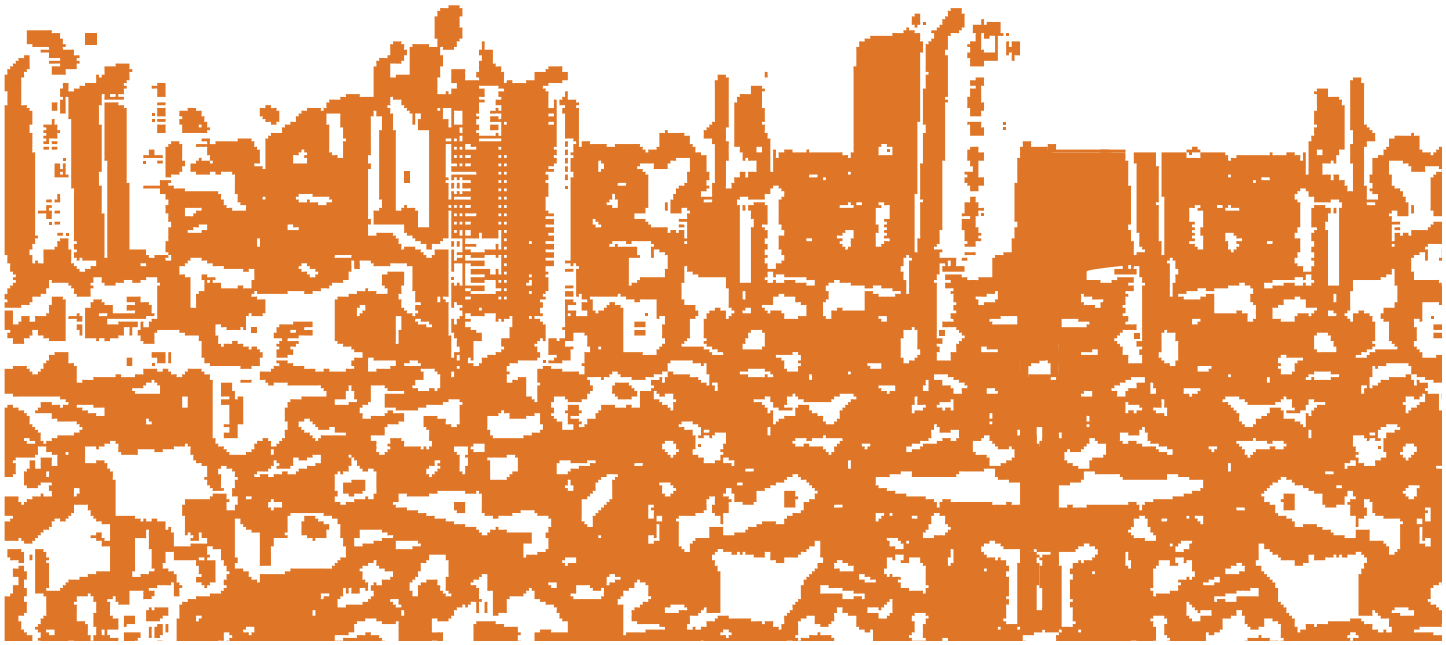
Asian Cities Climate Resilience

WORKING PAPER SERIES 2: 2013

Community consultation for long-term climate-resilient housing in Vietnamese cities: a comparative case study between Hue and Da Nang

TRAN TUAN ANH, TRAN VAN GIAI PHONG, TRAN HUU TUAN AND MARTIN MULENGA



Abbreviations

ADPC	Asian Disaster Preparedness Center
CBO	Community-based organisation
CCA	Climate change adaptation
CCFSC	Central Committee for Flood and Storm Control
CRH	Climate-resilient housing
CSRD	Center for Social Research and Development
DRR	Disaster risk reduction
DWF	Development Workshop France
EM-DAT	The International Disaster Database
FGD	Focus group discussion
GSO	General Statistic Office
HFH	Habitat For Humanity
HHVN	Habitat for Humanity Vietnam
IFRC	International Federation of Red Cross and Red Crescent societies
ISET	Institute of Social and Environmental Transition
MONRE	Ministry of Natural Resources and Environment
NGO	Non-governmental organisation
SC	Save the Children
SKAT	Swiss Resource Centre and Consultancies for Development
UNEP	United Nations Environment Programme
UNISDR	United Nations Office for Disaster Risk Reduction
UN	United Nations
UN-HABITAT	United Nations Human Settlements Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme
VNRC	Vietnam Red Cross

Contents

Figures and tables

About the authors

Tran Tuan Anh is a lecturer and researcher at the Faculty of Architecture, College of Sciences, Hue University, Vietnam. He is now conducting a PhD research on climate- and disaster-resilient housing in Vietnam at the School of Architecture and Design, RMIT University, Australia. Since 2010, he has worked extensively in the field of post-disaster housing reconstruction and disaster management for urban and rural vulnerable areas in Vietnam. He has published papers related to his work and is currently involved in various research projects for building climate-resilient housing systems in Vietnam. Email: ttuananh81@gmail.com

Tran Van Giai Phong is Technical Lead, Institute for Social and Environmental Transition, Viet Nam. Phong obtained his doctoral degree in Environmental Studies from Kyoto University, Japan and his master degree in urban and regional planning from Hawaii University, USA. He has an intensive knowledge of climate change adaptation and disaster risk reduction theories and practices. He has been conducting research on environment management, climate change adaptation, and disaster risk reduction in developing countries, particularly in Vietnam. Prior to his work with ISET, Phong worked as a consultant for the United Nations, and INGOs in South East Asia region. With ISET, Phong has worked with city and regional partners in Asia to build urban climate resilience.

Tran Huu Tuan is lecturer at Faculty of Economics and Development Studies, College of Economics, Hue University, Vietnam. Tuan holds both MSc. and PhD. degrees in Environmental and Resource Economics. He completed his PhD at the Norwegian University of Life Sciences, Norway. His speciality lies in disaster risk management, climate change adaptation, economic impact assessments of natural disasters, and economic valuation of natural resources. Tuan has a number of papers published on international peer reviewed journals. Tran Huu Tuan is a Vice-dean at the Faculty.

Martin Mulenga is a senior researcher at the International Institute for Environment and Development (IIED), a research and policy organization based in London. Specializing in sustainable urban development, Dr. Mulenga primarily works on water and sanitation projects in low-income urban settlements in Africa, Latin America and Asia and has a strong interest in low-income housing. He has a PhD in Civil and Environmental Engineering from the University of Southampton in the United Kingdom and a Post Graduate Diploma in Architecture from the University of KwaZulu-Natal in South Africa.

Acknowledgements

The authors are grateful to Diane Archer from the International Institute of Environment and Development, London, for providing us with invaluable guidance and feedback during the course of this research.

We would also like to sincerely thank Bui Duc Tinh at Hue University, Dang Minh Nam at Hue's Institute of Planning and Construction, and Phan Duc Hanh and Le Van Dau at Development Workshop France, for their essential assistance in liaising with local representatives for our fieldwork and in undertaking on-site data collection.

Abstract

Climate change and housing have a close link in Vietnam's cities. The impact of climate change is one of the biggest concerns for government and civil society. In Central Vietnam, storms and floods are common and dangerous hazards. Housing vulnerability is intensified by these hazards – but also by fragile physical and socio-economic conditions. In addition, post-disaster housing reconstruction in Central Vietnam is still mainly seen as a single recovery action, separate from the development of local housing and achieving long-term housing resilience.

Using comparative case studies from Hue and Da Nang – two of Vietnam's cities most vulnerable to climate change – this research examines key issues of climate-resilient housing (CRH) in post-disaster housing reconstruction to highlight the significant relationship between them, using a CRH framework developed from the Institute of Social and Environmental Transition's urban climate resilience framework (ISET, 2012). The findings show that developing CRH in Vietnam requires the integration of local (indigenous) and new (innovative) knowledge and requires the greater involvement of local government, civil society organisations and the private sector.

Key policy recommendations include:

- Built environment professionals such as local architects and engineers should work with low-income groups to support them in constructing safer and more resilient housing.
- Local governments should take more responsibility for this and for the development of low-income housing and settlements in hazard-prone areas.
- More support is needed from government and public and private sectors for local economic development in hazard-prone areas, and to bridge the gap between local built environment professionals and at-risk low-income households.
- Social capital such as mutual help among neighbours in response and recovery after disasters is an essential component of the climate resilience of low-income households.
- Planning permission is needed in the form of building permits, which include safety-related construction criteria for hazard-prone areas.

1 Introduction

1.1 Background

There is a strong link between housing and climate change, particularly in developing countries where housing is considered one of the most valuable assets of local residents (Ahmed, 2011). Housing often represents the highest loss due to climate-related disasters associated with the decrease of national economies (Lyons, 2009). Natural hazards intensified by climate change have placed huge demands on disrupted and affected communities all over the world, in terms of the need to provide long-term resilient housing (UNEP and SKAT, 2007), particularly in developing countries. People have very limited response and recovery capabilities and current housing strategies from government and aid agencies seem to lack an overall approach to long-term climate-resilient housing (CRH).

Despite this, housing reconstruction is seen as one of the key interventions to building disaster and climate resilience for vulnerable communities. Many factors related to CRH, such as hazard-resistant capacity, functional and spatial organisation, or livelihood development have been addressed in a number of studies and projects (Boen and Jigyasu, 2005; Barenstein, 2006; Alexander *et al*.,2006; Steinberg, 2007; Minamoto, 2010; DWF, 2010). But the relationship between these factors and community consultation – and how to address this relation in planning and implementation – is rarely mentioned. This research aims to examine this issue and the relationship between community consultation and post-disaster housing in the light of climate-resilient housing. Appropriate forms of community consultation for the development of long-term CRH will be the main output of this study.

Approaches to post-disaster housing reconstruction are usually different in how they engage and consult with communities, depending on cultural and political constraints. There is no 'best' model for community consultation: every local context is different (Davidson *et al*., 2007; Sliwinski, 2010). Recent research findings have highlighted an increasing concern over problems related to community participation and consultation (Lawther, 2009; Davidson *et al*., 2007; Barenstein, 2006) and the effectiveness of community engagement (Sliwinski, 2010; Davidson *et al*., 2007; Pearce, 2003) in building resilient housing. In Vietnam – one of the top five countries most vulnerable to climate change (UNFCCC, 2007) – housing is one of the four most vulnerable sectors (MONRE, 2008). Although the importance of housing for disaster risk reduction (DRR) has been widely recognised by development agencies, issues around the usefulness of community consultation and its impact on the real efficiency of developing housing construction products are problematic. Very few studies have been done in this area so far. This research aims to:

- understand the factors underpinning successful community consultation; and
- establish an appropriate framework for community consultation in the development of long-term CRH.

Some housing reconstruction projects have used community consultation, but the resulting housing designs were of limited effectiveness (Ahmed, 2011). For example, in a housing recovery programme in Sri Lanka, people who were selected for consultation reported that they were forced to participate, and that their levels of participation were lower than others who could have provided better responses (Minamoto, 2010). In La Hermandad in India, community consultation was used in housing reconstruction projects after the 2001 earthquake. However, this resulted in conflicts and tensions among new residents (Sliwinski, 2010). In other cases where community consultation has been used in the rebuilding of

houses, the new buildings have remained unoccupied while the old ones are fully occupied, even though they are unsafe (Audefroy, 2010).

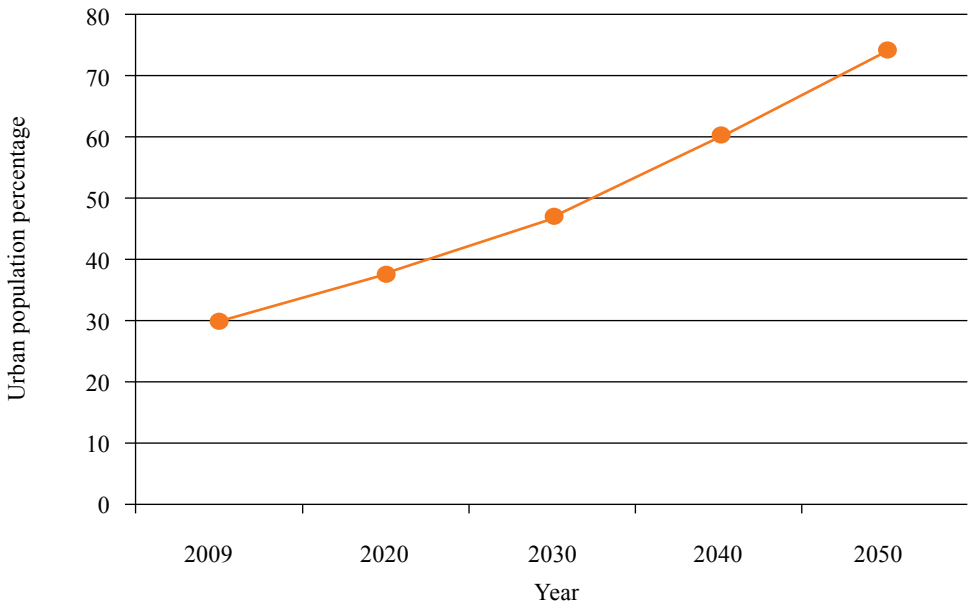
According to Ganapati and Ganapati (2009) and Lawther (2009), the three most common problems related to community consultation are:

- the narrow definition of 'community';
- the limited use of community feedback in planning; and
- limited facilitation skills.

As a consequence, if stakeholders have a limited understanding of community consultation, then participatory or community-based approaches are unlikely to achieve their expected results.

Vietnam is one of the world's fastest growing economies (Yip and Tran, 2008). With rapid urbanisation happening throughout the country, new cities and urban areas are being developed and there has been an explosion in urban population growth (GSO, 2009). According to the Vietnam national census of 2009, the percentage of urban populations increased from 23.7 per cent in 1999 to 29.6 per cent in 2009. Over the ten-year period (1999–2009), populations in urban areas increased by 3.4 per cent per year. In contrast, rural populations only grew by 0.4 per cent (GSO, 2009). As estimated by MONRE and UNDP (2010), urban populations in Vietnam will reach nearly 50 per cent in 2030 and 75 per cent in 2050 (Figure 1). This rapid development of urban populations has led to a recent increase of urban housing demand, exerting great pressure on Vietnam's cities. In addition, the rapid urbanisation process is likely to trigger uncontrolled housing development in Vietnam, particularly in climate-exposed areas such as the central regions. Substandard living conditions – intensified and worsened by climate change impacts – have become a prime concern in connection to increased housing vulnerability in Vietnam.

Figure 1. Predicted development of urban population in Vietnam to 2050



(MONRE and UNDP, 2010).

The two case study areas for this research are Da Nang and Hue, two cities in Vietnam most affected by extreme weather conditions linked to climate change. Both have several similar characteristics in terms of topographical, climatic and socio-economic aspects. Both are also close to the sea, where there are frequent tropical storms each year. According to statistics from Vietnam's central committee for flood and storm control, the two cities experience about three to five typhoons every year, commonly followed by long-lasting rains, floods and inundations. In suburban, boundary or hazard-prone areas of these cities, there are now a considerable number of houses which are highly vulnerable to climate hazards, despite the efforts of local government and NGOs such as Development Workshop France (DWF) and Save the Children (SC). These two agencies provided safe-houses after typhoons in these cities and are recognised as having some of the best practices in post-disaster housing reconstruction in Vietnam. According to experts from these agencies, they used community consultation approaches to develop new, post-disaster housing following the 2006 typhoon Xangsane. Therefore, two housing reconstruction project sites were selected as the case study locations for this research: a Development Workshop France (DWF) project site in Hue and a Save the Children (SC) project site in Da Nang. Both were selected because they met the research objectives requirements (see Annex 1). By examining both their successes and shortcomings in how they implemented community consultation processes, a community consultation framework is established.

1.1.1 Research questions

- What forms of community consultation are most appropriate for designing effective climate-resilient housing in Central Vietnam?
- What stakeholder roles and responsibilities are required to develop long-term climate-resilient housing in Central Vietnam?

1.1.2 Research objectives

- To understand which factors related to community consultation hinder the success of climate-resilient housing strategies.
- To develop a framework for community consultation in developing long-term climate-resilient housing in Central Vietnam.

1.2 Research methodology

Since many aspects of housing – from physical to social – are key to community consultation, a **framework** approach was selected as the backbone of this study and to provide an overall vision. The success of the framework approach in housing development has been demonstrated both in theory (SKAT and IFRC, 2012; Jha *et al*., 2010) and in practice (see Fien *et al*., 2008 for an Australian case study or UN-Habitat, 2008 for an Indonesian case study).

This study was conducted in three stages:

- Stage 1: Establishing a theoretical framework for using community consultation to develop climate-resilient housing (see chapter 2). The framework is based on a literature review focusing on the key factors required for developing climate-resilient housing.
- Stage 2: Examining the framework using case studies (see chapter 3). Grounding this framework using two real case studies, Hue and Da Nang, helped to examine the accuracy of this framework in the context of Central Vietnam.
- Stage 3: Identifying strengths and weaknesses, key lessons learnt, and revising the theoretical framework. Based on two case studies, the framework is examined in terms of its appropriateness in the context of Vietnam cities and revised accordingly.

1.2.1 Using case studies

The case-study approach used is one of the most common approaches for qualitative research (Bryman and Burgess, 1999) and provided in-depth insights into social processes beyond the formation of climate-resilient housing (ibid).

Because housing solutions are context-specific and different for every community (Jha *et al*., 2010), there is no single 'best' approach. Therefore, it was necessary to develop a specific and appropriate framework for Vietnam in order to support the building of a climate-resilient housing system. To do this, the case studies provided an excellent opportunity to examine the theoretical framework in greater detail. These two case studies were housing reconstruction projects: a Development Workshop France (DWF) project site in Hue and a Save the Children (SC) project site in Da Nang. In addition, houses reconstructed and self-built by owners after this disaster were also examined at the same time as the donor-built ones in each city. This helped in capturing a more comprehensive overview to housing reconstruction and its links with climate-resilient housing.

1.2.2 Data collection

First, this study gathered secondary data from the literature. This helped to define the term 'community', to examine current approaches to community consultation and the roles of stakeholders in building resilience, particularly for housing. Based on this, a theoretical framework for community consultation for climate-resilient housing was established.

Next, this study collected the primary data at the two case study sites using household interviews and focus group discussions (FGDs). Further discussions with experts from both agencies captured their viewpoints as well. Photography, measurements and hand-sketches of some of the surveyed houses were used to double-check information gathered during interviews.

In each case study area, 10 semi-structured interviews were conducted with ten households,five donor-built and five self-built households. In each city, there were also two open-ended group discussions with local representatives and local builders (10 people per group). The themes of both the FGDs and interviews were related to the participants' roles and responsibilities, contributions and awareness of post-disaster housing reconstruction. In addition, two officials from each district government were approached to capture their perceptions, roles and contributions to the development of climate-resilient housing.

1.2.3 Data analysis

The collected information was processed using thematic and comparative analysis and data based on key themes were identified in the theoretical framework of climate-resilient housing. Categorisation, grouping and comparison techniques were used to compare and contrast themes between the two case studies to assess the successes and shortcomings, similarities and differences of each. Based on these, several key lessons were identified.

1.3 Definition of climate-resilient housing

Understanding the term 'resilience' is critical to conceptualising climate-resilient housing (CRH). This section discusses the concept of resilience, capturing its nature and meaning in the field of climate change adaptation. This is helpful to theoretically characterise CRH later on.

Among several publications reviewed, 'climate resilience' is conceptualised in different ways and, sometimes, is used interchangeably with the term 'disaster resilience'. However, concerning its meaning, many scholars agree that **resilience** is the ability of a system, community or society exposed to hazards to resist, absorb and accommodate the effects of a

hazard and to bounce back to normalcy in a timely and efficient manner, without significant changes to its basic functions and structures (ISET, 2012; UNISDR, 2009; Amaratunga and Haigh, 2011; Pendall *et al*., 2010; IFRC, 2012).

> Resilience is the ability to absorb the disturbances, to be changed and then to re-organise and still have the same identity (retain the same basic structure and ways of functioning). It includes the ability to learn from the disturbance.
>
> (ISET, 2012: 3)

Housing is no exception as it is considered one of the most vulnerable sectors in Vietnam (MONRE, 2008). Based on this concept of resilience, climate-resilient housing can be theoretically perceived as housing that is equipped with an adequate capacity to resist, absorb and accommodate the effects of climate hazards and to return to normal conditions in a timely and effective manner without significant changes to its basic functions and structures.

1.4 Scope of the research

1.4.1 Post-disaster housing reconstruction: a significant opportunity for building resilience

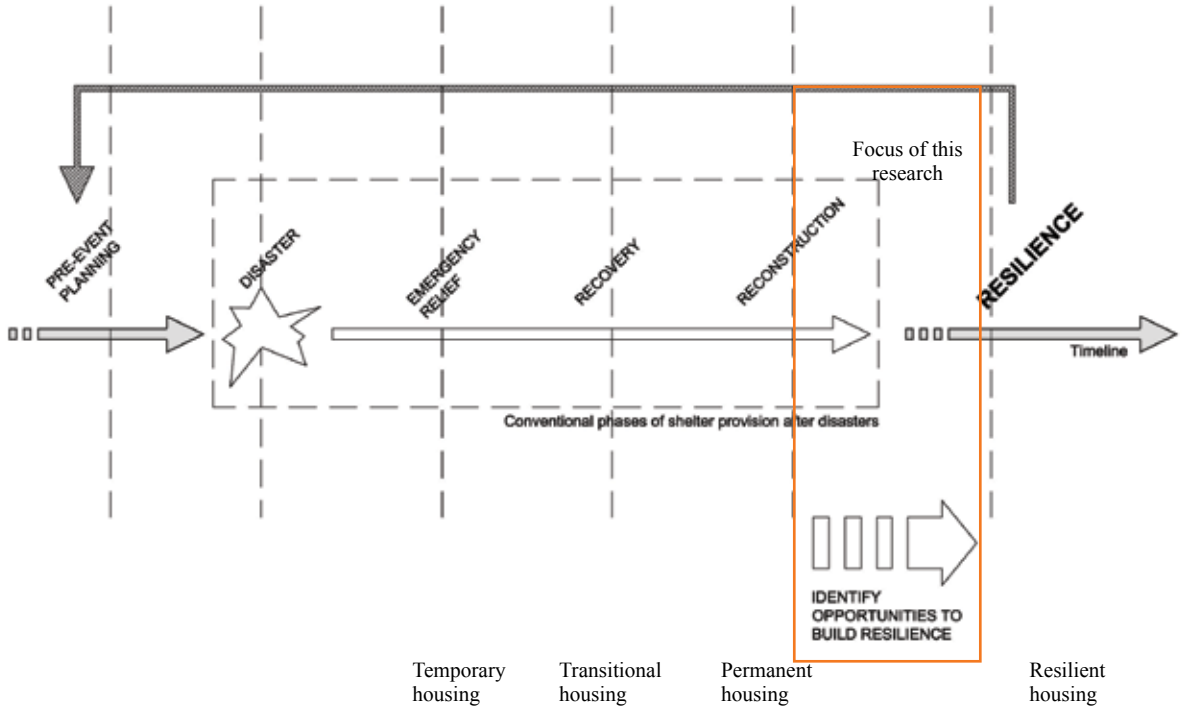
As this research focuses on the relationship between post-disaster housing reconstruction and the development of climate-resilient housing, it is important to examine what housing reconstruction can contribute to building a climate-resilient housing system. It is essential to 'regard shelter and dwelling reconstruction as a development rather than relief/welfare issue'. (Davis, 2011: 209).

Housing is often the most vulnerable sector to climate change and natural disasters in terms of scale (UN-HABITAT, 2011). Many authors (Lyons and Schilderman, 2010; Amaratunga and Haigh, 2011; Bosher and Dainty, 2011; Johnson and Lizarralde, 2012) and practical implementation agencies (e.g. UN-HABITAT, IFRC and Habitat-for-Humanity) have highlighted the link between housing reconstruction after disasters and achieving long-term resilience, where opportunities and demands can be identified and met in the reconstruction period. Appropriate post-disaster housing not only focuses on reducing disaster risks and meeting accommodation needs. It also addresses residents' psychological, economic and social needs and expectations in the longer term (Tas *et al*., 2007).

> Their plight creates a considerable risk for well-intentioned aid and recovery to actually pose greater harm than good, similar to the trends observed in Africa, as the pressure to meet immediate human needs often leads to imported resources and infrastructure that cannot be sustained after non-governmental organizations (NGOs) withdraw their aid (Correa and Taflanidis, 2012: 766).

Many studies and practices have identified three stages of housing provision following a disaster: temporary housing during the emergency period, transitional housing during recovery, and permanent housing during the reconstruction period (Davis, 2011; Johnson and Lizarralde, 2012; SKAT and IFRC, 2012; UN-HABITAT, 2011) (Figure 2). The reconstruction of permanent housing after disasters, targeting better housing than pre-disaster conditions (Schilderman and Lyons, 2011), can provide development opportunities for the affected communities (Lizarralde *et al*., 2010; Amaratunga and Haigh, 2011; Archer and Boonyabancha, 2011). Besides improving the physical aspects, housing reconstruction can help to enhance social, economic and environmental functions (UNEP and SKAT, 2007) for community resilience. People (affected populations) should be placed at the centre of the process for 'build back better' (Schilderman and Lyons, 2011) where pre-disaster fragilities of the housing system can be improved by post-disaster reconstruction.

Figure 2. The significance of post-disaster housing reconstruction in building long-term resilience



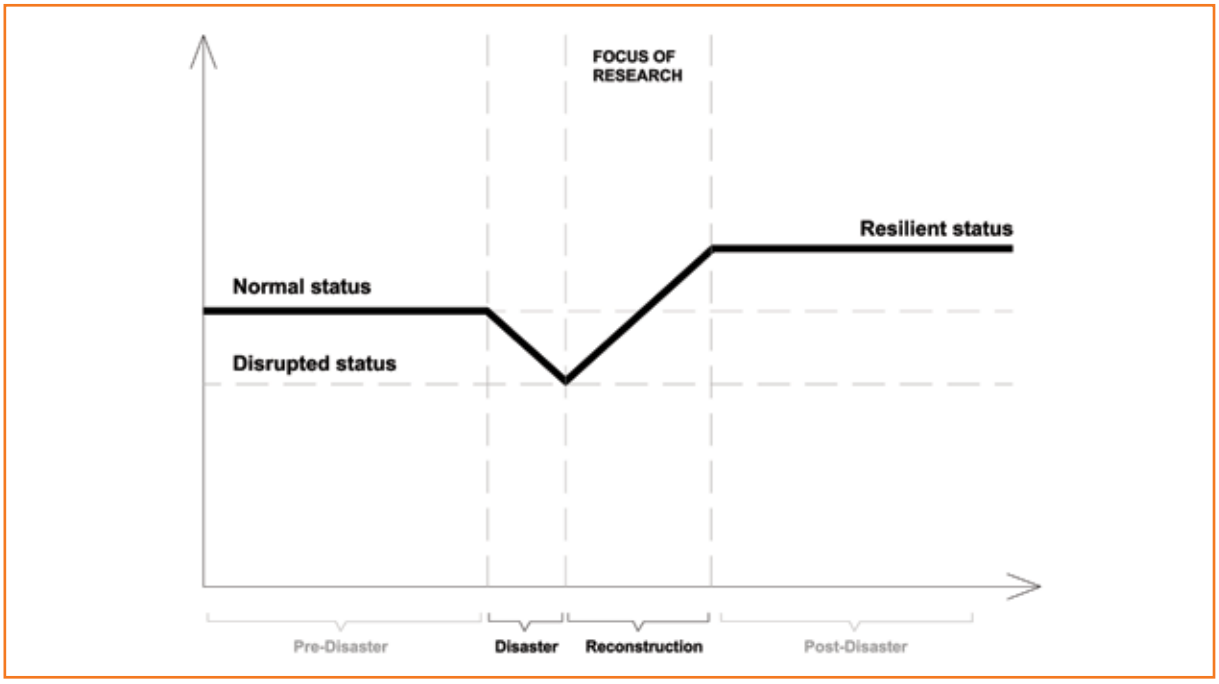
Source: Based on Davis (2011), SKAT and IFRC (2012); Johnson and Lizarralde (2012) and UN-HABITAT (2011).

As this study deals with the issue of resilience in the light of post-disaster reconstruction, the meaning of 'build back better' is quite close to the purpose of resilience. However, the sense of 'build back better' is commonly mistranslated in reality – many erroneously believe that rebuilt houses are always safer than old ones (Schilderman and Lyons, 2011). This misinterpretation has led to an excessive focus on producing visible end-products of housing which has triggered critical problems related to:

- cultural appropriateness of housing designs (see Boen and Jigyasu, 2005 for an Indonesian case study; Barenstein, 2006 for an Indian case study);
- the role of built environment professionals (Lizzaralde *et al*., 2010); and
- community consultation in the design and reconstruction process (Ganapati and Ganapati, 2009).

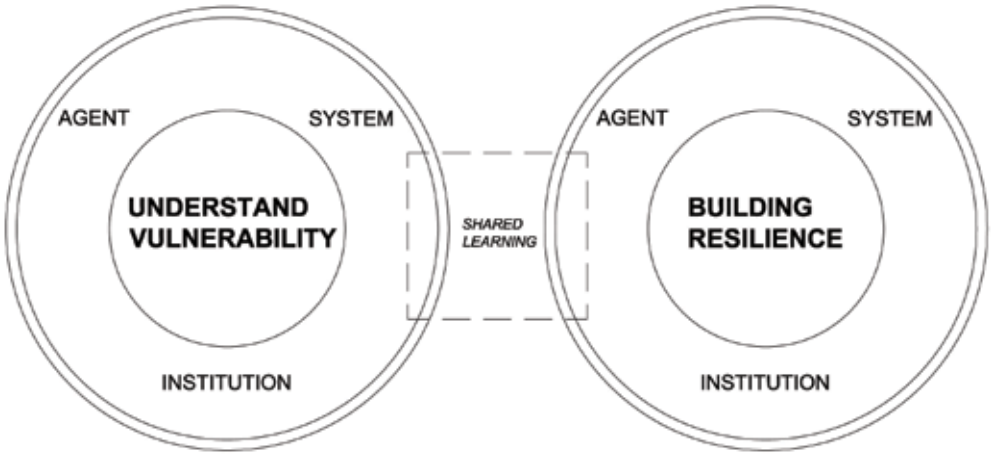
This is evidently seen in the case of Marathwada, Indonesia where World Bank-financed houses followed a new urban style that was in contrast to existing rural styles (Boen and Jigyasu, 2005). In Turkey, houses provided by the World Bank after the 1999 earthquake showed their limited cultural responses in the sense that Western-style toilets were unfamiliarto Muslim residents whose ablutions commonly occur in bathrooms without toilets (Ganapati and Ganapati, 2009).In fact, it is impossible to view post-disaster housing reconstruction as a single recovery action separated from the development of affected communities (UN, 2006; Archer and Boonyabancha, 2011). Instead, it needs to be realised as one of the key stages in the process of creating housing in both pre- and post-disaster periods. The role of post-disaster housing reconstruction should be broadened to make housing and communities more resilient to future shocks, stresses or changes associated with climate and natural hazards (Schilderman, 2010; Schilderman and Lyons, 2011). In this way, post-disaster housing reconstruction is likely to raise the status of existing housing conditions from 'normal' to 'resilient' (Figure 3) to maintain the stable development of climate exposed communities (Archer and Boonyabancha, 2011; Lyons, 2009).

Figure 3. Post-disaster reconstruction is key to approaching resilient conditions



As highlighted by Davis (1978, 2011), housing is a process where designers create a 'place' which has meaning and which involves people's living activities, rather than creating a mere 'space' which protects them from hazards. The housing process – whether it is done pre- or post-disaster – should aim to create value or benefits for occupants. The approach of ISET (2012) and Tyler and Moench (2012) to climate (disaster) resilience using three components (agents, systems and institutions) (Figure 4) is quite appropriate in this sense since the resilience can only be achieved through an integrated process or framework. It helped this research to capture resilient housing as a process involving not only the physical performance of housing, but also an understanding of the levels of stakeholder capacity and community consultation mechanisms.

Figure 4. Climate resilience framework



Source: Based on ISET (2012) and Tyler and Moench (2012).

Aside from physical improvements made by reconstruction, people's basic needs also need to be met in both the short- and long-term. In addition, housing reconstruction is considered as one part of a continuous process that shapes people's lives, occurring both before and after disasters. In this sense, housing can be seen as a process rather than product. The above discussions highlight the importance of post-disaster housing reconstruction for climate resilience, which was the driving factor behind this research.

1.4.2 Low-income housing

Economic factors have a critical impact on housing vulnerability and housing resilience (Wisner *et al*., 2004; Lyons *et al*., 2010). The rapid growth of urban populations in Vietnam means that meeting the rising needs of housing is a great challenge, particularly in cities where high levels of climate exposure still exist, such as in Da Nang and Hue, Central Vietnam. Housing vulnerability is often more severe for the urban poor (Schilderman and Lyons, 2011) who, due to financial constraints, usually purchase cheap plots in peri-urban or hazard prone areas (McEntire, 2011). Therefore, this research focused on low-income groups and low-income housing, to seek appropriate housing resilience strategies for the region of Central Vietnam.

1.4.3 Targeted reconstruction approaches

In the aftermath of a climate disaster, there is normally a vast proportion of the population whose houses have collapsed and been totally destroyed. Despite attempts by local governments and agencies to rebuild collapsed houses, there are always a considerable number of victims who do not gain access to this aid. These non-beneficiaries must reconstruct their houses on their own. In the research community, most literature tends to focus on post-disaster housing reconstruction with the external support of donors, such as the housing reconstruction projects funded by the Red Cross or Habitat for Humanity (HFH) after the typhoon Ketsana (2009) in Vietnam. But very few texts mention and analyse self-built reconstruction without external support. In order to gain a more comprehensive overview of post-disaster housing, this study aimed to examine both approaches, as follows:

- **Self-built housing**, where people rebuild their houses on their own without support (non-beneficiary) (see e.g. Marcillia and Ohno, 2012 for a case study from Japan).
- **Donor-built housing**, where donors help to rebuild beneficiaries' houses (see e.g. Karunasena and Rameezdeen, 2010 for a Sri Lankan case study; Shaw and Ahmed, 2010 for a case study from India).

Both approaches have been used in Vietnam for years, particularly after the great floods of 1999. The floods attracted a lot of international attention in terms of post-disaster housing reconstruction. However, the impacts of self-built post-disaster housing receive very little attention, whereas donor-built housing is heavily discussed and frequently praised in forums, such as the IFRC-funded houses built after the 1999 flood and HFH-funded houses built after the 2009 typhoon. Since the reconstruction approaches and the stakeholders involved in donor-built and self-built post-disaster housing are both different, it is necessary to identify the factors affecting climate risks and resilience in each approach to gain a clearer understanding of their strengths and weaknesses.

2 Establishing a theoretical framework for climate-resilient housing

2.1 Fragile housing and climate change

Climate change and its effects are seen as some of the biggest obstacles to development in Vietnam. Climate change intensifies climate-related disasters such as floods and typhoons which hinder efforts to eliminate poverty in this country (CARE, 2009). Most urban populations in Vietnam are located in coastal areas, which are frequently subject to floods and cyclones (Hoang, 2011).These are two of the most dangerous hazards to housing and account for 37 per cent and 33 per cent respectively of all climate-related hazards (Nhu *et al*., 2011).

According to the 2009 housing classification, there are four types of shelter in Vietnam. These are categorised based on the number of secure parts (foundation, walls and roof) there are in the structure:

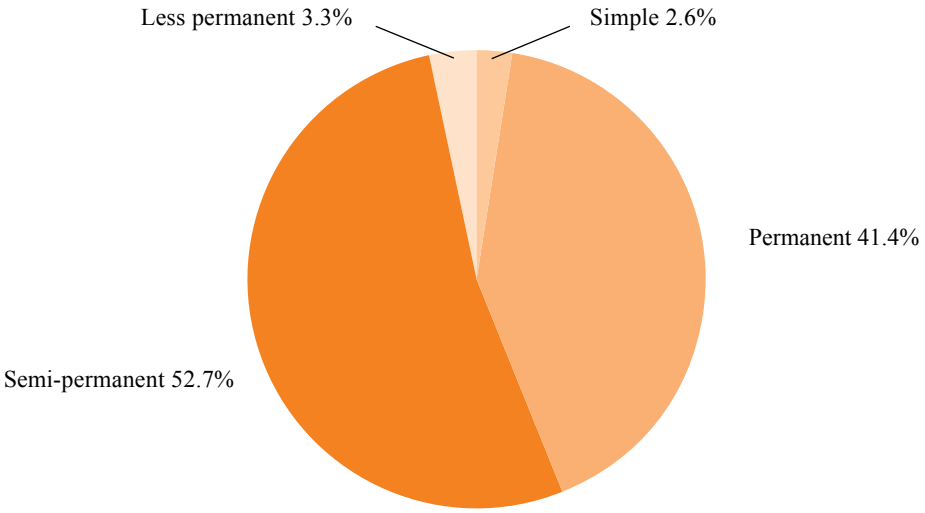
- permanent (kiên cc)
- semi-permanent (bán kii cc)
- less permanent (this kiên cc)
- simple (đơn sơ) (GSO, 2009).

A permanent house comprises all three secure parts whereas semi-and less permanent houses consist of two and one secure parts respectively. A simple house has no secure parts in its structure. In urban areas, semi-permanent and permanent housing account for 52.7 per cent and 41.4 per cent of housing respectively (GSO, 2009) (Figure 5). Less permanent and simple houses account for only 3.3 per cent and 2.6 per cent respectively. According to damage statistics for recent disasters such as typhoons Xangsane (2006) and Ketsana (2009), semi-permanent housing is the worst affected, with roofs and walls suffering the most critical damage (ADPC, 2007).

However, there are limits to what these statistics can tell us. In the 2009 national census, the assessment of building durability and stability was only gauged by the types of materials used. Reinforced concrete, brick, stone and masonry structures are perceived as materials which provide buildings with technical stability and safety. In contrast, bamboo, thatch, earth and low-quality timber are perceived as weak materials (GSO, 2009). This evaluation is likely to lead to misconceptions about safe construction, where masonry structures are automatically assumed to be ‘safer’. Particularly after Vietnam’s economic reform policy in 1986, which aimed to transform the national economy from a subsidised to market-orientated one, households have invested more money in housing construction, and particularly in replacing locally available materials (such as bamboo, timber and thatch) with new masonry materials (cement blocks, steel bars, fired bricks, ceramic roof tiles and iron corrugated sheeting) (Chantry and Norton, 2008). However, over 70 per cent

of houses built during this period lack hazard-mitigation measures and structures with non-reinforced walls and roofs are increasingly common. During big disasters such as typhoons Xangsane (2006) and Ketsana (2009), damages were unexpectedly huge (Figure 6) with low-income groups being the worst affected (Hoang, 2011).

Figure 5. Percentages of housing types in urban areas of Vietnam



Source: GSO, 2009

Figure 6. Semi-permanent houses damaged by typhoon Xangsane in Da Nang, 2006

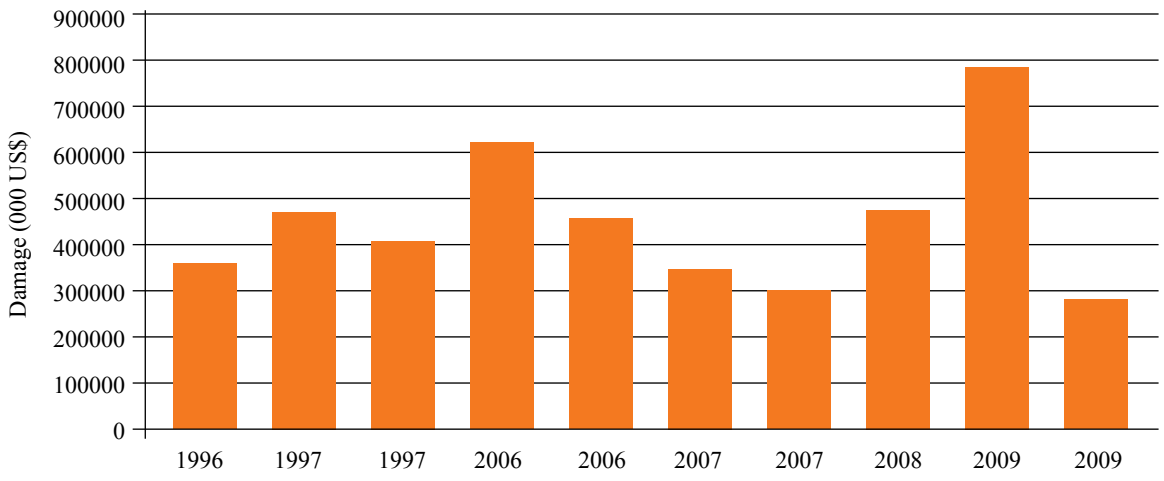
Buildings constructed using inappropriate masonry methods suffered more severe damage.

Photos: Nguyen Thanh Binh.

In Vietnam, there is a common local proverb: '*an cư, lạc nghiệp'* (housing first, livelihood second). Housing is seen as the top priority in an individual household's development. In addition, Vietnamese people believe that housing can reflect the economic prosperity of families and families often invest more money in housing construction. This makes housing one of their most valuable assets. However, design faults such as the lack of reinforced walls and roofs are likely to undermine these investments and potentially lead to unexpected housing damage in future disasters (Wisner *et al*., 2004).

Poorly constructed houses and inappropriate construction methods are considered to be the main causes of uncontrolled housing damage (Davis, 1978; Chantry and Norton, 2008; Charlesworth, 2011). In Vietnam, there is a rising trend in housing damage due to climate-related disasters despite efforts by local governments, agencies and affected communities to implement disaster risk reduction strategies. In 2006 for example, typhoon Xangsane hit Central Vietnam, causing more than 24,000 houses to collapse. Over 325,200 houses were damaged (CCFSC, 2011). In the same year, following typhoon Xangsane, typhoon Durian then hit the region and caused more loss and damage. Nearly 50,000 houses were totally destroyed, and almost 200,000 houses were inundated and badly damaged (ibid). In the following year, typhoon Lekima hit Central Vietnam, causing over 1,850 houses to collapse; 111,770 houses were damaged badly (ibid). In 2008, a big flood partially destroyed over 180,200 houses and totally destroyed 183 houses (ibid). Notably in September 2009, typhoon Ketsana landed in eleven provinces of Central Vietnam (with the greatest impacts seen in Hue, Da Nang, Quang Nam and Quang Ngai) and destroyed about 21,700 houses totally and more than 473,500 houses partially (CCFSC). Following these disasters, damage was usually more severe in masonry structures than in non-masonry ones and frequently affected low-income groups. This growing tendency of housing damage poses a real concern about the effectiveness of current housing construction methods and how to develop appropriate housing strategies for this region.

Figure 7. Top 10 natural disasters in Vietnam from 1900 to 2012



Source: Based on economic damage costs (EM-DAT 2012)

In an era of climate change, climate-related disasters in Vietnam are expected to increase in frequency and intensity (Hoang, 2011; MONRE, 2012), particularly greater floods and typhoons (EM-DAT, 2012) (Figure 7). Housing in urban areas of Central Vietnam tend to be modernised, built with new load-bearing structures and construction materials, such as reinforced concrete for structure, brick masonry for walls, and clay tiles and iron sheets for roofs (Ly *et al*., 2010). However, inappropriate uses of these innovations increase the risks to housing risks during adverse climate events.

For these reasons, this research has focused on low-income housing in the highly vulnerable areas of the two most disaster-prone cities of Central Vietnam: Hue and Da Nang. Semi-permanent housing was selected for this study as it is the most common type of housing in Vietnam and is most at risk from climate hazards. Examining semi-permanent low-income housing through the lens of post-disaster housing reconstruction and climate resilience should help us to better understand climate-resilient housing and improve the likelihood of developing a resilient housing system for Central Vietnam.

2.2 Limitations of current implementations for climate-resilient housing in Central Vietnam

2.2.1 Limited governance from legal frameworks

In Vietnam, the government considers housing as one of the four sectors most vulnerable to climate change (MONRE, 2008). In particular, floods and typhoons have the greatest impacts on housing in comparison with other hazards (Nhu *et al*., 2011). An estimated 80–90 per cent of Vietnam's population is significantly affected by these two events (Vietnam Government, 2007) with Central Vietnam being the most disaster-prone region of the country (Phong and Tinh, 2010).

Most current policies and legal frameworks in Vietnam focus on urgent preparedness measures and immediate relief and rescue immediately before, during and after disasters. In particular, there are four sets of onsite guidelines on how to cope during disasters, called *Phương châm 4 tại chỗ*. These guidelines are strictly obeyed at local levels (Jani, 2010). However, they tend to follow immediate or short-term strategies for providing quick relief and recovery actions with limited considerations of longer term recovery and reconstruction after disasters.

In terms of long-term recovery in Vietnam, there are only two key documents that address climate change adaptation (CCA) and disaster risk reduction (DRR) for vulnerable sectors by providing general principles and guidelines. The first document is the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020. Released in 2007, its key goal is to minimise damage and loss of human life and property. The second is the National Target Programme to Respond to Climate Change released in 2008. Its focus is on issues related to climate change. These two documents highlight the importance of mitigation and adaptation measures to climate change impacts for residential housing in vulnerable regions throughout the country. However, the guidelines in these two documents are top-down in terms of planning and implementation at lower levels in provinces and cities. They view CCA and DRR in macro terms, without specific and detailed instructions and orientations for each sector in each region. And of course, responses to local contexts for building effective and long-term resilient housing to climate change are inadequately addressed in these two documents.

In terms of urban management, the Vietnam government released the new Decree 64 in October 2012. This stipulates that housing construction in urban areas must have a building permit before construction can proceed. However, no building permit is needed in rural areas. In urban areas where building permits are required, Circular 10 (valid from 6 February 2013) is a guide on how to implement Decree 64 in practice. It verifies that anyone building a house with a total floor area of 250m2 or more or with three stories or more must have a structural assessment done by a registered professional company before applying for a building permit. Where total floor areas are below 250m2 or where a building's height is below three stories, a structural assessment is not required. Households are free to decide on the design and construction method. Houses that have had a professional structural assessment are technically much stronger and safer than the houses without. However, in reality, most houses in Vietnam cities have a floor area below 250m2 or are below three stories in height. This reveals the limitation of current legal systems for urban housing construction, particularly in cities highly prone to climate change hazards and climatic extremes.

At lower levels, city planning departments play a key role in controlling housing construction through enforcing building regulations and codes. Building permits are often required in urban areas and are only granted once the building's design is consistent with the city's master plan and architectural and construction guidelines for the neighbourhood involved.

However, there seem to be almost no transparent policies and planning criteria that people in hazard-prone areas must comply with regarding risk reduction measures – except for advising or encouraging them to do so (ADPC, 2007; Reed and Thinphanga, 2012). The urban planning in Vietnam's cities tends to pursue supply-driven rather than demand-driven approaches (Reed and Thinphanga, 2012). The extension of existing urban residential areas and the development of new ones are mainly based on physical estimations such as the expected population sizes, land coverage areas and building heights. The actual needs and expectations of residents or climate risk reduction measures for hazard prone areas are inadequately considered or addressed. This is likely to generate inappropriate urban planning in local regions and building design and construction afterwards.

According to the Prime Minister of Vietnam's Decision 445/QD-TTg of April 2009, the proportion of urban population is expected to reach 38 per cent by 2015 and 45 per cent by 2020 (GSO, 2009). This means that meeting the housing needs in urban areas of cities is under even more pressure, particularly in the peri-urban and hazard-prone areas where large numbers of vulnerable low-income housing is still available. In a recent national assembly meeting in 2012, more focus was given to the role of national government in DRR and CCA. In particular, the government is considering taking on a greater role in providing at-risk local communities with better resources and improving their capacity to cope with climate change and natural disasters (Hang, 2012).

2.2.2 Inadequate local responses and adaptation to climate change

Since Vietnam is situated in one of the storm beds of the Asia Pacific region, Vietnamese people have a long history of coping with adverse climate conditions. There are a number of local disaster responses such as changing the crop calendar and crop patterns to avoid adverse climate impacts (MONRE and UNDP, 2010; DWF, 2010), using secure public buildings as evacuation shelters during disasters (Xuan, C. 2010), or using an early warning system e.g. via radio or loudspeaker (OXFAM, 2005). At the household level, people have used various disaster responses such as strengthening weaker parts of their houses, using communication channels to update information about hazard occurrences, storing food, finding the nearest safe places for evacuation, or stockpiling water for drinking and domestic use during disaster seasons (CSRD, 2010; OXFAM, 2005).

Architecturally, local housing in Central Vietnam already includes elements of disaster preparedness, such as planting trees around houses, which act as windbreaks (CSRD, 2010; DWF, 2010), building houses on stilts in low-lying areas to avoid flooding, or building shorter houses with heavy roofs to reduce the impact of the wind during storms (Anh-Tuan *et al*., 2011). Building a mezzanine level below the roof space provides people with a means of escape and somewhere to store valuable possessions during big floods (CSRD, 2010). To respond to big typhoons, in some regions of Central Vietnam, people have started to build storm-escape rooms to evacuate family members to (*nhà trú bão*). These are separated from the main house and usually serve other functions, such as bathrooms or storage (Xuan, 2010). According to a recent survey in 2010 to assess the coping and responsive capacities of some local communities in Central Vietnam to natural disasters, most surveyed households said that reinforcing storm shelters is their first priority, followed by stockpiling food and water, gas and gasoline; moving livestock to safer places; helping neighbours to reinforce their houses; protecting valuable household items; and protecting agricultural crops (DWF, 2010).

The above discussion shows that local people have already found some adaptive ways of implementing their own climate risk reduction strategies which are effective to some extent. However, these responses seem inadequate in terms of addressing future unanticipated risks posed by climate change. Households living in vulnerable areas of Central Vietnam perceive that climate events have increased in severity and frequency in recent years (DWF, 2010). In a survey by MONRE and UNDP in 2010, some local authorities in Vietnam reported that while their communities are able to cope with climate disasters at the scale of past climate events, they may be unable to address and face future unanticipated impacts and effects of a changing climate (MONRE and UNDP, 2010). Local knowledge and responses can be very effective in development. However, in terms of responding to climate change impacts, they are still limited and may be inadequate (Schilderman, 2004).

2.2.3 Inadequate housing implementation by local governments and agencies

Recognising these problems and the importance of developing solutions to cope with and respond to climate change impacts, Vietnam's central and local governments, civil societies, agencies and the private sector have all initiated projects on post-disaster housing reconstruction in Central Vietnam. One of the most important national programmes, named 167, was adopted following the Prime Minister of Vietnam's Decision 167/2008/QD-TTg. This partly supports housing construction for the poor (Vietnamese Government, 2008). This programme started in early 2009 and ended in late 2012 with 500,000 beneficiary households. It not only focused on disaster-affected families but also ethnic minorities, poor families in general, and families in hard-hit regions (ibid).

This programme provided each household with an amount of money in cash (VN$ 6–7 million, currently equivalent to 300-350 US$) – enough to build an area of 2–4m2 – and also requires that each house has a minimum living area of 24m2(ibid). House owners had to invest more money to complete their houses, usually without any technical guidance or professional supervision related to hazard mitigation. In reality, this has resulted in poor-quality housing construction and has increased housing vulnerability to climate events. Where families have had insufficient money to finish their houses, they have had to unexpectedly stop construction work and live in their incomplete houses (usually lacking windows, doors and roofs). It is homes like these which are at the most extreme risk in terms of exposure to climate hazards.

One of the most influential organisations in Vietnam in post-disaster relief and recovery is the Vietnam Red Cross (VNRC). They have organised many community recovery and development activities. In terms of post-disaster response, VNRC mainly offers emergency relief and livelihood recovery such as providing rice, food, clean water, first aid, medicine, animals and cash to directly support the affected households and communities (VNRC, 2010).

In post-disaster housing reconstruction, the main role of VNRC is soliciting for help and raising funds, whereas housing design and reconstruction are often done by other professional organisations or agencies sent by or in partnership with VNRC, such as Development Workshop France (DWF), the professional consultant for the reconstruction of 650 houses in Central Vietnam after the typhoon Ketsana in 2009. DWF are known for their best practice in post-disaster housing reconstruction in Central Vietnam (Ahmed, 2011). They developed ten principles for cyclone-resistant construction, from the foundations to the roof. However, these ten principles only focus on technical aspects of safe construction with less attention to social aspects of housing resilience.

In a 2010 study to assess the effectiveness of DWF's principles in practice, barriers inhibiting people from applying those principles were identified, such as:

- cost (people do not have enough money to build them);
- unattractive design (according to local people's tastes); and
- unfamiliarity (applied by very few households) (DWF, 2010).

In addition, in an era of climate change and with more uncertain impacts on both physical and social structures likely, having only ten principles for increasing storm resistance is less likely to adequately serve the extremely disaster-prone areas of Central Vietnam.

Supporting this argument, Ahmed (2011) states that the impacts of global climate change are more complicated than anticipated, which has contributed to the increase of frequency, magnitude and intensity of climate-related disasters such as floods and typhoons. In developing countries, which are highly vulnerable to climate change, most housing (re) construction practices tend to follow technology-driven approaches to create 'perfect' visible end-products, despite the use of so-called participatory or owner-driven approaches (Hayles, 2010).

In Vietnam, housing reconstruction efforts usually focus more on visibly safer buildings while other important invisible factors such as cultural appropriateness of the building's design are commonly neglected. Local needs and capacities as well as livelihood development opportunities are then hurriedly examined in planning departments. This potentially generates inappropriate housing designs later on, which are inappropriate for people's lifestyles, difficult to maintain, inflexible to extend or renovate, and expensive to replicate (Schilderman and Lyons, 2011). This issue is evident in a housing recovery programme by IFRC and VNRC after the 1999 flood in Central Vietnam. Thousands of houses were built with standardised core steel structures. But they did not suit local people's needs or lifestyles, resulting in low adoption. They were difficult to replicate because local workers were unfamiliar with the construction methods, the high cost of steel, and were too inflexible in terms of future expansion and replacement (IFRC and VNRC, 2002) (Figure 8).

Figure 8. After the big flood of 1999, VNRC's use of core steel structures was unfavourable with local people

Source: IFRC, 1999

The implication is that housing governance, planning and implementation still operate as separate areas. Local housing implementation is usually done autonomously, with very limited assistance from or collaboration with local government and the public sector. In addition, one critical problem with post-disaster housing is the limited consideration given to micro-climate or passive design strategies such as using natural ventilation, natural light and sun shading for human comfort. Long-term resilient housing design should be capable of coping with climate change impacts. But it should also enhance human comfort. This research, therefore, also aims to clarify the role and contribution of governance mechanisms in building climate resilience for housing while simultaneously addressing the need to improve human comfort through better design.

2.3 Climate-resilient housing and community consultation: lacking an overall approach

Many issues to do with long-term resilient housing have been discussed in depth. Some studies recommend resource-based approaches (Chang *et al*., 2010; Matsumaru *et al*., 2012) while others focus on livelihood development (Pomeroy *et al*., 2006; Cosgrave, 2008; Minamoto, 2010) and governance issues (Guarnacci, 2012). Various theories for disaster response and resilience have been suggested, in which community consultation is seen as a key component (UNEP and SKAT, 2007; Jha *et al*., 2010). Very few texts underestimate the importance of community participation or using participatory approaches to create an effective resilient housing system. For example, in Lizarralde *et al*. (2010), while the focus on sustainable reconstruction, community engagement/consultation is also considered to be a key factor.

However, **how** to consult with communities in practice is still problematic. Although they should be the key actors in the process, communities affected by climate change still require assistance from external stakeholders (governments, agencies or experts) (Skinner, 1984; Nakagawa and Shaw, 2004). Linking with residents in the design and construction of their home is seen as one of the most effective methods to produce appropriate and acceptable housing products (Sliwinski, 2010; Özden, 2006). However, what is the real contribution community consultation to housing design. Many housing reconstruction projects have encountered problems with community consultation, due to a lack of skilled facilitators and poorly designed consultation processes. In fact, in some housing projects, merely having a link with the beneficiaries and/or their participation in construction work is immediately considered as a participatory or community-based approach.

There is still a very limited focus on community consultation in designing resilient housing in research. Barakat (2003) and UNEP and SKAT (2007) frame sustainable resilient housing using five key elements: technical, economic (financial), social, environmental and institutional (organisational) – but without providing a detailed description of community consultation. Jha *et al*. (2010) suggested a conceptual model for long-term post-disaster housing in which community consultation is a key requirement, but without any guidelines for how to facilitate such processes. In practice, some projects with inappropriate community consultation processes have resulted in limited success. For instance, beneficiaries from a housing project in Turkey were unhappy with their new houses as the reconstruction mainly involved agencies but only minimally engaged with local people about their actual needs (Özden, 2006). After the 2004 Indian Ocean earthquake, a housing reconstruction project in Aceh, Indonesia also revealed its shortcomings in terms of community consultation, when local masons were found to be poorly equipped with a limited understanding of why and how to build safe houses (Petal *et al*., 2008). A post-disaster housing reconstruction project in Vietnam done by IFRC and VNRC after a large flood in 1999 was found to be ineffective because construction was heavily dependent on external resources (both materials and labour) with unaffordable high costs to low-income families and not enough attention was given to local needs and capacities for the longer term (Barakat, 2003). These examples show the varying problems related to post-disaster housing where there has been limited community consultation.

There is a huge difference between community 'participation' as providing free construction labour and their active engagement in the whole resilient housing design and construction process (Sliwinski, 2010). Although the issue of community consultation is not a new topic, its limited achievements in practice poses a real concern about the realistic effectiveness of community consultation in providing effective and long-term housing solutions. Effectively engaging communities in resilient housing design is a huge challenge (Lawther, 2009; Ganapati and Ganapati, 2009) including how to facilitate community consultation (Davidson *et al*., 2007). Most housing recovery programmes seem to fall into the category of either contractor- or provider-driven, thus hindering the possibility of community engagement (Barakat, 2003). And while current theories state the importance community consultation, they are still limited in clarifying the real nature and function of community consultation in practice.

In Vietnam, the work of Save the Children UK (SC) and Development Workshop France (DWF) are seen as best practice in post-disaster housing reconstruction. In 2006, SC funded a housing project for affected urban residents in Da Nang after the typhoon Xangsane, in which 88 houses were reconstructed in partnership with one local architectural firm. According to the project architect, beneficiaries participated in consultations during the design phases. DWF, working with IFRC and

VNRC, was responsible for the design and construction of 650 houses after the typhoon Ketsana (2009). Tran Tuan Anh, the principle author of this working paper, worked as an architect overseeing the construction of 200 houses in the central highlands of Vietnam. Consultation was broadly used, whereby local people were engaged in shared learning activities, both within people's homes and outdoors, in defining the size of homes, function and spatial layouts, and possible technical options for risk reduction. DWF (2010) used an innovative approach, known as 'family-tailored' design, which produces a design according to each household's needs and situations. However, in practice, the **community** is still limited to individual beneficiaries, community-based organisations and local authorities.

As highlighted in the literature, local knowledge alone is likely to be unable to cope with future climate risks. In addition, local construction methods would have limited success in achieving climate resilience for housing. Local people and local authorities are important but lack the capacity to develop resilient housing strategies for the longer term without some external support.

Besides at-risk communities and local governments, the critical contributions of two additional types of stakeholder are also required:

- **civil society organisations** (community-based organisations (CBOs), non-governmental organisations (NGOs) and agencies); and
- **private sector** (building contractors, suppliers, developers, consultant companies and researchers).

The development of climate-resilient housing should be, in practice, a process of sharing information, knowledge, lessons and experiences (ISET, 2012) regarding climate resilience among these key four groups by using effective forms of communication and consultation. This may comprise developing multiple activities, interactions and relationships among stakeholders (IFRC, 2012).

2.4 Key factors associated with community consultation

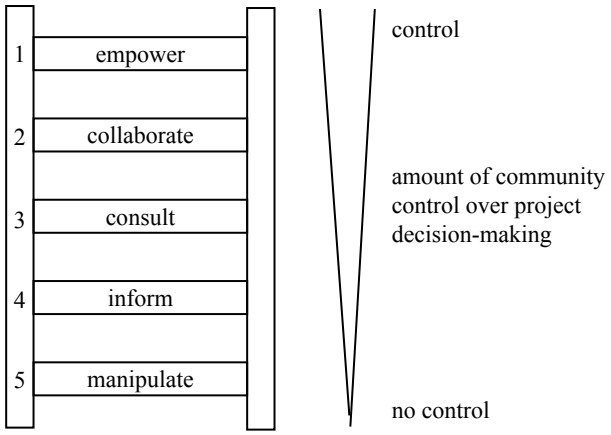
The nature of consultation is the mutual interaction, through forms of communication, between two or more groups who require expertise and knowledge from each other to come up with a solution. Community consultation is believed to satisfy four purposes:

- to discover the public's preference;
- to improve decision-making processes by integrating local and scientific knowledge;
- to achieve fairness and justice; and
- to gain legitimacy for public decisions (Innes and Booher, 2004).

As recent papers highlight (ISET, 2012; Mercer *et al*., 2010), the development of climate-resilient strategies critically necessitates the involvement of both local and external stakeholders – i.e. both indigenous and scientific knowledge. The crossroads of these two sources of knowledge exists only in community consultation, which helps to address any weaknesses or gaps in knowledge or understanding between the parties involved. Davidson *et al*. (2007) proposed a conceptual ladder to classify community involvement into five levels: to manipulate or inform (i.e. the lowest levels of participation) to consult, collaborate or empower (higher levels of participation) (Figure 9).[1] Placing people at the centre of a process of empowerment requires technical support from professionals (Lyons *et al*., 2010; Schilderman and Lyons, 2011). However, empowerment, in some cases, is hard to facilitate, due to barriers to do with local context. Thomas (1995) suggested the establishment of an advisory committee consisting of all stakeholder representatives for all decision-making steps.

1 *This is based on Hart's (1992) original concept of the ladder of participation.*

Figure 9. Levels of community engagement in building built-environment resilience



Source: Davidson *et al*. 2007

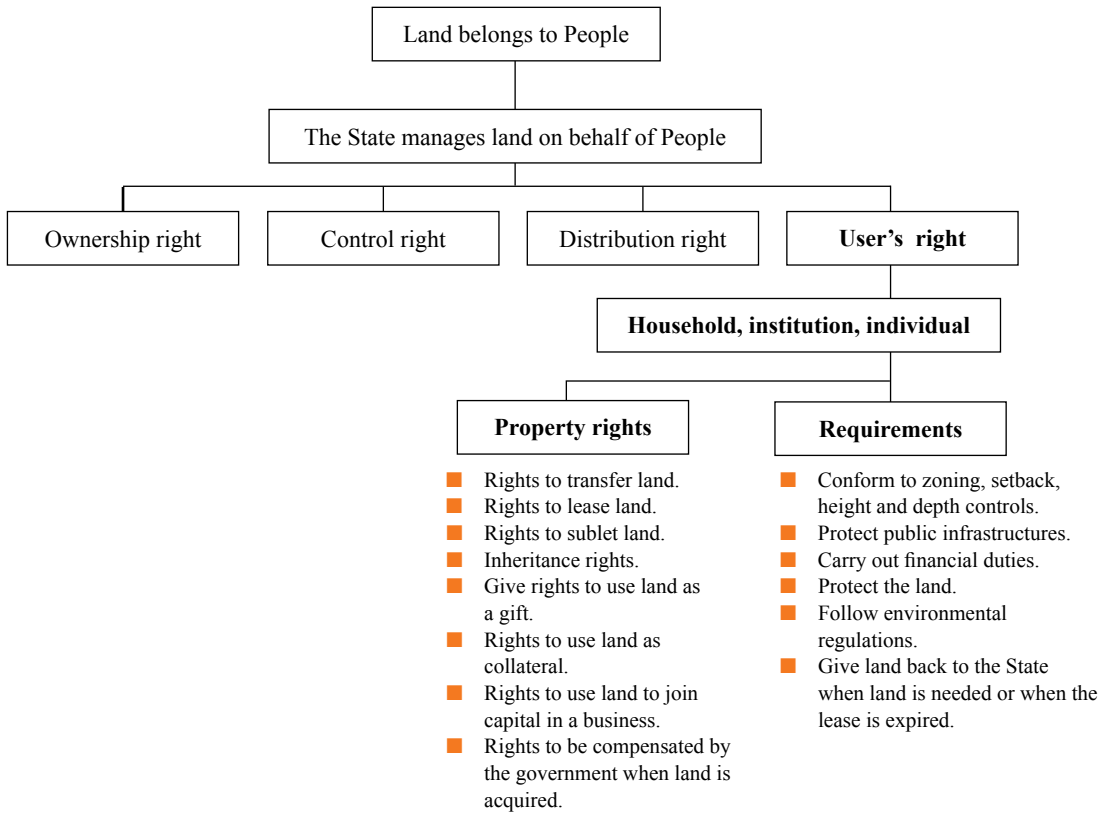
In summary, community consultation should be a key component in developing effective climate-resilient housing. At-risk or those people and communities affected by climate extremes must be key actors and central to the process (Schilderman and Lyons, 2011). External stakeholders including local governments, civil societies and the private sector should play a supportive and indispensable role. Since community consultation is context-specific, finding appropriate forms of consultation in the context of Central Vietnam is necessary to develop appropriate resilient housing strategies.

2.5 Land tenure issues

2.5.1 Tenure system

Permanent rights of land-use and the guarantee of secure tenure for landholders are required for long-term housing stability, particularly in post-disaster situations, in order to avoid future conflicts or even eviction (SKAT, 2012). The 2003 Land Law has had a significant effect on urban planning and urban management. Under the law, land is considered to belong to the whole population but the State owns or takes control all land as the representative of all citizens. Land regulation and management have become more detailed but also more flexible. The law delegates the responsibility for land administration and registry to local governments and defines more specific rights of users (residents) as well as obligations that land-holders must conform to (Figure 10).

Figure 10. Land tenure system in Vietnam



Source: Based on Vietnam's Land Law (2003) and Lodder (2012)

2.5.2 Access to land

In Vietnam, there are two common methods of gaining access to residential land in urban areas:

Allotted and leased land-use rights: Although the distinction is not officially recognised in the new Land Law, there is one type of land-use rights used for residential purposes, called 'allotted land'. Allotted land (giao đất) is only available for non-commercial organisations, family households and individuals. Land allotted for residential use conveys rights in perpetuity to transfer, bequeath, lease and mortgage. After paying an initial land allocation fee, no further state charges apply.

Land transfers: Private access to urban residential land in both official and unofficial land markets is primarily gained through land transfers (chuyển nhượng), rather than buying and selling. Although the civil code requires the transfer of land-use rights to be based on a price formula set by the Ministry of Finance, in practice, both officially registered and unregistered land is routinely bought and sold according to market prices. Unofficial (or unregistered) land is bought and sold through land brokers. In most cases, at ward/commune level, people's committees stamp short sale notes signed by the parties. The purpose of the stamp is not to validate the transfer, but merely to certify that this vendor has a residency permit for the demised premises. In sum, the benefits attached to land-use rights depend on both the land-use purpose and the identity of land-users.

2.5.3 Land titling

There are two methods of acquiring land-use rights certificates: they can be issued when people's committees allot and lease urban land; or, in some circumstances, those occupying untitled residential land can apply for the allotment of land-use rights. Applicants are required to either provide documentary evidence of officially recognised land documents, or demonstrate long-term occupation. Land registration boards comprising of ward/commune level people's committee officials certify the validity of land title documents and long-term residency. Evaluations are based on lists of approved land title documents issued by the General Department of Land Administration and studies conducted by land registration boards. Provincial/city cadastral departments assess certifications. These bodies then advise the people's committees whether to allot land-use rights certificates. Since 1994, urban residential land-use right certificates have been issued together with house ownership certificates in red books, called *sổ đỏ*.

Although the majority of the poor are able to find shelter, however substandard it may be, many additional problems arise in their daily survival that revolve around restricted accesses to basic services and infrastructures such as water, electricity, sanitary facilities and refuse disposal. The alternative is to access them illegally or create makeshift arrangements. These are inevitably more expensive services than the publicly provided ones. For example, connecting to private electricity metres or purchasing water from third parties can cost ten to twenty times the official prices (Bolay *et al*., 1997). These are becoming more commonly in peri-urban areas of cities where populations mainly belong to the poor and low-income classes and where urban planning and design are usually inadequately addressed.

2.5.4 Land tenure and housing resilience

As seen in the relevant literature, one critical problem relating to land tenure after disasters is the destruction of boundaries or reference markers (trees, fences or buildings) (Brown and Crawford, 2006). Destruction of markers make it difficult to identify the border of a claimant's original lands, particularly after catastrophic disasters such as the Indian Ocean tsunami of 2004 or the Haiti earthquake in 2010. However, within smaller-scale disasters such as floods and storms in Vietnam, land identification after disasters is not as complicated, because the disaster does not destroy boundary marks of plots. People also usually stay in their homes during disasters or, sometimes, temporarily move to safer places for several days in cases of big disasters.

However, land tenure security is critical in cases of 'hanged planning', called *quy hoạch treo*, where residential land is replaced or transformed to non-residential lands and residents become temporary landholders without permissions to build new houses or to upgrade their existing ones. Hanged planning areas are usually used for non-residential purposes such as tourist resorts, shopping centres or parks but investors rarely provide residents with adequate compensation for being compulsorily evicted from their homes. In some cases, this leads to conflict where the compensation prices offered are lower than market prices. This has a significant link with the increase of housing vulnerability to climate events and reduces the possibility of building housing resilience in hanged planning areas. Realising these problems, in October 2012, the Vietnam government issued Decree 64, to allow housing construction and renovation in hanged planning areas. However, this decree has viewed housing construction and renovation as temporary and no compensation is given when land ownership is later revoked.

2.6 Viewing climate-resilient housing through the lens of urban climate resilience

The key framing of urban climate resilience for Asian cities, including Vietnam, has been developed by ISET (2012), in which building resilience is the continuous process of understanding the vulnerability of urban sectors and raising their resilience capacities based on shared learning dialogues. This concept is quite similar to the framework for integrating

indigenous (local) and scientific (innovative) knowledge in disaster risk reduction suggested by Mercer *et al*. (2010) in that it considers an adequate perception of vulnerability as key to combining local and scientific knowledge.

The urban climate resilience framework given by ISET (2012) provides an umbrella to guide the development of climate resilience for almost all urban sectors including housing and settlements. According to the definition of climate-resilient housing mentioned in section 2.2, ISET (2012) and Tyler and Moench (2012) have developed a pathway to climate resilience by dealing with three different but interrelated components:

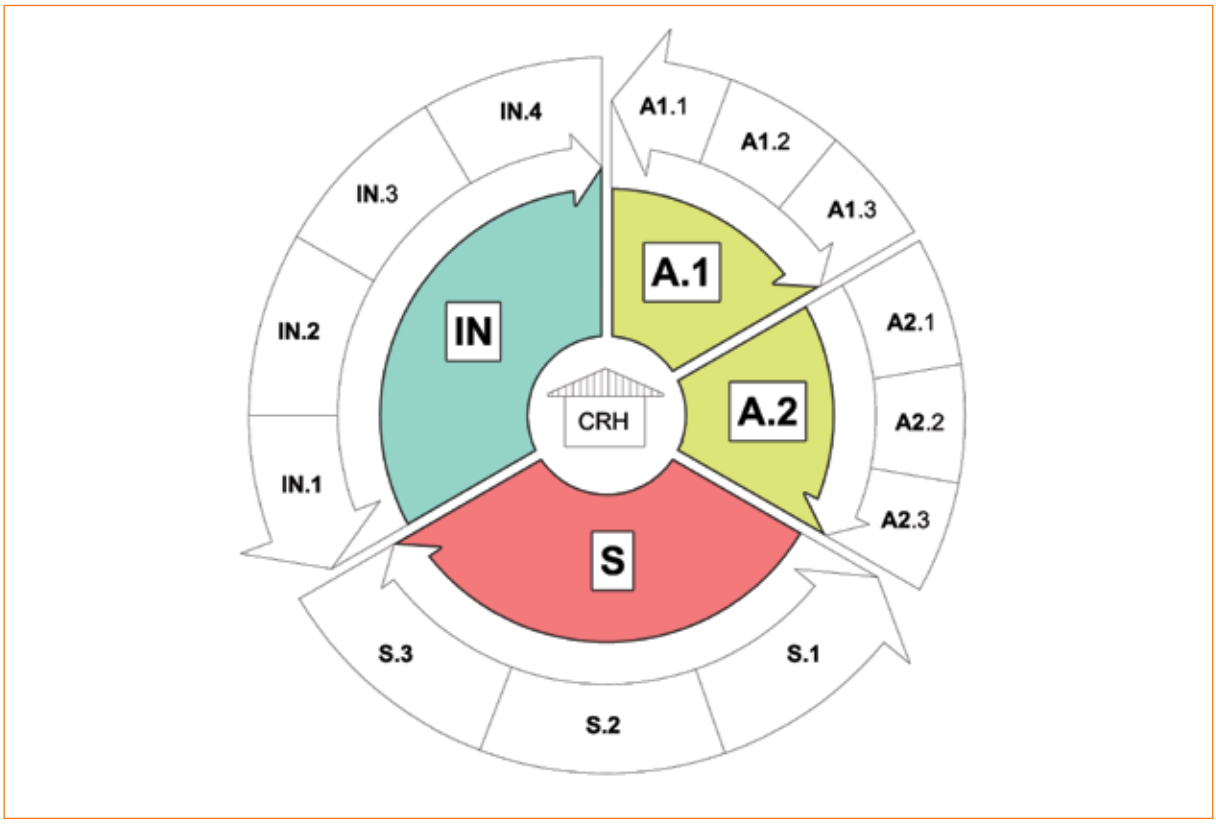
- agents (human-related aspects)
- systems (housing-related aspects) and
- institutions (information- and policy-related aspects).

In this study, they are described as follows:

2.6.1 Agents (A)

Based on the discussion in sections 2.3 and 2.4, four types of stakeholder are needed to develop climate-resilient housing: at-risk communities, local governments, civil society organisations and the private sector. They can be classified into two groups: at-risk communities (households living in climate exposed areas) and the public sector (local governments, civil society organisations and private sectors). These stakeholders are seen as the **agents** due to their necessary involvements and contributions to building climate-resilient housing.

Figure 11. Framework for climate-resilient housing (CRH).



2.6.2 At-risk communities (A.1)

There is a consensus that the involvement of householders/residents in the design and construction of their houses is a crucial requirement to achieve the best long-term results of resilient housing. They should be placed at the centre of the process and participate into all decision-making stages of housing design and construction (Tas *et al*., 2007; Lyons *et al*., 2010; Nakagawa and Shaw, 2004). They are the people best placed to advise on the reality of their situation, limited conditions, actual needs and capacities in any process of vulnerability reduction and resilience enhancement. In response to this, they are required to demonstrate three following characteristics:

- **Responsiveness (A.1.1):** The ability of at-risk households to identify and prepare for a climate hazard and/or a disruptive event and the ability to recover quickly after a crisis (Tyler and Moench, 2012).
- **Resourcefulness (A.1.2):** The capacity to mobilise vital basic resources in times of emergency to reduce damages and losses.
- **Learning capacity (A.1.3):** The ability to internalise past experiences, to avoid repeated failures, and innovate to improve performances of housing resilience (Tyler and Moench, 2012).

2.6.3 Public sectors (A.2)

Besides the at-risk community, local governments, civil society organisations and the private sector are crucial for the construction of climate-resilient housing. Although their roles are considered as supportive, advisory or supplementary, their inputs are indispensable to building long-term housing resilience to climate change, particularly in articulating and defining actual local needs and capacities, specifying and bridging barriers due to social and political constraints, facilitating community consultation and establishing a plan for action (Pardasani, 2006).

Similar to at-risk community, these three stakeholders need to address three following characteristics:

- **Responsiveness (A.2.1):** The ability of public sector actors to anticipate, identify, plan and implement for a climate hazard and/or a disaster and the capacity to effectively respond to crises (Tyler and Moench, 2012).
- **Resourcefulness (A.2.2):** The capacity to mobilise resources for climate risk reduction and resilience improvement.
- **Learning capacity (A.2.3):** The ability to internalise past experiences, to avoid repeated failures, and the capacity to learn new or innovative knowledge and expertise for the better performance of climate-resilient housing (Tyler and Moench, 2012).

2.6.4 System: housing (S)

Housing should be seen as a process rather than a product (Davis, 2011) and involves multiple factors (UNEP and SKAT, 2007). In the scope of this research, housing is perceived as the **system** and encompasses three following features:

- **Flexibility (S.1):** This refers to the functional, spatial and technical flexibilities of the house that can accommodate unexpected changes, extensions or renovations due to climate change impacts.
- **Redundancy (S.2):** The ability of the house to use spare parts to ‘bounce back’ to normal conditions in a timely and effective manner after a big event.
- **Fail-safe measures and human comfort (S.3):** The house consists of one place where inhabitants can escape to during disasters. Furthermore, housing design is also required to address the hot-humid climate of Vietnam in order to increase human comfort.[2]

2 *A fail-safe measure means that it will not endanger lives or properties when it fails.*

2.6.5 Institutions (IN)

'Institutions' involves the accessibility of information, governance and legal frameworks, social norms and beliefs that shape human relations and interactions, and access to and control over resources and influences (ISET, 2012) for the effectiveness of climate-resilient housing. Accordingly, **institutions** need to address four following factors:

- **Rights and entitlements (IN.1):** The permission to access and use basic resources and urban infrastructures and public services for the purpose of resilience (Tyler and Moench, 2012).
- **Decision-making processes (IN.2):** The decision-making stages in the design and construction of climate-resilient housing must be broadly accepted by all stakeholders; the affected population should play a key role (Lyons *et al*., 2010; Lizarralde, 2011; Maly and Shiozaki, 2012).
- **Information (IN.3):** The agents are provided with sufficient information to assess their risks and vulnerability, and to decide appropriate coping strategies (Tyler and Moench, 2012).
- **Application of new knowledge (IN.4):** This refers to the likelihood of applying new or innovative knowledge to enhance the resilience performance of housing.

From the discussion above, Figure 11 captures the concept of climate-resilient housing (CRH). From this diagram, it can be seen that climate-resilient housing is the endless process where **agents**, **systems** and **institutions** work together in a closed cycle to target effective and long-term resilient housing outcomes. A resilient housing system is only achieved once the agents (stakeholders) involved have sufficient awareness and capacities and local institutional frameworks are effective enough to reduce housing vulnerability and to raise the climate resilience of both the agents and the system.

3 Case studies and comparative analysis

During the course of this research, qualitative interviews with households and focus group discussions with local representatives and external professionals revealed that there are several impediments to reaching resilience in terms of stakeholder awareness and capacity, physical housing conditions, and local institutional mechanisms. Economic shortages are one of the biggest obstacles to households in building safe housing. This chapter will discuss qualitative results from the fieldwork.

3.1 Case Study 1: Hoa Hiep Bac, Lien Chieu, Da Nang

3.1.1 Background

The Hoa Hiep Bac ward is situated in Lien Chieu District, north Na Dang. It is one of the two selected case-study areas where climate change impacts are critical and residential housing is at high risk during adverse climatic events. This ward is close to the sea and extremely exposed to typhoons and floods (Figure 12). According to group discussions, signs of climate change here have become more frequent in recent years, such as changes in rainfall patterns and intensity, or the alteration and frequency of storm seasons. Especially for low-income households, these have seriously affected both local housing and livelihoods, particularly aquaculture and agriculture. In addition, precarious and low-paid jobs have been negatively affected the economic development of low-income households and contributed to their increasing vulnerability. Temporary manual labour, on-train vendors and unskilled workers are increasingly common when fishery and agriculture become harder to make a living from due to adverse weather conditions.

The typhoon Xangsane in 2006 was the biggest disaster this community had ever experienced. Many people still talk about its awesome destruction to this day. As one interviewee said:

> It is a really divine wind. Before, nobody believed Da Nang could face a storm like it (Xangsane) because there were no storms in this city previously. When it came, everyone was taken by surprise and there was no time for any preparations. It caused massive damages and losses.

Xangsane caused serious damage in this ward. It broke the sea dam, destroyed the road system, and damaged local ships and boats. In terms of housing, group discussions revealed that more than 200 houses were totally destroyed and over 500 houses were partially damaged, and that most of these belonged to low-income groups. However, because of economic constraints, not all households were able to reconstruct their homes immediately after the typhoon. According to local authority respondents, 25 houses were rebuilt by Save the Children UK (donor-built) and over 100 houses were rebuilt by owners (self-built).

Figure 12. Location of Hoa Hiep Bac, Lien Chieu, Da Nang

Photo: Tran Tuan Anh
Map source: www.threeland.com

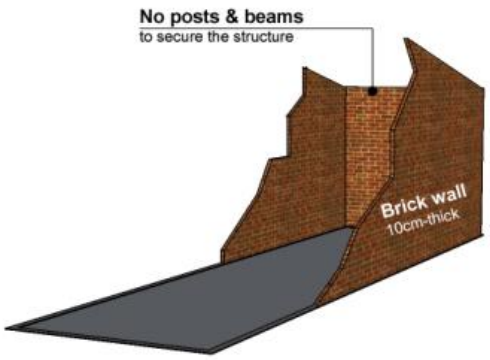
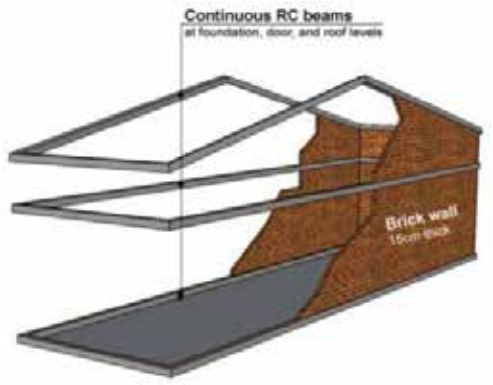
3.1.2 Differences between donor-built and self-built post-disaster housing

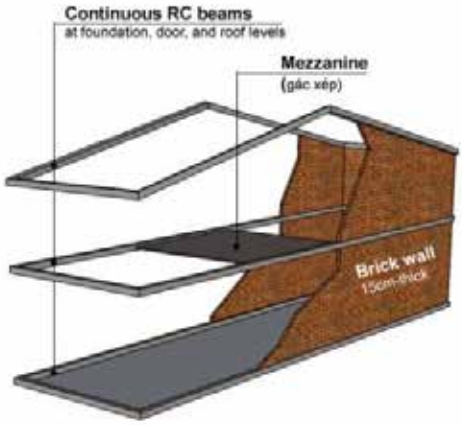
Generally, self-built post-disaster housing is more unsafe than donor-built ones in Hoa Hiep Bac. In particular, four out of the five self-built houses surveyed lack continuous beams at the middle and top levels which are needed to strengthen the walls, whereas these beams were installed in all five donor-built houses (Table 1). According to key informant interviews with building experts, these beams play a crucial role in connecting the walls and give the building more solidity.
On the other hand, household interviews showed that the main reasons for not using these beams in self-built houses were due to economic constraints and the limited knowledge and skills of local workers, mainly masons, about storm resistant construction.

> Our biggest difficulty to build safe homes is economic. How can we think of it when we can't afford our basic living needs, such as school fees and other expenses for children?

> I built my house based on available experiences of hired local masons without taking into consideration the safety-related measures because we were afraid they would cost much money.

Table 1. The difference between self-built and donor-driven construction

<table>
<tr><th>Self-built house structure</th><th>Donor-built house structure</th></tr>
<tr><td rowspan="2"> 
</td><td> 

For households within limited financial capacity.</td></tr>
<tr><td> 

For household within financial capacity.</td></tr>
</table>

Key informant interviews also highlighted the limited capacity of local workers in safe construction:

> Local masons have very little experience on the technical safety of buildings. What they usually do is following the same practices as before without understandings of the forces or pressures generated on buildings by storm winds.

One of the most interesting differences between donor-built and self-built houses is the use of different types of brick. While self-built houses typically use one type of locally common brick with 10cm thickness, donor-built ones use a new type of brick, which are thicker than local bricks (15cm) and were first provided by a local factory for this Save the Children project. The architect in charge of the design of donor-built housing noted that the brick walls with a minimum thickness of 15cm could work as both a load-bearing and wind-resistant structure. This was actually an innovation at that time (2007) because brick walls were widely seen as serving a covering function only. The architect tried to convince several local factories to produce this type of brick and, finally, one factory agreed. However, due to its unfamiliarity to

local clients and as it was more expensive than the locally available bricks, this new type of brick disappeared from the scene as soon the project was completed.

In terms of construction costs, self-built housing is more affordable than donor-built housing. Even though similar levels of investment were spent on both types of houses, the self-built houses were bigger than the donor-built ones, providing more living space. According to household interviews, self-built households had to find all possible ways to reduce construction costs such as reusing damaged materials or participating in construction work whenever possible. On the other hand, despite great efforts to provide low-cost housing, donor-built houses were still seen to be costly. Based on household interviews, the reason for this was that they employed construction contractors and workers outside of the community instead of engaging householders in the construction process.

> The use of many players outside the community made the cost increase. In future projects, if possible, people here would only need the design from architects and then self-organise all construction works with local builders. Local authority and sponsors can supervise our works anytime to ensure the quality.

In general, both self-built and donor-built houses faced challenges in mobilising adequate finance for reconstruction after the typhoon. However, more difficulties were experienced by self-build households who, with very limited external support, became in debt after the storm. According to household interviews, many self-build households in this ward had to borrow 50–80 per cent of the total construction costs from relatives, neighbours or friends and were unsure when they could repay these debts. Where they did not have enough money for reconstruction, they had to 'borrow' labour from neighbours, relatives or friends who were later repaid in kind in the construction of their own homes. Self-build households effectively supported each other to finish their housing reconstruction even without sufficient finance in place.

> After the storm, my house was totally destroyed except for the foundation. Together with our savings, we had to borrow up to 70 per cent to rebuild this house and we are not sure when we will be able to repay this debt.

> Because we had too little money to hire masons, we had to borrow 50 workdays from our neighbours and friends and, afterwards, worked for their housing construction for the same number of borrowed workdays as a payment.

Regarding the housing type, both self-built and donor-built houses belong to *nhà cấp 4,* the lowest ranking type of housing in Vietnam as prescribed by the Vietnam government's Decree 209/2004/NĐ-CP of 2004. According to this decree, *nhà cấp 4* is a house which has a total floor area below 1000m2 or is less than four stories in height. Technically, according to the Circular 05-BXD/ĐT of 1993 by the Ministry of Construction, *nhà cấp 4* is characterised by brick load-bearing walls for structure, stones for its foundations and corrugated iron sheets or clay tiles for the roof. The main difference between *nhà cấp 4* and other types (*nhà cấp 3*, *nhà cấp 2* and *nhà cấp 1*) is that it has a load-bearing structure – reinforced concrete (RC) skeletons are used in the other types.

Based on this classification, both self- and donor-built houses in Hoa Hiep Bac belong to *nhà cấp 4*. However, from key informant interviews, despite the same structure, donor-built houses are technically stronger than their self-built counterparts.

Another difference between self-built and donor-built post-disaster houses is the use of community consultation during the design and construction process. While donor-built houses were designed with the participation of beneficiaries, the local authority, community-based organisations and building experts, self-built houses had no consultation with any external stakeholders except for the collaboration between the homeowners and local workers. As one self-build respondent said:

> I rebuilt my house on the old foundation and in the same type of pre-disaster house without instructions from professionals. All we did was try to finish the construction as soon as possible for my family.

The ultimate difference, however, lies is the construction quality of some building parts. From observations supported by household interviews, self-built houses seem to be of a better quality than donor-built ones, particularly the roof. All five donor-built houses surveyed had problems with water leaks (Figure 14) while no similar problems were found in the self-built houses. As local builders commented, this may have resulted from the low-quality mortar used for roof ridges or because the iron corrugated sheets were incorrectly inserted into the roof ridges. This problem means that the steel roof purlins underneath rust much more quickly, which reduces their load-bearing capacity. This can affect the building's stability during disasters and ultimately reduces the building's lifespan.

Figure 13. Donor-built house with thicker walls and continuous beams

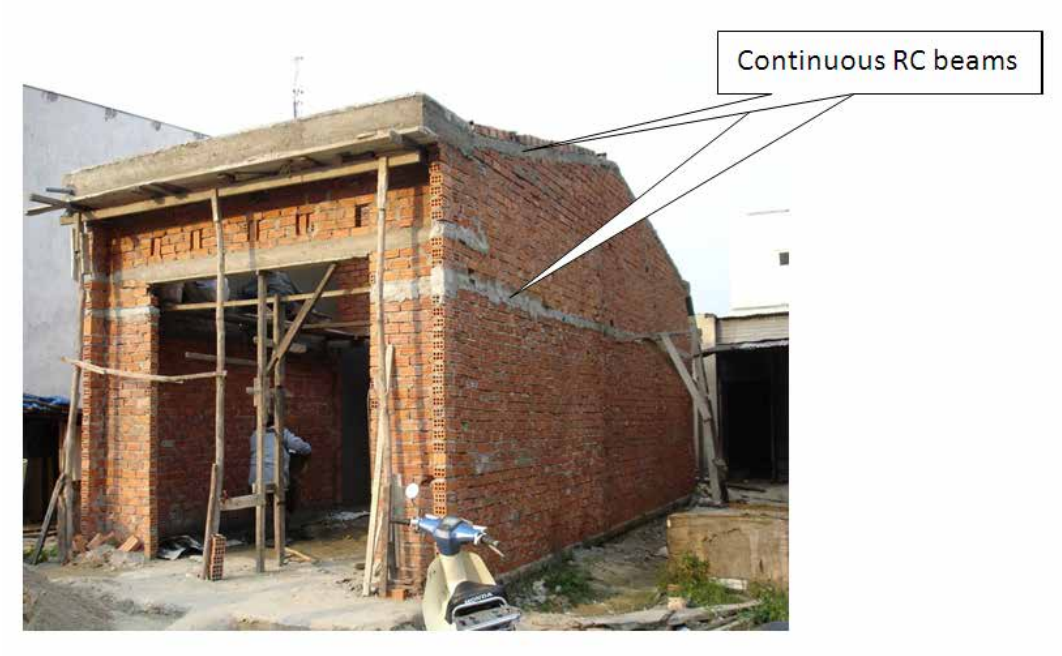


Photo: Nguyen Thanh Binh

Figure 14. Problems with water leaks seen in donor-built houses

Photos: Tran Tuan Anh

Further group discussions and household interviews helped to explain this failure. For self-built households, the owners become the key actors, supervising all construction work. They are also spending a significant amount of their annual budget. All parts of the building are strictly monitored by the homeowners, meaning that any problems would be immediately corrected. On the other hand, usually only building contractors and project technical staff are minutely involved in the construction of donor-built houses. This is more likely to reduce the control that homeowners have over the construction process. Despite beneficiaries being encouraged to participate in their house's construction, in reality, householders said that their voices were not very powerful as their self-built counterparts and that some of their requirements were neglected by external contractors.

3.1.3 Issues relating to agents

The main issues related to agents are the limited awareness of at-risk households and local authorities, and the fact that while the private sector has valuable resources, these remain out of reach of most communities in need.

Household interviews showed that both self-built and donor-built households lack an in-depth awareness of potential risks from climate change and climate hazards. The fieldwork findings revealed that both self-built and donor-built households have quite similar levels of awareness about both the risks and their own resilience. They seem to have less understanding of climate change but more knowledge about natural disasters. However, their awareness of natural disasters is still limited. Eight out of ten surveyed households said that the occurrence of natural disasters in Da Nang had reduced, as there had been no more big storms since 2006 like Xangsane. Two respondents felt that Xangsane was a 'once in a hundred years' disaster and may not happen for another century. This limited awareness may explain a lack of disaster preparedness measures in local housing and may have contributed to the uncontrolled housing vulnerability of this ward. As one key informant stated:

> At the time right after Xangsane, due to many houses being destroyed, the pressure of building safe houses made people easily accept and follow safe construction principles. Nowadays, when economic pressures are greater than disaster management pressures, most practices of local housing construction do not conform to safety-related criteria. In addition, due to the lack of knowledge of local masons and the subjectiveness of householders, most new houses built in recent years do not incorporate storm resistant features and may obviously be incapable of coping with future typhoons.

People experienced great trauma during typhoon Xangsane. This has negatively affected local perceptions of the effectiveness disaster risk reduction. It has reduced people's beliefs in the safety of their houses, even those provided by SC with storm-resistant features. As one donor-built interviewee said:

> I don't think my house can withstand a typhoon like Xangsane. All of us must run to safer places if the Xangsane revisits. We still remember very clearly what happened in the Xangsane seven years ago.

There is also a gap in local authorities' awareness of climate risk management and climate change adaptation for low-income housing. Group discussions showed that building climate-resilient housing is considered as solely the responsibility of households and that local authorities only play a supportive role, offering immediate help to disaster victims immediately before, during and immediately after disasters. There was no mention of strategies for raising housing resilience to climate change for longer-term periods in their responses. Efforts to improve communication systems or administrative mechanisms for safe construction, were also absent.

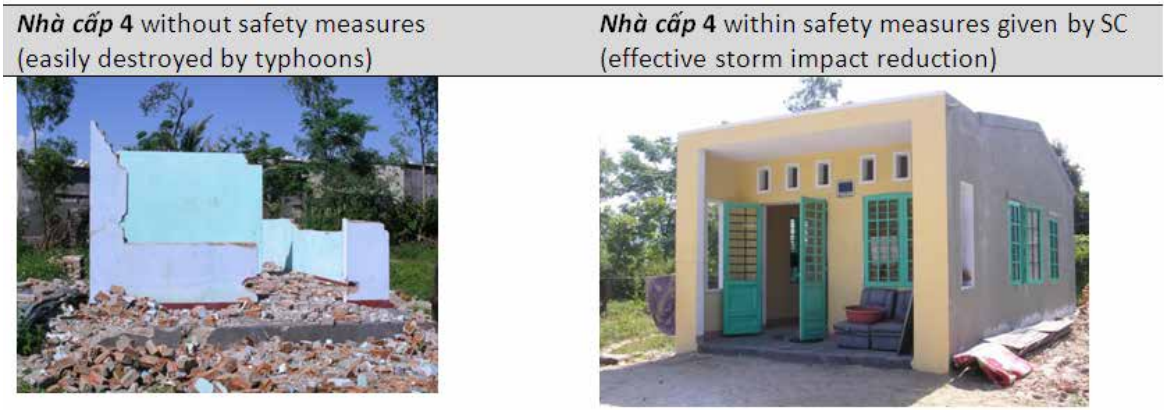
> The disaster prevention and preparedness board of the local authority is usually active during the rainy and stormy seasons when receiving the directional documents, instructions, and tasks from the higher levels.

In addition, the fieldwork found that households, community based organisations and also local authorities all have a fundamental misunderstanding about the design of *nhà cấp 4* houses. They see them as often unsafe and incapable to withstand storms. In their minds, and *nhà cấp 4* is only a one-storey brick house without a RC skeleton and/or RC roof slab.

> Before the storm (Xangsane), local houses in this ward mostly belonged to nhà cấp 4, unsafe and weak. After the storm, people started to build safer houses with the addition of more posts in structure.
>
> People here are poor. Their income is enough only for food and nhà cấp 4. To them, there are many other vital needs rather than safe home.

The reality of the *nhà cấp 4* house is distorted in reality. It is seen as a temporary, unsafe house. In fact, if constructed properly as the government intended, *nhà cấp 4* can become a safe and permanent structure. This has been proven in practice in Central Vietnam recently, where *nhà cấp 4* houses were built by projects implemented by e.g. DWF, SC and HHVN (Figure 15).

Figure 15. *Nhà cấp* 4 can resist typhoons if properly constructed



Photos: Save the Children.

This misunderstanding about *nhà cấp 4* has led to a dominant social belief that houses made by RC skeletons and slabs are the best for storm resistance, and that houses without these RC parts such as *nhà cấp 4* are easy to be destroyed by storms. Ironically, it is the high construction costs involved in building houses with RC features which have undermined the resilience efforts of low-income households.

> This house (brick house) is unable to resist typhoons. Only houses by RC can withstand them. If I have money at any time, I will build a RC house immediately because of intense fears from the Xangsane……Living in this existing house, if there will be a storm as Xangsane, we must run to a primary school nearby, about 5-minutes running.

On the other hand, private sector actors, particularly built environment professionals, seem to have a better understanding of how to build climate-resilient housing in terms of using safety-related principles and techniques even though the quality of these houses (donor-built) was not as good as self-built ones. When interviewed, one key informant – a project architect – indicated that misunderstanding by local people was one of the main reasons for increased housing vulnerability.

> The poorer, the more vulnerable they are because they cannot afford the use of some costly safety-related measures with good-quality materials… People always think brick houses are incapable of resisting storms but in the SC houses I designed, even by brick, they can withstand storms effectively.
>
> Not all weak houses can be upgraded for disaster mitigation because they are technically weak from the foundation and the improvement of foundation is similar to the construction of a new house.

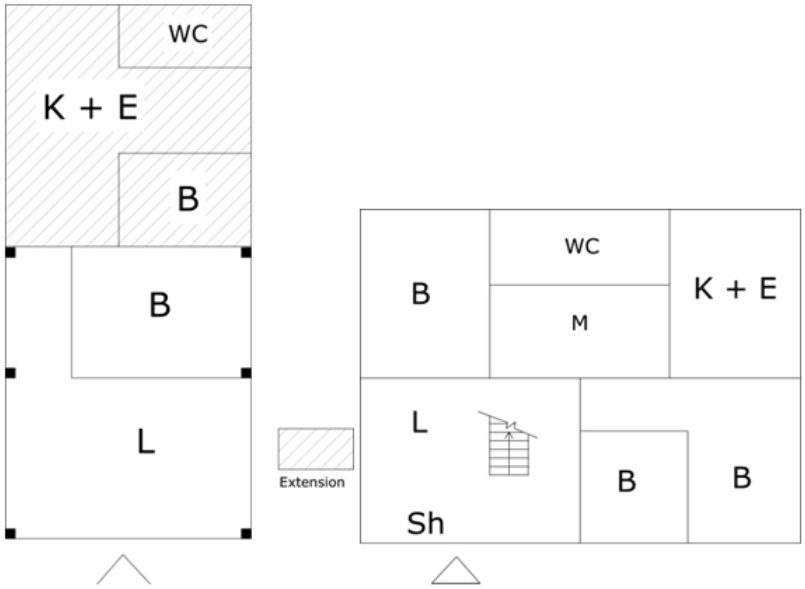
3.1.4 Issues related to the system

While there is more flexibility and fail-safe features found in self-built housing, there is more redundancy in donor-built housing.

Regarding **flexibility**, based on household interviews, the functional spatial layout of self-built houses is more appropriate to a family's needs. The position and the size of each space/room are decided by owners (Figure 16). On the other hand, donor-built houses with similar designs and room sizes, even those agreed on by most beneficiaries during the project planning phase, seem to be less adaptive to a family's expectations. Three out of five donor-built households interviewed said that their houses were too small to accommodate vital living functions such as bedrooms, a kitchen or a toilet.

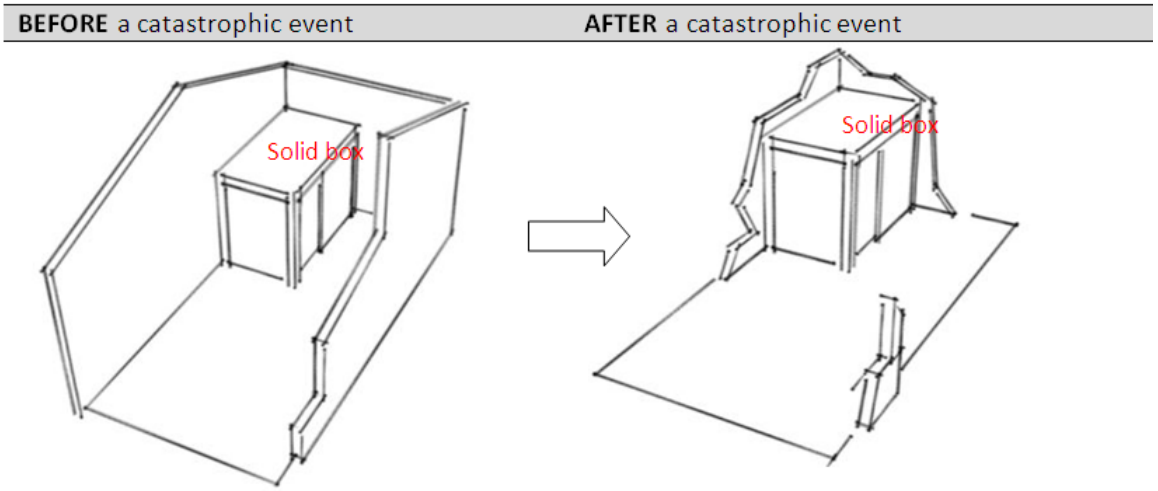
> My house with two small bedrooms is not enough for my children. We cannot put a double bed in a small bedroom and so, they have to sleep on the floor instead.

Figure 16. The flexibility of the spatial layout in a self-built house (right) compared to a donor-built one (left)



Although self-built houses are, technically, not better than donor-built ones, their owners seem to be more creative when designing safe places in their unsafe houses for emergency use during catastrophic events. Four out of five self-built houses visited included a 'solid box' (Figure 17), made with a reinforced skeleton and slab, where the family can take refuge during calamitous typhoons. For the rest of the time, it is used as a toilet. In comparison, according to household interviews, none of the five donor-driven houses visited have similar emergency solutions except for evacuating to the nearest safe place. The fieldwork demonstrates that while *fail-safe* design is widely applied in self-built houses, it is limitedly addressed in donor-built ones.

Figure 17. Self-built houses commonly include a solid box room, such as a toilet, which acts as a fail-safe



However, according to respondents, even where they have incorporated a solid box in their homes, they will use it as a last resort if it is impossible to evacuate to another safe place.

In terms of **redundancy**, donor-built houses have illustrated better performances than their self-built counterparts. Redundancy here refers to the number of technical features used for storm hazard mitigation in the house. Houses that contain more such technical features have a **higher redundancy**. Donor-built houses, with the addition of structural elements such as beams and thicker walls, have a higher redundancy than self-built ones.

From his surveys on houses destroyed by Typhoon Xangsane in this area, the project architect found out that this storm had destroyed all building parts – except for a type of front veranda made with a closed reinforced concrete frame (Figure 18). He applied this lesson to new donor-built designs for post-disaster housing, in which the whole structure can be consolidated in the same manner with the addition of some continuous beams. It was then found in all five houses surveyed in this study. To increase the solidity of buildings, he also recommended the use of thicker walls because he believes the presence of these two elements helps the house to stand firm during typhoons. In this way, redundancy is widely found in the donor-built houses, but not in the self-built ones.

3.1.5 Institutional issues: resilience-related information, governance and community consultation

Resilience-related information here refers to the experiences, knowledge and lessons learnt related to building long-term climate resilient housing, rather than just resisting disaster impacts in the short term. However, it is hard to find resilience-related information in this community. Even at local authority levels, such information is widely unknown to local staff apart from their knowledge from previous years related to short-term preparation measures immediately before a disaster, as well as responding to and recovering right after a disaster. According to one focus group participant,

> Information for disaster management in this ward just focuses on the preparation and implementation of immediate coping strategies before disasters and relief and recovery measures after disasters without consideration to the long-term solutions for increasing local housing resilience to climate extremes.

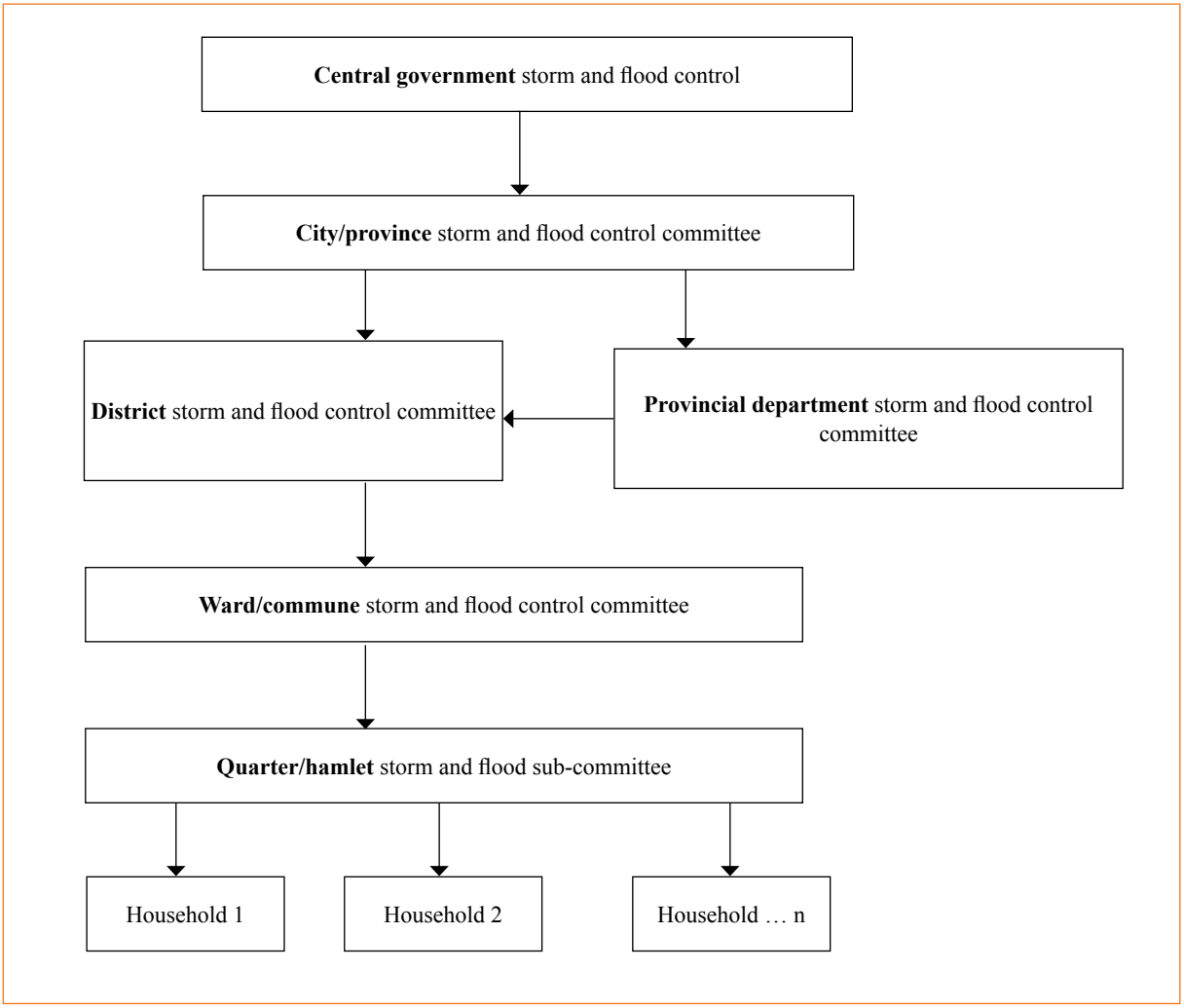
Figure 18. This reinforced concrete veranda was still intact after the typhoon Xangsane in 2006

Photos: Save the Children.

In terms of effective governance for housing vulnerability reduction, disaster management in this ward is mainly based on an action plan, which is annually designed and adopted from the central and city governments to the local levels. In some cases, there may be more directional documents from the city and/or district governments to further plan and implement for more disaster-responsive strategies in some specific regions, due to their greater exposures to climate risks. Group discussions revealed that the local authority in Hoa Hiep Bac ward adheres completely to the directions and tasks in the action plan adopted by the district and city government.

> All local departments here (in this ward) absolutely conform to the tasks in this action plan to plan and implement specific actions for disaster reduction in each location of this ward. We never think of using other measures outside this plan because it already shows all necessary measures for disaster management.

Figure 19. Current disaster management mechanism in Vietnam



In reality, the action plan is initiated through a conventional administrative system from the central government to households. A disaster management committee is established at all levels (Figure 19). According to group discussions, committees at hamlet/quarter levels are the most effective, as they are seen as the pioneer force when a climate event occurs. They work as the main information channel in the disaster seasons within the community, where directional information from the ward and district is disseminated to all at-risk households. The real situation of each at-risk place, group or household is reported back to ward and district leaders for making timely appropriate decisions. The head of this

committee is also the leader of the hamlet/quarter who usually captures the real circumstances of each household and the community, and who has a position of high prestige in community.

> Subcommittee for storm and flood control in each hamlet is very busy in the disaster season. They have to go to each household to remind them about housing consolidation and property protection and have become the main information channel between communities and local governments during disasters.

However, they are only effective in preparing immediate measures to respond to a predicted disaster, which are given in the action plans or by the ward and district. According to group discussions, their work is still limited to reminding, warning and providing updated information to people to help them reduce damage and losses. For the purpose of building housing resilience, they seem to lack information, knowledge and tools. Furthermore, in the action plan, there are no detailed instructions or guidelines for improving housing resilience to climate change except for encouraging people to consolidate their houses or, in cases of extremely unsafe housing, encouraging them to evacuate to safer places when a hazard is approaching.

The over dependency on the action plan has revealed the limitation of local administrative bodies in achieving climate change adaptation and resilience, particularly for housing. This has led to ineffective governance for developing a resilient housing system. In addition, weak safety management for local construction (such as the lack of construction laws or standards for safe construction in hazard-prone areas) has also contributed to the limited governance system in this ward. For the construction of *nhà cấp 4* (perceived as temporary houses), a building permit is not required except for a permission application form, which is signed and sent to the ward committee by homeowners. Only basic information such as simple house plans, building sizes and some building elevations are needed for the application.

There is a lack of communication between at-risk communities and professional stakeholders. From the survey, it can be seen that those with self-built houses had no communication and consultation with professionals during the design and construction of their houses on how to build safer houses. They were free to decide their housing forms, spatial layouts, building sizes, materials and methods of construction and commonly without storm-resistant features. On the other hand, donor-built houses were designed in consultation with beneficiaries through community meetings at the preliminary stages and household visits in later stages, according to key informant interviews.

In the current situation of local housing construction, according to group discussions, the construction of low-income housing, mainly *nhà cấp 4,* still lacks any consultation with professionals related to safe construction. People simply work with hired local masons and freely decide which means of construction they want to use. The process to build a *nhà cấp 4* house in this ward often has two main stages. First, the preparation of the house plans and elevations is done, and an application to gain permission is sent to the ward people committee. Housing plans and elevations are usually prepared with the help of local staff from the ward's land registration department or architecture students temporarily staying in the community while studying in nearby universities. The purpose of this planning permission application is to help the local authority ensure the residential land use and building sizes conform to planning criteria for the region. After approval, homeowners can begin construction with local masons. According to household interviews, many changes are often added during construction, such as alterations of spatial layouts or roof types, according to owner's needs or recommended by the masons as being easier and cheaper to construct. Ward and district authorities rarely visit the construction site to check whether the house conforms to the approved plans.

In terms of land tenure, seven out of ten interviewed households have no official land-use rights certificate, locally called *sổ đỏ*, except for a confirmation paper from the ward's land registry department. Most of them said that they were to be granted *sổ đỏ* in a year or two. For the plots without *sổ đỏ*, it is impossible to get a building permit from the district if they want to build a permanent house. They are only able to ask permission for temporary construction, usually in the form of *nhà cấp 4* which is without upper stories or a concrete slab, and of course without any technical design features. This is also one of the obstacles to the development of climate-resilient housing here.

3.2 Case Study 2: Loc Tri, Phu Loc, Hue

3.2.1 Background

Loc Tri, located in Phu Loc District on the southeast of Hue City, was the second case study site (Figure 20). This commune next to the Cau Hai Lagoon is seen as one of the areas of Hue City most vulnerable to climate change. Climate change projections in this region relate to the irregular occurrence of climate events with unpredicted times of happening and increased intensity and frequency of rains and cyclones. Climate change has had a critical impact on housing and local livelihoods, mainly fishery, resulting in critical economic losses in recent years.

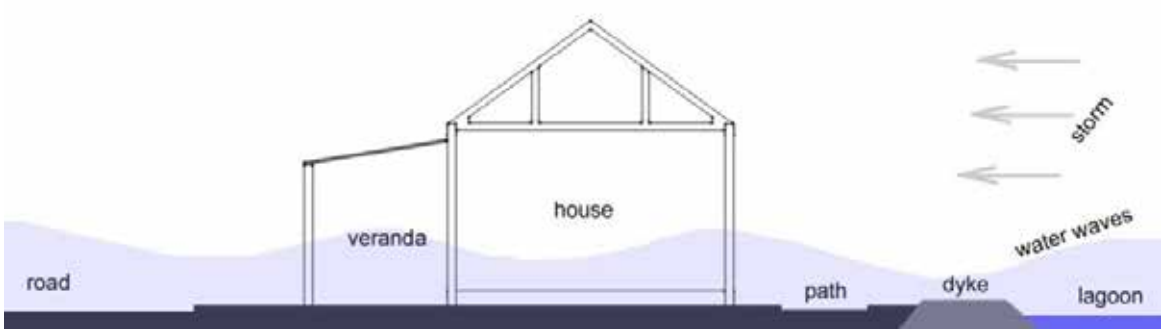
Figure 20. Location of Loc Tri in southeast Hue.

Photo: Tran Tuan Anh
Map: www.ttvnol.com

In housing, storms and resulting high sea waves are considered to be the main climate hazards (Figure 21). Strong storm winds intensify the sea waves which, subsequently, put greater pressure on houses. According to household interviews, the impact of sea waves during the storms is more intense and dangerous than the impact from high winds. Waves can easily destroy walls. According to the group discussions, about 85 per cent of local houses here belong to *nhà cấp 4* category, which is a temporary housing type as discussed above.

Figure 21. Storms are the main hazard to local houses, and storm waves in particular

Huge sea waves can breach the sea dyke, causing poorly-constructed buildings to collapse easily. Consequently, all houses in this area must be built on concrete beds which help to protect the walls.



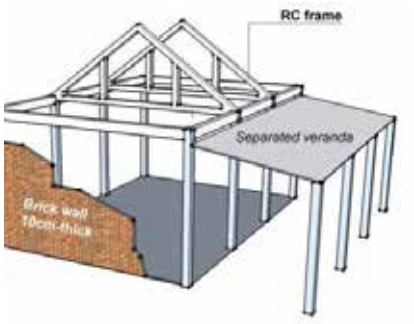
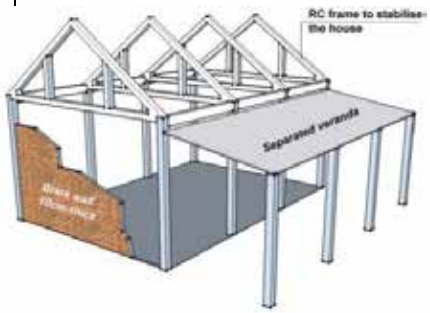
Typhoon Xangsane in 2006 seriously damaged this commune, in which nearly 100 houses were totally destroyed, over 300 houses were damaged, and there were significant losses of local livelihoods and infrastructure. After Xangsane, DWF supported the reconstruction of 7 donor-built houses in the case study site. The number of self-built houses, however, were much higher, about 30–40 houses, according to local representatives.

3.2.2 Differences between donor-built and self-built post-disaster housing

There are not many differences between self-built and donor-built houses in Phu Loc. Two dominant housing types, *nhà ống* (tube house) and *nhà ba gian* (three compartment house), are commonly seen in both self-built and donor-built groups (Table 2). While the *nhà ba gian* is the reflection of Hue traditional houses, the *nhà ống* is representative of modernisation and urbanisation in Vietnam, in which one side is often much longer than the other side due to the common rectangular form of divided plots in new urban areas. It can be found almost everywhere in Vietnam. According to housing classification by the Vietnam government, these two types belong to the *nhà cấp 4* category. Similarly, the concept of *nhà cấp 4* is also misunderstood by local people here as they suppose *nhà cấp 4* is a temporary and unsafe house.

The first difference between self-built and donor-built houses here can be found in the roof structure. The donor-built houses contain more structural elements in the roof than the self-built ones, such as the addition of concrete frames in the middle of the house and on the gable walls. This makes the roofs of donor-built houses stronger than self-built ones and improves the solidity of buildings. According to household interviews, the main reason for using fewer structural roofing elements is the limited awareness of householders. Most self-built households assume that such elements would cost more money and that the stability of their houses is not dependent on the presence of these elements.

Table 2. The difference between self-built and donor-built houses.

Self-built	Donor-built
	
	
Nhà ba gian (three compartment house) above, and nhà ống (tube house) below	

3.2.3 Agents: improved awareness of at-risk households and local authorities

According to household interviews, people here have a long tradition in coping with extreme climate events. They take disaster preparedness measures seriously. They were not surprised when Xangsane came, as several similar storms had visited the region in the past. In 8 out of ten houses surveyed, each included some features for consolidating the house during the stormy season, such as wooden bars for putting on the roof, tough fishing net to cover the roof, or iron cables to anchor roof structures to the ground. Due to economic constraints, they prefer these immediate solutions because they are cheaper and locally available.

> My family has to buy these iron cables and nets to consolidate the house when storms come. They cost not much money but can help avoid unexpected damages.

At the community and authority level, according to group discussions and key informant interviews, the awareness of those in charge appears satisfactory. They could identify the main climate hazards and the most vulnerable sectors in their regions and were worried by the worsening trend of future climate conditions caused by climate change and global warming. Most of them believed that storms would increase in future and that local housing would be inadequate to cope if no safety-related measures were taken.

> People in this commune have realised potential threats of storms, particularly with sea waves, because many big storms occurred in the past. Their housing construction, despite being without building permits, has addressed some structural elements to stabilise the building.

3.2.4 The system: adequate flexibility and redundancy but limited fail-safes

All surveyed houses were highly flexible to each household's needs in terms of functional space. Self-built houses are not discussed here because their **flexibility** has already been addressed due to the design freedom home-owners have, based on their actual needs. Within donor-built houses, even though designed by an outsider (DWF), the houses still demonstrate a high level of responsiveness to people's ways of life. For instance, spaces for fishing tools (livelihoods) and worship (culture) can be found in all donor-built houses. As one donor-built householder said:

> The project team was highly respectful of local needs and allowed us to participate in the project as much as possible. For construction, we collaborated with local masons and all construction work was under a very strict supervision of the project's technical staff.

Another aspect showing the flexibility of post-disaster housing here, seen in both self- and donor-built houses, is the use of lightweight furniture such as plastic tables and chairs to avoid flood damage. The lightweight furniture is easy to move or lift up to hang from the ceiling during storms or floods.

In terms of **redundancy**, a combination of technical solutions for disaster risk reduction has been applied in both self-built and donor-built houses. Reinforced concrete beds or altars are used to consolidate the foot of walls (Figure 22 and 23) and continuous beams surrounding the building intensify the stability of the housing structure. As mentioned earlier, powerful sea waves during the stormy seasons are more dangerous than storm winds, and are more likely to destroy a house's walls. And the use of reinforced concrete beds is valuable local wisdom in terms of disaster risk reduction.

> You can find the reinforced concrete beds in all houses here. Because of their long-term experiences facing strong typhoons and sea waves every year, people here, by themselves, designed this solution which is very effective, cheap and durable.

Learning from this local experience, the DWF applied it to all their donor-built houses. Reinforced concrete beds are also incorporated in all five donor-built houses.

The project staff (DWF) were very kind when they listened to household's proposals and they accepted this solution of reinforced concrete beds design because this was necessary for disaster preparedness.

Figure 22. Reinforced concrete beds and altars act as consolidating elements in housing structures

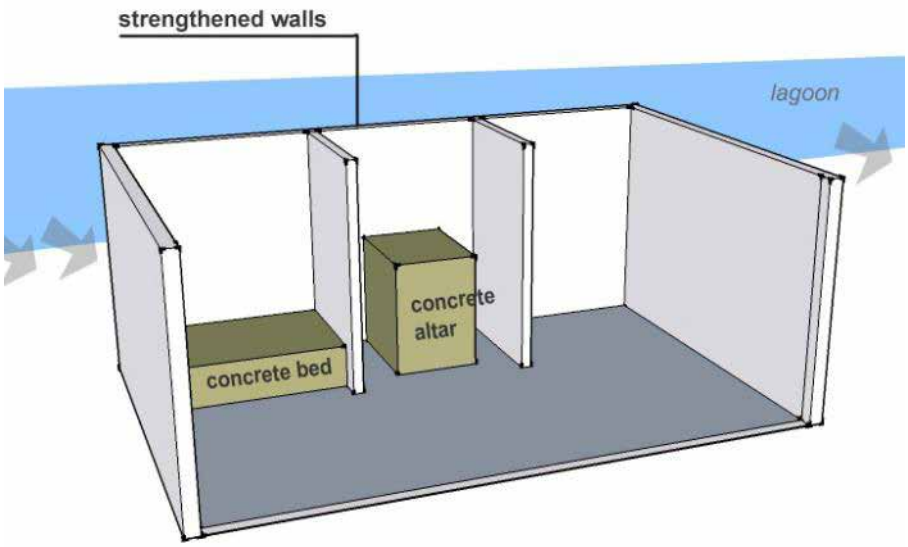


Figure 23. Reinforced concrete beds (left) and altars (right) were found in all surveyed houses

Photos: Tran Tuan Anh

To further reinforce their houses, people here also add two to three reinforced concrete beams in the middle levels of the house. These connect all the walls together and intensify the building's solidity (Figure 24). After every three lines of cement blocks in the wall structure, there is a reinforced concrete beam going around the house. This local technique was also applied by DWF and can be found in their houses. By this way, the redundancy in technical aspects of local houses here seems to have been met. And people believe that, using these two solutions, their houses can effectively withstand disaster impacts, as has been the case in the previous disasters.

Figure 24. Continuous reinforced concrete beams surround the building to strengthen its walls

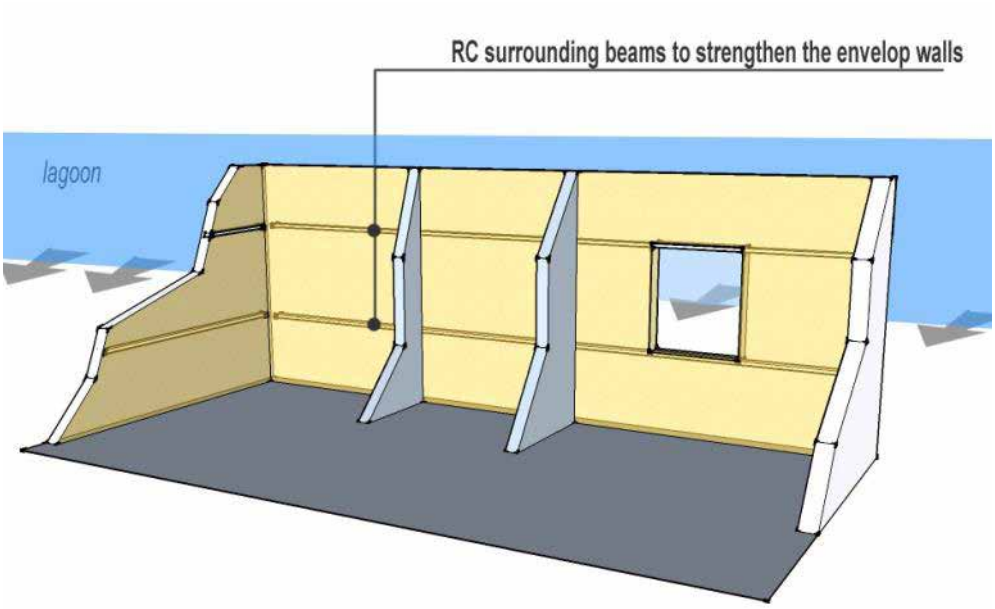


Photo: Tran Tuan Anh

Post-disaster houses seem to lack **fail-safe** elements in their designs. Despite their houses containing some construction techniques for safety, most surveyed households preferred to evacuate to a safe place in the event of a disaster, particularly for children, women and the elderly. Only men remain on site during disasters to respond to unexpected situations such as collecting belongings and valuable items from a collapsed house or floodwaters, or to rescue people. Because this region is affected by both storms and floods at the same time, the use of a safe place such as the solid box seen in Da Nang is not so effective if floodwater levels submerge the house. The option of moving to a safer place is preferred as a result.

One of the biggest concerns about the post-disaster houses visited was the absence of an indoor toilet in both self-built and donor-built houses (nine out of ten houses surveyed). Household respondents revealed that they go to the dam at the lagoon to relieve themselves. The toilet is considered to be an unclean place which must be outside of the house and the dam becomes the 'perfect' place for this function. However, it is really an unsafe activity in the rainy and stormy seasons. It is also the main factor behind of disease transference, and has a negative impact on the natural environment. According to group discussions with local authority and community-based organisations, this unhealthy habit needs to be changed in the future.

> We don't like to have toilets inside the house because of their bad smells. Nobody in this village builds a toilet in their houses. The project team had suggested the toilet but we disagreed and they accepted what we wanted.

3.2.5 Institutions: limited governance and community consultation

In terms of **governance**, there are no legal documents stipulating or instructing the construction of climate-resilient housing. Short-term solutions for protecting people and property are preferred in current governance mechanisms, whereas long-term strategies for raising housing resilience such as improvements to administration systems or legal frameworks are still absent. Just like in Da Nang, most actions taken for disaster risk reduction are based on the action plan approved at the district level. And those actions mainly involve immediate responses to disasters.

> At the beginning of the stormy seasons, this ward will organise a meeting with the participation of village leaders to implement the action plan for each vulnerable area. Solutions to reducing disaster impacts, evacuating, rescuing, relief and recovering after disasters will be planned and assigned to each department.

In addition, building permits are not required for housing construction of *nhà cấp 4* – and not only after the Xangsane typhoon (2006). People can still freely decide how to design their own house without any instructions or guidelines on how to build safer home.

In terms of **community consultation**, as in Da Nang, there was no consultation for the self-built group, although community consultation was widely used with the donor-built ones. While the construction of self-built housing was done by owners and local masons, donor-built housing was designed through the collaboration among people (beneficiaries), community leaders, community-based organisations, the local authority, local builders and built-environment professionals. The process of community consultation used by DWF was done in two stages: a community meeting with beneficiaries, community-based organisations and the local authority; and individual meetings with beneficiary households to initiate design solutions, based on their family-tailored approach. With effective community consultation and the use of sufficient community feedback, DWF provided this community with an adequate appropriate housing solution following Xangsane, which was highly appreciated by local people.

> DWF staff worked as our friends. They were very friendly and always had open minds. They listened and understood what we needed and satisfied us with appropriate and specific solutions.

In terms of land-use rights certificates (*sổ đỏ*), all surveyed houses in Loc Tri already have these certificates. This increases their sense of land ownership and allows them to build more solid or permanent houses, not *nhà cấp 4*, on their land whenever they can afford to. To do so, they need to apply for a building permit, submitting more detailed architectural plans and drawings of the house to the district authority. However in reality, not many households can afford to construct permanent houses due to the high costs involved and their economic constraints. Most local households in Loc Tri still use the *nhà cấp 4* design for their houses as it is much cheaper and a building permit is not required (except for a permission form sent to the commune authority). This uncontrolled situation in terms of the construction of *nhà cấp 4* has contributed to the increased housing vulnerability in this region.

3.3 Comparative analysis

Technically, the difference between donor-built and self-built post-disaster housing is clearer in Da Nang. The case studies show that people in Hue seem to have more experience of disaster preparedness than people in Da Nang, as the self-built houses in Hue have incorporated more safety-related measures in their structures. It may also be due to their longer history of coping with natural disasters, whereas Da Nang has only experienced strong typhoons since 2006.

In terms of **agents**, the perceptions of local communities on climate change and climate risk reduction in both cases vary. Most respondents realise the climate risks to low-income housing, although people in Hue seem to have higher levels of awareness. At-risk local families in Hue demonstrated more activeness and readiness to cope with climate hazards in comparison with Da Nang's families. As well as using techniques for safer construction (such as adding reinforced concrete beds and multiple beams to the house), Hue's families also use vital equipment and tools (e.g. wooden bars, iron cables or strong fishing nets) to consolidate the house when a hazard (storm) comes. They seem to be more self-sufficient in responding to climate change.

Another interesting finding from the case studies is the appearance of social capital. In Da Nang, self-built households with limited financial capacity used their strong social relationships with neighbours, friends and relatives to seek assistance to complete their housing reconstruction. Instead of hiring construction workers, they 'borrowed' workdays from their friends or neighbours and later repaid them in kind (free labour). This type of social capital was commonly seen in most self-built post-disaster houses, but rarely found in donor-built ones in Da Nang. In Hue, both self-built and donor-built houses used this social capital to reduce construction costs. The DWF (donor) approach, family-tailored, was entirely based on the full use of local resources and capacities to meet local needs and expectations.

Civil society (community-based organisations and NGOs) appear to have similar levels of awareness and capacity in both Hue and Da Nang. Their role is important to help at-risk communities identify and then reduce their vulnerability. However, the different reconstruction approaches for post-disaster housing used by two NGOs, Development Workshop France and Save the Children, generated different results. The family-tailored approach used by the DWF made Hue's families more satisfied with their donor-built houses compared with SC, where a so-called 'community-based approach' only gave beneficiaries limited satisfaction. The more participation of local people in the housing design and construction process in the Hue case, again, demonstrated its real efficiency regarding local cultural appropriateness and reduced construction costs.

It can be seen from the two case studies that the private sector seems to stand outside the process. Some private sector actors, such as architectural firms, university scholars or building experts – who have better insights into disaster risk reduction and climate change adaptation – are not really involved in the design and construction of low-income housing. Currently, there is still an absence of appropriate consultation and participation mechanisms in both cases, where the involvement of the private sector could be intensified and integrated into the development of climate-resilient housing.

> Post-disaster housing reconstruction in this ward after the typhoon Xangsane (2006) mainly involved the project technical staff, local authority and the beneficiary community. The private sector is unnecessary and often out of this process.

In terms of **systems**, while donor-built houses in both cases demonstrated an adequate capacity for hazard mitigation, self-built houses in Hue exhibited a better performance than self-built houses in Da Nang, since they incorporated more technical hazard mitigation features to meet the requirements of **redundancy**. The improvement of **flexibility** due to culturally appropriate spatial layouts is widely seen in donor-built houses in Hue, but only limitedly in Da Nang. People in Da Nang had more complaints about their donor-built houses due to the difficulty in fitting their furniture inside and for extending the house at a later date. Although **fail-safes** were addressed in Da Nang's self-built houses, their overall performance regarding technical safety is not higher than Hue because fail-safes will be ineffective in any extremely unsafe houses. Similarly, donor-built houses in Hue show their higher flexibility since the actual needs and expectations of at-risk families were fully addressed in both housing design and construction. The family-tailored approach of DWF, where people had a stronger voice and more decision-making power in the housing reconstruction process has proven its long-term success in reality.

In relation to cost effectiveness, self-built houses in both cases were quite efficient as they used all available resources (materials and labour) whenever possible. However, the donor-built houses in Da Nang seemed to be less cost effective due to the use of building contractors from outside the community.

Concerning local knowledge and experiences, donor-built houses in both cases showed their inheritance of local wisdom related to safe construction. Project architects learnt about valuable local experiences and practical solutions and then applied them to their new housing designs, such as the use of surrounding reinforced concrete beams in Da Nang, or the use of local common reinforced concrete beds in Hue.

In terms of preparing for future climate risks, Hue people were more active than people living in Da Nang. They use important tools and equipment to strengthen their houses for when disasters strike, but no similar preparation measures were found in Da Nang. According to household interviews, these future preparedness strategies do not cost much money but could significantly help to minimise storm damage and losses.

In terms of **institutions**, both cases revealed critical shortcomings in terms of stakeholder participation and community consultation for climate-resilient housing. Community consultation was used in donor-built housing reconstruction in both cases, but only during the time of project implementation (2007). There was no such consultation for the self-built groups. Within the donor-built groups, a community meeting was organised at the beginning of the project with the participation of project staff, community representatives, the local authority, community-based organisations, local builders and beneficiary families. The main purpose of this meeting was to provide information about the project objectives and timescales, the targeted populations and the working procedure, and to seek some initial agreements for the next steps. Then, separate visits and talks with the selected beneficiary families were conducted by the project technical staff, mainly architects, to assess their living needs and capacities for reconstruction prior to finalising the design and construction method. In both case study sites, the community consultation process for donor-built reconstruction followed two main steps: community meetings and then separate household consultations. However, Hue's donor-built houses were more successful because, according to key informant interviews, the project team worked very closely with the community from the beginning and during the decision-making stages, to seek agreement on any suggested housing design solutions before construction took place. Furthermore, the project team also had a regular supervision on construction activities to ensure the building work conformed to the design.

For the self-built houses, people constructed their houses without any support or guidance on safer construction from external stakeholders – they simply based the construction on their available experiences. What is clear from the two case studies is that people in Hue had a much longer history of facing disasters. This accumulated experience allowed them to build stronger houses than people in Da Nang, who have only recently realised the need for storm-resistant houses since typhoon Xangsane struck in 2006.

In both cases, the reality of having no community consultation process in the construction of the self-built houses shows a gap between the built environment profession and at-risk communities, where essential professional expertise and knowledge is not found in either housing design or construction. According to household interviews, low-income households could not afford to hire architects. On the other hand, from the viewpoint of local architects, they would not usually target low-income groups as clients, because they could not charge a high enough fee. This gap is a real challenge to the development of climate-resilient housing that necessitates the involvement of local governments and the public sector to seek a bridge between these two groups.

Regarding **governance**, limited links between at-risk households and local administrative bodies still exist in both cases. No official forms of managing and directing local construction are used in these two hazard-prone areas, apart from encouraging or trying to convince people to use safer construction methods. No building codes, regulations or guidelines for safer construction are used in these vulnerable regions. In addition, building permits are often not required for the construction of low-income housing, mostly *nhà cấp 4* with one-storey structures of load-bearing brick walls, apart from a permission form submitted by the homeowners to inform local authority about their housing construction. People design their homes based on limited experience and skills in relation to disaster risk reduction. This weak governance of local housing construction makes a significant contribution to the uncontrolled housing vulnerability in the two case study sites.

In sum, the discussion above relates to the successes and limitations of post-disaster housing in Hue and Da Nang against the climate housing resilience framework established in the literature review, which revealed some key issues related to climate-resilient housing in Central Vietnam. There are eighteen dimensions of resilience performance addressed in the case study findings and classified in three main groups: agents, systems and institutions (Table 3). The results in Table 3 show that donor-built houses in Loc Tri, Hue City have the highest performance (83 per cent) in comparison with other groups (≤61 per cent). The success of DWF's donor-built post-disaster houses indicates that the effectiveness of climate-resilient housing really necessitates the cooperation between both local and new knowledge and expertise. These should be shared among stakeholders through community meetings and separate household consultations, with the organisation and facilitation of experienced and skilled persons.

Table 3. Resilience performance of post-disaster housing (✓: have ✗: have not)

Resilience performance	Da Nang		Hue	
	Donor-built	Self-built	Donor-built	Self-built
Agents				
Perception of climate risks	✓	✓	✓	✓
Self-sufficiency	✗	✗	✓	✓
Household satisfaction	✗	✓	✓	✓
Support from relatives, neighbours and friend	✗	✓	✓	✓
Local government involved	✓	✗	✓	✗
Civil society involved	✓	✗	✓	✗
Private sector involved	✓	✗	✓	✗
Systems				
Local culturally appropriate spatial layout	✗	✓	✓	✓
Hazard mitigation	✓	✗	✓	✓
Fail-safe	✗	✓	✗	✗
Cost effective	✗	✓	✓	✓
Local labour	✗	✓	✓	✓
Local knowledge	✓	✓	✓	✓
Future preparedness	✗	✗	✓	✓
Institutions				
Consultation	✓	✗	✓	✗
Leadership	✗	✗	✗	✗
Building permits	✗	✗	✗	✗
Land-use rights certificate	✓	✓	✓	✓
TOTAL	8✓ + 10✗	9✓ + 9✗	15✓ + 3✗	11✓ + 7✗
Percentage*	**44 per cent**	**50 per cent**	**83 per cent**	**61 per cent**
Community consultation				
Community meetings	✓	✗	✓	✗
Separate household consultations	✓	✗	✓	✗

* = number of ✓total (18)

Figure 25. Resilience performance of post-disaster housing in Hue and Da Nang

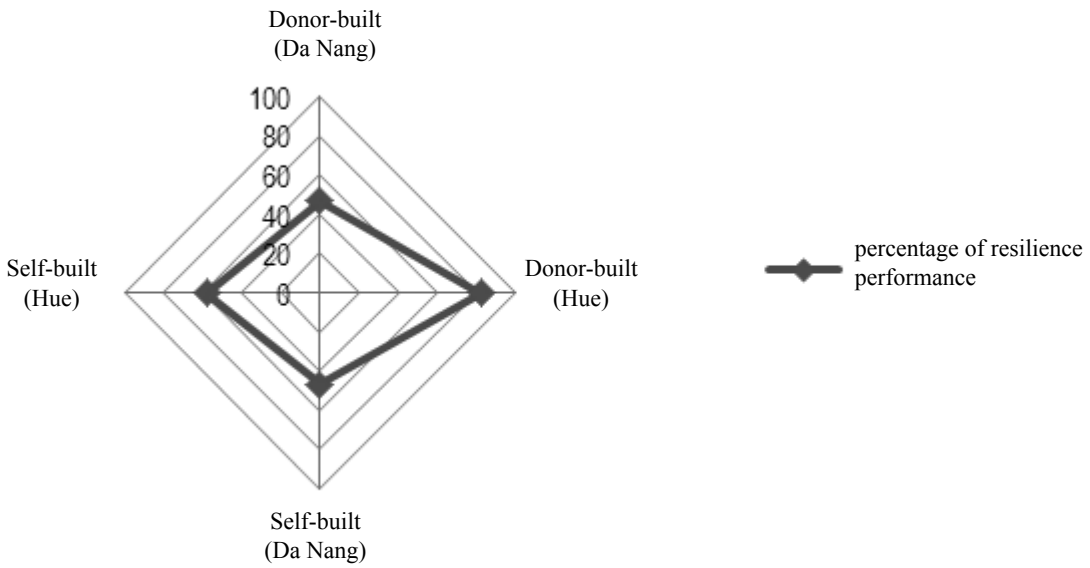


Figure 25 shows that the people of Hue have a long history of coping with natural disasters and have plenty of local experience. However, if there is no consultation with and assistance from external stakeholders (particularly the built environment professionals), their resilience performance to future climate risks are still limited (61 per cent). This echoes the findings of the literature review which found that local (indigenous) knowledge is regarded as inadequate to cope with future climate risks if there is no support from new (scientific) knowledge and expertise. On other hand, donor-built housing in Da Nang, despite involving community consultation, still revealed a restricted resilience performance (44 per cent). This poses a question about the meaning of **community**, the ability of consultation facilitators and the use of community feedback in housing strategies rather than the use or non-use of community consultation as highlighted in the literature review. The word 'community' in terms of **community consultation** should be extended to include external stakeholders outside of the at-risk community such as NGOs or the private sector (scholars, experts, researchers, practitioners, or suppliers).

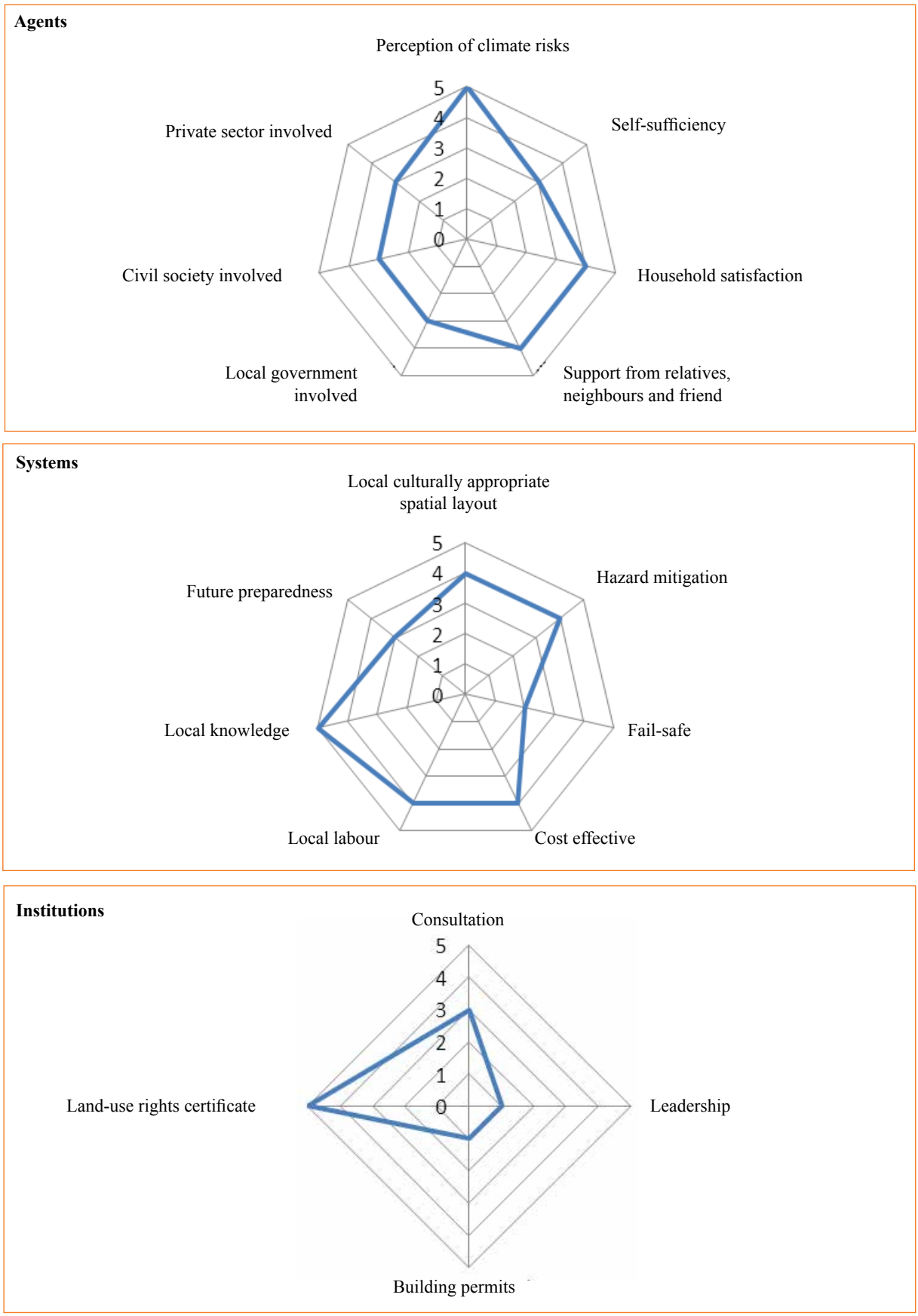
3.4 Community consultation framework

These findings infer that the development of climate-resilient housing for the Central Vietnam is, in fact, the attempt to enhance the performance of these eighteen resilience indicators. And community consultation is required to meet this target.

From the qualitative result in Table 3, it is possible to model them in the spider charts (Figure 26) to easily identify which indicators are currently unsatisfactory and need more attention and actions from stakeholders.

From the **agents** chart, generally, local government, civil societies, and the private sector are required to build more participation into the process. At-risk households, particularly those groups receiving external financial and technical support, need to be more self-sufficient rather than relying on external help for long-term climate resilience. Preparing adequate resources and capacities in response is necessary for them to reach this goal. The case studies demonstrate that economic resources and technical assistance are the most crucial resources for **self-sufficiency** in at-risk communities in

Figure 26. Resilience performance of three climate-resilient housing components (1: lowest, 5: highest)



Central Vietnam. Local government is important for local economic development while technical experts or consultant agencies are essential for technical assistance. Current social capital found within communities, such as mutual help provided among neighbours, friends and relatives, should be maintained and promoted. This necessitates the involvement of civil society organisations, such as community-based organisations, who often manage social issues.

From the **systems** chart, it can be seen that **fail-safes** are currently the weakest aspect of local housing, followed by **future preparedness** for disaster risk reduction. This necessitates the involvement of built-environment professionals, such as architects and engineers, who often have adequate professional solutions to such problems. In addition, their professional knowledge and expertise are required to improve the performance of **locally culturally appropriate spatial layouts**, **hazard mitigation** and **cost effectiveness**. **Local labour** needs to be used for housing construction as much as possible to ensure cost effectiveness. The use of local knowledge, currently adequately addressed in both case studies, should be maintained and promoted in future practices.

The **institutions** chart shows that local governance and **leadership** for building climate resilience in low-income housing in Central Vietnam is currently ineffective. The extreme limitations shown in the chart demonstrate an urgent need for local governments to take more responsibility for the development of climate-resilient housing, especially for low-income groups, and to incorporate more participation into local housing processes. Future housing construction requires more leadership and the greater use of **building permits** and directional documents to reduce climate risks.

The above discussion identifies the crucial contribution of four key stakeholders to achieving long-term climate-resilient housing. At-risk households are seen as the first and most important participants in the process, followed by local government, technical experts (architects and engineers) and consultant agencies (e.g. DWF and SC), and community-based organisations. In most cases, at-risk households need to be viewed as the key actors and placed at the centre of the process. They should participate from the very early stages and in all decision-making processes and have an influence on housing design and construction solutions.

Self-built housing has certain inherent limitations, and more assistance and guidance is required from local government, professional agencies/experts and community-based organisations for climate risk management. There is a need for administrative documents and building permits for housing construction in hazard-prone areas to reduce housing vulnerability and raise housing resilience to future climate impacts. In addition, there is a demand for having appropriate legal frameworks, based on which low-income households can access local professional services such as affordable local architectural and construction firms. This requires the involvement of local government, community-based organisations and local professionals.

Donor-built housing, which often has sufficient financial and technical assistance, needs to consider problems related to the cultural appropriateness of housing design, the cost effectiveness of housing construction, construction quality and the self-sufficiency of households. Donor support may reduce the self-sufficiency of residents, increase families' reliance on external help, and result in limited preparedness for future climate risks.

As community participation and consultation are context-specific (Davidson *et al*., 2007; Lizarralde *et al*., 2010), forms and degrees of stakeholder engagement will be varied in different communities. In the case of Da Nang and Hue, two dominant and interrelated forms of community consultation were effectively applied, with a focus on donor-built post-disaster housing. First, community meetings are conducted from the beginning of housing projects with the participation of all stakeholders involved. Second, separate household consultations involve the participation of at-risk households and technical experts (e.g. architects and engineers) to develop housing design solutions and seek agreements on construction works (e.g. labour, materials, methods of construction) later. This consultation process can be used with self-built households who usually lack basic information and knowledge about constructing climate-resilient housing.

In addition, longer-term strategies for a resilient housing system to climate change also need to be considered, such as improving building codes, using building permits, intensifying social networks between local professional services and at-risk communities, and mainstreaming disaster risk reduction in local development plans. Some key places such as public offices that people can go to for guidance on safe construction or renovation should be established, with low-cost and affordable services.

4 Conclusions and recommendations

This project investigated key issues related to climate-resilient housing, post-disaster housing and community consultation for the region of Central Vietnam, in order to provide local vulnerable communities with a more overall vision of resilient housing. It also aimed to provide policy-makers with reliable data from which they can promulgate appropriate documents and policies for climate risk reduction and resilience. This project has identified some key findings that are useful to shape policy responses:

- The limited self-sufficiency of households living in hazard-prone areas is linked to their limited financial resources. Local governments, together with the public and private sectors, need to plan and implement actions for local economic development. Programmes for vocational training or financial support for economic development at the household level need to be put in place for this purpose.
- One of key finding of this research is the effectiveness of social capital through mutual help among relatives, neighbours and friends for post-disaster recovery and reconstruction. Government and education programmes to enhance neighbourhood activities and promote mutual aid could increase this capital to build community resilience.
- Important stakeholders such as professional agencies/experts still rarely participate in the construction of low-income housing, particularly with *nhà cấp 4*. Some obstacles such as the high costs associated with design services for low-income households require local governments to initiate appropriate supportive policies or subsidy programmes to reduce obstacles and to bridge this gap.
- Problems related to technical aspects of housing such as limited hazard mitigation and fail-safes indicate that the government should develop more training opportunities for people and that universities should add more subjects and courses related to climate change adaptation and disaster risk reduction to their curriculums. Currently, there are no such courses or subjects in Central Vietnam's universities.
- The limited future preparedness for climate risk reduction of at-risk households is linked to their limited awareness of climate risks, a lack of information and ineffective communication and consultation. There is a need to develop programmes or campaigns to raise public awareness, to build systems for improving information transfer to people, and official procedures to improve community communication and consultation.
- Weaknesses of current local housing construction practices regarding risk reduction and climate resilience point to a need for policies that require the use of building permits in hazard-prone areas, which include safe housing construction principles.

Climate resilience is central to the valuable findings of this study. The policies proposed above have the potential to enhance climate resilience for housing systems in regions of Central Vietnam which are exposed to climate risks.

References

ADPC. 2007. Promoting safer housing construction through CBDRM: Community-designed safe housing in Post-Xangsane Da Nang City. *Safer Cities* 19. Thailand.

Ahmed, I. 2011. An overview of post-disaster permanent housing reconstruction in developing countries. *International Journal of Disaster Resilience in the Built Environment* 2, 148–164.

Alexander, B., Chan-halbrendt, C. and Salim, W. 2006. Sustainable livelihood considerations for disaster risk management: Implications for implementation of the Government of Indonesia tsunami recovery plan. *Disaster Prevention and Management* 15, 31–35.

Amaratunga, D. and Haigh, R. 2011. *Post-disaster Reconstruction of the Built Environment: Rebuilding for resilience*. Wiley.

Anh-tuan, N., Tran, Q.B., Tran, D.Q. and Reiter, S. 2011. An investigation on climate responsive design strategies of vernacular housing in Vietnam. *Building and Environment* 46, 2088–2106.

Anh, T. 2012. Likelihood of innovative construction techniques to build disaster resilience for vernacular housing in the highland of central Vietnam. *Journal of Civil Engineering and Architecture* 6, 1401–1407.

Archer, D. and Boonyabancha, S. 2011. Seeing a disaster as an opportunity – harnessing the energy of disaster survivors for change. *Environment and Urbanisation* 23, 351–364.

Audefroy, J.F. 2010. Post-disaster emergency and reconstruction experiences in Asia and Latin America: An assessment. *Development in Practice* 20, 664–677. See www.tandfonline.com/doi/pdf/10.1080/09614524.2010.491528.

Barakat, S. 2003. *Housing Reconstruction After Conflict and Disaster.* Network Paper. Humanitarian Practice Network, London. See www.odihpn.org/download/networkpaper043pdf.

Barenstein, J.D. 2006. *Housing Reconstruction in Post-earthquake Gujarat: A comparative analysis.* Network Paper. Humanitarian Practice Network, London. See www.odihpn.org/download/networkpaper054pdf.

Boen, T. and Jigyasu, R. 2005. *Cultural Considerations for Post Disaster Reconstruction Post-Tsunami Challenges.* See www.adpc.net/iRC06/2005/4-6/TBindo1.pdf.

Bolay, J.C., Cartoux, S., Cunha, A., Du, T.T.N. and Bassand, M. 1997. Sustainable Development and Urban Growth: Precarious habitat and water management in Ho Chi Minh City, Vietnam. *Habitat International* 21, 185–197.

Bosher, L. and Dainty, A. 2011. Disaster risk reduction and 'built-in' resilience: Towards overarching principles for construction practice. *Disasters* 35, 1−18.

Brown, O. and Crawford, A. 2006. *Addressing Land Ownership After Natural Disasters: An agency survey*. International Instite for Sustainable Development (IISD), Canada. See www.iisd.org/pdf/2006/es_addressing_land.pdf.

Bryman, A. and Burgess, R.G.(eds) 1999. Qualitative research methodology: a review. *Qualitative Research: Fundamental Issues in Qualitative Research.* London: Sage Publication.

CARE. 2009. *Mainstreaming Climate Change Adaptation: A practioner's handbook*. Care International in Vietnam. See www.careclimatechange.org/files/adaptation/care_vn_mainstreaming_handbook.pdf.

CCFSC. 2011. Disaster data in Vietnam. Central Committee for Flood and Storm Control (CCFSC) website. See www.ccfsc.gov.vn/kw6f2b34/disaster-database.aspx. Accessed September 2011.

Chang, Y., Wilkinson, S., Potangaroa, R. and Seville, E. 2010. Resourcing challenges for post-disaster housing reconstruction: A comparative analysis. *Building Research and Information* 38, 247–264.

Chantry, G. and Norton, J. 2008. Vaccinate your home against the storm – reducing vulnerability in Vietnam. *Open House International* 33, 26–31.

Charlesworth, E. 2011. Home, sustainable home. *Making Cities Work.* Melbourne: RMIT University.

Correa, T.K. and Taflanidis, A.A. 2012. The Haitian housing dilemma: Can sustainability and hazard-resilience be achieved? *Bull Earthquake Engineering* 10, 765–771.

Cosgrave, J. 2008. *Responding to Earthquakes: Learning From Earthquake Relief and Recovery Operations.* ALNAP and ProVention Consortium. See www.alnap.org/resource/5239.aspx.

CSRD. 2010. *Community-based Adaptation Strategies for Enhancing Resilience to Climate Change in the Huong River Basin: Thua Thien Hue province, Vietnam.* Centre for Social Research and Development (CSRD), Hue City. See www.adapts.nl/perch/resources/communitybased-adaptation-strategies-for-enhancing-resilience-to-climate-change-in-the-huong-river-basin.pdf.

Davidson, C.H., Johnson, C., Lizarralde, G., Dikmen, N. and Sliwinski, A. 2007. Truths and myths about community participation in post-disaster housing projects. *Habitat International* 31, 100–115.

Davis, I. 1978. *Shelter after disaster*. Oxford Polytechnic.

Davis, I. 2011. What have we learned from 40 years' experience of Disaster Shelter? *Environmental Hazards* 10, 193–212.

DWF. 2010. Impact study on developing local capacity to reduce vulnerability and poverty in Central Vietnam. November 2010 ed. Hue: BSHF. Development Workshop France (DWF). See www.preventionweb.net/files/submissions/20274_dwfimpactstudyofdwfprogrammeinvietnambshf2011.pdf.

EM-DAT. 2012. The International Disaster Database. See www.emdat.be/database.

Fien, J., Charlesworth, E., Lee, G., Morris, D., Baker, D. and Grice, T. 2008. *Towards a Design Framework for Remote Indigenous Housing*. AHURI Final Report 114. Australian Housing and Urban Research Institute. See eprints.qut.edu.au/13362/1/ahuri_final_report_no114_towards_a_design_framework_for_remote_indigenous_housing1.pdf.

Ganapati, N.E. and Ganapati, S. 2009. Enabling participatory planning after disasters: a case study of the World Bank's housing reconstruction in Turkey. *Journal of the American Planning Association* 75, 41–59.

GSO. 2009. Vietnam Population and Housing Census 2009. Migration and Urbanisation in Vietnam: Conditions, Trends, and Differences. Ministry of Planning and Investment, General Statistics Office, Hanoi. See https://vietnam.unfpa.org/webdav/site/vietnam/shared/census%20publications/7_monograph-migration-urbanization.pdf.

Guarnacci, U. 2012. Governance for sustainable reconstruction after disasters: Lessons from Nias, Indonesia. *Environmental Development* 2, 73–85.

Hang, P. 2012. Thảo luận dự án luật phòng, chống thiên tai và KHCN. Vietnam Plus website. See www.vietnamplus.vn/home/thao-luan-du-an-luat-phong-chong-thien-tai-va-khcn/201211/167740.vnplus. Accessed 22 July 2013.

Hayles, C.S. 2010. An examination of decision making in post disaster housing reconstruction. *International Journal of Disaster Resilience in the Built Environment* 1, 103–122.

Hart, R. 1992. Children's participation: from tokenism to citizenship. Innocenti Essay 4. UNICEF International Child Development Centre: Italy. See: www.unicef-irc.org/publications/pdf/childrens_participation.pdf

Hoang, V.H. 2011. Housing and Climate Change: Adaptation Strategies in Vietnam. In: Kumssa, B.Y.A.A. (ed.) *Climate Change and Sustainable Urban Development in Africa and Asia.* Springer Science+Business Media.

IFRC. 1999. House Frame Kit For Flood And Typhoon Prone Areas In Vietnam. IFORCARCS.

IFRC and VNRC. 2002. Disaster Resistant House Rehabilitation Program: Mid-Term Evaluation and Recommendations. *Workshop on Safer Shelter in Vietnam.* International Federation of Red Cross and Red Crescent Societies (IFRC) and Vietnam Red Cross (VNRC). Asian Disaster Preparedness Center (ADPC), Hanoi.

IFRC. 2012. *Understanding Community Resilience and Program Factors That Strengthen Them: A comprehensive study of Red Cross Re Crescent Societies tsunami operation*. International Federation Of Red Cross And Red Crescent (IFRC). See www.ifrc.org/pagefiles/96984/final_synthesis_characteristics_lessons_tsunami.pdf.

Innes, J.E. and Booher, D. E. 2004. Reframing public participation: strategies for the 21st century. *Planning Theory and Practice* 5, 419–436.

ISET. 2012. *Climate Resilience Framework: Putting resilience into practice*. The Institute for Social and Environmental Transition-International (ISET-International), Boulder. See www.i-s-e-t.org/images/pdfs/isetinternational_crfputtingresilienceintopractice_richardfriendkennethmacclune_2012.pdf.

JANI. 2010. *Framework on Community based Disaster Risk Management in Vietnam*. Vietnam. Joint Advocacy Networking Initiative in Vietnam (JANI), Centre for International Studies and Cooperation (CECI). See www.ceci.ca/assets/Asia/Asia-Publications/CBDRM-Framework.pdf.

Jha, A.K., Barenstein, J.D., Phelps, P.M., Pittet, D. and Sena, S. 2010. *Safer Homes, Stronger Communities: A handbook for reconstructing after natural disasters*. Global Facility for Disaster Reduction and Recovery (GFDRR), Washington DC. See www.gfdrr.org/node/1074.

Johnson, C. and Lizarralde, G. 2012. Post-disaster housing and reconstruction. In: Susan, J.S. (ed.) *International Encyclopedia of Housing and Home.* Elsevier, San Diego.

Karunasena, G. and Rameezdeen, R. 2010. Post-disaster housing reconstruction: Comparative study of donor vs owner-driven approaches. *International Journal of Disaster Resilience in the Built Environment* 1, 173–191.

Lawther, P.M. 2009. Community involvement in post-disaster reconstruction - case study of the British Red Cross Maldives Recovery Program. *International Journal of Strategic Property Management* 13, 153–169.

Lizarralde, G. 2011. Stakeholder participation and incremental housing in subsidized housing projects in Colombia and South Africa. *Habitat International* 35, 175–187.

Lizarralde, G., Johnson, C. and Davidson, C. 2010. *Rebuilding After Disasters: From emergency to sustainability*. 1 ed. Taylor and Francis, Hoboken.

Lodder, E. 2012. *Pressure on Land in Peri-urban Vietnam: The impact of agricultural land conversion and the need for livelihood diversification in Thuy Duong commune.* Utrecht University.

Ly, P., Birkeland, J. and Demirbilek, N. 2010. Applying environmentally responsive characteristics of vernacular architecture to sustainable housing in Vietnam. *Sustainable Architecture & Urban Development*, CSAAR Press, Amman, 287–306. See www.irbnet.de/daten/iconda/CIB_DC22717.pdf.

Lyons, M. 2009. Building back better: the large-scale impact of small-scale approaches to reconstruction. *World Development* 37, 385–398.

Lyons, M. and Schilderman, T. 2010. *Putting People at the Centre of Reconstruction*. PCR position paper. Practical Action, Rugby. See practicalaction.org/docs/access_to_services/PCR_Position_Paper.pdf.

Lyons, M., Schilderman, T. and Boano, C. 2010. *Building Back Better: Delivering people-centred housing reconstruction at scale*. Practical Action, Rugby. See practicalaction.org/print/energy/docs/ia3/building-back-better-lyons-schilderman.pdf.

Maly, E. and Shiozaki, Y. 2012. Towards a policy that supports people-centered housing recovery—learning from housing reconstruction after the Hanshin-Awaji Earthquake in Kobe, Japan. *International Journal of Disaster Risk Sciences* 3, 56–65.

Marcillia, S.R. and Ohno, R. 2012. Learning from residents' adjustments in self-built and donated post disaster housing after Java earthquake 2006. *Procedia – Social and Behavioral Sciences* 36, 61–69.

Matsumaru, R., Nagami, K. and Takeya, K. 2012. Reconstruction of the Aceh Region following the 2004 Indian Ocean tsunami disaster: A transportation perspective. *IATSS Research,* 36(1), 11–19. See www.sciencedirect.com/science/article/pii/S0386111212000234.

McEntire, D. 2011. Understanding and reducing vulnerability: from the approach of liabilities and capabilities. *Disaster Prevention and Management* 20, 294–313.

Mercer, J., Kelman, I., Taranis, L. and Suchet-Pearson, S. 2010. Framework for integrating indigenous and scientific knowledge for disaster risk reduction. *Disasters* 34, 214–239.

Minamoto, Y. 2010. Social capital and livelihood recovery: Post-tsunami Sri Lanka as a case. *Disaster Prevention and Management* 19, 548–564.

MONRE and UNDP 2010. *Building Recovery Capacity: Strategies for responding to coastal livelihoods most affected by climate change in Central Vietnam*. *Ministry of Natural Resources and Environment (MONRE), Hanoi and United Nations Development Programme*.

MONRE. 2008. *National Target Program to Respond to Climate Change*. *Ministry of Natural Resources and Environment (MONRE),* Hanoi. See www.isgmard.org.vn/vhdocs/nationalprograms/ntp%20respondtoclimatechange.pdf.

MONRE. 2012. *Scenarios of Climate Change and Sea Level Rise in Vietnam.* Ministry of Natural Resource and Environment (MONRE),Hanoi.

Nakagawa, Y. and Shaw, R. 2004. Social capital: A missing link to disaster recovery. *International Journal of Mass Emergencies and Disasters* 22, 5–34.

Nhu, O.L., Thuy, N.T.T., Wilderspin, I. and Coulier, M. 2011. A preliminary analysis of flood and storm disaster data in Vietnam. United Nations Development Programme (UNDP) Vietnam, Hanoi. See www.preventionweb.net/english/professional/publications/v.php?id=26598.

Oxfam. 2005. *Community Based Disaster Management Action Planning: Oxfam in Vietnam*. See tinyurl.com/oxfam-vn-disaster.

Özden, A.T. 2006. *Developing a Model for Community Involvement in Post-Disaster Housing Programmes*. Middle East Technical University, Faculty of Architecture, Ankara. See www.grif.umontreal.ca/pages/ozden_ali%20tolga.pdf.

Pardasani, M. 2006. Tsunami reconstruction and redevelopment in the Maldives: A case study of community participation and social action. *Disaster Prevention and Management* 15, 79–91.

Pearce, L. 2003. Disaster management and community planning, and public participation: How to achieve sustainable hazard mitigation. *Natural Hazards*, 211–228.

Pendall, R., Foster, K.A. and Cowell, M. 2010. Resilience and regions: Building understanding of the metaphor. *Cambridge Journal of Regions, Economy and Society* 3, 71–84.

Petal, M., Green, R., Kelman, I., Shaw, R. and Dixit, A. 2008. Community-based construction for disaster risk reduction. In: Bosher, L. (ed.) *Hazards and the Built Environment: Attaining Built-in Resilience,* 191–217, Taylor and Francis, London.

Phong, T. and Tinh, B.D. 2010. Housing sector considerations in disaster risk reduction and climate change adaptation. In: Shaw, R., Pulhin, J.M. and Pereira, P.P. (eds) *Climate Change Adaptation and Disaster Risk Reduction: Issues and Challenges (Community, Environment and Disaster Risk Management 4)*, 291–302, Emerald Group Publishing Limited.

Pomeroy, R.S., Ratner, B.D., Hall, S.J., Pimoljinda, J. and Vivekanandan, V. 2006. Coping with disaster: Rehabilitating coastal livelihoods and communities. *Marine Policy* 30, 786–793.

Reed, S.O. and Thinphanga, P. 2012. New risk and risk transfer: Climate and urban development case studies from Vietnam and Thailand. Paper presented at the Vietnam Cities Tomorrow – Actions Today conference, Hanoi, 30 October2012.

Shaw, J. and Ahmed, I. 2010. *Design and Delivery of Post-disaster Housing Resettlement Programs: Case studies from Sri Lanka and India*. Monash Asia Institute, Monash University. See mams.rmit.edu.au/2ulsye0lkgb5z.pdf.

Schilderman, T. 2004. Adapting traditional shelter for disaster mitigation and reconstruction: Experiences with community-based approaches. *Building Research and Information* 32, 414–426.

Schilderman, T. 2010. *Putting People at the Centre of Reconstruction: What do we want to take forward?* Practical Action, Rugby. See architecture.brookes.ac.uk/research/cendep/media/theo%20schilderman_people%20centred%20reconstuction.pdf.

Schilderman, T. and Lyons, M. 2011. Resilient dwellings or resilient people? Towards people-centred reconstruction. *Environmental Hazards* 10, 218–231.

SKAT and IFRC. 2012. Sustainable Reconstruction in Urban Areas: A Handbook. Swiss Resource Centre and Consultancies for Development (SKAT) and International Federation of Red Cross and Red Crescent Societies (IFRC). See *www.alnap.org/pool/files/urban-reconstruction-handbook-ifrc-skat.pdf.*

SKAT and UNEP 2012. Sustainable Reconstruction in Disaster-affected Countries: Practical Guidelines. Swiss Resource Centre and Consultancies for Development (SKAT) and United Nations Environment Programme (UNEP). See www.unep.org/sbci/pdfs/practicalguidelines_sustainablereconstruction.pdf.

Skinner, R.J. 1984. Community participation in Third World housing: Potential and constraints. *Cities*, 564–574.

Sliwinski, A. 2010. The politics of participation. In: Gonzalo, L., Johnson, C. and Davidson, C.H. (eds.) *Rebuilding After Disasters: From Emergency to Sustainability.* Spon Press, New York.

Steinberg, F. 2007. Housing reconstruction and rehabilitation in Aceh and Nias, Indonesia: Rebuilding lives. *Habitat International* 31, 150–166.

Tas, N., Cosgun, N. and Tas, M. 2007. A qualitative evaluation of the after earthquake permanent housings in Turkey in terms of user satisfaction—Kocaeli, Gundogdu Permanent Housing model. *Building and Environment* 42(9), 3418–3431.

Thomas, J.C. 1995. *Public Participation in Public Decisions: New skills and strategies for public managers.* Jossey-Bass, San Francisco.

Tinh, B.D., Tuan, T.H., Phong, T., The, B.D. and Tam, B.T. 2010. Local vulnerability and adaptation to extreme climate events along the central coast of vietnam. In: Shaw, R., Pulhin, J.M and Pereira, J. J. (eds.) *Climate Change Adaptation and Disaster Risk Reduction: An Asian Perspective.* Emerald Group Publishing Limited.

Tyler, S. and Moench, M. 2012. A framework for urban climate resilience. *Climate and Development* 4, 311–326.

UN-HABITAT. 2008. *Country Programme Document 2008–2009: Indonesia*. United Nations Human Settlements Programme (UN-HABITAT). See www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2705.

UN-HABITAT. 2011. *Global Report on Human Settlement 2011: Cities and climate change*. United Nations Human Settlements Programme (UN-HABITAT).

UN. 2006. *Exploring key changes and developments in post-disaster settlement, shelter and housing, 1982–2006: Scoping study to inform the revision of 'Shelter after Disaster: Guidelines for assistance'*. United Nations.

UNEP. and SKAT. 2007. *After the Tsunami: Sustainable building guidelines for South East Asia* [Online]. UNEP and SKAT. United Nations Environment Programme (UNEP) and Swiss Resource Centre and Consultancies for Development (SKAT). See www.preventionweb.net/english/professional/publications/v.php?id=1594.

UNFCCC. 2007. *Climate Change: Impacts, vulnerabilities and adaptation in developing countries*. United Nations Framework Convention on Climate Change (UNFCCC), Germany. See unfccc.int/resource/docs/publications/impacts.pdf.

UNISDR. 2009. Terminology on Disaster Risk Reduction. United Nations Office for Disaster Risk Reduction. See www.unisdr.org/we/inform/terminology.

Vietnam Government. 2007. National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020. Hanoi: Vietnamese Government.

Vietnam Government. 2008. Decision of Prime Minister No. 167/2008/QĐ-TTg on 12 December 2008 about housing-supporting policies for poor households Hanoi: Vietnamese Government.

VNRC. 2010. *Annual Report*. Vietnam Red Cross (VNRC), Hanoi.

Wisner, B., Blaikie, P., Cannon, T. and Davis, I. 2004. *At Risk: Natural hazards, people's vulnerability and disasters*. Routledge, London and New York.

Xuan, C. 2010. *Xây hầm tránh bão tại nhà*. Dan Viet website, Nong Thon Ngay Nay Agency. See http://danviet.vn/20186p1c34/xay-ham-tranh-bao-tai-nha.htm. Accessed 22 July 2013.

Yip, N.M. and Tran, H.A. 2008. Urban housing reform and state capacity in Vietnam. *The Pacific Review* 21, 189–210.

Annex 1. Household questionnaire

Name	***Date***
Location *(Flood, storm, flood + storm zones)*	
Household situation Income: Main occupation: Land tenure status *(red book, land certificates, others)*: House tenure status *(owners, renting or sharing with friends/relatives)*:	
Explanation of climate change: Climate change is a process that causes adjustments to the 'average weather' that a region/location experiences. In Central Vietnam, climate change is believed to have resulted in increased temperatures, increased number and severity of cyclones, and more intense and long-lasting rains associated with serious floods and flood tides.	
1) **Agent**	
What do you think of the extreme weather trends and risks in the region?	
How does the extreme weather affect your housing and livelihoods?	
How aware are you of climate change and what capacity do you have to cope with extreme weather?	
How does the community/district/city assist/help you and other households in terms of capacity building for DRR and CCA?	
Are you willing to learn new knowledge and experiences about DRR and CCA?	

2) **System**	
Has your house been effective in withstanding extreme weather events, particularly the strongest events, in the past? If yes, how? If not, why? *(Preventive, adaptive, or withdraw)*	
Do you have any plans/strategies in situations where extreme weather events may be stronger than the worst experienced in the past? (over thresholds) *(Preventive, adaptive, or withdraw)*	
If you have answered 'yes' to the above question, are these plans/strategies effective in normal circumstances?	
What technical solutions do you have to reduce damage caused extreme weather and climate-related disasters?	
Is the house responsive to the region's micro-climate (hot and humid and near the sea)? How?	
Has the house followed criteria/regulations/ guidelines for DRR and CCA? If not, why?	
What are the main barriers to the development of climate-resilient housing?	
Was the construction of your house cost effective? How?	
Is your house appropriate to your living traditions and lifestyle? (Spatial layout, structure, materials)	
Are any unhealthy wastes from construction activities (gas, water or solid waste) disposed of in the natural environment? How can you control this situation?	
3) **Institutions**	
Do you have full access to information on climate risks and climate risk reduction? If not, why?	
Is a building permit required in your area? Did your housing construction require a building permit? If not, why?	
Within your family, who decides on the design and construction of your house? Why?	
Within your community and district, who can decide or affect your decisions on your housing construction/renovation? (Local government, civil society organisations, private sectors)	

What is the governance system for housing construction in your area?	
What are your rights and entitlements regarding land tenure, housing construction/renovation?	
Which methods do you prefer for sharing information, knowledge, experiences and skills with other stakeholders?	
What forms of communication/consultation was used by the donor/implementers to collect and share information with at-risk community? E.g. meetings, workshops, informal discussions, graphic presentations (2D plans, 3D models…) etc.	
What is the role of building professionals in developing climate-resilient housing for low-income groups? (Which phases: planning, design, construction, evaluation?)	

Community consultation for long-term climate-resilient housing in Vietnamese cities

Asian Cities Climate Resilience Working Paper Series

This working paper series aims to present research outputs around the common theme of urban climate resilience in Asia. It serves as a forum for dialogue and to encourage strong intellectual debate over concepts relating to urban resilience, results from the ground, and future directions. The series is also intended to encourage the development of local research capacity and to ensure local ownership of outputs.

The series has arisen out of the Asian Cities Climate Change Resilience Network (ACCCRN, www.acccrn.org), an initiative funded by the Rockefeller Foundation.

The series is intended to present research in a preliminary form for feedback and discussion. Readers are encouraged to provide comments to the authors whose contact details are included in each publication.

Published by IIED, October 2013

IIED order no: 10643IIED
http://pubs.iied.org/10643IIED.html
ISBN 978-1-84369-962-0

80-86 Gray's Inn Road, London WC1X 8NH, UK
Tel: +44 (0)20 3463 7399
Fax: +44 (0)20 3514 9055
email: humans@iied.org
www.iied.org