

City Resilience Profile

# Hue, Viet Nam



URBAN CLIMATE  
CHANGE RESILIENCE  
TRUST FUND

Asian Development Bank

# Introduction

In 2018, ADB's Urban Climate Change Resilience Trust Fund (UCCRTF) visited Hue to undertake research to assess the city's ability to cope with shocks and stresses from climate change. The study forms part of a wider assessment to measure resilience in 25 UCCRTF-supported cities. It provides a baseline assessment of Hue's resilience, based on a series of structured interviews with city officials and on surveys that were conducted with 113 households in Hue. UCCRTF is implementing urban resilience projects in Hue, and the baseline results provide a basis for a better understanding of the impact these interventions have had.

This document presents the results of the baseline study and provides an insight into the current perceived level of resilience across four key dimensions: health and wellbeing, economy and society, infrastructure and ecosystems, and leadership and strategy. The findings provide an indication of potential areas of future investment in infrastructure, governance or planning, that could help to further strengthen the city's resilience. More detail about the methodology of the baseline study and how to interpret the results can be found at the back page of this document.

Hue is highly exposed to climate-related shocks and stresses, such as river flooding, sea-level rise and extreme temperatures. Climate projections suggest that these issues will become more severe in the future. Improvements to Hue's infrastructure, urban planning, and community preparedness are essential to ensure its resilience. The baseline study collected primary data at the city level. The results showed that Hue demonstrated many positive qualities that lend the city resilience to shocks and stresses. However, they also indicated that there are several areas where improvements could be made to increase resilience, including in urban development planning, the quality of infrastructure for connectivity, and disaster prevention and mitigation.

ADB is actively working with Hue to strengthen the city's urban planning and critical infrastructure. These projects in the city are complemented by UCCRTF activities to build climate resilience in Hue by supporting disaster risk financing activities and community-led resilience projects. UCCRTF intends to undertake another assessment once ADB infrastructure projects are complete to assess changes in resilience.

## KEY FINDINGS

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- Hue is sensitive to climate change shocks and stresses, including sea level rise, surface water flooding, and extreme heat. The city displays many qualities that contribute to its resilience, however it can strengthen its resilience by investing in improved infrastructure, and urban planning.
- Hue's good emergency management plans, co-ordinated governance and multi-stakeholder engagement provide a strong foundation for its leadership and strategy resilience. The city could improve in this area by investing in improved integrated development planning.
- Hue's health and wellbeing resilience was strengthened by high levels of access to quality, robust public healthcare system. Areas for improvement in this area were found to be strengthening safe housing, energy supply, and access to safe drinking water.
- Critical infrastructure systems in Hue were perceived to be relatively well able to cope with shocks and stresses. However, resilience could be strengthened investing in ecosystem protection, infrastructure to support disaster risk reduction, and better codes and standards for infrastructure design and planning.
- Hue's economic and social resilience, is supported by effective law enforcement, crime prevention and access to criminal justice systems. To further increase resilience in this area, the city could improve its engagement with its citizens and diversify its economic base.
- Household-level surveys found that most vulnerable households in Hue reported that they had diverse sources of income and owned assets (87.6% and 67.3% respectively). This lends them resilience. However, there was a relatively high dependency on government support services (62.8%) and less than half of households (45.1%) were aware of the availability of basic services in their area, which could undermine their resilience to repeated shocks or chronic stresses.

# Hue in the context of climate change

**Hue is one of the most vulnerable cities to climate change in Viet Nam. Situated in the delta region of the Perfume River, it sits just 3 meters above sea level. Hue is exposed to shocks and stresses related to sea-level rise and flooding. Temperatures in the city can reach 41°C in the dry season which will likely impact vulnerable populations such as the elderly, the sick and those who are required to work outdoors. By the end of the century, climate change could lead to 48 more days per year where temperatures go above 40°C.<sup>1</sup>**

Home to over 350,000 people, the city's population has grown at a modest rate of 1.1% over the last five years.<sup>2</sup> Nonetheless around a fifth of the population is classified as being urban poor and is therefore especially vulnerable to climate impacts. The expanding population and increasing tourism have put additional strain on the city's infrastructure systems, especially transport and wastewater treatment facilities. The city also faces a range of significant infrastructure challenges, for instance, less than 15% of urban wastewater is collected and treated by centralized treatment systems.<sup>3</sup> Nonetheless, infrastructure for water and energy has undergone significant improvements in recent years, with almost all households connected to the utilities.

Hue is annually subjected to flooding from tropical storms during the rainy season. Urban flooding has increased as a result of the city's poor drainage systems, deforestation upstream and rapid urbanisation across the floodplain. Extreme rainfall events, which are expected to increase in intensity in the region, are likely to continue affecting Hue, thanks in part to its extensive canal network. ADB flood hazard simulations suggest that while the

land area exposed to flooding will not change significantly, the flood depth could increase by around 1 meter in the lower reaches of the Bo and Perfume rivers, by the end of the century.<sup>4</sup>

Sea level rise will increase the pressure on Hue's coastal zone. Climate projections indicate that sea levels may rise by up to 94 cm by 2100, and could lead to further coastal erosion, especially around the area at the mouth of the Perfume River. Elevated sea levels will make coastal areas more exposed to storm events, increasing the city's sensitivity to such events thanks to the significant loss of pine forests that used to protect the city from the worst effects of storms.

Tourism has also become an important contributor to the economy. Climate change will pose risks to tourism, public health, and infrastructure in the form of flooding, siltation, erosion, destruction of homes, damage to power supply and impacts to ecosystems. To respond to the significant risks posed by climate change, Hue is currently developing a city-wide resilience programme to incorporate climate change adaptation considerations into the city's urban plans.

## Resilience context

### Climate impacts



Sea-level rise projected to be 94cm by 2100, causing flooding and coastal erosion



Extreme rainfall events to increase in intensity



Increased temperatures to result in 48 more days per year above 40°C by 2100

### Additional factors



Population growth of 2.5% puts strain on current infrastructure



Poor drainage systems exacerbate flooding



Deforestation reduces protection from storms and increases flooding

1 World Bank Climate Knowledge Portal: <https://climateknowledgeportal.worldbank.org/country/Viet Nam/climate-data-projections>

2 Asian Development Bank (2018) SC 109094 REG: Climate Change and Flood Hazard Simulations Tools for ADB Spatial Application Facility Final Report.

3 Asian Development Bank (2018) SC 109094 REG: Climate Change and Flood Hazard Simulations Tools for ADB Spatial Application Facility Final Report.

4 Asian Development Bank (2018) SC 109094 REG: Climate Change and Flood Hazard Simulations Tools for ADB Spatial Application Facility Final Report.

# City Resilience Profile



In 2018, the Asian Development Bank's Urban Climate Change Resilience Trust Fund visited Hue city and conducted a baseline assessment of the city's resilience. The study assessed Hue's resilience relating to four dimensions: health and wellbeing, economy and society, infrastructure and ecosystems, and leadership and strategy. The assessment scored these categories relating to twelve relevant goals of resilience, which are crucial in addressing a wide range of chronic problems or a sudden catastrophe for a city<sup>5</sup>. The scoring was based on structured interviews with key city officials. The overall scores for each resilience dimension and goal are shown in the diagram to the right. The analysis showed that Hue is perceived to demonstrate resilience in several areas, and in others where it could invest to strengthen its resilience, considering the city's high level of exposure to climate change and its impacts. This is discussed according to each dimension in the coloured boxes below.

<sup>5</sup> The resilience dimensions and goals are based on the City Resilience Index (CRI). The CRI is a tool developed by the Rockefeller Foundation to help cities assess their resilience progress.

## LEADERSHIP & STRATEGY

Hue has effective leadership which helps it to cope with hazards, shocks and stresses contributing to its resilience. Qualities that were perceived to lend the city resilience in this area included proactive multi-stakeholder co-operation, effective coordination between government bodies, and good emergency management plans ('Effective Leadership' – 4.0) and ('Empowered Stakeholders' – 3.8). However, Hue's most recent urban development plan was its GrEEEn City Action Plan, produced with support from ADB in 2014.<sup>6</sup> To boost the city's resilience further investment is needed to update and build on this plan, to ensure that it is fully integrated into the city's urban development planning processes ('Integrated Planning' – 2.8).

<sup>6</sup> ADB (2014) Hue GrEEEn City Action Plan. <https://www.adb.org/sites/default/files/publication/179170/hue-green-city-ap.pdf>

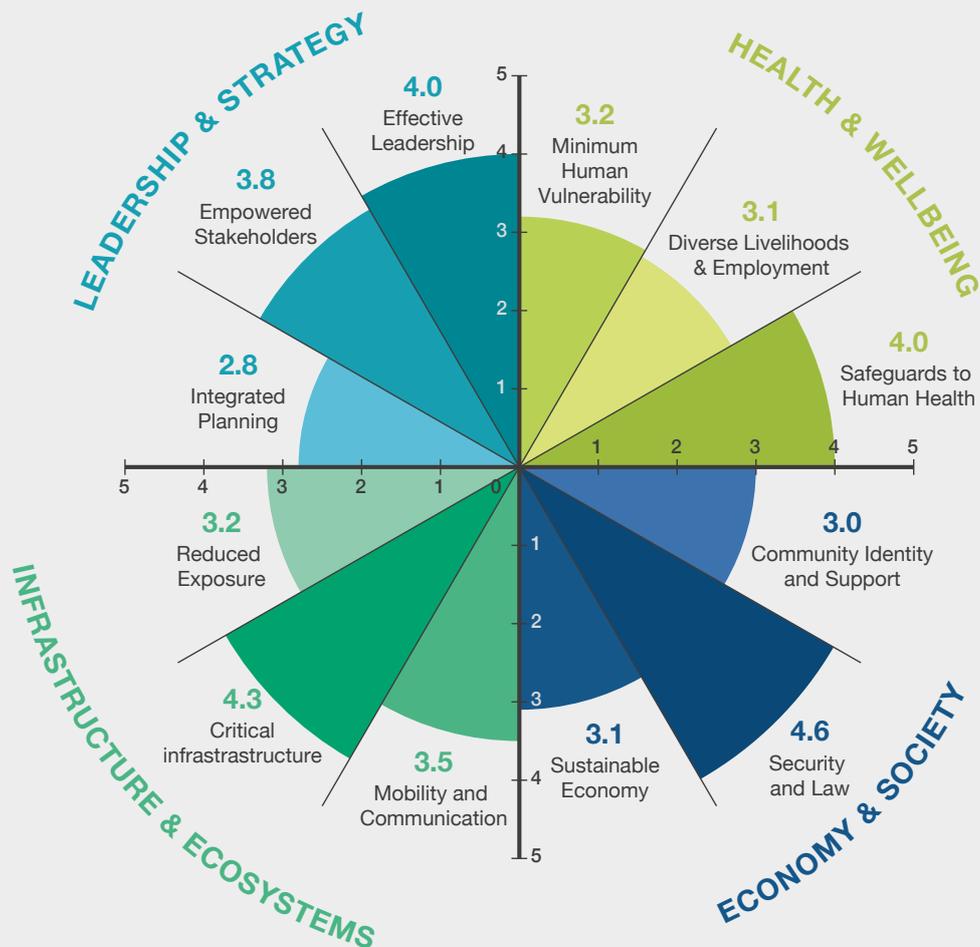
## HEALTH & WELLBEING

Ensuring that residents of Hue are healthy and have a good quality of life, is important to cope with shocks and stresses. Hue was perceived to have higher levels of access to good quality, robust public healthcare system including specialist healthcare facilities ('Safeguards to Human Health' – 4.0). The city could boost its resilience levels further by strengthening safe housing, sanitation, and access to safe drinking water, ('Minimum Human Vulnerability' – 3.2).<sup>7</sup> While many neighborhoods are well served by these utilities, poorer neighborhoods around the Citadel are often not connected to sanitation infrastructure.<sup>8</sup> Hue could also support greater variety and diversity of employment opportunities by boosting its tourism sector<sup>9</sup> ('Diverse Livelihoods and Employment' – 3.1).

<sup>7</sup> ADB (2014) Hue GrEEEn City Action Plan. <https://www.adb.org/sites/default/files/publication/179170/hue-green-city-ap.pdf>

<sup>8</sup> ADB (2014) Hue GrEEEn City Action Plan. <https://www.adb.org/sites/default/files/publication/179170/hue-green-city-ap.pdf>

<sup>9</sup> REF: ADB (2014) Hue GrEEEn City Action Plan. <https://www.adb.org/sites/default/files/publication/179170/hue-green-city-ap.pdf>



## INFRASTRUCTURE & ECOSYSTEMS

Hue's infrastructure and ecosystems resilience is boosted by its effective provision of critical infrastructure ('Critical Infrastructure' – 4.3). Infrastructure systems were perceived to be able to cope with shocks and stresses relatively well. Hue's infrastructure is improved by being one of the greenest cities in Viet Nam, benefitting from the protection offered by the Ru Cha mangrove forest and coastal lagoons.<sup>10</sup> However, these assets must be preserved in order to continue to allow natural ecosystems to protect the city from hazards ('Reduced Exposure' – 3.2). To do this the city would benefit from better codes and standards for infrastructure design and planning. Hue's resilience would be further strengthened by improving the road and pavement infrastructure in and around the Citadel area which would also help to boost tourism in the city ('Mobility and Communications' – 3.5).<sup>11</sup>

10 CIFOR (2019) Opportunities and challenges for mangrove management in Viet Nam: Lessons learned from Thai Binh, Quang Ninh and Thanh Hoa provinces. [http://www.cifor.org/publications/pdf\\_files/OccPapers/OP-197.pdf](http://www.cifor.org/publications/pdf_files/OccPapers/OP-197.pdf)

11 ADB (2014) Hue GrEEEn City Action Plan. <https://www.adb.org/sites/default/files/publication/179170/hue-green-city-ap.pdf>

## ECONOMY & SOCIETY

Hue's overall resilience for the economy and society dimension is positively influenced by the city's 'Security and the Rule of Law' (4.6) with effective law enforcement, crime prevention and access to criminal justice systems for its citizens. Hue remains a relatively safe and stable city in which to live and work.<sup>12</sup> The city's resilience could be improved by increasing its engagement with its citizens ('Collective Identity & Community Support' – 3.0), especially with regards to urban planning which remains largely a top-down process<sup>13</sup> and diversifying its economic base ('Sustainable Economy' – 3.1).<sup>14</sup>

12 World Bank (2019) Taking Stock: Recent Economic Developments of Viet Nam.

13 ISET International (2017) Assessment of urban planning and urban development in An Van Duong, Hue City. [https://www.acccrn.net/sites/default/files/publication/attach\\_phong\\_l06\\_peri\\_hue\\_171122en.pdf](https://www.acccrn.net/sites/default/files/publication/attach_phong_l06_peri_hue_171122en.pdf)

14 Hue GrEEEn City Action Plan. <https://www.adb.org/sites/default/files/publication/179170/hue-green-city-ap.pdf>.

# Household perceptions of resilience

At the same time as the city-level baseline study, UCCRTF also collected household level data to provide an indication of the perceptions of resilience in certain sections of the city's population. The data collection was limited to 113 respondents from the Citadel area of the city. UCCRTF team and ADB staff jointly with city officials to identified households in areas that were exposed to climate impacts and were deemed socio-economically vulnerable. The results rather provide an initial indication of household resilience perceptions, rather than a comprehensive assessment. For more information on the methodology please see the box on the back cover of this document.

As a general indication of householders' impression of the local community in Hue, residents were asked to rate their community, on a scale of 1 to 5; with 1 being the lowest rating and 5 being the best against four characteristics: i) Infrastructure and Services ii) Economic Opportunities (Diverse Livelihood); iii) Connected (internal and external linkages); iv) Organized (socially cohesive).

As shown in figure 1 at the bottom of the page, respondents scored Hue highest for provision of infrastructure and services (3.03), but relatively poorly for economic opportunities (1.67), connectedness (1.51) and organisation (2.02). This may be due to the socio-economic position of many of the households that were interviewed for the survey. Most surveys were conducted in the Citadel area of the city, in poorer neighbourhoods where people rely on farming activities, and there are few opportunities for business or tourists.

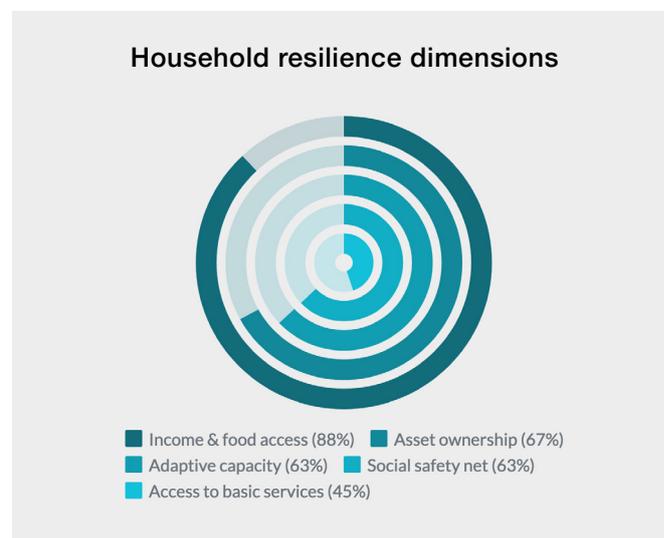
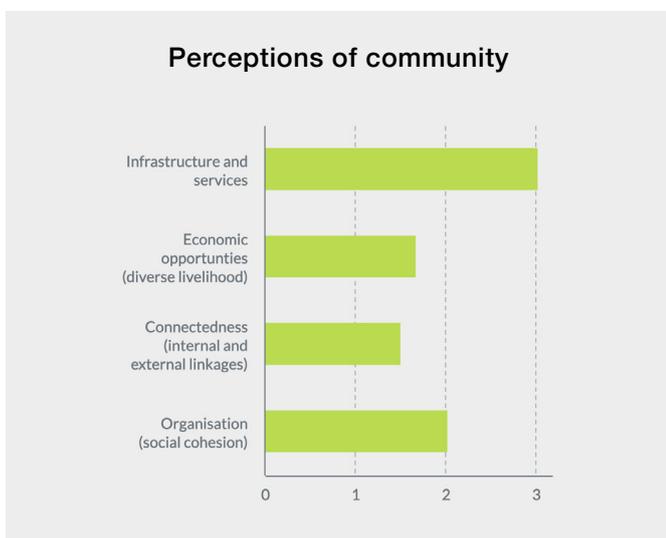
The household survey also assessed perceptions of

resilience against five commonly-used dimensions: i) Access to Basic Services; ii) Assets; iii) Adaptive Capacity; iv) Income and Food Access; and v) Social Safety Net. Scores against each of these dimensions were calculated as an averaged-index from survey responses and secondary data.

As shown in figure 2 at the bottom of the page, perceived household resilience was highest for "income and food security" with 87.6% of households having diverse sources of income and sufficient access to food. Levels of asset ownership were also relatively high, with 67.3% reporting that they owned assets and 62.8% of households have the capacity to adapt and recover after a natural disaster. The results suggest that households' financial resources and asset ownership are important factors that could help the people of Hue recover from disasters.

Despite the perception of relative financial security in Hue, almost two thirds (62.8%) of households are dependent on some form of government-supported social programme. This may indicate that household financial security is less sustainable than it first appears, which could be undermined by significant losses due to external shocks. Less than half of households (45.1%) were aware of the availability of basic services in their area which further restricts their adaptive capacity and overall resilience to shock.

Hue has experienced several shocks and stresses in its recent history, so respondents to the survey were able to draw on recent experience about their ability to deal with and recover from shocks. Overall almost two thirds of respondents to the household survey



felt that their level of resilience was “medium” (63.7%) compared with 22.1% who felt they had relatively high levels of resilience and 14.2% who saw their resilience as “low”. This is in line with the overall city level scores (see page 6) which scored Hue as having moderate levels of resilience across all four dimensions.

As shown in figure 3 below, over half of respondents also reported that their ability to recover from shocks was worse than it used to be (50.4%), a further 37.2% felt that their ability to recover had not changed, and very few felt that it was better than before (3.6%).

### Early warning system in Hue

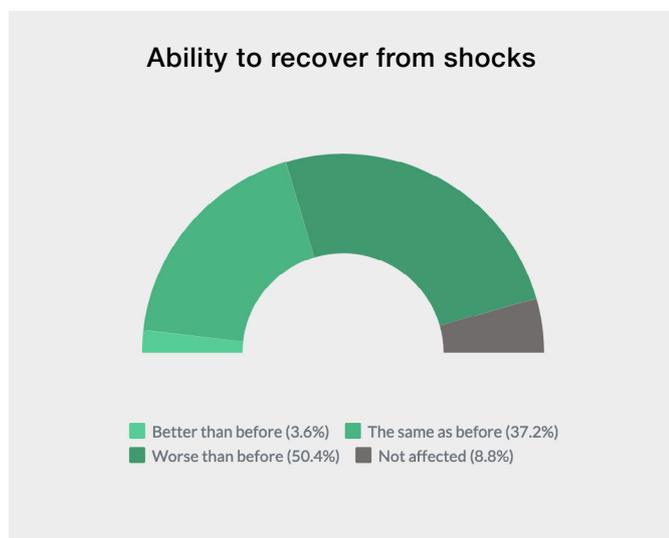
Almost all respondents in Hue reported that they had received an early warning before the last natural disaster (94.7%). These warnings were communicated effectively via multiple channels, the most popular of which were: radio (51.4%), television (86.9%), and from neighbours or relatives (56.1%).

Despite the very effective early warning system in Hue, most people did not move to another place to take shelter either before or after the last natural disaster (75.2%). This is likely due to several factors. Firstly, the most popular communications channels for receiving the early warnings were largely passive. Far fewer respondents reported receiving warnings via direct instruction from people who have received training such as community volunteers or disaster management committees (12.1% for each).



Image: The UCCRTF and SPADE team visit Hue for the baseline study

There was an overall lack of awareness of where to seek shelter or help in case of disaster. Over half (55.8%) of respondents said they were not aware of a local safe shelter, and 73% were not aware of members of the community who are trained to help during a disaster. Very few people reported having received disaster preparedness training (5.3%). Many people also reported that they wanted to stay at their own home instead of seeking shelter elsewhere. Almost half of households believed that their home was already protected (49.4%) and a further quarter (25.9%) wanted to stay behind to protect their home or assets.



# Resilience interventions in Hue

## ADB and UCCRTF projects in Hue

### CURRENT ADB PROJECT

#### Secondary Cities Development Project

\$224 million between 3 cities in Viet Nam



9,000 linear meters of embankment to be strengthened



22 km of drainage pipelines upgrades and dredging 6.2 ha of water-retention ponds



over 31 km of road improvements and new projects



17 hectares of green spaces and landscaping for public amenities



water supply system for a solid waste treatment in Phu Son

### UCCRTF program preparatory technical assistance \$1 million

#### Supporting:

- feasibility studies for climate-resilient urban infrastructure investment
- preliminary engineering designs
- capacity building programs on planning and management for green city development
- integrating green infrastructure

### UCCRTF climate risk financing technical assistance \$1 million

#### Supporting:

- strengthening regulatory frameworks
- market building
- stimulating premium payment mechanisms
- capacity development

### UCCRTF community-led initiatives grant \$2 million

#### Supporting:

- community-defined projects
- preparation of community resilience plans
- the implementation of chosen projects
- sustaining the plans in the long term

### UCCRTF e-mobility project

#### Supporting:

- knowledge and capacity to develop policy actions and technical solutions for e-mobility

### UCCRTF Spatial Data Analysis Explorer (SPADE)

#### Supporting:

- improved city-level climate and geospatial data
- project preparation, consultation and map production

According to the city level baseline assessment, Hue has many qualities that contribute to its resilience. The city's infrastructure provision serves the basic needs of the population, there is a robust healthcare system, and the population benefits from good levels of law and order. However, given the high level of exposure to climate change and its impacts, there remains several areas where the city can invest to strengthen the resilience across all four dimensions: health and wellbeing, economy and society, infrastructure and ecosystems, and leadership and strategy.

In particular, the city's capacities around integrated development planning could be enhanced. While the city's critical infrastructure systems were found to contribute to its resilience, improving infrastructure provision in key areas such as flood protection, to reduce exposure to hazards was found to be a priority for Hue. Investments in infrastructure that improves mobility and communications could also contribute to improved resilience in other areas, such as increasing employment opportunities and boosting the local economy.

The results of the household survey appear to support the scores at the city level, with reasonably good levels of financial security and asset ownership lending the populations resilience to shocks and stresses. However, the household survey also pointed to areas for improvement especially around access to and awareness of infrastructure provision, and improved disaster risk management planning and communications.

To contribute to improved resilience in Hue ADB has approved the Secondary Green Cities Development Project, which supports environmentally sustainable and socially inclusive development in the cities of Hue, Vinh Yen, and Ha Giang. The total loan amount for the project stands at just over \$224 million<sup>15</sup> covering all three cities, and will finance sub projects to (i) control urban stormwater runoff and reduce flood risks, (ii) improve sanitation for public health, (iii) enhance green landscaping and public amenities, (iv) upgrade urban road networks and their connectivity, and (v) promote public participation in planning.

In Hue, the project will upgrade 21.9 km of drainage pipelines, rehabilitate 15.9 km of road surface and drainage, develop 17.2 ha of green spaces, strengthen and improve river embankments, and extend access to a clean water supply.

## **Resilience building and the Urban Climate Change Resilience Trust Fund**

Alongside ADB's loan investment in the city, UCCRTF supported the following interventions: : i) Technical assistance to support the planning and preparatory stages of projects, and prepare Green City Action Plans and integration of nature-based solutions; ii) Climate risk financing support; iii) Grant-funded community-led initiatives to increase the resilience of vulnerable communities; iv) A geo-spatial data tool the 'Spatial Data Analysis Explorer (SPADE) to increase data access; and v) Technical assistance on e-mobility. These projects contribute to improving key areas where Hue's resilience might be increased, according to the baseline study.

**Green City Action Plans and integration of nature-based solutions:** In Hue, the UCCRTF supports the preparation of green city action plans, feasibility studies for climate resilient urban infrastructure investments, preparation of preliminary engineering designs for each urban infrastructure subproject, capacity building programs on planning and management for green city development, and other workshops and consultations associated with these activities. This is particularly important in Hue, which showed a gap in integrated development planning according to the baseline study.

**Climate risk financing:** The UCCRTF provided \$1 million in technical assistance towards climate risk financing which will allow the city to better manage the cost of disasters by strengthening sources of finance aimed at recovering from climate related shocks. UCCRTF activities include strengthening regulatory frameworks, market building, stimulating premium payment mechanisms and capacity development. Through technical assistance support for climate risk financing, the UCCRTF supports Hue to develop diverse livelihoods and employment opportunities, and a sustainable economy.

**Community-led initiatives:** Funded through an investment grant of \$2 million for Hue, a series of community-led initiatives will support a range of activities to improve the resilience of the most vulnerable communities. While the specific interventions supported by the investment grant will be defined by the communities themselves, the project will support the preparation of community resilience plans; the implementation of the projects; and sustaining the plans in the long term. community-led initiatives to support vulnerable communities in the city, strengthen participation, good governance, and build collective identity and community support.

<sup>15</sup> ADB (2014) Hue GrEEEn City Action Plan. <https://www.adb.org/sites/default/files/publication/179170/hue-green-city-ap.pdf>

**SPADE:** The UCCRTF SPADE is a web-based tool and data repository that contains various geospatial data that can be used for consultation, project preparation, production of maps, and analysis of climate change impacts. Hue city was one of the five pilot cities for the tool. The maps and socio-economic surveys carried out in the city have been digitized and available on SPADE. For Hue, SPADE can display thematic layers including utilities, various infrastructure, natural water system, cultural heritage locations, and land use.



Figure: SPADE map of central Hue with hazard exposure

**E-mobility project:** UCCRTF promotes e-mobility by enhancing knowledge and capacity of Hue, amongst other cities, to develop policy actions and technical solutions. This is part of a regional technical assistance that aims to promote sustainable transport operations in ADB and partner countries. In Hue, traffic is dominated by motorcycles. However, the city intends to increase the share of journeys taken on public transport share from currently less than 1% to 10% by 2030. The city also intends to increase the use of electric vehicles to transport tourists in the city centre. Currently 59 vehicles are in operation and by the end of 2020 they expect to increase this to 300.<sup>16</sup>

### Potential areas for investment to build Hue’s resilience

The baseline assessment provides a snapshot of perceived levels of resilience in Hue city, it does not represent a full assessment of the investment needed to build urban resilience. However, the results of the study do suggest possible areas of focus for resilience investment, these include:

- Strengthened efforts to foster community engagement and support in resilience planning and urban development.
- Increased investment in flood resilience from coastal and river flooding, with an emphasis on green infrastructure and ecosystem-based solutions to complement planned grey infrastructure investment and potentially reduce cost.
- A catchment-wide flood management plan that includes efforts to increase tree cover.
- Improved wastewater treatment facilities increasing coverage as Hue expands.
- Improved internal transport links to reduce congestion and improve air quality, to handle increased numbers of tourists and a growing population

<sup>16</sup> ADB (forthcoming) E-Mobility for Hue: A report on the potential of Electric Vehicles in Hue and strategies to foster electric mobility.



*A view from the citadel of the Imperial City of Hue.  
Image by: Vyacheslav Argenberg CC by 2.0*

The City Resilience Profiles are developed using the City Resilience Index. Developed by the Rockefeller Foundation and Arup, the CRI is a comprehensive, technically robust framework for measuring city resilience based on over five years of research and application in cities globally. For further information, visit: <http://cityresilienceindex.org/>

The City Resilience Profile was developed by Arup for the ADB Urban Climate Change Resilience Trust Fund in partnership with Daira, Acclimatise, Plan International, and Oxford Consulting Partners.

## Methodology

The data presented in this document is derived from a baseline study conducted in 2018. In Hue data was collected at the city-level, and at the household level. In both cases, as the data is derived from interviews, the results should be considered as perceptions of the city's resilience.

At the city level, data was collected through surveys with City Officials, surveys with identified key informants and focus group discussions. The city level methodology was adapted from the City Resilience Index, developed by Arup and the Rockefeller Foundation. A comprehensive systems view of urban resilience, the framework is structured along four dimensions of resilience: health and well-being, economy and society, infrastructure and environment, and leadership and strategy. Underpinning these four dimensions, are twelve resilience goals that each and every city should strive towards in order to achieve resilience. The baseline study in Hue, collected data pertaining to the resilience goals and relevant supporting indicators agreed for the purposes of measuring resilience for UCCRTF interventions. A more detailed assessment, as designed for the City Resilience Index methodology can be undertaken separately with the city by request to Arup. More information about the City Resilience Framework and City Resilience Index can be found here: [https://www.cityresilienceindex.org\\_](https://www.cityresilienceindex.org_)

The household level data was derived from surveys with 113 residents. A larger sample size was not possible due to time and resource constraints, and while these results are not statistically significant, they provide a general indication of household perceptions of resilience. Survey information was used to test against five resilience dimensions: access to basic services; assets; adaptive capacity; income and food access; and social safety nets. Households were selected from the smallest administrative units in each city. In discussion with city and ADB officials, areas where physical interventions were planned were selected, along with those which were considered to be most vulnerable to climate impacts. As full household listings were not available, within these units, households were selected at random.

## FOR MORE INFORMATION ABOUT THE PROJECTS MENTIONED IN THIS DOCUMENT PLEASE VISIT:

**Regional:** Promoting Urban Climate Change Resilience in Selected Asian Cities - Knowledge Management and Resilience Measurement for Urban Climate Change Resilience (Subproject 2): [www.adb.org/projects/48317-003/main](http://www.adb.org/projects/48317-003/main)

**Viet Nam:** Secondary Green Cities Development Project: [www.adb.org/projects/47274-003/main](http://www.adb.org/projects/47274-003/main)