribute information and it handed out fans and hats with the project prevention message. In 2002

DWF in some communes is sponsoring commune football matches as another publicity events.

The animation activities are an ongoing process with different events happening regularly in each commune.

2. Developing the social and institutional environment that supports preventive strengthening - a partnership between family groups and the Commune Damage Prevention Committees

The process of raising awareness, of providing support and of taking action cannot be sustained without the engagement of both families in the community and the commune representatives. Each plays a key role in awareness raising and support. In the villages, families who have made their homes safer share the experience with neighbours, whilst the commune provides the framework to provide guidance, support and organise animation events.

This participation is the basis for the continuation of the project activities after external funding is ended, and DWF has worked to formalise this local capacity to carry on the actions introduced by the project.

To achieve this, at the level of hamlets DWF encourages the development of family groups, bringing together all the people who are beneficiaries in the project and making beneficiary selection a democratic process.

In parallel DWF has instigated the creation of Commune Damage Prevention Committees who provide the necessary support and animation to encourage and help village family groups to undertake vulnerability reduction activities.

Family groups for damage prevention

In each targeted hamlet, beneficiary families are invited into a group to constitute a base for mutual support. They are involved in decisions about which families should have priority for support and credit, they provide support in the management of credit for house strengthening, and they participate in assessing what work needs to be done. Through experience gained with the project, these families become a focal point for sharing information and their experience. A group leader represents the views of the family group at commune level.

The project works with families to show how existing buildings can be strengthened simply and efficiently in a manner that is sympathetic to local tastes and visual preferences and this is important in developing local acceptance of techniques that can be used. Families always contribute both in kind and financially to the cost of strengthening.

The family group is central to the implementation of a family based vulnerability reduction process.

The Commune Damage Prevention Committees

In each commune DWF has collaborated with the People's Committees to establish a Commune Damage Prevention Committee (CDPC) who progressively take on responsibility for managing most of the project activities in their commune.

The CDPC brings together members of the People's committee, village representatives and local unions. DWF develops the capacity of the CDPC with training and work sessions so that it can provide the necessary support, technical advice and follow up to family groups benefiting from subsidies and credit and in undertaking preventive strengthening. The CDPC is helped to organise animation and communication activities in the commune, and it is provided with prepared materials, such as cassettes and handouts (documents, posters, etc.) for their use.

Once established, the CDPC becomes the commune level extension of the project team, and in time takes over its activities. For example, the CDPC, in collaboration with the Farmers and Women's Unions, manage the house strengthening credit programme.

3. Practical action and support : training, demonstration and finance

Three complementary actions take place in each commune:

Training:

DWF runs training sessions for community representative and construction workers so that they can learn and discuss about the need to strengthen houses and public facilities, and get practical and technical training about the ways that this strengthening is done on different types of building.

The workshops discuss the issues of typhoon damage prevention, the practical theories and methods are suited to the locality; practical work on local buildings then demonstrates different techniques. Each participant receives a manual on cyclone resistant construction.

For many participants these workshops are the first time that they can discuss local building problems and issues with professionals. This is also important, in that each commune has its own styles and requirements, and few buildings are actually the same.

After the training course, evaluations have shown that the local builders are more confident about applying the new techniques. They are also ready to promote the principles of storm prevention in housing construction inside or outside the target communes.

Demonstration:

DWF collaborates with individual families to strengthen their existing home. Each beneficiary house is surveyed, the weaknesses discussed and a contract drawn up detailing the work to be done to make the building safe and defining the contribution that will be made by the family and by the project. The project makes a subsidised contribution in the order of about 2 millions VN Dongs and since the beginning of 2002 the family has access to a credit fund to contribute to costs. The family covers all of the remaining costs, and, using trained skilled labour and their own help, manages the strengthening work.

DWF also collaborates with the commune to strengthen small public buildings, including primary schools, kindergartens and markets, as these buildings provide additional exposure for the same techniques that can be used on homes.

No two buildings have the same strengthening needs, but typical actions include ensuring that all parts of the structure are solidly tied together, that the roof covering is securely held done with reinforced ribs or bars, that the building has strong doors and shutters and that walls are made more water and wind resistant.

Credit:

Although commune representatives were originally sceptical that people would contribute to and participate in the strengthening of their homes, the project has proved that not only are people very ready to participate in the process of strengthening, but that they will in addition borrow money in order to cover their contribution.

Household surveys have also shown that because no formal credit facility existed to pay for strengthening the home, families have had to go to informal moneylenders, who charge high repayment rates. DWF concluded that this was causing hardship and that the project needed to demonstrate that a dedicated source of credit for house strengthening can work successfully: the result is that it does.

Credit programmes relate more commonly to income generation activities, but the indications are that strengthening the house is considered just as important an investment, and families have both been ready to borrow sums in the order of 1 to 2,5 millions VN

Dongs and make regular repayments (duration 18 months / 0,3% monthly interest / monthly repayment from 57 000 to 143 000 VN Dongs).

The credit system is managed by the Commune Damage Prevention Committee in collaboration with the participation of the Women's or Farmers' Union. The target is to achieve loan rates up to 85% with a low level of subsidy, but as yet in the communes it is generally considered that until the poorer and most vulnerable families have been helped, a subsidy is needed to enable these families to strengthen their homes.
A longer term goal for DWF is to see other organizations including credit banks take note that people do repay loans for house strengthening and that they will in turn provide similar credit opportunities.

Who benefits?

The projects actions target poor and vulnerable families. But it has also been encouraging to see that women in particular have participated in the project's activities, and that 40% of the beneficiary families involved in house strengthening have been headed by women. Not only do women participate directly and efficiently in the animation and communication

activities, but they have also shown themselves to key actors in bringing about change in the attitude of families so that prevention becomes a priority in housing improvement and construction.

The families who are directly helped by the project are selected by the community in a village. Some groups are more favoured, as those who have lost family members during the years of resistance, and single women heading families are also favoured. But beneficiaries also include families who are needy and likely to play a significant role in encouraging others to take preventive action to strengthen their house.

The case of Madam Phan Thi Yêm is quite typical (see the box in the next page).

Madame Phan Thi Yêm, village of Thanh Thuy Chanh, Thuy Thanh commune
Married at the age of 17, Madame Yêm assures us that this was not considered young at the time, but life was really hard – difficult to express how hard. To begin with, the young couple were farmers, and were able to feed and bring up their children. Then her husband went off in 1963 to fight in the Resistance. He was killed in May 1963 in a ghastly massacre. This was a terrible blow, leaving her with 5 young children, the eldest 13 and the youngest only 3 years old. With meagre savings from making straw hats, like others in the village, she was able to pay for her children to attend school. But once basic needs were met, she could only afford to live in a poorly maintained bamboo shelter. Using savings scraped together and with manual help from cousins and neighbours, in 1974 she managed to build a cement block house with a tin roof, but no reinforcement. Only to find herself homeless in 1985, when the typhoon ripped off all the roofing and she was forced to purchase fibro-cement sheets to replace it. "That's why when I hear a typhoon warning, I'm absolutely terrified," she adds.

Asked about strengthening houses against storm damage, she says she had heard about this and was most interested. Which is why when the village meeting to decide which families should benefit from the damage prevention project was held, Madame Yêm took an active part. In the event she met all the conditions for becoming a beneficiary. She assures us that if the project can make her a loan, she will do everything she can to help improve her house as required by the Project. Before strengthening, her house was built of cement blocks, with a tin roof and very rudimentary tin panel doors.

All her children are married and have work, but at some distance, except for her youngest daughter who still lives with her. So she hopes her house can be finished before the Têt [Vietnamese New Year] holiday so that she can celebrate with her neighbours. The total budget for the work is some 4 200 000 dôngs, of which Madame Yêm is contributing 200 000 dôngs, and the Project has agreed to loan her a further 1.5 million dôngs at an interest rate of 0.3% per month. She receives a State pension of 120 000 dôngs (as a Revolution widow) and this together with her income from raising animals will enable her to make the monthly repayments of 57 000 dôngs. Before, she used to borrow from the Women's Union for her farming activities, but until now no organization used to provide loans for strengthening homes against storms. She is delighted with the new loan scheme and is determined to save and repay on time so that others can also benefit. At the time of writing, the walls of her house have been carefully rendered and eight iron reinforcements have been added to the roof, making it both attractive and strong!

Greatly moved, Madame Yêm tells us that although her children have grown up now, none of them are in a position to help her. Thanks to the help she has received from the Project as well as from her cousins and neighbours, her house is now comfortable and strong. She is grateful to the project and hopes that others like her will be able to benefit..

Conclusions

In 1999 when DWF first proposed a strategy that is based on working in the community with families to strengthen existing homes in central Vietnam, and with relatively small sums of money, many people were sceptical that this could either work or even be of any value.

Four years later, opinions are very different.

DWF's team in Thua Thien Hué has been successful in developing a programme that is changing the attitudes and the practices of the different stakeholders in the community - families, technicians, and decision-makers - so that damage prevention in housing becomes a higher priority.

The diversity of the animation activities has encouraged the active involvement of both local authorities and the population; the beneficiary families are pleased and reassured by their strengthened homes; the community leaders fully understand the project's aims and are engaged in the process, and they recognize that by motivating people and mobilising relatively small sums of money a great deal can be achieved to strengthen houses and small public buildings.

They recognize too that with a safer home, families can turn their attention to meeting other priorities and needs with greater assurance.

The scale of the project remains, however, small, covering, as it has, only ten communes in one province. The challenge in the coming years is to expand the example, to bring more help, both practically and financially to vulnerable families along the coast, and to work towards a much wider adoption of the strategy of preventive strengthening.

The house of Madame Phan Thi Yêm in Thuy Thanh Commune

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THE TEN KEY POINTS OF TYPHOON RESISTANT CONSTRUCTION

1. Choose the location carefully to avoid the full force of the wind.
2. Build a house with a simple shape to avoid negative pressure.
3. Build the roof at an angle of 30° to 45° to prevent it from lifting off.
4. Avoid wide roof overhangs; separate the veranda structure from the house.
5. Make sure the foundations, walls, roof structure and roof covering are all firmly fixed together.
6. Reinforce the triangular bracing in the structure.
7. Make sure the roof covering is attached to the roof structure to prevent it from lifting.
8. Match opposing openings.
9. Use doors and windows that can be closed.
10. Plant trees around the house as wind breaks.

Note: These were developed and tested in the course of the DW/GRET implementation of UNDP/UNCHS programme VIE /85/019 "Demonstration of typhoon resistant building techniques" 1989-1991.

HOUSING REINFORCEMENT (ILLUSTRATIONS)

Commune (Cost : 3 900 000 Dongs)

Mrs. Nguyen Thi Thieu, Thuy Thank

Mrs Nguyen Thi Lan, Phu Da Commune (Cost : 3 800 000 Dongs)

Mr Do Nguyen, Phu Da Commune (Cost 4 500 000 Dongs)

HOUSING REINFORCEMENT (DATA)

CIDA I (2000-2001)

Type	Number	Project Subsidy		Family Contribution	Total
Reconstruction	**34**	**200 183 000**		**360 902 000**	**561 085 000**
Subsidy / Family contribution		**36%**		**64%**	
House / VN Dongs		5 887 735		10 614 765	16 502 500
House / US$		395		712	1 108
Reinforcement	**188**	**697 970 000**		**233 144 000**	**931 114 000**
Subsidy / Family contribution		**75%**		**25%**	
House / VN Dongs		3 712 606		1 240 128	4 952 734
House / US$		249		83	332
TOTAL	**222**	**898 153 000**		**594 046 000**	**1 492 199 000**
Subsidy / Family contribution		**60%**		**40%**	
House / VN Dongs		4 045 734		2 675 883	6 721 617
House / US$		272		180	451

FAVC (January – March 2002)

	Number	Project Subsidy	Project Credit	Family Contribution	Total
Reinforcement	**20**	**57 530 400**	**26 000 000**	**11 020 000**	**94 550 400**
Breakdown		**61%**	**27%**	**12%**	
Subsidy / Family		61%	39%		
Project / Family		88%		12%	
House / VN Dongs		2 876 520	1 300 000	551 000	4 727 520
House / US$		189	86	36	311

CIDA II (from June 2002)

	Number	Project Subsidy	Project Credit	Family Contribution	Total
Reinforcement	**25**	**44 334 712**	**41 700 000**	**11 817 600**	**97 852 312**
Breakdown		**45%**	**43%**	**12%**	
Subsidy / Family		45%	55%		
Project / Family		88%		12%	
House / VN Dongs		1 773 388	1 668 000	472 704	3 914 092
House / US$		116	109	31	256

CREDIT SCHEME (CIDA II / Family Group 1 - Phu Da Commune)

Reinforcement works

	N°	Name	Born in	Members of the family	Total amount works	Subsidy DW	Family contribution	
							Credit	Cash
Group 1	1	Phan Thanh	1944	6	4 599 000	2 000 000	2 500 000	99 000
(Luong Vien)	2	Phan Thi Chac	1950	1	3 988 000	1 988 000	2 000 000	
	3	Le Thi Giang	1946	2	3 561 000	2 000 000	1 500 000	61 000
	4	Phan Thi Anh	1957	4	4 011 000	2 000 000	2 000 000	11 000
	5	Le Ngoc Trung	1954	4	6 293 000	2 000 000	2 500 000	1 793 000
	6	Ho Thi Luong	1947	3	3 655 000	1 855 000	1 800 000	
	7	Phan Truoi	1954	8	4 641 000	2 000 000	2 000 000	641 000
	8	Phan Dong	1969	4	4 477 000	2 000 000	1 200 000	1 277 000
	9							
	10							
Total					**35 225 000**	**15 843 000**	**15 500 000**	**3 882 000**

Loans

N°	Name	Interest by month	Loan	Duration month	Monthly repayment	Monthly Interest (*)
1	Phan Thanh	0,3%	2 500 000	18	142 900	4 000
2	Phan Thi Chac	0,3%	2 000 000	18	114 300	3 200
3	Le Thi Giang	0,3%	1 500 000	18	85 700	2 400
4	Phan Thi Anh	0,3%	2 000 000	18	114 300	3 200
5	Le Ngoc Trung	0,3%	2 500 000	18	142 900	4 000
6	Ho Thi Luong	0,3%	1 800 000	18	102 900	2 900
7	Phan Truoi	0,3%	2 000 000	18	114 300	3 200
8	Phan Dong	0,3%	1 200 000	18	68 600	1 900
9						
10						
			15 500 000		**885 900**	**24 800**

(*) Average on the total duration

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Workshop on Safer Shelter in Vietnam:
Towards Designing an Urban Disaster Mitigation Project
4 – 5 September 2002

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ADPC Materials on Urban Disaster Mitigation

Working Papers

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2. Sri Lanka Urban Multi-Hazard Disaster Mitigation Project, Prepared by the Centre for Housing, Planning and Building, National Building Research Organization, and Urban Development Authority, August 2000.

3. Kathmandu Valley Earthquake Risk Management Project, Prepared by National Society for Earthquake Technology-Nepal and GeoHazards International, USA, September 2000.

4. Indonesian Urban Disaster Mitigation Project, Prepared by Institute of Technology Bandung, September 2000.

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1. Workshop on Urban Risk Reduction in Asia, Ahmedabad, 29 March 2001, Organized by Ahmedabad Municipal Corporation, Centre for Environmental Planning and Technology, and Asian Disaster Preparedness Center, April 2001.

2. Workshop on Safer Shelter in Vietnam, Towards Designing an Urban Disaster Mitigation Project, Hanoi, 4-5 September 2002, Organized by Ministry of Construction, Vietnam Red Cross and International Federation of Red Cross and Red Crescent Societies, Disaster Management Center, and Asian Disaster Preparedness Center, October 2002.

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Safer Cities Case Studies

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6. Building for Safety: The Case of Retrofitting Schools in Kathmandu Valley, Nepal, Produced by the Asian Urban Disaster Mitigation Program of the Asian Disaster Preparedness Center, Bangkok, January 2002. (English)

7. Video Documentary on Bangladesh Urban Disaster Mitigation Project Activities, Produced by the Bangladesh Urban Disaster Mitigation Project, September 2002. (Bangla/English)

All the videos listed here are available in both VHS/PAL and VCD formats.

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