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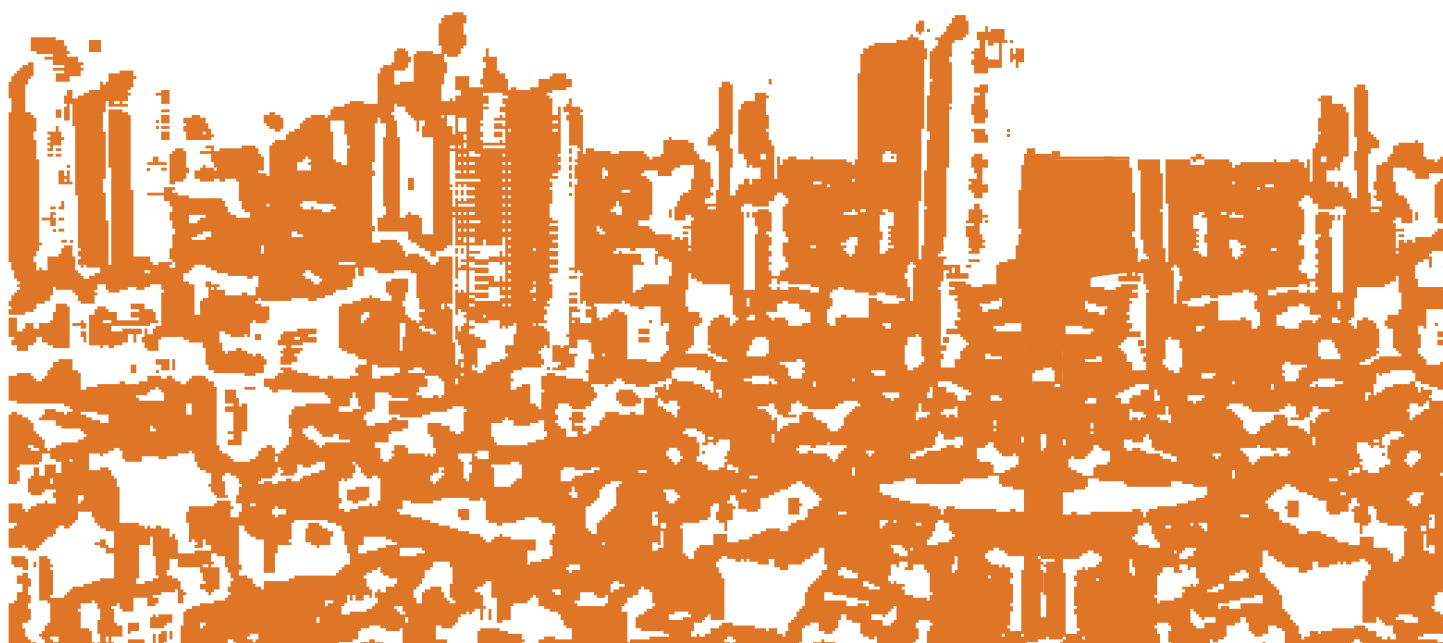
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Asian Cities Climate Resilience

WORKING PAPER SERIES 33: 2016

Gender needs and roles in building climate resilience in Hue City, Vietnam

THI DIEU MY PHAM AND THI THU SUU LAM



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Acknowledgements

This research was supported by the International Institute for Environment and Development (IIED). We are thankful to our colleagues: Sarah Colenbrander from IIED and Assoc. Prof. Dr. Le Anh Tuan- from Can Tho University, Vietnam who provided expertise that greatly assisted the research.

We are also grateful to local authorities, local people and key staffs from relevant agencies who cooperated with us in organising in-depth interviews and focus group discussions; and providing information for our research.

We have to express our appreciation to other NGO representatives working on climate change resilience in Vietnam for sharing their pearls of wisdom with us during the course of this research and for their comments on an earlier versions of the manuscript, although any errors are our own and should not tarnish the reputations of these esteemed professionals.

We highly appreciate the contribution of CSRD staff and volunteers who directly conduct research activities in the field including interviews, focus group discussion as well as collect secondary data.

All photos are credited to CSRD staff.

Abstract

Gender roles in building climate resilience are an emerging issue worldwide – so it is important to understand the drivers of gender-specific vulnerabilities, needs and capacities with respect to climate change. These include health and social, political and economic contexts, which, when combined with other social changes such as urbanisation, are likely to exacerbate climate change impacts.

This working paper examines gender roles in building climate resilience in Hue City. We conducted participatory research in 12 wards using the City Resilience Framework (Arup, 2014) to engage with local authorities, people and city planners. Hue City has its own special identity that significantly influences its resilience to climate change: health and well-being have been improved by investment in healthcare. The society and economy of Hue is more stable than many other cities. The municipal government has taken some action to improve climate change resilience while the infrastructure and environment have been considerably upgraded, contributing to better resilience.

In relation to gender roles, our study found that men and women at a grassroots level have different vulnerabilities and contribute differently to building climate resilience in Hue City. Women play key roles in sustaining and enhancing the health and well-being of people within their community, and accruing funds for households, communities and society. They also take part in organising mutual support for each other during times of disruption. By comparison, men are more engaged in activities relating to safety, security and other continuity plans within their communities. However, at the management level, we found that women hold only minor roles. There are therefore significant opportunities to challenge gender-based conceptions of capacity and responsibility, and to improve the gender sensitivity of decision-making processes and forums. This could significantly enhance the resilience of the people living in Hue City.

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Acronyms

ACCCRN	Asian Cities Climate Change Resilience Network
ADB	Asian Development Bank
CSRD	Centre for Social Research and Development
ECOSOC	Economic and Social Council of the United Nations
EGM	Effective gender mainstreaming
FGD	Focus group discussion
FSCC	Flood and Storm Control Committee of Thua Thien Hue province
GAP	Gender action plan
GCAP	GrEEEn City Action Plan
ICT	Information and communications technologies
ISET-International	Institute for Social and Environmental Transition International
M-BRACE	Mekong-Building Climate Resilient Asian Cities
MONRE	Ministry of Natural Resources and the Environment
VND	Vietnamese dong (currency)

Glossary

Adaptive capacity is ‘the ability of a system to adjust to climate change to moderate potential damages, to take advantage of opportunities, or to cope with the consequences’ (Smit *et al.* 1999). In this context, systems can be natural ecosystems and also human systems such as individuals, households and communities.

Exposure to climate variation is strongly linked to location. For example, coastal cities have a higher exposure to sea-level rise and storm surges. Within these cities, low-lying settlements and settlements next to the sea are most prone to flooding.

Gender refers to the relations between men and women: there are significant differences that exist in most societies between the rights and opportunities of men and women, including rights to land, resources, work opportunities and wages, and participation in decision-making processes.

Resilience is ‘the ability of a community to resist, absorb, and recover from the effects of hazards in a timely and efficient manner, preserving or restoring its essential basic structures, functions and identity’ (IPCC 2014). A **resilient city** has institutions, infrastructure and social and economic life that is able to prepare for, and adjust to, shocks and stresses. Resilient cities reduce vulnerability to extreme events and respond creatively to economic, social and environmental change in order to increase their long-term sustainability.

Sensitivity is the degree to which a given community or ecosystem is affected by climatic stresses. For example, a community dependent on rain-fed agriculture is much more sensitive to changing rainfall patterns than one where mining is the dominant livelihood. Likewise, a fragile, arid or semi-arid ecosystem will be more sensitive than a tropical one to a decrease in rainfall, due to the subsequent impact on water flows (IPCC 2007)

Vulnerability ‘is the degree to which a system is susceptible to and unable to cope with adverse effects’ (IPCC 2007). It depends on three factors: exposure, sensitivity and adaptive capacity.

1 Literature review

Hue City is situated in the Thua Thien Hue province in Central Vietnam with tropical monsoon conditions. Hue suffers an average of 3.5 floods per year, with floods lasting from five days up to a week. Typhoons and windstorms are also important extreme weather events impacting the city. The city experiences natural hazards almost every year, and residents have long ago learnt how to manage and live with them. However, climate change and urbanisation have changed the topography and the hydrology of the city, affecting traditional water patterns and creating unpredictable and possibly extreme levels of flooding and water shortages. In addition, a gender perspective has not been comprehensively mainstreamed into climate change and related policies and practices, and gaps still exist in understanding gender roles in climate change adaptation and resilience. This literature review will provide an overview of gender vulnerability and how gender is integrated into climate change resilience in Hue City.

1.1 Gender vulnerability and climate change impacts

According to the United Nations (2008), women in the developing world will suffer the most from the effects of climate change. While both men and women are affected, women are more vulnerable because their livelihoods are more dependent on natural resources that are threatened by climate change (UNDP 2009). For example, women play an important role in ensuring food security for their families. When changing climate conditions have a negative impact on agriculture quality and quantity, women are the first to deal with the resulting food stress. A woman's role in the family can also lead to an additional work burden when climate-related shortages of energy, water and food occur (GIZ *et al.* 2015). Moreover, Peterson (2007) found that women, boys and girls are 12 times more likely to die than men during a disaster and women suffer much more than men in the post-disaster period. Demetriades and Esplen (2008) show women and girls have less capacity than men to adapt to existing and predicted climate impacts because they have fewer capabilities and resources. This is in part because women also face more social, economic and political barriers that limit their coping capacity. In some areas, for example, social norms impede women's access to early warning systems of extreme weather events and to emergency or post-disaster services during and after disasters. For instance, shelters can be less accessible to women due to mobility constraints and childcare responsibilities. Moreover, shelters are often not suited to accommodate women in terms of their hygienic and safety requirements. Women's care for children, the elderly and the sick can become more demanding when climate change impacts on health and psychosocial well-being.

1.2 Gender roles in climate change resilience

In recent research, gender roles in climate change vulnerability and resilience have been considered and recognised, with many differences between men and women identified due to physical characteristics and social and cultural attributes. UN Habitat (2008) mentions that the best-practice examples of incorporating gender concerns into local governments are a result of outstanding leadership by women at the local level and strong engagement with civil societies, especially organisations led by women. These factors have helped to ensure that women are considered change agents in climate change resilience in their communities. The United Nations (2008) states that women in developing countries are already

on the frontline of adapting to climate change, with increasing floods and droughts impacting on their livelihoods, and those women represent an immense source of potential and power to combat the increased disaster risks that climate change will bring. In particular, as pivotal managers of natural and environmental resources, women have the experience and knowledge to build the resilience of their communities to the intensifying natural hazards to come.

However, women are underrepresented in decision making at all levels, in both public entities and the private sphere (GIZ *et al.* 2015). One of the consequences of this imbalance is a male bias in planning and decision making, resulting in a failure to consider the different needs of women which stem from their socially defined roles and responsibilities. Depending on the cultural setting, women also tend to have less influence on decisions at household level. In too many places, women are still marginalised from community discussions about development planning. Without the full participation and contribution of women in decision making and leadership, real community resilience to climate change and disasters cannot be achieved (United Nations 2008; see also Box 1). Real community-based development must involve the knowledge and energy of women, men, boys and girls. Without the input of diverse groups including women, risk reduction and climate change adaptation strategies will not be designed for the entire community. Disaster risk reduction projects, policies and programmes will be meaningful and successful only if the interests of the whole community are taken into consideration. Women's responsibilities in households, communities and as stewards of natural resources, position them especially well to understand and develop strategies for adapting to changing environmental realities.

Box 1. Gender mainstreaming and gender equality

Gender mainstreaming does not replace government policies on gender inequality. Gender equality and women's issues are complementary strategies and should be examined together, but this depends on the data available in determining what is needed.

One of the most important prerequisites in achieving gender equality is the political will to implement a strategy. A gender equality policy should be in place and gender-sensitive data and statistics should be available. Tools and instruments to put the strategy into practice have to be developed and the people involved have to be trained.

Source: UN Habitat (2008)

1.3 Urban climate change policy and gender perspectives

Cities are increasingly recognised as an essential scale at which climate change policy and programmes should be designed and implemented. Due to the concentration of people, infrastructure and economic activity, cities are hotspots of risk but also have particularly large opportunities to enhance resilience (Birkmann *et al.* 2010; Hoornweg *et al.* 2011). Over the past 20 years, local governments around the world have developed a range of climate change policies. Those policies normally consider a range of sectors, in particular when both mitigation and adaptation are to be tackled. Mainstreaming of climate change is required in order to integrate climate considerations into all relevant sector policies and administrative procedures.

It is important that gender dimensions of urbanisation and climate change are integrated into local planning and action on mitigation and adaptation at all policy stages. Prevailing power relations and differences in access to and control over resources, such as land, credit and capital, mean that women and men often have different vulnerabilities and capacities to respond to climate change (GIZ *et al.* 2015). These gender differentials, as well as the different impacts of policies on women and men, are especially pronounced at local levels. While it is widely acknowledged in international climate policy that gender dimensions need to be addressed, most local governments do not pay attention to gender in the context

of climate change (see for instance Alber 2011; Röhr 2009). This means that women's needs and potential contribution can be neglected. Therefore, gender mainstreaming has become a cross-cutting issue in every aspect of development work.

Gender mainstreaming¹ was defined in the 1997 agreed conclusions of the Economic and Social Council (ECOSOC)² as:

The process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetrated. The ultimate goal is to achieve gender equality.

In Vietnam, the National Targeted Programme (which prepares climate change and natural disaster policies and plans) has no specific targets or activities to address women's vulnerability or gender issues, especially at the community level (Oxfam and UNDP 2009). Accordingly, no funding is allocated specifically for women to enhance their adaptation needs at local level. Furthermore, although many laws and policies were developed in Vietnam to promote gender equality, these are not always translated into gender-equitable practice (UN Vietnam 2009). Besides the first and only UN desk review (ibid) on gender and climate change in Vietnam, there is little observation on gender vulnerability and gender roles in building resilience in the urban context.

1.4 Local-level practice in Hue City

Today, numerous projects and programmes are underway to support local people and authorities to plan and undertake systematic action on climate change resilience. However, the effectiveness of these projects and programmes needs to be examined.

In the case of Hue City, there have been several climate change-related projects implemented with varied purposes. Mainly, those projects focus on local action, raising awareness and building capacity. Gender was included in some of the projects as a component but the effectiveness has not been fully assessed.

In 2013, the Asian Development Bank (ADB) and other global climate funds including the Netherlands Trust Fund (NTF), the Urban Climate Change Resilience Trust Fund (UCCRTF) and WFPF (the Water Financing Partnership Facility) agreed to support its Green Cities: A Sustainable Urban Future in Southeast Asia programme, also known as the GrEEEn Cities Programme. The three 'E's relate to environmental sustainability, economic competitiveness and equity. The programme seeks to integrate urban development and environmental improvements by implementing a green city action plan.³ Hue is one of the pilot cities. The project, running until 2020, will aim to deliver environmental protection, sustainable economic development and balanced quality of life, with a focus on infrastructure and climate change adaptation. The technical assistance project was approved by Vietnam's Prime Minister in December 2014. By the end of this project, Hue City is expected to be a green city of heritage with better environmental sustainability and climate resilience. The project is required to follow ADB's requirements of gender mainstreaming (Category II Effective gender mainstreaming – EGM) (ADB 2012).

¹ See more at: www.unwomen.org/en/how-we-work/un-system-coordination/gender-mainstreaming

² ECOSOC is the United Nations central platform for reflection, debate and innovative thinking on sustainable development.

³ For more information, see: www.adb.org/green-cities

According to ADBs' guidelines for gender mainstreaming categories (ibid), EGM is not directly targeting gender equality or women's empowerment, but the project outputs are expected to contribute to these goals by directly improving women's access to social services, economic and financial resources and opportunities, basic rural and urban infrastructure, and/or enhancing voices and rights. According to ADB (ibid), the main requirements of EGM are:

- To conduct social analyses during project preparation,
- To include specific gender design features,
- To include gender targets and performance and monitoring indicators in the project design management framework,
- To include a gender action plan (GAP),
- That the main text of the report and recommendations must discuss how the project will contribute to improving women's access to or benefits from the project, and
- That a covenant or a condition in the policy matrix supports implementation of the GAP.

To support compliance with the Law on Gender Equality of Vietnam (National Assembly 2006), in August 2014, the government of Vietnam issued guidelines for policymakers and related agencies at all levels to integrate gender perspectives into the drafting and implementing of policies and plans. The guidelines emphasise that men and women who are impacted by the projects may have different needs and priorities, thus all the projects need to take gender issues into account at all stages: design, preparation, implementation and evaluation. Otherwise, the expected outcomes and the effectiveness of the projects will not be achieved, which may lead to a bigger gender gap.

The ADB project in Hue City is a good opportunity to test and showcase how the ABD and Vietnamese government's policy on gender is mainstreamed into urban development.

2 Policy frameworks

This study aims to answer the following questions:

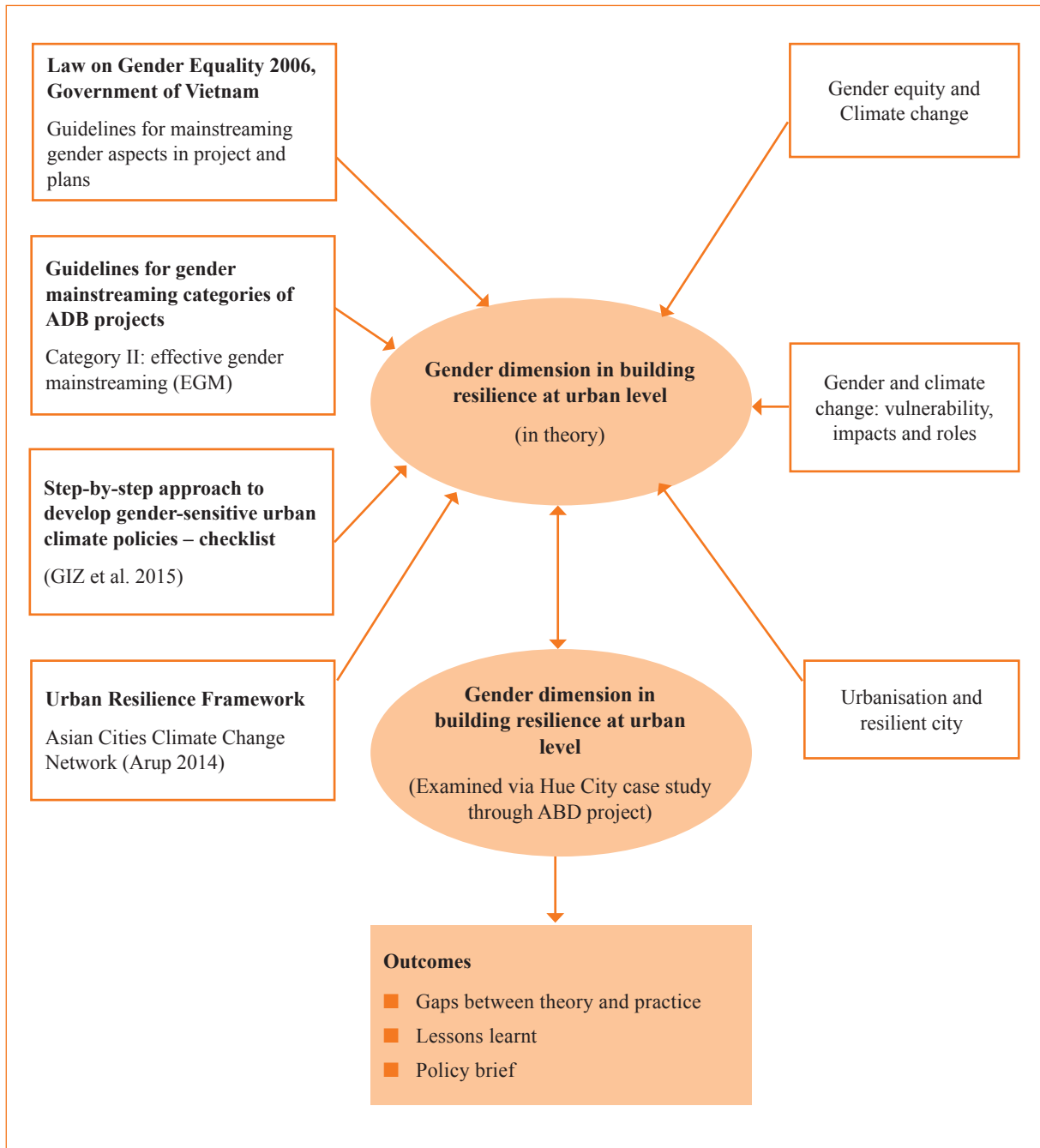
- How resilient is Hue City?
- How are men and women impacted differently by urbanisation and climate change in Hue?
- To what extent and how have women and men have been involved in assessing climate vulnerability and contributing to the resilience of the city, particularly through the ADB-funded GrEEEn Cities Programme in Hue?
- What are the lessons learnt and what good practice can be identified in order to build urban climate resilience with gender sensitivity and sustainability?

Four main sources have provided the tools or frameworks for understanding gender mainstreaming in building urban resilience:

- Government of Vietnam's guidelines for mainstreaming gender considerations in projects and plans under the Law on Gender Equality 2006 (Vietnamese Government 2006, Nguyen 2015)
- ADB guidelines about effective gender mainstreaming applied to the GrEEEn Cities Programme (ADB 2012)
- GIZ *et al.*'s (2015) step-by-step approach to developing gender-sensitive urban climate policy checklists, and
- The City Resilience Framework developed by the Asian Cities Climate Change Resilience Network (Arup 2014) (see also Figure 1).

By using the GrEEEn Cities Programme in Hue City as a case study, we can examine how policies relating to the gender dimension in building resilient cities work in the field – and what should be improved.

Figure 1. Theoretical framework for this study on gender and urban resilience



2.1 Vietnam's laws on gender equality

The aims of the Law on Gender Equality (Vietnamese Government 2006) are to eliminate gender discrimination, to create equal opportunities for men and women in socio-economic development and human resources development in order to reach equality between men and women, and to establish and enhance cooperation and mutual assistance between men and women in all fields of social and family life. This law provides for principles of and measures for ensuring gender equality and the responsibilities of agencies, organisations, families and individuals in exercising gender equality. The main principles of this law are:

- Men and women are equal in all fields of social and family life,
- Men and women should not be discriminated against because of gender,
- Measures aimed at promoting gender equality are not considered gender discrimination,
- Policies aimed at protecting and supporting mothers are not considered gender discrimination,
- Ensuring the gender mainstreaming in the process of development and implementation of laws, and
- Exercising gender equality is the responsibility of agencies, organisations, families and individuals.

This law marked a huge change in Vietnamese society, as this country was dominated by feudalism that discriminated against the position and roles of women, limiting opportunities for them to develop. Hue City was the last place where feudalism was replaced by the socialist republic regime, so traditional viewpoints underpinning gender discrimination still strongly persists. Therefore, this law has raised the awareness of Hue people and has created opportunities for women to overcome social barriers and improve their position in society.

To implement this law at local level, there are guidelines to mainstream gender in practice, consisting of nine steps (Nguyen 2014):

Step 1. Needs and problem analysis based on gender:

- Identify the needs of both men and women
- Identify the trend and causes of inequality
- Identify and prioritise interventions for both men and women

Step 2. Gender mainstreaming in targeted group analysis and selection:

- Select the direct and indirect beneficiaries (both men and women) of programmes and projects
- Analyse the changes (positive and negative) expected after project implementation
- Apply appropriate approaches for men and women
- Involve the proper participation of both men and women
- Provide an opportunity for both men and women to raise their awareness of gender equality

Step 3. Gender mainstreaming in analysing and building capacity for implementing agencies

Step 4. Gender mainstreaming in the project strategy

Step 5. Gender mainstreaming in project objectives and results

Step 6. Gender mainstreaming in sub-projects

Step 7. Gender mainstreaming in project activities and approaches

Step 8. Gender mainstreaming in project input and resources

Step 9. Gender mainstreaming in indicators for monitoring and evaluation (M&E)

2.2 Guidelines for gender mainstreaming

To examine gender mainstreaming in practice at the local level relating to climate change and the environment, we chose to study the ongoing project funded by ADB's GrEEEn Cities Programme. It belongs to the Secondary Cities Development Programme (Green Cities),⁴ and is intended to enable the development of sustainable and resource-efficient urban growth models for secondary cities in Vietnam.

The GrEEEn Cities Programme must satisfy ABD's gender mainstreaming criteria (ABD 2012). The requirements for projects with an EGM classification include:

- The social analysis conducted during project preparation must include careful consideration of gender issues highlighting both constraints and opportunities.
- Specific gender-design features must be included in the majority of project outputs and/or components to facilitate and ensure women's participation and access to project benefits. Most of these outputs/components should have at least three gender-design features and targets.
- Gender targets and performance and monitoring indicators must be included in the project design and monitoring framework.
- A GAP should be included as a linked document to the report and recommendations of the president to the board and in the related project administration memorandum.
- The main text of the report and recommendations should discuss how the project will contribute to improving women's access to or benefits from the project.

2.3 Developing gender-sensitive urban climate policies

In 2015, GIZ, Gender CC and UN Habitat published a handbook on gender and urban climate policy (GIZ *et al.* 2015). The aim is to close the gender gap that has not been resolved by international policies and local governments. Most local governments pay no attention to the diverse impacts of climate policies on women and men, whereas in international climate policy, it is widely acknowledged that gender dimensions need to be addressed.

The handbook shows the approaches for integrating gender dimensions of climate change into various stages of policy-making at local levels:

The handbook introduces gender concepts and gender dimensions of climate change as well as resources, tools and ideas for action to climate policy decision makers, consultants and practitioners in local governments. Moreover, it shall assist women's groups and other civil society and community-based organisations to get involved in local climate policy and to advocate for a gender-sensitive approach (GIZ et al. 2015).

In particular, this handbook has six steps and checklists for practitioners to follow:

Step 1. Commitment

Step 2. Problems analysis

Checklists: INTERSECTIONALITY/MULTIPLE DISCRIMINATIONS

- Who are the most marginalised women/girls, men/boys in the community, and why?
- What social/economic programmes are available to different groups in the community?

⁴ This programme will pilot integrated urban development and environment improvement through implementation of green city action plans (GCAPs) in three secondary cities in Vietnam: Ha Giang (Ha Giang Province), Hue (Thua Thien Hue Province) and Vinh Yen (Vinh Phuc Province). See: www.adb.org/projects/47274-001/main

- Who does/who does not have access or control over productive resources, and why?
- Which groups have the lowest/highest level of public representation, and why?
- Which laws, policies and organisational practices limit opportunities of different groups?
- Which initiatives could address the needs of the most marginalised/discriminated groups in society?

Step 3. Strategy and priorities

Checklists: GENDER-SENSITIVE COMMUNICATION

- Is gender-sensitive and inclusive non-technical language used which addresses women and men?
- Are the contents and images suited for women and men?
- Are pictures included which represent all genders and show women and men beyond their traditional roles?
- Are the communication channels suited to reach both women and men?

Step 4. Action plan

Checklist: GENDER IMPACT ASSESSMENT OF POLICIES AND MEASURES

- Does the policy or measure concern one or more target groups and will it affect the daily life of the population or specific groups?
- Does it affect gender differences with regards to rights, resources, participation, values and norms?
- What impact does it have on gender equality?
- Does the policy or measure affect equality policy objectives? Does it affect women and men differently and might it lead to positive/negative impacts on gender equality?
- What data/knowledge is available to assess the impacts of the measure on gender equality, eg sex-disaggregated data?
- Who are the actors involved in the development of the initiative/which additional experts and groups should be involved? Is there a gender balance in the group of actors?
- Is there a need for further (sex-disaggregated) data, information and research?

Step 5. Implementation and monitoring

Checklist: EQUAL PARTICIPATION OF WOMEN AND MEN

- Are women from different socio-economic groups represented and participate in all meetings and activities?
- Are formal and informal women's groups and networks included?
- Are female facilitators involved?
- Do meetings/activities take place at a time when women and men can attend?
- Is the venue for meetings safe and convenient for women and men?
- Are separate meeting rooms for women appropriate?

Step 6. Evaluation and revision of action plan

Checklist: IMPLEMENTATION OF A GENDER-SENSITIVE PROJECT

- To what extent does the project contribute to increasing women's influence in policy design, planning and decision-making processes?
- Do the financial resources and measures benefit women to the same extent as men?
- Does the project lead to a more balanced distribution of public resources among women and men?

- Does the project contribute to changing gender-biased power relations and allocation of duties?
- Does the project help to revise the generalisation of masculine experiences/perspectives?
- Does the project adequately take into account the requirements of care work which is mostly done by women, eg time consumption, transport, energy?
- Does the project contribute to reducing the harassment of women (and of men)?
- Does it contribute to relieving women (or men) of threats, restrictions and sanctions?

2.4 ACCCRN's city resilience framework

Launched in 2008 by the Rockefeller Foundation, the Asian Cities Climate Change Resilience Network (ACCCRN) has helped cities to strengthen their capacity to prepare for, cope with, and recover from the projected impacts of climate change. It started with a range of activities in 10 cities in Vietnam, India, Indonesia and Thailand. ACCCRN has subsequently expanded this work to more than 50 new cities and two additional countries: Bangladesh and the Philippines. By 2016, more than 50 cities will have received ACCCRN's support to develop robust resilience plans for facing their climate challenges.

Located in the region of Vietnam most vulnerable to extreme weathers and climate change, Thua Thien Hue province has been facing loss of human life and damage to economic development. Therefore, the local authority has made a significant effort to mitigate the predicted impacts of climate change. According to ISET-International (2014), the Mekong-Building Climate Resilient Asian Cities (M-BRACE) project officially started in Hue City in March 2012 to build climate change resilience. The United States Agency for International Development (USAID) funds this project, with technical support from ISET-International, under the direction of Thua Thien Hue province and the leadership of Hue City. In this study, we also employ the City Resilience Framework for resilient capacity assessment and gender roles in building resilience of Hue City.

The City Resilience Framework provides a lens through which the complexity of cities and the numerous factors that contribute to a city's resilience can be understood. It comprises 12 key indicators that describe the fundamental attributes of a resilient city (Arup 2014: 10–13) (see also Table 1).

Table 1. Categories and indicators used in ACCCRN's City Resilience Framework (Arup 2014).

Categories	Indicators
Health and well-being	<p>Minimal human vulnerability: indicated by the extent to which everyone's basic needs are met</p> <p>Diverse livelihoods and employment: facilitated by access to finance, ability to accrue savings, skills training, business support and social welfare</p> <p>Adequate safeguards to human life and health: relying on integrated health facilities and services, and responsive emergency services</p>
Economy and society	<p>Collective identity and mutual support: observed as active community engagement, strong social networks and social integration</p> <p>Social stability and security: including law enforcement, crime prevention, justice and emergency management</p> <p>Availability of financial resources and contingency funds: observed as sound financial management, diverse revenue streams, the ability to attract business investment, adequate investment and emergency funds</p>
Infrastructure and environment	<p>Reduced physical exposure and vulnerability: indicated by environmental stewardship, appropriate infrastructure, effective land use planning and enforcement of planning regulations</p> <p>Continuity of critical services: indicated by diverse provision and active management, maintenance of ecosystems and infrastructure, and contingency planning</p> <p>Reliable communications and mobility: indicated by diverse and affordable multi-modal transport systems and information and communications technologies (ICT) networks, and contingency planning</p>
Leadership and strategy	<p>Effective leadership and management: involving government, business and civil society and indicated by trusted individuals, multi-stakeholder consultation, and evidence-based decision making</p> <p>Empowered stakeholders: indicated by education for all and access to up-to-date information and knowledge to enable people and organisations to take appropriate action</p> <p>Integrated development planning: indicated by the presence of a city vision, an integrated development strategy, and plans that are regularly reviewed and updated by cross-departmental working groups</p>

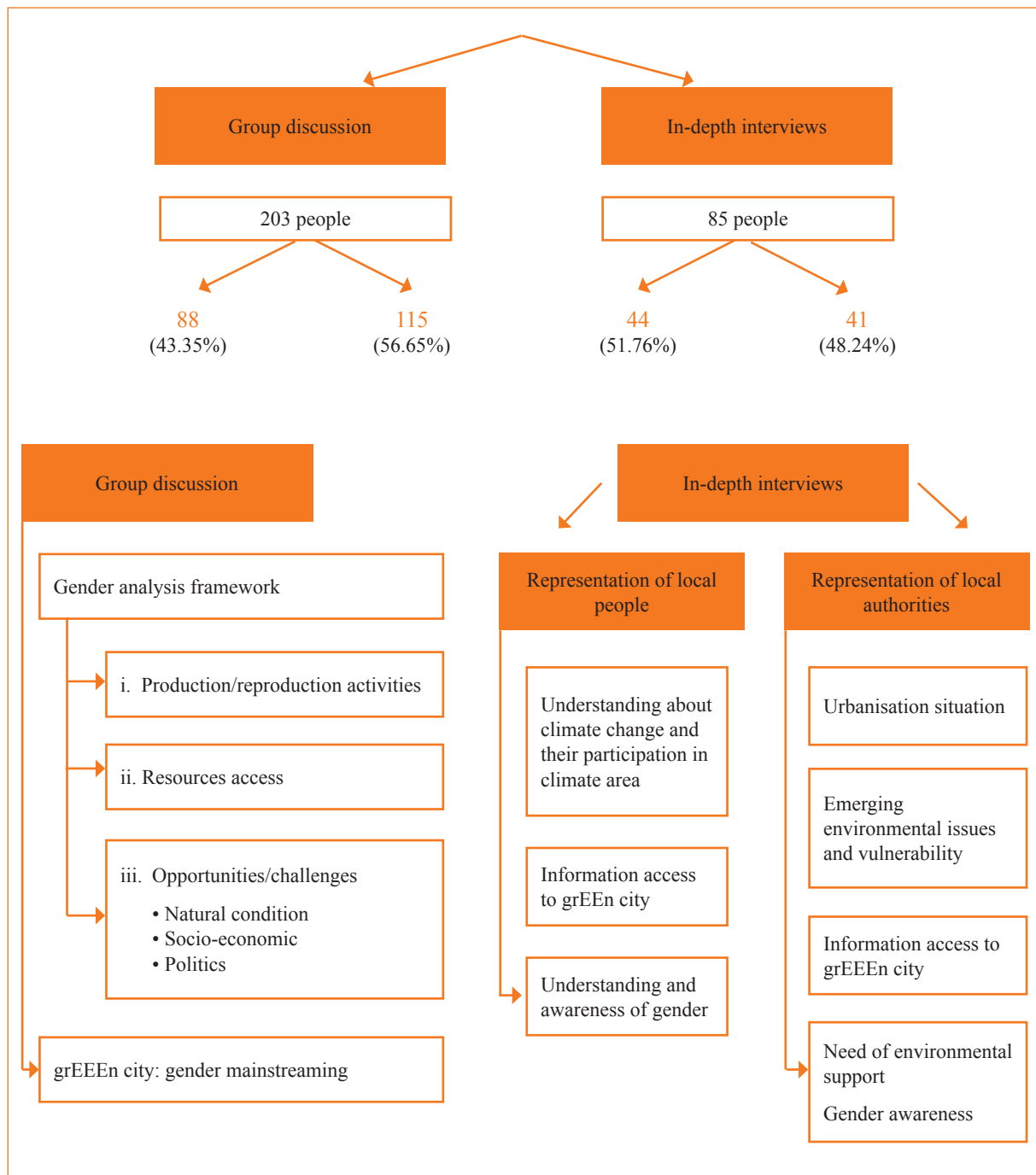
3 Methods used

This participatory study was done using qualitative methodologies (see Figure 2). Participatory research methods put people (urban men and women) at the centre, to analyse their situation. To collect data, we began with a literature review. This helped us to define important terms such as ‘gender vulnerability’, ‘gender roles’ and ‘city resilience’. Based on the desk study, we then established the theoretical framework for our gender-inclusive analysis of urban climate change conditions and resilience. We designed the tools and techniques to answer to the specific research questions.

Following the literature review, we collected primary data at the case study sites using in-depth interviews and focus group discussions (FGDs) at the local level. We also conducted interviews with city planning experts from government agencies and the ADB team. In-depth interviews and FGDs were conducted in 12 wards including Huong So, Thuan Hoa, Phuong Duc, Vy Da, An Cuu, Thuan Thanh, Thuy Bieu, Phu Hau, Tay Loc, An Hoa, Thuan Hoa, Phuoc Vinh (two FGDs per ward, one each for men and for women). FGDs were conducted with 203 local people, while in-depth interviews were done with 85 people, of whom 14 were from local authorities, 7 were city planners, 64 were local people and one was from the ABD team. The themes of both the FGDs and interviews were vulnerability to climate change and the participation of men and women in creating green city plans and a resilient city. The city planners were asked about their understanding of gender roles, gender relations and gender participation in making plans and policies.

The data-collection process was conducted carefully and systematically. All the interviews were recorded and transcribed by the interviewers and sent to the research team for analysis. All the findings were then presented at the subsequent validation workshop with the participation of representatives from local government and local people from selected wards, experts from other projects, and relevant agencies in the city and provinces. Comments and feedback from participants were discussed and clarified before adding or adjusting the study results.

Figure 2. Research methods used



4 Case study: Hue City

Hue City is the economic, cultural and political centre of Thua Thien Hue province, and is also an area most vulnerable to natural disasters and climate change. Floods, storms and droughts are the three main disasters that the city experiences. In recent years, the intensity and frequency of these extreme events have increased and become more unpredictable. For example, in 1999, a massive flood occurred and claimed 352 lives, injuring 305 people and causing economic damage of about VND 1,700billion. This flood event was triggered by massive rainfall that reached 986mm in one day (FSCC).

4.1 Characteristics of Hue City

The Ministry of Natural Resources and the Environment (MONRE) has developed a set of climate change scenarios, which indicate that natural disasters will increase in frequency and intensity in the future (MONRE 2011). In addition, sea levels in Thua Thien Hue could rise by up to 94cm by 2100. This will mean that natural disasters and extreme weather events will continue to seriously affect local people, ecosystems and the infrastructure of Hue City.

4.1.1 Climate

Thua Thien Hue in general and Hue City in particular are located in the transitional climate zone between North and South Vietnam. This has created the tropical humid monsoon climate of Hue City (ISET-International 2014). In the summer (May to September), temperatures remain fairly high, with southwest dry winds. The average temperatures in summer months are 27–29°C, with temperatures in the hottest months (May and June) reaching 38–41°C. In the rainy season (October to April), the city often experiences the northeast monsoons, which generate considerable rainfall, high humidity and significantly decrease the temperature. Average temperatures in the winter are 20–22°C. The average annual precipitation fluctuates – around 2,800mm – which means that Hue has high levels of rain compared to other areas of Vietnam. The rain is unequally distributed across the months and is mainly concentrated in the rainy season, especially in October and November, which receive about 30 percent of annual rainfall.

4.1.2 Hydrology

The Huong River system is the largest system in Thua Thien Hue province and mostly controls the hydrological regime. The Huong River system comprises three tributaries including the Bo, Ta Trach and Huu Trach, originating from the slopes of the Truong Son mountain range. The Ta Trach and Huu Trach tributaries combine at the Tuan confluence, which then runs through the centre of Hue City. The Huong River basin covers an area of 2,830km and about 56 percent of the province. The basin length is 63.5km and drainage density is 0.6km/km² (ie there is 0.6km of drainage per square

kilometre of basin). There are also interconnected branches of the An Cuu, Nhu Y, Bach Yen, An Hoa, Ngu Ha, and Ho Thanh Hao rivers, which create a complete natural drainage network. In Hue's ancient Imperial City citadel area, there is also a series of interconnected lakes that function as natural water retention services (Thua Thien Hue PPC 2005; ISET-International 2014).

4.1.3 Topography

Hue is located on a confined plain sloping steeply from the west to the east. The central area of the city was built on a narrow strip of floodplain, on the downstream section of the Huong River. There are two types of terrain: low, eroded hills on deeply weathered sedimentary rocks and depositional plains concentrated to the north and east of the city. The northern area of Huong River is flat. The citadel area has an elevation of 1.8–3.5m. Phu Hiep and Phu Cat wards have an elevation of 2.7m to 3.5m. Areas with an elevation of less than 2m are frequently flooded. The southern area of the Huong River has a fairly broad elevation range of 2.5–7.5m. There are flat hills with an elevation of 12–18m, in contrast to rice fields and lakes with an elevation of less than 1.5m (Thua Thien Hue PPC 2005; ISET-International 2014).

4.1.4 Land resources

According to the Thua Thien Hue Office of Statistics (2014), Hue City covers 7,099ha comprising: 1,908.7ha of agricultural land (26.6 per cent of the city area), 5,135.6ha of non-agricultural land (71.6 per cent) and 24.2ha of unused land (1.73 per cent). Land use in Hue City has been influenced by the development of new urban areas. The land inventory report (DONRE 2014) shows that from 2011 to 2012, agricultural land in Hue City decreased by 40.94ha due to land acquisition for urban development. An example of this can be seen in the An Van Duong urban area project where non-agricultural land increased by 5.78ha after the conversion of 5.04ha of rice land, 0.03ha of annual crop cultivation land and 0.66ha of perennial crop cultivation land.

4.1.5 Water resources

Hue City's main surface water supply is the Huong River and tributaries, and 48 lakes of various sizes, particularly in Thuan Loc, Thuan Hoa, Tay Loc and Thuan Thanh wards. In Thuan Loc ward there are Tinh Tam, Hoc Hai and Sen (Cay Mung) lakes; in Thuan Hoa ward there are Vo Sanh and Tan Mieu lakes; and in Tay Loc ward there are Moc Duc and Huu Bao lakes. In addition, surrounding the citadel, there are the inner and outer Kim Nguu lakes. In terms of groundwater, underground aquifers are distributed throughout the city at depths varying from 12m to 22m. The quality of water in each aquifer ranges from poor to average, depending on its source. The water is fresh rather than saline, with very shallow static water levels, varying from 0.1m to 5.5m (Thua Thien Hue PPC 2005).

Regarding domestic water supply capacity, documents released in 2014 by Statistic Office of Thua Thien Hue province, the rate of water supply in Hue City was quite high, sitting at 98 percent. This water is taken from the Huong River and treated by the Van Nien, Quang Te 1, Quang Te 2 and Da Vien water plants.

4.2 What are the likely climate change scenarios for Hue City?

There are no climate change scenarios down-scaled to the level of Hue City only; therefore, data about climate change projections are based on scenarios for the whole country and for Thua Thien Hue province. We can extract some main indicators from the nation-wide scenarios, and focus on further detailed projections of climate change in Thua Thien Hue. The scenarios for Thua Thien Hue at the end of the 21st century in accordance with the climate change scenarios of Vietnam issued by the Ministry of Natural Resources and the Environment (MONRE 2011) can be seen in Table 2.

Table 2. Thua Thien Hue climate change scenarios

Climate characteristic	Low emission scenario	Medium emission scenario	High emission scenario
Average temperature increase	1.6–2.2°C	>3.1°C	2.5–3.7°
Annual rainfall increase	>6%	2–7%	2–10%
Seasonal rainfall increase (September to November)	4–10%	10–14%	18%
Sea-level rise	52–63cm	60–71cm	82–94cm

Hue City regularly suffers several types of natural disasters including floods, storms and droughts. Flooding is considered the most dangerous and causes enormous damage in terms of mortality and economic, cultural and social loss. Between 1990 and 2011, floods in Hue caused 596 deaths (an average of 27 deaths/year), and approximately VND 8,320 billion of material loss (an average of VND 378 billion/year). In recent years, the changing climate (particularly varying temperatures and rainfall) has made these disasters more severe and unpredictable.

4.2.1 Floods

One third of Thua Thien Hue (including Hue City) is on low-lying plains (Zoleta-Nantes 2006). Therefore, floods often occur in the rainy season, with the period from September to December accounting for about 65 per cent of total annual flow. The greatest number on record is eight floods a year, and 36 percent of floods are considered potentially disastrous. Floods will typically be more severe under the impacts of tropical cyclones combined with climate change. When sea-level rise is combined with more intense rainfall, the level of inundation in plains area will be higher and floods will cover a greater area.

4.2.2 Storms

Situated only about 20km away from the coast, Hue City is commonly affected by storms, which are mostly generated over the western North Pacific Ocean. The storm season is from May to November, with the highest frequency occurring in September and October, coinciding with the rainy and flood seasons. Between 1884 and 2000, there were on average 0.684 storms and tropical depressions directly affecting Hue City every year that have caused huge damage to human lives, properties and livelihoods of local people (Pham 2013). The economic growth of the city, therefore, risks being held back.

4.2.3 Droughts, water shortage and saline intrusion

In the past, when the river system was not well controlled, droughts and saline intrusion occurred every year, especially during the El Niño years (ISET-International 2014). These events do not cause loss of life but can lead to severe impacts on agriculture, industry, environment and health. Droughts often occur from May to August and directly affect agriculture and water supply. For example, during the drought in 2002, salt water intruded into the Tuan confluence, forcing many plants and factories to close, and significantly affecting the local economy. However, since the Thao Long anti-salinity barrage was completed; it has significantly controlled saline intrusion in the Huong River system and other inland canals.

4.2.4 Tornadoes and whirlwinds

Tornadoes and whirlwinds are also considered common natural disasters in Hue City. Since 1993, on average, there have been approximately four tornadoes a year. These kinds of hazards do not cause the same extensive damage as storms; however, they are sometimes accompanied by hail, which can cause considerable damage. In the El Niño years, the occurrence of tornadoes and whirlwinds in Thua Thien Hue increased (ISET-International 2014).

5 Results

5.1 Climate change resilience in Hue City

Our research results show that in recent years, the resilience of Hue City has significantly improved across four key categories: health and well-being, society and economy, infrastructure and environment, and leadership and strategy (see Tables 3–6). These gains can be significantly attributed to efforts by the Hue City government and citizens, supported by projects and programmes in disaster risk reduction and climate change adaptation delivered by central government and other stakeholders.

Using the City Resilience Framework (Arup 2014), all the basic health and well-being needs of city citizens are met: human vulnerability, livelihoods and employment, and safeguards to human life and health. In terms of human vulnerability, the everyday needs are met at the basic level for the whole city. Access to food, energy, water and sanitation has been improved for household use: 98 per cent of households can access sanitised water systems and 100 per cent can access the electricity grid (Thua Thien Hue Office of Statistics 2014). The livelihoods and employment level is also reasonable, with some job opportunities created by industrial zones and through vocational training programmes run by the government. Like other provinces, Thua Thien Hue has launched policies that encourage investment from foreign enterprises or large businesses within Vietnam. Public health services have also been significantly improved in recent years. The staff, facilities and equipment are adequate for citizens' needs. The high-quality central hospital is also an advantage of Hue City.

In terms of society and economy, Hue has a special identity because of its ancestral traditions and great natural beauty. These elements have been driving the socio-economic development strategy of the province and the city. The master plan for **the province up to 2020 (Office of the Prime Minister 2009) states that Thua Thien Hue province will be built around a centrally governed city, and ultimately become the cultural, tourism, scientific and technological centre of central Vietnam.** Inspired by the city's World Heritage monuments, eye-catching landscapes and cultural values, the economic strategy of Hue City is to develop green industries and tourism, the latter of which is currently the main revenue source for Hue. This environmentally friendly focus means that the ecosystems in and around the city are maintained, which considerably helps urban residents in coping with extreme weather and other hazards such as high temperatures and air pollution.

The ecological focus is indicated in the master plan objectives including areas such as:

- Increase the forest coverage up to more than 60% by 2020.
 - Protect the environment and ecosystems, prevent pollution of water resources (surface and underground water), and protect mangroves and aquatic ecosystems.
 - Set up waste-water treatment systems in urban areas, industry zones and improve rubbish and treatment systems.
 - Mitigate the degradation of natural resources and environmental pollution caused by natural disasters.
-

In addition, Hue is an ancient city where traditional mutual relationships within the community are still strong and highly appreciated. This strengthens the community, helping them to collectively overcome natural disasters and other disruptions in their lives.

In recent years, the city government has made a huge effort to strengthen infrastructure and environmental policy to enhance the city's capacity to cope with natural disasters and extreme events. Several international development projects have invested in infrastructure such as drainage systems and public shelters for emergencies, especially natural disasters. Moreover, other soft techniques have been significantly developed to meet daily needs, as well as the needs of emergency response. The evacuation plan has proven effective thanks to better transport and communication technologies. For example, during the discussions with the women's groups, they expressed that compared to in the past, they now receive timely early warning alerts via mass media, mobile phones and other transmitting equipment. Taskforce group members have been able to respond quicker and more effectively by using mobile phones for planning and taking action. In addition, when natural disasters occur, evacuation activities have been undertaken in good time, thanks to upgraded roads leading to safer places.



At provincial levels, the government has issued two important policies relating to climate change adaptation and mitigation: the climate action plan for Hue City (ISET-International 2014) and the Green Growth Action Plan⁵. In addition, the 'four on-the-spot' motto for disaster management (leadership on-spot; human resources on-spot; means on-spot; and logistics on-spot) in natural disaster risk reduction has been promoted and established by the Flood and Storm Control Committee in every ward (see JANI 2010). Among the new policies, non-construction adaptation measures are prioritised, such as zoning vulnerable areas for warning and rescue, and establishing the master plan for Huong River riverbanks in order to mitigate floods and improve the landscape.

Relating to leadership and strategy, the coordination and participation of stakeholders in climate change and natural disaster response have been improved. A vertical and horizontal consultation process has used during the policy making process, creating more opportunities for relevant agencies to integrate their plans and for citizens to be heard. During emergency situations, the participation of all stakeholders could lead to a better response and lower levels of loss. Lessons learnt and good practices have been shared through workshops, meetings and training to raise awareness of climate change resilience and disaster risk reduction for both government and citizens, and to promote policy implementation at local levels.

⁵ <http://tinyurl.com/jsxm3qr>

In general, efforts by government and citizens have contributed to the capacity of Hue City to respond to natural disasters and other disruptions. However, to be more resilient in the context of climate and social changes (such as urbanisation), there are still some shortcomings that need to be improved for the long-term and sustainable development of the city. The most significant weaknesses affecting resilience are unstable livelihoods, unplanned urbanisation, poor management of critical ecosystems and weak policy implementation.

A large proportion of Hue's population has unstable livelihoods and lacks the financial savings to handle shocks or disruptions. This also means that the revenue of the city is unstable. The major sources of income for Hue citizens are informal, such as builders, small business owners, housewives and other manual work. These informal jobs provide income for everyday life but are insufficient for resilience as people need savings to cope with disruption and recover after disasters. Informal workers are also unable to access the optional health and social insurance programmes launched by governments. The opportunities for the poor to improve their income became limited when the microfinance models supported by development projects closed and the support from social policy banks stopped. This has caused labour migration of young and skilled workers to bigger cities. Urbanisation has also contributed to the decline of some livelihoods; as land conversion from agricultural use to industrial and residential purposes has been causing income losses for households.



Food processing (women)



Handicrafts (women)



Builders (men and women working together)



Manual work (men)



Working in textile companies (women)



Street-food seller (women)

Some of the main livelihoods of Hue citizens © Nguyen (2015)

In recent years, urbanisation has had unexpected impacts on the resilience of the infrastructure of Hue City. The emerging issue is that there has not been systematic investment in the maintenance and expansion of its infrastructure. The urban sewerage network covers only 30 per cent (population based) or 35–40 per cent (area based) of the city. In some new streets, there is no drainage for rainwater to flow out (see eg Figure 4). In addition, poor maintenance of the drainage systems is leading to partial inundation and environmental pollution in some wards located in low-lying areas. In the new urban areas, infrastructure systems have not been designed to match with the old ones causing differences of elevation and the breakdown of links to existing road and drainage systems. This means that floodwater flows will be held back and cause more severe impacts. Not enough trees are being planted to refresh the air and reduce the impacts of high temperatures. Public buildings such as schools, community centres and healthcare clinics are meant to be reinforced to serve as places of safety for local people in emergencies, especially natural disasters. In recent years, as local government awareness of climate change has increased, some newly built construction has integrated climate change adaptation objectives, but they do not satisfy the master plan of the city.

As in several ancient cities of Vietnam, water bodies and natural ecosystems are not well maintained in the city, creating a threat to people and to the resilience of Hue. In the past, the man-made and natural rivers, canals and lakes systems in the city played an important role in creating romantic landscapes; facilitating water retention during the flooding season and ensuring micro-climate harmony (see also Figure 3). However, at present, these water bodies are blocked by construction, temporary houses and solid waste. They also suffer from moderate organic pollution and eutrophication in the dry season because there is no domestic waste-water collection system or treatment plant in Hue, so waste-water is discharged into the environment without adequate treatment. Therefore, water flowing through canals, rivers and lakes can become stuck, leading to a decrease in water retention capacity and an increase in water-borne diseases.

Another important factor that needs to be taken into account is the poor management of ecosystems that provide essential services and contribute to Hue's resilience. For example, people tend to prioritise construction measures for protecting riverbanks and canals. In the Huong River systems, several projects such as embankments, dykes and levees have been invested in. Other similar projects are proposed as part of the GrEEEn Cities Programme run by ADB. It seems that non-construction measures such as swamps or marshes are less likely to be considered. This means the long-term ecological resilience of the city is not significantly taken into account in practice.

Figure 3. Water body network of Hue City

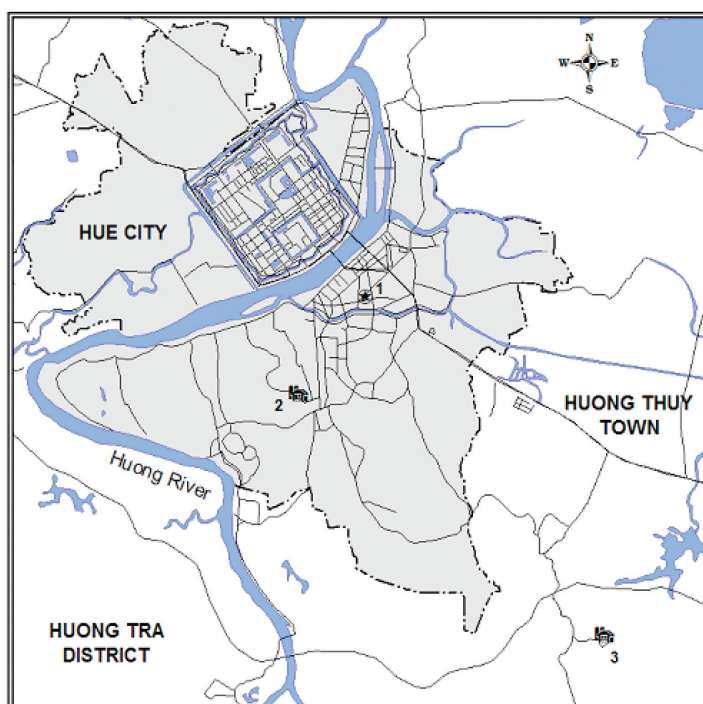
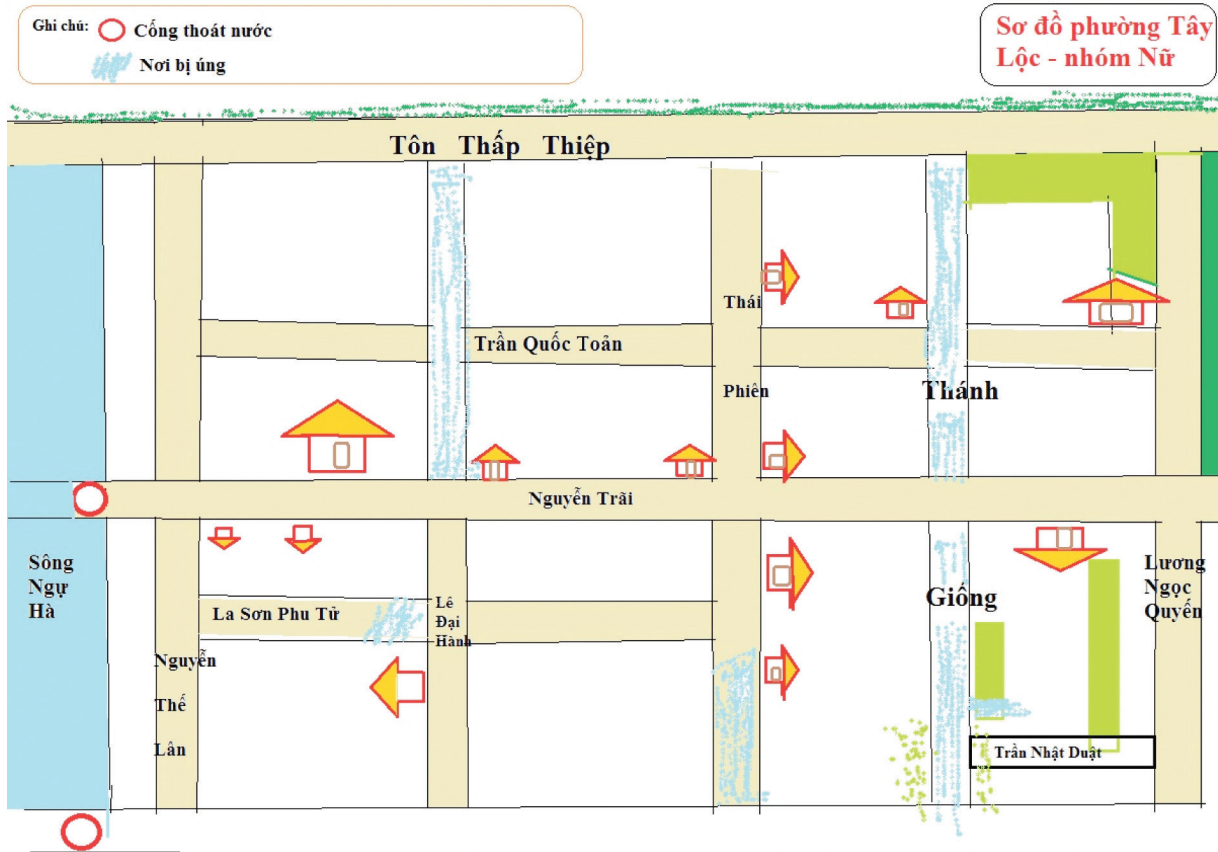


Figure 4. Map of Tay Loc ward showing areas prone to flooding due to poor roads and sewers



Notes: Red circles indicate access to sewers. Blue shading indicates areas prone to flooding.

This situation is reflected in relevant policies. In recent years, the provincial and city governments have issued some policies in response to climate change. The most important ones are the plan to respond to climate change in Thua Thien Hue province, the Green Growth Action Plan for Thua Thien Hue province, and the GrEEEn Cities Programme for Hue City. Overall, these policies indicate the concerns of governments in terms of capacity building, raising awareness and construction. However, the key point is that most projects included are construction-based with huge budget lines, even though the financial capacity of the province and city is limited. All the finance for these proposed projects is expected to come from the support of outsiders. That is the reason why these policies are not implemented in reality.

In conclusion, the resilience of Hue City is still inadequate to cope with climate change. Most resources including human and capital are just sufficient to sustain the basic needs of everyday life and cope with short-term shocks or disruptions like storms and floods. For long-term climate resilience, Hue City needs a healthier economy with sustainable livelihoods that allow citizens to accrue financial resources at household and city levels. This would also help people to access optional insurance programmes, and make the city and its citizens more active in adapting to changes and help them to recover more quickly after periods of disruption. The vision for policymaking processes, planning and investment needs to be more strategic in terms of using internal resources and identities including landscapes and ecosystem management for coping with and adapting to extreme weather events and strengthening the capacity of Hue.

Table 3. Health and well-being indicators and performance in Hue City

Sub-indicators	Current situation +: Adequate -: Needs improvement
1. Human vulnerability: this relates to the extent to which everyone's basic needs are met	
Food, water and sanitation, energy and housing	<ul style="list-style-type: none"> + Food, water and energy supplies meet the daily needs of local people + Continuity plans for natural disaster events and other emergency situations are established at city and ward level + After emergencies, all systems are able to recover quickly + 98 per cent of households have access to sanitised water system + 100 per cent of households have access to the electricity grid + Public shelters are strengthened/reinforced + Most households (~95 per cent) have strengthened/reinforced houses
	<ul style="list-style-type: none"> - Food quality is not guaranteed, which can affect people's health in the long term - Solid-waste collection system is inadequate in some wards (not enough rubbish bins and disposal places), leading to water and air pollution - Clean water and electricity systems stop working during and immediately after disruptions, which impacts on emergency rescue activities and healthcare - Some houses in the city are still in a poor condition - In the area around the citadel, people need planning permission to reinforce their homes, which is time-consuming and complicated
2. Livelihoods and employment: this is facilitated by access to finance, ability to accrue savings, skills training, business support and social welfare	
Livelihood opportunities, skills and training, development and innovation, access to financial assistance	<ul style="list-style-type: none"> + Industrial zones create some jobs for local people + Vocational training programmes for young people have been launched + Policies supporting business have been enabled
	<ul style="list-style-type: none"> - Most livelihoods are unstable and easily affected/disrupted by weather, shocks or other disastrous events – working conditions are also poor - Agricultural land is limited and of poor quality, leading to low productivity and insufficient incomes for local people - Some women are jobless, meaning they can generate no income for their family and then have no voice in their family and community - Vocational training schools are working effectively, but the training programmes do not meet the demands of the labour market - Microfinance for livelihood development supported by government and others has been limited, making it difficult for women to improve their income - Finance support programmes from Vietnam Bank for Social Policies⁶ have high interest rates and fewer opportunities for the poor - Many people are informal workers, leading to low and unstable incomes and no access to social/health insurance

⁶ The Vietnam Bank for Social Policies was established in 2002 for providing credit for the poor and other policy beneficiaries. See: www.vbsp.org.vn/evbsp

Sub-indicators	Current situation +: Adequate -: Needs improvement
3. Safeguards to human life and health: this relies on integrated health facilities and services, and responsive emergency services	
Public health management and access to affordable health services, emergency facilities and practitioners	<ul style="list-style-type: none"> + Clinic centres are adequately equipped with the infrastructure, facilities and staff to provide public healthcare and preventive health services + High-quality hospital located in the city + The poor and disabled are supported by health insurance + Optional health-service programmes have been launched with accrued finance to increase opportunities for informal workers to have better health care in the future + Adequate facilities and staff for emergency rescue <hr/> <ul style="list-style-type: none"> - Environmental pollution due to inadequate solid-waste collection - Some pollution sources (cement plant, plastics processing plant) are located in the city close to residential areas, which affects the health of local people - Lack of communal areas for community activities and sports to improve health - Unpredictable weather affects the health of children and adults, and therefore working productivity and well-being

Table 4. Society and economy indicators and performance in Hue City

Sub-indicators	Current situation +: Adequate -: Needs improvement
1. Collective identity and mutual support: this includes active community engagement, strong social networks and social integration	
Community and civic participation, social relationships and networks, local identity and culture, integrated communities	<ul style="list-style-type: none"> + High consolidation and unique traditional cultural values because Hue is an ancient city where family and neighbourhood relationships are very important + Local people often participate in community meetings to get information about new government policies or programmes + Poor households receive support from local government programmes, charity organisations and others during and after disruptions/emergencies - Community-based organisations in Hue City are still weak and have limited a budget for activities - Some local people are busy with work, so they are not interested in community activities
2. Social stability and security: this includes law enforcement, crime prevention, justice and emergency management	
Deterrents to crime, reducing corruption, policing and justice, approaches to law enforcement	<ul style="list-style-type: none"> + Society is quite stable and secured + Social crimes are mostly controlled <p>A more detailed study is required to assess the indicators</p>
3. Financial resources and contingency funds: this is observed in sound management of city finances, diverse revenue streams and the ability to attract business investment, allocate capital and build emergency funds	
Economic structure, inward investment, integration with regional and global economy, business continuity planning, sound fiscal management	<ul style="list-style-type: none"> + The economy has an environmentally friendly orientation, with an expanding green industry sector and significant tourism sector + Significant financial support from outside organisations for community development, natural resources management, infrastructure investment, natural disaster management and climate change response + Funding from government for natural disaster management + According to the conclusion of the fiscal year meeting for 2015 the financial sources for Thua Thien Hue province are sufficiently distributed for the economic development and social welfare of the province - Foreign investment in Hue is limited - There is no separate budget line for climate change response and disaster risk reduction - Official funds from the government for emergencies are inadequate, so recovery after disasters must rely significantly on support from outside/charity organisations - Private sector is not involved in/has not contributed to continuity planning of the city

Table 5. Infrastructure and environment indicators and performance in Hue City

Sub-indicators	Current situation +: Adequate - : Needs improvement
1. Physical exposure and vulnerability: this relies on environmental stewardship, appropriate infrastructure, effective land-use planning and enforcement of planning regulations	
Environmental policy, safeguards for critical infrastructure, building codes and standards	<ul style="list-style-type: none"> + Significant investment in building and strengthening infrastructure + The drainage system is considerably improved due to government spending and projects + Natural disaster-prevention capacity has been enhanced by strengthening the construction of public shelters + Action plans on climate change response and environmental protection are in place - Lowland plots are flooded in the rainy season due to poor planning and urban encroachment - Poor maintenance and inadequate drainage systems in some streets leads to flooding during heavy rainfall and reduced drainage capacity during flood events - Local natural disaster responses have not been updated in the context of climate change - Still a lack of trees in new urban areas - New buildings are designed to include climate change adaptive measures but do not comply with the master plan for the whole city - There is no building code for natural disaster prevention and climate change adaptation
2. Continuity of critical services: this relies on diversity of provision, redundancy, active management and maintenance of ecosystems and infrastructure, and contingency planning	
Ecosystem management, flood-risk management, maintenance practice, demand on critical infrastructure, continuity planning	<ul style="list-style-type: none"> + A natural disaster prevention plan including flood and other disaster risks is made every year by the Flood and Storm Control Committee (FSCC) at all levels + The four on-the-spot motto for disaster management has been applied effectively + Vulnerable areas have been zoned for management and rescue plans + The Huong River banks are being re-planned so that no construction is allowed - No special ecosystem protection activities have taken place in Hue City - There is no specialised construction for natural disaster prevention (ie integrated into the design of new public buildings) - Poor maintenance of natural disaster prevention infrastructure has led to flooding in low-lying areas and lack of capacity for flood control - No budget to implement the master plan's commitment to riverbank protection - Most risk management relies on construction instead of non-construction measures
3. Communications and mobility: this is enabled by diverse and affordable multi-modal transport systems and information and communications technologies (ICT) networks, and contingency planning	
Integrated transport networks, information and communications technology, emergency communications services	<ul style="list-style-type: none"> + ICT technology and infrastructure are adequate for daily life and partly meet the needs of emergency response + Evacuation plans for local people are made with the support of improved transport systems and ICTs + Local people are kept updated via mass media, internet and regular meetings at the local level about policies - Data on disaster and climate change response activities supported by projects/programmes are not well managed by relevant agencies, so it is difficult to have a master plan for the whole city - During times of disruption, it can be difficult to keep in touch due to power cuts

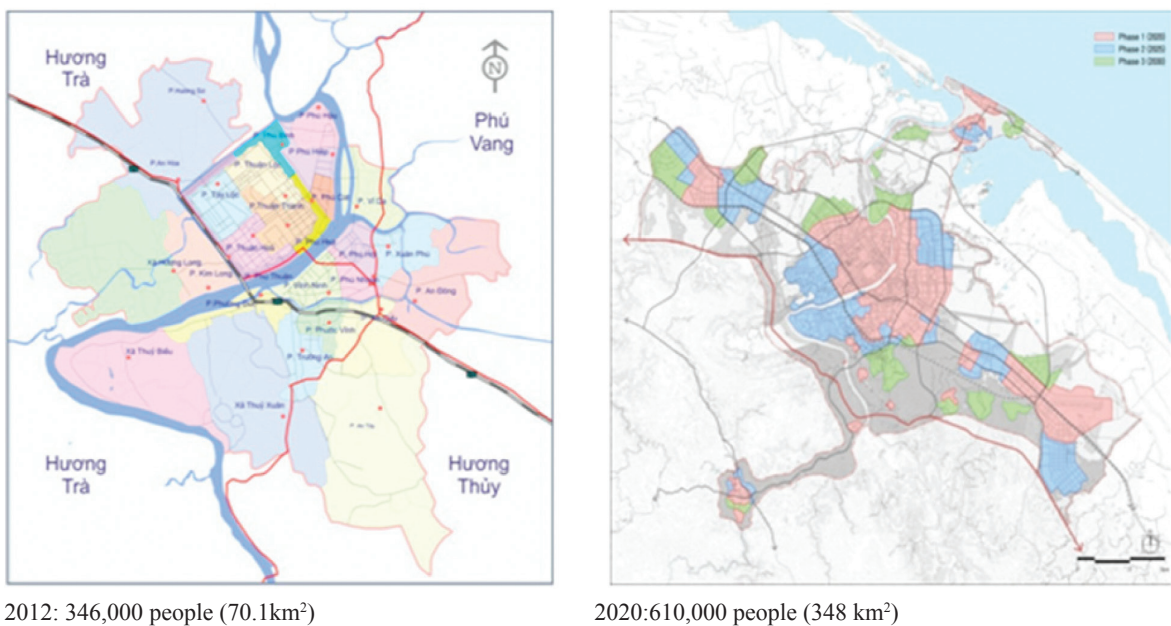
Table 6. Leadership and strategy indicators and performance in Hue City

Sub-indicators	Current situation +: Adequate-: Needs improvement
1. Leadership and management: this relates to government, business and civil society and relies on trusted individuals, multi-stakeholder consultation and evidence-based decision making	
Multi-stakeholder alignment, intra-governmental alignment, government decision-making and leadership, emergency capacity and coordination	<ul style="list-style-type: none"> + Policy-making processes include cross-sector consultation + Key actors are able to coordinate in emergency situations thanks to the four on-the-spot motto + There are systems to zone affected areas for early warning and rescue planning + Emergency response has been improved and well managed in recent years + The role of local NGOs has been recognised by local authorities and residents, especially in natural disaster and climate change response situations – several related activities/projects have been delivered by local NGOs + The emergency capacity is adequate in terms of human resources (healthcare clinic staff, taskforce team) and facilities for crisis and disruption times
Local consultation on reducing risks associated with climate change and disasters is ineffective as the needs of men and women are not clearly identified	
2. Empowered stakeholders: this is underpinned by education for all, and relies on access to up-to-date information and knowledge to enable people and organisations to take appropriate action	
Research, knowledge transfer and best practice sharing, risk monitoring and alerts, public awareness of risk, communication between government and citizens, education	<ul style="list-style-type: none"> + Research and best practice have been shared with local governments and local communities through workshops/meetings/trainings + People have been trained on reducing risks associated with climate change and disasters by projects and programmes that raise awareness + People and government often connect with each other through regular local-level meetings <ul style="list-style-type: none"> - Need more knowledge and best-practice sharing - Lack of monitoring and early warning activities - Communication on climate change and environment is still weak - Awareness of local people about climate change risks is still limited, based on general information about climate change from the mass media with a lack of specific information about climate change impacts on their lives and their role in adapting to climate change
3. Integrated development planning: this is indicated by the presence of a vision, an integrated development strategy, and plans that are regularly reviewed and updated by cross-departmental groups	
City monitoring and data, strategies and plans, land use and development	<ul style="list-style-type: none"> + Information and key planning documents are available on local government websites: <ul style="list-style-type: none"> Hue City master plan Hue City climate action plan Thua Thien Hue province climate change response action plan up to 2020 Thua Thien Hue province green growth strategy Thua Thien Hue province green growth action plan
- Lack of finance for planning implementation at local level	

5.2 The impacts of urbanisation on climate change resilience in Hue City

In Section 5.1, we assessed the resilience of the Hue City using the City Resilience Framework developed by ACCCRN (Arup 2014). In this section, we focus on gender and climate resilience of Hue City using the same framework. The four components (health and well-being, society and economy, infrastructure and environment, and leadership and strategy) were included in the interviews and discussions, and used to structure the analysis.

Figure 5. Hue City urban expansion



Map source © Nguyen (2015)

In the spatial development plan for Hue City, the coverage of urban areas will expand to approximately 349km² by 2020, from 71km² in 2015 (Nguyen *et al* 2015). This will help to consolidate Hue City as a political, economic, cultural, scientific and technical centre for Thua Thien Hue province. Each functional area within the city will have its own orientation, contributing to the development of the whole province and providing specific services to its township. There will be four functional areas as below:

1. Hương Thủy: located in the southern part of Hue City. The plan is to provide the multiple services of an industrial centre, and public services to Hue City and the Hương Thủy area. The orientation of this city is to develop residential, industrial, tourism and service sectors.
2. Thuan An: located in the lagoon area. The plan is to develop an ecotourism centre and a maritime trading gateway for the city, to provide public services to Phu Vang district. Further investigation into the feasibility of urban development in low-lying areas such as An Van Duong should be conducted.

3. Huong Tra. The plan is to provide basic industrial functions such as manufacturing and production, with Tu Ha industrial zone as a hub, and provide public services for Huong Tra area.
4. Binh Dien. The plan is to connect Hue City to the western area of Thua Thien Hue province, and to serve as a centre in the future western area of Hue City.

The primary survey we conducted which is supported by our literature review shows that the urbanisation of Hue City has had significant effects on its resilience in both negative and positive ways. In terms of health and well-being, human vulnerability has been mitigated: people feel more prepared for everyday life and safer during emergencies because of investments in and upgrading of much of the civil and disaster-prevention infrastructure. Furthermore, compared to the base year of 2009, street density is projected to increase by 150 per cent by 2020 whereas roadway infrastructure will rise by 20–25 per cent. This means that mobility during both everyday life and emergencies will be easier.

Importantly, disaster prevention facilities will continue to be improved, for example by upgrading drainage works, dredging and re-enforcing the Huong, Nhu Y and An Cuu rivers, installing a new rainwater drainage system and building new pumping stations and floodwater retention lakes. Other sanitation systems will also be developed, for example, by constructing a water supply system for the whole of the urban population, expanding drainage capacity to achieve 85 per cent coverage in urban areas, and expanding waste collection to reach 100 per cent coverage and 90 per cent treatment rate. Additionally, the healthcare service sector has been developed. City residents have had more opportunities to access moderate-quality healthcare clinics. The number of staff and quality of facilities of the clinics have been improved enough to be adequate for use in everyday life, and for disease prevention and rescue during disasters. The expansion of urban areas has created more jobs for formal and informal workers and for others whose livelihoods depend on the provision of small services such as mobile repair shops, street food shops etc.

However, during urbanisation, ineffectual planning and an inappropriate long-term vision has caused some unexpected negative impacts on human vulnerability, employment and human life and health. In new urban areas, different standards of building construction and facilities have led to problems in the landscape, environment and public services. In particular, although drainage systems in the new urban areas were designed with better standards, with climate change adaptation parameters integrated into the construction phase, they do not match with systems in other areas. This is leading to blockages in drains and inundation in some wards when extreme rainfall occurs. Similarly, rapid urban population growth has resulted in an inadequate waste-collection system, which in turn has led to environmental and health problems. Due to a shortage of public rubbish bins, uncontrolled waste collection sites have formed, polluting the landscape and air in some wards. In addition, untreated domestic wastewater is directly released into the environment due to the lack of sewage systems, becoming a source of disease.

Spatial urbanisation which does not consider sustainability sometimes creates more short-term jobs for informal workers – but it also causes net income loss for some households. This is the case with conversion from agricultural land to residential land and the lack of adequate infrastructure in newly built wards (see Table 7). Farmers lose their livelihoods but do not have the skills to change to new jobs. In some wards, people stated that they do not have enough green space for community activities to strengthen social cohesion and improve physical and environmental health.

Table 7. Compulsory land acquisition by the state in Hue's peri-urban zones (2000–2012)

Locality	Area (ha)	Affected households (#)
An Dong	17.8	124
An Tay	23.9	154
Xuan Phu	26.8	157
Vy Da	24.1	159
An Hoa	9.2	225
Huong So	9.5	296
Phu Thuong	70.3	542
Thuy Van	99.5	651
Thuy Duong	111.9	462
Total	393.6	2,770

Source: Nguyen et al (2015). Notes: Over 80 per cent of land acquired by the state was agricultural land.

Regarding socio-economic conditions, according to the opinions of local people, urbanisation in Hue City has created some problems with social relationships and security. From a traditional viewpoint, the mutual support among of inner-city communities during and after times of disruption is highly appreciated. Normally, the community connections in rural areas are stronger than in urban areas due to local and family norms, but the urbanisation process has weakened these connections as people's lifestyles have changed and become less community oriented.

Relating to infrastructure and the environment, urbanisation processes have partly improved access to and continuity of services in Hue City. However, there is a need for greater financial capacity if the local authorities are to implement the master plan for the whole city. The investment in construction and facilities has reinforced the capacity of local people to overcome difficulties caused by natural disasters. For example, upgrading the road network and drainage has mitigated the impacts of floods during the rainy season. The improvement of ICTs has contributed to higher living standards for Hue citizens as well as more effective continuity plans. Mass media, the internet, mobile phones and other modern facilities have raised public awareness of several issues including climate change. However, according to a representative from the Planning Institute we interviewed, Hue City faces some overlaps in terms of planning and investment. Some new construction integrates climate change adaptation in its design, but does not integrate with other construction projects or with existing infrastructure. As a result, citizens have suffered flooding, pollution and damage caused by extreme events.

5.3 The role of gender in building climate change resilience in Hue City

As mentioned in the literature review in Section 1, several researchers have found that the impacts of climate change are gendered due to the distinction between men and women in terms of their physical characteristics and socio-political experiences. As a result, the vulnerability and resilience of each gender to climate change is dissimilar in some ways. In general, both men and women are affected by climate change but women are more vulnerable because their livelihoods are more dependent on natural resources and systems that are threatened by climate change. In the case of Hue, our research indicates that in urban areas where natural resources are limited and people mostly work in the services sector, the different experiences of men and women depend on their jobs and working conditions.

Applying the City Resilience Framework in Hue, most livelihoods of Hue citizens are very vulnerable to both human and natural problems, but with higher rates of vulnerability for women. According to the interviews and group discussions, women in Hue City play an important role in sustaining their family by working hard, but in jobs and roles that are easily affected by the weather and environment. Table 8 shows a list of jobs commonly undertaken by women and their working conditions. A small proportion of women also work as government officers, with comfortable working conditions and a stable income.

Table 8. Women's jobs and their working conditions

Jobs	Working conditions
Small business, hawker (majority of women's jobs in study wards)	<ul style="list-style-type: none"> ■ Working outside all day and suffering during bad weather and other risks ■ Limited capital ■ Unstable income ■ Stressful
Making conical hats	<ul style="list-style-type: none"> ■ Skills needed ■ Time demanding (getting up early and staying late) ■ Associated health risks (sitting down for a long time) ■ Low income
Animal husbandry	<ul style="list-style-type: none"> ■ Associated health risks due to poor sanitation ■ Loss of income if animals are ill (more probable with extreme weathers)
Making incense	<ul style="list-style-type: none"> ■ Associated health risks (sitting down for a long time and exposure to chemicals) ■ Low income
Collecting recyclable things	<ul style="list-style-type: none"> ■ Working outside all day and suffering during bad weather ■ Significant income
Processing recyclable plastics	<ul style="list-style-type: none"> ■ Exposure to toxic substances
Working in textile companies	<ul style="list-style-type: none"> ■ Stable income and working inside ■ Associated health risks (inhaling dust and sitting down for a long time)
Farming and gardening	<ul style="list-style-type: none"> ■ Working outside all day and suffering during bad weather ■ Exposure to pesticides
Making trumpery/trinkets	<ul style="list-style-type: none"> ■ Low income but allows more time for family
Hairdressing	<ul style="list-style-type: none"> ■ Working inside ■ Low income ■ Exposure to toxic substances
Embroidering	<ul style="list-style-type: none"> ■ Unstable income ■ Associated health risks (sitting down for a long time)

Men also contribute to household incomes. Many do informal work as builders and carpenters, and need their strength to cope with bad weather. However, unlike women, men do not have to care much for the family after work. This means that women face more pressure from daily life and sacrifice their own needs to meet those of their families. As indicated in the FGDs, most women often prioritise the happiness of family members instead of their own leisure or learning time. Although sometimes they feel exhausted after work, they choose to stay at home to do housework for their husbands, children and other family members to make them feel more comfortable. Some women felt guilty when they joined our FDGs as there would be no one at home cooking. According to one woman during the FDG in An Cuu ward,

Sometimes, I love to join social activities but my husband is not happy. He uncomfortably often asks me why I go to those kinds of activity as he thinks they are not as important as serving family members. It is difficult to convince him that I have my own needs.

Heavy workloads and traditional viewpoints have restricted women to a daily routine that limits their time for recreational and learning activities (which would also enrich their emotional health).

Differences in the roles of men and women in families and communities also mean differences in vulnerability relating to climate change. While men are vulnerable in terms of their physical health due to having to do heavy work outside during extreme weather, women are expected to suffer more risks. Pressure to provide food security for their families has created an additional daily work burden for women as they must generate income as well as serve family members. This has a negative effect on their physical health. Women who have to work outside all day in uncomfortable working conditions suffer from headaches, backaches and the cold.

Also, because women devote most of their time to their families, women lack time for learning or updating their knowledge of climate change and other disruptions. According to the Vice Chairperson of provincial women union, women need to be equipped with knowledge to be well-prepared and respond to climate change. Furthermore, their lack of knowledge means they lack the confidence to participate in consultations and meetings in general or climate change response-related policymaking process. This means the needs women have not been properly recognised or taken into account by policymakers. Therefore, women will not be sufficiently supported in every aspect of climate change response practices.

According to the study results shown in the tables below, gender roles in building climate resilience are clearly communicated using the four main indicators in the ACCCRN City Resilience Framework (see Table 1). The clearest evidence for the different contributions of men and women to resilience in Hue is the health and well-being category, followed by society and economy and infrastructure and environment. The proof of differing gender roles in leadership and strategy is not as strong. All the results collected from in-depth interviews and group discussion are described in the tables below:

Table 9. Gender roles in health and well-being

Sub-indicators	Gender roles	
	Men	Women
1. Human vulnerability: this relates to the extent to which people's basic needs are met		
Food, water and sanitation, energy, housing	<ul style="list-style-type: none"> ■ Strengthening/reinforcing houses to cope with natural disasters 	<ul style="list-style-type: none"> ■ Managing and securing food, water, energy and sanitation for all family members (women are responsible for buying and processing food for the whole family) ■ Managing income to pay for energy, water and other needs for their households ■ Normally, if their families have enough food, women often prioritise feeding their children, elderly family members and husband ■ Looking after and being responsible for the health and safety of family members in both daily life and during times of disruption
2. Livelihoods and employment: ie access to finance, ability to accrue savings, skills training, business support and social welfare		
Livelihood opportunities, skills and training, development and innovation, access to financial assistance	<ul style="list-style-type: none"> ■ Working to contribute income for everyday family life ■ Responsible for work that needs physical strength at home, such as house repairs ■ Receiving formal education and training in vocational training programmes 	<ul style="list-style-type: none"> ■ Working to contribute income for everyday family life ■ Taking care of many household jobs at once to maintain a balance for family life: cooking meals, taking care of children and the elder, cleaning, washing dishes and taking children to school ■ Receiving formal education and training in vocational training programmes ■ Accessing financial assistance from microfinance institutions, social policy banks and government loans (women sign the contracts/agreements, however, men decide how to spend the loans)
3. Safeguards to human life and health: this relies on integrated health facilities and services, and responsive emergency services		
Public health management and access to affordable health services, emergency facilities and practitioners	<ul style="list-style-type: none"> ■ Serving the community as the main taskforce team members during emergencies 	<ul style="list-style-type: none"> ■ Participating in and leading campaigns/movements on healthcare and environmental protection at community level ■ Responsible for taking family members (children, elderly) to health services ■ Forming the majority of staff at healthcare clinics ■ Facing more health risks due to direct exposure to polluted water sources, waste and working outside

Table 10. Gender roles in society and the economy

Sub-indicators	Gender roles	
	Men	Women
1. Collective identity and mutual support: this is observed as active community engagement, strong social networks and social integration		
Community and civic participation, social relationships and networks, local identity and culture, integrated communities	<ul style="list-style-type: none"> ■ Making key decisions within the family ■ Holding leadership positions in community activities/events to connect people 	<ul style="list-style-type: none"> ■ Being the core group of communities ■ Implementing and promoting participation of community members (especially other women) in community activities ■ More social expectations for women to develop social networks and be involved in communities
2. Social stability and security: this includes law enforcement, crime prevention, justice and emergency management		
Deterrents to crime, reducing corruption, policing and justice, approaches to law enforcement	<ul style="list-style-type: none"> ■ Serving the community as main security team members during emergencies and disruption ■ Taking part in community rescue teams 	<ul style="list-style-type: none"> ■ Taking part in stabilising the community during disruptions (providing food and other goods for families and vulnerable people) ■ Taking part in community rescue teams ■ Playing an important role in managing community conflicts and contributing to social stability ■ Facing more risk of domestic violence
3. Financial resources and contingency funds: this relies on sound management of city finances, diverse revenue streams, and the ability to attract business investment, allocate capital and build emergency funds		
Economic structure, inward investment, integration with regional and global economy, business-continuity planning, sound fiscal management	<i>No new evidence.</i>	

Table 11. Gender roles in infrastructure and environment

Sub-indicators	Gender roles	
	Men	Women
1. Physical exposure and vulnerability: environmental stewardship, appropriate infrastructure, effective land-use planning and enforcement of planning regulations		
Environmental policy, safeguards for critical infrastructure, building codes and standards	<i>No new evidence</i>	
2. Continuity of critical services: this results from diversity of provision, redundancy, active management and maintenance of ecosystems and infrastructure, and contingency planning		
Ecosystem management, flood risk management, maintenance practice, demand on critical infrastructure, continuity planning	■ Taking part in disaster response plans	■ Taking part in disaster response plans
3. Communications and mobility: this is enabled by diverse and affordable multi-modal transport systems and information and communications technologies (ICT) networks, and contingency planning.		
Integrated transport networks, ICTs, emergency communication services		■ Playing an important role in connecting people in communities and strengthening the consolidation of families and communities during times of disruption

For the indicators within leadership and strategy, gender roles were raised but not strongly. This may be because people just recognise the participation of men and women in policymaking process in terms of quantity instead of quality. Through in-depth interviews with local authorities and relevant agencies, most interviewees agreed that women are now working in several sectors, including natural disaster and climate change response. The FSCC, for example, includes a female member from the provincial Women's Union. The development projects related to disaster risk reduction and climate change have done consultation with women in order to improve gender equality and learn more about the needs of women in these areas. However, women are involved as a procedure of a project or policy, without meaningful consideration of their capacities, needs and interests. In the interview with the representative of the Women's Union, they agreed that their role is still passive in this type of consultation. Therefore, their voice is not significantly taken into account. The reason for this situation is that the guidelines for gender mainstreaming at the local level are limited. The case of GrEEEn Cities Programme shows a weak implementation of gender-related policy and ineffective participation of women in development projects (see Table 12).

Table 12. Participation and gender roles in the GrEEEn Cities Programme

Approach (as per Thua Thien Hue province project-management board and ADB consultant team)	Participatory level (as per CSRD study results)	Comments
<p>1. The identification of sub-projects per city was done through the preparation of the Green Cities Action Plan (GCAP). The GCAP detailed the vision for the city, the key infrastructure and service needs, and from there identified specific sub-projects and locations</p> <p>2. Consultation process</p> <ul style="list-style-type: none"> ■ Organise in-depth interviews, meetings, workshops and group discussions from March to September, 2015 ■ Target groups: from national to community level, including authorities, relevant agencies, NGOs, private sector, affected people and beneficiaries. ■ Gender integration: <ul style="list-style-type: none"> Gender action plan (GAP) was established for GrEEEn Cities Programme of Hue City, in which the solution for gender issues and gender integration were included. This GAP was submitted to ABD for review and approval The core groups of provincial project management board, monitoring and consultant groups include at least 20 per cent - 30 per cent female staff Assign a gender expert at national level being responsible for gender integration Integrate gender assessment and finalised GAP into the feasibility study or proposed sub-projects Have indicators for gender integration assessment 	<ul style="list-style-type: none"> ■ Only about 30 per cent of interviewees knew about the GrEEEn Cities Programme (representatives from local authorities and relevant agencies) ■ About 90 per cent of interviewees did not understand the green city concept or gender roles introduced by ADB ■ The provincial Women’s Union was informed about the project and invited to participate in a workshop but was not provided with enough information about the GrEEEn Cities Programme ■ Women were not properly involved in either needs assessments or programme design 	<ul style="list-style-type: none"> ■ Grassroots participation in this programme is very limited, which is why local people were not well informed ■ In theory, the GrEEEn Cities Programme management board and consultant team conducted the consultation and integrated gender issues following ADB guidelines, but it was done ineffectually as the provincial Women’s Union had little information about the project so could not contribute meaningfully ■ Although there is a legal framework for gender integration into development projects (from both Vietnamese government and ADB) in practice, at grassroots level this is still ineffective

In addition, women are still struggling to become change agents in climate change resilience, due to challenges created by the long history and traditions in Hue. According to the traditional viewpoint, a typical Hue woman needs to perform well in domestic science (housework, cooking and needlework) (Nguyen 2010). These values mean that women often lack time for social activities or resilience initiatives. Most Hue women still devote their time to their husband, children and the elderly instead of developing their own career. In discussions, participants identified a number of barriers preventing women from more active participation in leadership and strategy issues in Hue City. In particular, participants agreed that women are always busy with their families, so they lack time and are too exhausted to participate.

Moreover, lower rates of participation in public meetings mean that women are less informed about climate change and disaster risk reduction. They hesitate to raise their voices in public forums. In addition, the opinion of women is less recognised because of gender discrimination and prejudice, which also means few women hold leadership roles. During the process of building resilience plans, men have more time to participate in the consultation meetings. Therefore, they have more opportunity to contribute to the plans at all levels. In policymaking process and implementation, decisions are mostly made by male members in the agencies.

The limitations caused by the traditions mentioned above do not mean that women do not make an effort to improve their position in society in general and in building resilience in particular. The history of Hue shows that significant number of Hue women were famous leaders and artists, contributing to the social and cultural values of Hue. During group discussions and workshops organised by CSRD, the representative of the provincial Women's Union indicated that women have changed their attitudes and action to become change agents, and now promote their roles in several emerging areas. They apparently identified that there is a need in the short term for women to actively participate in policymaking processes. From the FGDs, discussions showed that women's institutions also recognised the need to focus on the strategic needs of women when equipping themselves with knowledge and information related to emerging issues – including climate change and disaster risk reduction – to improve their participation.

6 Discussion

Compared to other research in the same area, this study offers both different and similar results in terms of gender vulnerability to climate change. Women in Hue City are not uniquely vulnerable to climate change in terms of natural resource shortages during extreme weather nor vulnerable in terms of lack of ownership of land or other assets (Alston 2013). Women and men in this city have equal access to resources. Most basic needs such as clean water and sanitation, electricity and energy are sufficiently met by public services. However, women face particular vulnerabilities due to their additional workloads from livelihood activities and family care (Alber 2011). They are also more vulnerable because they receive less education and training and have less access to institutional support and information (Alston 2013).

Satterthwaite *et al.* (2007, p45) state that ‘within low-income populations, women often have particular vulnerabilities as a result of gender-related inequalities’. As commonly found in other research, the work burden created by livelihood activities and unpaid family care puts more pressure on women and limits them in building their own resilience. The case of Hue City also showed that many households depend on informal jobs with unstable incomes and no welfare policies. Kakota *et al.* (2011) found that women are more likely to be vulnerable to climate variability impacts than men because of social and cultural conditions that influence the division of labour. Alber (2011) mentioned that at least 60 per cent of women workers globally have informal employment and generate larger income than men. Similar to the findings of Alston (2013), exposure to unsafe conditions during working hours has been another factor that causes physical ill-health for women in Hue City. Additionally, women feel exhausted after work and do not have time for them to learn about new issues such as climate change.

Family care is another barrier that limits women’s involvement and participation in social activities. As indicated by Kakota *et al.* (2011), compared to men, women often have extra duties at home. They are responsible for collecting water and firewood, preparing food, doing housework and caring for children and the elderly. Similar to our findings in Hue City, Kakota *et al.* (2011) said that the roles of women are ‘routine activities’ and the demands of the household are daily. This means both that the need for both income generation and providing family care makes women more vulnerable in terms of physical health and knowledge.

The representative of the provincial Women’s Union of Thua Thien Hue admitted that the participation of women in climate change decision making is still limited in both time and quality, which excludes them from relevant activities, including needs assessments, policymaking and planning meetings. As a result, their needs and opinion have not been taken into account during decision-making processes, leading to inadequate consideration of gender issues in resilience building strategies.

Another factor that limits the public participation of women is local norms. For example, Figueiredo and Perkins (2013) show how the social and economic status of women strongly influences their vulnerability to climate change which undermines their ability to cope with and adapt to climate change. In some localities, women have been kept behind doors. Due to the history of male domination in Hue, women have long been affected by gender discrimination. The feudal society has only respected women who devote their time to housework, cooking and needlework, and has ignored the role women play in the community. This viewpoint has limited the participation of Hue women in public forums.

It is clear that, in Hue, women have lower resilience capacity and less voice in society. Women lack the time for learning and participating in social work. In addition, as climate change is a complex issue and requires specialist knowledge and skills, it can lead to further exclusion (Alber 2011). Therefore, it is necessary to improve women's resilience by promoting sustainable livelihoods and providing more learning opportunities for women. In terms of generating income for households, women in Hue need more support to access financial resources in communities and from governmental systems. As found by our research, microfinance model and loans from social policy banks with low interest rates would be helpful for women to develop their household-scale businesses. With a secure income, women may have more time for learning activities such as training and workshops at the local level. Those activities need to be done systematically by involving women from communities and relevant bodies, especially in decision-making processes.

In addition, capacity-building for women also means paying more attention to their voice. It is necessary to create more room for public participation of women in all stages of climate change resilience planning. As mentioned by Tschakert and Machado (2012), the meaningful participation of different genders needs to be mainstreamed into household decision making, community social activities, and local political and management structures. In the case of Hue City, setting up the quantitative balance in some cases is not enough and may not be particularly helpful, especially if women representatives are not confident and their voice is not recognised. The meaningful participation of women will make their specific vulnerabilities, needs and roles better understood, respected and taken into consideration by society and policymakers.

Focusing specifically on gender roles in building climate resilience in urban areas, we find that men and women have different advantages in adapting to and coping with extremes events or disruption. This is consistent with the small body of literature on the subject. As also concluded by Kakota *et al.* (2011), adaptive capacity differs along gender and social lines, and varies among local social and political contexts. In Hue, women have significant influence on health, human well-being and the economy at a community level while men take more responsibility for infrastructure and the environment. The roles of women are maintained in routine activities while men just act when the needs are raised. Similarly, Alston (2013) recognised that social well-being can be impressively enhanced if women are included in the labour force, and that the health and education of children are better if women are empowered. Tschakert and Machado (2012) find that women in Senegal have played important roles in mitigating climate change by contributing to their own livelihood security by increasing the availability of fuelwood and generating new financial resources. These authors present a case in Ghana where, in response to heavy rainfall, women diversified their livelihoods through alternative cash crops. However, in the Senegal case study, women have been taking on more leadership and management roles at community level. In comparison in Hue City, women's livelihood activities do not directly rely on natural resources.

The influence of socio-cultural norms and physical health has several impacts on gender roles in building climate resilience. However, there is growing agreement that men and women should have equal opportunities to develop critical adaptive capacities. Alston (2013) states that pursuing gender equality in climate change adaptation require decision makers to promote the rights, responsibilities and opportunities for both men and women. In order to strengthen the roles of women in decision-making processes, their needs and interests must be given equal weight. Women are beginning to emerge in leadership roles in their communities but the outcomes of those cases are more about the 'feminisation of responsibility' instead of structural change in power relations (Tschakert and Machado 2012).

According to Oxfam and UN Vietnam (2009) gender discrimination is still widespread in formal and informal institutions. If women are to become change agents, we need a fundamental change in power relations. Vietnam continues to grapple with a lack of meaningful participation of women and weak gender integration in policymaking and implementation at a local level. In the context of Vietnam, the national government has issued several important policies related to climate change responses. Gender was significantly considered but there remains a gap between policy and practice. Gender is mentioned in some legislation, but it is not clear how to implement in practice. According to UN Vietnam (2009), the action plans for the NTP-RCC developed by line ministries and provinces are, as yet, not specifically mandated to address gender equality in CCA/DRR. In the action plans developed by provinces, priority actions focused on capacity building for women were proposed (action plan of Can Tho, Hue) but have not been implemented, and so far gender issues are only

integrated into some projects by NGOs. Particularly, Oxfam and UN Vietnam (2009) indicate that the NTP-CC identifies gender equality as a guiding principle, but women's involvement in consultations has been limited, and no gender targets were developed. Therefore, although awareness of gender equality and women's participation in decision making at a household level has been increasing, this does not always translate to increased gender equality at a community and city scale. The participation of women in local formal political and management structures remains low.

This situation is again proved by the Hue City case. By examining gender inclusion in the GrEEEn Cities Programme funded by ADB, we find that although ADB has a clear gender policy and detailed guidelines for projects, the implementation in practice has been poor. Women at all levels have not been fully informed about the project. Therefore, their participation has been minor and not meaningful. This illustrates how important it is to support women's roles in climate resilience by strengthening mechanisms for inclusion and providing adequate resources to ensure women's full and equal participation in decision making at all levels— both with respect to climate change and on a much wider array of issues (Tschakert and Machado 2012)

7 Conclusions and recommendations

7.1 Climate change resilience in Hue City

Due to the natural environment, the historical legacy and urbanisation, Hue City has its own special identity that significantly influences its resilience to climate change. By examining the four indicators in the City Resilience Framework of ACCCRN, it is evident that both Hue City government and citizens have significantly been strengthening their capacity to cope with extreme weather and other disruptions in the short term. But some important components still need to be improved for an effective long-term response.

Regarding health and well-being, our research shows that human vulnerability is now mitigated by more investment in healthcare systems and other basic services, such as treated water, food and energy for everyday life. Hue citizens are able to easily access these services during normal situations, as well as during and after disruption. Local governments and citizens are also establishing safeguards to human life and health by strengthening houses, making rescue plans available and integrating disaster-mitigation measures into public construction. However, livelihoods and employment are still unsustainable, with limited accrued financial resources constraining people's ability to recover after disruptions.

In terms of society and economy, Hue has some traditional cultural values which have contributed to strong mutual support and a stable and secure society both in everyday life and during challenging situations. The shortcomings of Hue City are its insufficient financial capacity and limited contingency funds. Although a fund for disaster risk reduction is available at the local level, the needs of local people after disruptions have not been met, so they have mostly relied on outsiders for support.

The infrastructure and environment of Hue City have been considerably upgraded for better resilience. We recognise that Hue City has invested in public construction, drainage systems, waste collection, information technology and other services for emergency situations. This mitigates the physical exposure and vulnerability of the city, but in some cases these investments are not systematic. This is especially true for the natural environment, as critical ecosystems have not received enough maintenance in the face of human pressures, leading to degradation and reduction of the resilience of Hue City.

Regarding leadership and strategy, it is clear that the municipal government has raised its awareness of climate change resilience and taken some action in this area. Policymakers have recognised the importance of public participation to some extent and integrated it into recent relevant policies. However, in order to make policies work effectively, they need more vision and to carefully allocate their limited budget to prioritised projects and strategies.

To some extent, urbanisation has contributed to the climate resilience of Hue City by leading to the upgrading of infrastructure, expanded healthcare systems and new forms of employment. However, it has also created disadvantages for people due to the lack of long-term or systematic planning, and due to the loss of livelihoods for those in peri-urban areas.

To improve the resilience of Hue City, the following actions should be taken by policymakers and city planners:

- Improve livelihoods at the household level to sustain their health and improve financial capacity. This is important both in everyday life and for overcoming disruptions, especially extreme weather. This could also be supported by helping vulnerable people to access optional insurance programmes and other social services.
- Review the master plan for urbanisation for Hue City to develop a long-term vision for climate change resilience. This should include proper infrastructure and sustainable livelihoods for people in new urban areas and an interconnected approach to information exchange to support relevant capacity building.
- Improve waterbody networks in Hue City to enhance resilience and conserve the landscape for developing tourism as a main revenue source. It is also important to promote ecosystem-based disaster risk reduction and climate change adaptation in Hue City

7.2 Gender roles

In relation to gender roles, our study found that men and women at a grassroots level contribute differently to building climate resilience in Hue City. This is due to their different roles in households and the workplace, and the resulting types of influence they have over the government and community. Women play key roles in sustaining and enhancing the health and well-being of people within their community, and accruing funds for households, communities and society. They also take part in organising mutual support for each other during times of disruption, while men are more active in activities relating to safeguarding, security and other continuity plans within their communities.

At the management level, we found that women hold only minor roles. They do participate in the policymaking processes for some plans, strategies and projects relating to enhancing resilience. However, they do not share their experiences or give decisive opinions, so women's needs have not been integrated into subsequent plans. The reason is that women face cultural and educational barriers, and also have limited time for community activities and or learning about climate change.

To promote gender inclusion in Hue City, we recommend that policymakers:

- Promote microfinance funds and other mechanisms that allow women to develop their livelihoods, so that they can generate more income and raise their position in society.
 - Create more opportunities for women to participate in capacity-building opportunities.
 - Create more opportunities for women to participate in decision-making processes, including in policy, community and business contexts.
 - Educate people about the limitations of traditional gender roles, and the importance of unlocking men's and women's potential in different spheres.
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Gender needs and roles in building climate resilience in Hue City, Vietnam

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Published by IIED May, 2016

IIED order no: 10780IIED

<http://pubs.iied.org/10780IIED.html>

ISBN 978-1-78431-347-0

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