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# POVERTY DIMENSIONS OF WATER, SANITATION AND CLIMATE VULNERABILITY IN CAN THO CITY



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# Poverty Dimensions of Water, Sanitation and Climate Vulnerability in Can Tho City

Prepared for: CSIRO

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# Summary

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## Background

This report details findings from research on the poverty dynamics of water and sanitation services and climate vulnerability in the city of Can Tho, Vietnam. The research forms part of the CSIRO-AusAID Research for Development Alliance study: Climate Adaptation through Sustainable Urban Development, Can Tho Case Study. Findings presented in this report were drawn from Vietnamese government data, the results of a survey of 1,200 households undertaken by Can Tho University in 2011 (as part of the wider study), and a qualitative empirical study comprising 23 interviews with low income households in O Mon and Thot Not districts. Insights from the research are presented in this report including an analysis of the scale and nature of poverty in Can Tho, a discussion of poor households' access to infrastructure and water related behaviour, and an exploration of social vulnerability.

## Poverty dynamics in Can Tho

Based on measures of income, in the past decade poverty rates in Can Tho have been higher than for comparable cities in Vietnam. While recent official data indicates that poverty rates are falling so that overall in the city only 6% of households were classified as officially poor in 2010, there is a significant variation between the urban districts, with Ninh Kieu having the lowest rate of householder poverty (1%) and O Mon having the highest rate, with 8% of households officially classified as poor. Data from the survey conducted for this project suggests that these figures may underestimate the extent of poverty, particularly if analysis extends to non-income dimensions of poverty such as those related to living standards

Focusing on poor households specifically, the research explored the characteristics and experience of poverty and identified implications for water and sanitation service provision in the context of climate adaptation. According to official data, 59% of households classified as poor in urban districts are living in 'dilapidated' dwellings. The independent survey data indicates a link between household income and housing structure with over 50% of households in the two lowest income groups living in temporary or semi-permanent housing. The nature of the dwellings in which poor households live is a key consideration when assessing the significance that options for providing water and sanitation services (such as rainwater tanks or septic tanks) will have. This is because these options may not be feasible for these households and alternative approaches need to be identified.

Affordability and the capacity to plan and manage household income are also key considerations. Sources of income for poor households are typically seasonal, sporadic



and unreliable. Most households included in the qualitative study reported experiencing stress related to their situation, with key concerns identified as health, income, food, education, ability to cope with flooding and overall quality of life. The majority of households interviewed lived over or near to waterways, with some occupying very marginal land highly vulnerable to seasonal or longer-term climatic changes and weather events.

### **Access to infrastructure and water-related behaviour**

Review of the current situation with respect to access to water and sanitation services indicates that targeted efforts are needed to increase access for urban poor households. In the urban districts, 27% of poor households were without access to water services in 2008 (compared to the Water Supply and Sewerage Company's figure of 20% for the city overall). The rate differs significantly between districts, with only 2% of poor households in Ninh Kieu lacking access while the figure in other urban districts is between 30% and 40%. This implies a correlation between poverty and lack of access to water in Can Tho that reflects global findings on the links between wealth and service provision, with the poor 2–5 times less likely to use improved water and sanitation facilities (WHO/UNICEF 2010).

In working to increase access for poor households, careful consideration of models of service delivery are needed to ensure the proposed options meet the needs of targeted households in terms of access, demand and affordability. For most households in the qualitative study, it was common practice to use multiple sources of water, matching the source with intended purpose. While piped water (when available) was identified as the main source for non-drinking purposes, interviewees used river water for at least some purposes (for example washing) to save on water bills. For poorer households the assessment of affordability was also influenced by whether they met official criteria which makes them eligible for registration and payment of subsidies by the city. If the survey has accurately identified a significant number of potentially poor people who are not included in the official statistics (i.e. are not registered) the challenge of housing affordability will be more widespread. Models of likely demand and revenue for water services need to take this into account, as projected demand may be lower than anticipated if the water provided is considered to be too costly and if alternative free sources are readily available and perceived to be of sufficient quality for particular households purposes.

Similar considerations need to be taken into account with respect to sanitation. While the survey data indicates that 81% of households overall are using facilities defined as 'improved sanitation' by the WHO/UNICEF Joint Monitoring Program, this is linked to income with only just over 60% of respondents in the lowest income group reporting access to this standard of facility. Of the 23 households included in the qualitative study, 21 used hanging fishpond toilets. There was a lack of expressed household demand for



and willingness to invest in improved sanitation compared with water supply. In light of this, there is a need for sanitation improvement programs to focus on the social aspects of sanitation promotion, including demand creation and behaviour change.

Affordability is also a significant part of the sanitation picture for poor households. Four interviewees reported that microfinance was available for constructing a toilet within their house, but that they were either unable or unwilling to participate in the scheme due to concerns about their ability to make repayments. This has implications for both sanitation and water supply schemes that require households to invest either directly or through microfinance or subsidised loan schemes.

### **Social vulnerability**

Questions relating to social vulnerability were explored in order to establish whether the link identified in the literature between poverty and vulnerability was present. Data from the qualitative study indicates that poor households are indeed highly vulnerable to the impacts of climate change predicted for Can Tho, including an increased risk of flooding, a reduction in the quality of surface water, changes in river flows and a more intense dry season. Key dynamics are the location of poor households (typically on marginal land proximate to waterways) and their livelihood situation with respect to income and resource dependency.

The proximity of dwellings to waterways, combined with their poor structural quality, intensifies the experience of seasonal and tidal flooding, indicating significant exposure to the increased risk of flooding predicted for Can Tho. The impacts of flooding reported in interviews included poor health (respiratory and skin disorders), reduced mobility and loss of income. Those reliant on rice or fish industries for employment in particular cited difficulties.

The marginal location of households interviewed also means that any changes in water quality and local environmental conditions directly impacts households. Many households noted a decline in local environmental conditions, for example degraded water and river environment quality or a decline in fish numbers. Interviewees identified a link between water quality and health, with sickness most commonly attributed to a decline in the quality of river water over time with particular concerns about quality during low tides and the dry season. Illnesses reported included stomach upsets and skin disorders.

The impacts of changes in water quality are particularly significant for households relying on local waterways for some or all household water uses – including those without access to piped water and those that cannot afford to use piped water for all purposes.

In addition to those reliant on surface water, households that are either directly or indirectly dependent on local resources for their livelihood are particularly vulnerable. The



majority of households interviewed were either directly or indirectly dependent on local resources for employment and in some cases food. This includes households that depend on eating locally caught or grown fish and vegetables, those making use of local resources for income generation, and those for whom the primary sources of income rely on the success of local crops or production.

### **Next steps**

Research into the poverty dynamics of water, sanitation and climate vulnerability in Can Tho reinforces the relationship between poverty, access to basic services and social vulnerability, and sheds light on the specific situation for urban poor households in Can Tho. To date there has been little information available that focuses on the poverty aspects of water services in Can Tho. This study draws together available information from existing data sets and adds additional qualitative insight from interviews to build a richer picture of the situation for urban poor households, with reference to water and sanitation services as well as social vulnerability.

The findings from this study of poverty, water, sanitation and vulnerability will inform the upcoming phases of the climate adaptation study, and the next phases of the study will in turn add to the emerging picture of poverty. In identifying potential future scenarios for Can Tho based on development trajectories and predicted climate change impacts, a 'poverty lens' can be applied to consider how alternative scenarios might be experienced by the poor, and how they might respond. Similarly, case study analysis will provide detailed information about the life-cycle costs and sustainability considerations of various service options, including implications for the urban poor.





# 1 Background and rationale

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This report forms part of ISF's contribution to the CSIRO-AusAID Research for Development Alliance study: Climate Adaptation through Sustainable Urban Development, Can Tho Case Study. It details findings and implications from a study of the poverty dimensions of water services and climate adaptation that form part of Activity 1 (understand the current situation and obtain data) and aims to inform Activity 3 (climate-adapted integrated urban water system analysis at the city scale) and Activity 4 (capability building through development of alternative water service options for climate change adaptation in a peri-urban or new development area).

The aim of this component of the research is to fill a gap in existing knowledge about the socio-economic dynamics of water and sanitation services in Can Tho City, with a particular focus on services for the urban and peri-urban poor. To date there has been little research focused on the poverty aspects of water services in Can Tho. This study draws together information from four sources: the official poverty data from the Can Tho Department of Labour, Invalids and Social Affairs (DoLISA); data from the official population census in 2009; data from a survey of 1,200 households undertaken by Can Tho University (CTU) as part of the wider CSIRO/CTU/ISF study; and an empirical study using semi-structured interviews undertaken with 23 low-income households in Can Tho.

The focus on socio-economic dynamics and poverty is important for a number of reasons. Firstly, poverty reduction is the core objective of international development assistance and the CSIRO-AusAID research alliance represents one of Australia's initiatives to support development and reduce poverty. The alleviation of poverty is the first of the Millennium Development Goals (MDGs) and improving access to sustainable and safe drinking water is also fundamental to the MDGs (as enshrined in the seventh MDG). The focus on the urban and peri-urban poor in this study is in recognition that these two goals are inherently linked.

Secondly, the specific focus on the poor is also a critical consideration in the planning of future water and sanitation services under climate change scenarios. The poor are two to five times less likely to use improved water and sanitation facilities (WHO/UNICEF 2010), and a focus on poor households is therefore warranted in any research or development project that ultimately aims to improve sustainable and equitable access to water and sanitation. Further, poorer households are typically less resilient and more vulnerable to shocks, including disruptions in income or services (Adger 1999, Brooks 2003). In the context of climate adaptation it is critical to investigate the situation and potential vulnerability of poorer households to determine the likely impacts of climate change on these groups and to inform planning for appropriate service provision, adaptation and disaster risk reduction.

Finally, different water service options and scenarios will have specific implications for poorer households, and these will affect the policy response to potential options. In order to examine the likely implications of different service options for poor households, it is



essential to gain an insight into their current situation, so that potential policy drivers and barriers related to water service scenarios can be anticipated and predicted (e.g. the relationship between water services tariffs and affordability and cost recovery).

The contemporary literature on climate change adaptation and vulnerability goes further than documenting and analysing poverty. In a review of the climate change literature on vulnerability, risk and adaptation, Brooks (2003) identifies two definitions of vulnerability:

- (i) The potential damage to a system caused by climatic events or hazards (from Jones and Boer 2003); or
- (ii) A system state unrelated to specific hazards (Allen 2003).

The second definition is significant for this study and for the wider project on climate change adaptation in Can Tho because it locates vulnerability in structural and institutional characteristics which then mediate the relationship between climate related events and their impacts (Brooks 2003). In other words, vulnerability can be seen as socially rather than biophysically determined, with the nature of vulnerability shaped by socio-political processes that allocate social and other resources (Blaikie & Canon et al. 1994 and Hewitt 1997, as cited in Kuruppu 2009).

This literature draws a helpful distinction between biophysical or ecological vulnerability and social vulnerability. Biophysical vulnerability relates to the likely impacts of a climatic event on the natural environment (e.g. ecosystem impacts) and the amount of damage in human terms (e.g. mortality, monetary cost) (Brooks 2003). Social vulnerability (as a social-political state unlinked to specific hazards) relates to factors such as poverty and inequality as well as housing quality, marginalisation, and access to insurance and food entitlements (Blaikie et al. 1994; Adger and Kelly 1999; Cross 2001 cited in Brooks 2003). Resource dependency is a key component of social vulnerability. As Marshall et al. (2009 p.11) note, “the sensitivity of individuals who rely on ecosystem goods and services is largely determined by how strongly they depend on the specific goods and services which will be affected by environmental change”.

Vulnerability is one part of the climate adaptation picture, with adaptation typically defined in the literature as “the ability or capacity of a system to modify or change its characteristics or behaviour so as to cope better with the existing or anticipated external stresses” (Brooks 2003 p.8; see also Burton et al. 2002; Adger et al. 2003). This report does not attempt to fully assess the adaptive capacity of poor households as this would require a full analysis of biophysical vulnerability and institutional adaptation (as described by Adger 1999) in addition to exploration of social vulnerability.

The main body of this report therefore investigates poverty dynamics in Can Tho (Section 4.1) and then examines the access by poor households to water and sanitation infrastructure and how they use and live with what is available to them (section 4.2). We then make an initial assessment of social vulnerability in terms of location and types of housing, livelihoods and resource dependency (section 4.3).



## 2 Exploring poverty in Vietnam

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This section provides a brief introduction to measures of poverty and the situation in Vietnam, to set the scene for the more detailed analysis of poverty in Can Tho.

### 2.1 Measuring poverty and the situation in Vietnam

While the objective of reducing poverty is clear (and arguably universal), the issues of how to conceptualise and define poverty are complex. The concepts of what constitutes poverty have changed over time with the recognition that simple and single measures are inadequate for understanding or developing policies for water and sanitation. As such, this study has drawn on several sources of information, combining a range of measures to build a richer and more adequate picture of the experience of poverty.

The conventional starting point for assessing poverty, and the initial basis for most analysis since the start of the 20th century, has been income (Maxwell 1999). However, as the concept developed from the middle of the last century there was an acknowledgement that poverty is a relative rather than an absolute measure; that is, it relates to the standards of a particular society at a point in time and is not a fixed condition linked to physical 'needs'. Further, poverty is not merely about the characteristics of particular individuals or households but is linked also to access to basic services usually provided socially, including education and health. The concept has been broadened, deepened and unpacked. It now encompasses a range of overlapping components covering vulnerability, well-being, livelihoods, and social inclusion and exclusion. With this more complex understanding, the analysis of poverty, vulnerability and inclusion/exclusion includes (adapted from Maxwell 1999):

- Individual as well as household poverty
- Access to public goods (like sanitation) as well as personal income
- Non-monetary as well as monetary components
- Changes over time as well as snapshots
- Potential as well as current and actual poverty
- Stocks or resources people have access to as well as flows of income
- Outputs and how well people are able to participate as well as the "inputs" of their income
- Relative requirements and not just absolute requirements
- Subjective measures (how people experience their situation) in addition to objective data.

In the development sector, subjective considerations – that is, how people describe or evaluate their own situations – have been added to the objective measures of poverty (for example see UN-DESA 2009). In this report we focus on the dynamics of poverty and access to water and sanitation services in particular, including some subjective information and experiential data from the semi-structured interviews with low income households. However this report does not attempt to engage with questions of self-perception, so it is important to note that these indicators form just one part of the picture in terms of both the characteristics and experience of poverty (and beyond that to issues of vulnerability and adaptation).



One of the more comprehensive and established frameworks currently deployed in development analysis that goes beyond income measures of poverty is the Multidimensional Poverty Index (MPI), which is now used in the UNDP Human Development Report. The MPI takes into account multiple dimensions of deprivation including those relating to education, health and living conditions. It provides a framework for measuring both the incidence and intensity of deprivation, with intensity defined as the number of deprivations experienced at the same time. The MPI provides an international benchmark against which to assess the situation in Vietnam nationally.

The incidence of poverty in Vietnam based on MPI measures is shown in Figure 1 and the MPI figure is compared with other measures of poverty in Figure 2. Interestingly, the MPI poverty rate indicates lower rates of poverty in Vietnam than are implied by more traditional income measures, though these rates are still significant at almost 18% and a further 18.5% of the population is identified as ‘vulnerable to poverty’.<sup>1</sup> MPI data also reveals how poverty is experienced, with drinking water, child mortality and sanitation (in that order) the most common deprivations (Alkire et al. 2011). Analysis at the sub-national region indicates that rates of poverty, vulnerability to poverty and severe poverty are higher in the Mekong Delta than most other regions with the exception of the Central Highlands (Alkire et al. 2011).

Survey	Year	Multidimensional Poverty Index (MPI = H×A)	Incidence of Poverty (H)	Average Intensity Across the Poor (A)	Percentage of Population Vulnerable to Poverty	Percentage of Population in Severe Poverty
DHS	2002	0.084	17.7%	47.2%	18.5%	6.0%

Figure 1 MPI measures for Vietnam 2002 (from Alkire et al. 2011)

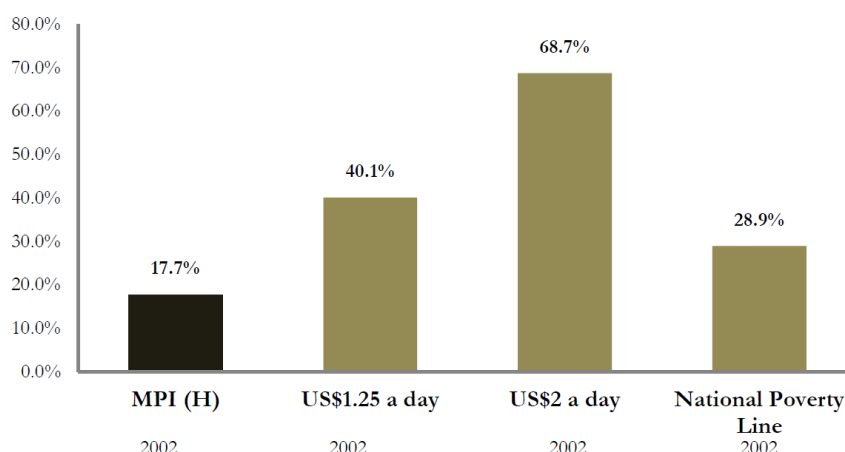


Figure 2 Comparison between MPI and income measures of poverty in Vietnam (from Alkire et al. 2011)

## 2.2 Official definition of poverty in Vietnam

There is an official Government of Vietnam definition of poverty used nationally and at city, district and ward levels, which is based solely on income. The official definition is

<sup>1</sup> Note that this data is from the 2002 Demographic and Health Survey and the situation has likely changed in decade since, nevertheless it gives an indication of the dimensions of poverty in Vietnam.



used in the collection and reporting of poverty by the national Ministry of Labour and Social Affairs and at the city level in Can Tho by the Department of Labour and Social Affairs (DoLISA). Although based solely on income, the official definition of poverty is a relative measure (as discussed previously) in that there are different income levels used for urban and rural areas (incorporating the notion that there are different requirements for living in these areas) and the income thresholds for defining poverty are revised upward every five years.

The current definition derives from Decision 09/2011 of the Prime Minister (30 January 2011). For the period 2011–2015, in urban areas, households are defined as poor if the average household income is equal to or less than 500,000 VND/person/month (equivalent to around US\$25.6/person/month, less than 1 USD per day). The official definition also incorporates the notions of the importance of the potential for poverty in addition to the current situation. The Decision establishes a category of households that are 'close to poor', with an income threshold in urban areas for this group of 501,000-650,000 VND/person/month (which translates to US\$25.6 to \$33.3 at the exchange rates current in 2011).

Based on the official definition of poverty, households can apply to register as poor with the local authorities. If successful in their application, they receive a registration card that entitles them to a range of benefits including lower fees for services (including water, see below) and reduced cost health care. Households just above the poverty line are not eligible for these benefits.

The linking of official poverty data to registration and associated benefits means that poverty figures across data sources should be viewed with some caution. The situation for registered poor households can change with a re-definition of income thresholds (which happens every five years), or a small increase in income. This can create confusion and concern for households reliant on benefits related to their registration, and it is an incentive to under-report income.



## 3 Approach

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The study of poorer households reported here is derived from four major sources. There are two sources of official data from existing Vietnamese Government information: poverty data from DoLISA for the period 2006–2010 and census data from 2009. The third is data from a survey of 1,200 households undertaken by Can Tho University (CTU) as part of the CSIRO/CTU/ISF study in 2011 (referred to in this report as the survey). The fourth is a series of semi-structured interviews with a 23 poor households in O Mon and Thot Not districts (termed the interviews in the subsequent sections of this report). Below we provide descriptions of the methodological approaches taken for each source.

### 3.1 Vietnamese government data

Data from the Can Tho Department of Labour, Invalids and Social Affairs (DoLISA) was available for households officially defined as poor under current Vietnamese government income thresholds and includes a number of other aspects of the living conditions of the poor such as access to water. This was made available by district from 2006–2010. Census data for 2009 was also available, which provides basic demographic information by district including a breakdown of dwelling types from permanent to simple. Both datasets were collated and measures considered relevant for exploring poverty (as discussed above) were identified. These ranged from income poverty through to access to resources and housing structure.

The DoLISA data makes it possible to assess the characteristics of poor households as a distinct group. With reference to areas explored in the survey and interviews as well as initial findings from both, relevant dimensions available from DoLISA data were extracted to enable closer examination of the situation specific to poor households. These dimensions include access to water, ethnicity, people with a disability and housing structure. Available data was collated in tables and charts to facilitate assessment of the situation overall and recent trends for each district; for urban districts as a group; and for the whole of Can Tho.

### 3.2 Survey

A survey of 1200 households across 24 wards in Can Tho's five urban districts was undertaken during April and May 2011. The survey forms part of the 'climate adaptation through sustainable urban development study'. Questions were drafted by CSIRO and ISF in collaboration with Can Tho University and translated into Vietnamese. The survey was undertaken by a team of 22 CTU staff. Topics explored include basic demographic and socio-economic information, household water and sanitation practices, attitudes to water services and perceptions around water quality and threats such as flooding. A full description and analysis of the survey will be available in Neumann et al. (in preparation).



We aimed explore the situation specifically for lower income households included in the survey sample, and intended to use the survey to obtain a more comprehensive picture of the situation and experience of low income households. This presented two challenges: the first was that we wanted to have some comparability with the DoLISA data on poor households, so we had to generate data consistent with the income thresholds used in the official definition of poverty. Secondly, we were aware that reported income is typically problematic in Vietnam for a range of reasons:

- People under-report income for fear of losing benefits due to their low income status.
- Only formal income is reported, which creates a skewed picture if informal sources are significant (as they are extensively in Vietnam).
- People may not track monthly income or it may be highly variable month to month (as is the case with many poorer households) and therefore difficult to calculate.

Given these limitations, a variety of other measures from the survey were also initially investigated as potential indirect or composite measures for poverty and vulnerability using survey data, including education and dwelling structure. All these measures provide some further insight into the poverty dynamics of Can Tho. However, like income, when considered in isolation they are problematic. We chose to use income as the primary measure despite its limitations because: (a) the available research evidence indicates that it correlates with other aspects of poverty such as health indicators that are relevant in determining social vulnerability (Glewwe & van der Gaag 1990, cited in Adger 1999); and (b) it provides comparability across different contexts and over time, so it provides a helpful baseline for further subsequent investigation (Adger 1999).

In order to isolate a sub-sample of poor households comparable with DoLISA data, but to also acknowledge the importance of other, imperfectly correlated, variables, we therefore applied criteria combining income levels and level of education (primary or junior secondary). This process identified 523 households who could be classified as poor. For these households we then undertook sensitivity analysis to assess the appropriateness of our classification. The survey analysis of poor households therefore focuses on this sub-sample of 523, and uses income as the primary variable in the assessment.

### **3.3 Qualitative empirical study**

Semi-structured interviews were conducted over two days in October 2011 in O Mon and Thot Not districts. A total of 23 interviews took place including 11 in O Mon (Chau Van Liem ward) and 12 in Thot Not (Thoi Thuan and Thuan An wards). These districts were selected because DoLISA official data indicated that the level of poverty amongst households was relatively high compared with other urban districts in the city, and a consideration in the selection of wards was that they be close to waterways. Chau Van Liem in particular was selected because it had been identified as a potential 'hot spot' in the stakeholder workshop conducted in an earlier phase of this research project and initial analysis of survey data suggested a relatively high level of water related health issues.



The interview team comprised Ms Naomi Carrard (ISF), Mr Do Xuan Thuy (consultant), Mr Trinh Cong Doan (Can Tho Water Supply and Sewerage Company) and Mr Vo Quoc Thanh (CTU). The sample of poor households was selected by the District People's Committee in O Mon and the district water company in Thot Not based on local knowledge about the relative wealth of different wards and the location of poorer communities. Interviews were conducted in Vietnamese with two interviewers at each household. Local officials were present during most interviews. Care was taken to ensure consistency of approach between pairs of interviewers and to support development of interview skills across the team. At the end of each day notes were compared. Any discrepancies or points of confusion were noted, discussed and clarified where possible.

Interview questions covered:

- Demographic and socio-economic information.
- Access to water and sanitation facilities.
- Relationships around water and sanitation services including relationships with any service providers.
- Perceptions about the local environment and climate change impacts.
- Perceptions about social vulnerability and resilience.

The question guide used during interviews is provided in Annex 1. Data from interviews was summarised and coded using the Dedoose qualitative data analysis web application (dedoose.com).

Respondents included both women and men, of Kinh and Khmer ethnicity, as shown in Table 1.

**Table 1 Gender and ethnicity of interviewed households**

	Gender		Ethnicity	
	Female	Male	Kinh	Khmer
Gender	12	11	14	9

All but one of the households interviewed were registered poor (four households), below the threshold of poor, or 'close to poor' according to the official definition (18 households). Reported income/household/month for interviewed households is shown in Figure 3. Education levels of interviewees are shown Figure 4, with most having completed primary school or part of secondary school.





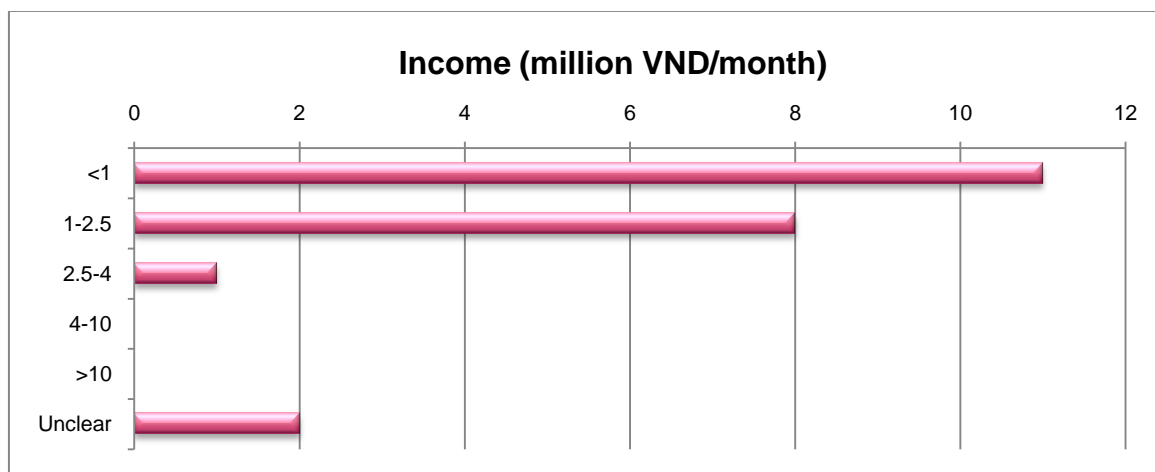


Figure 3 Household income VND/month

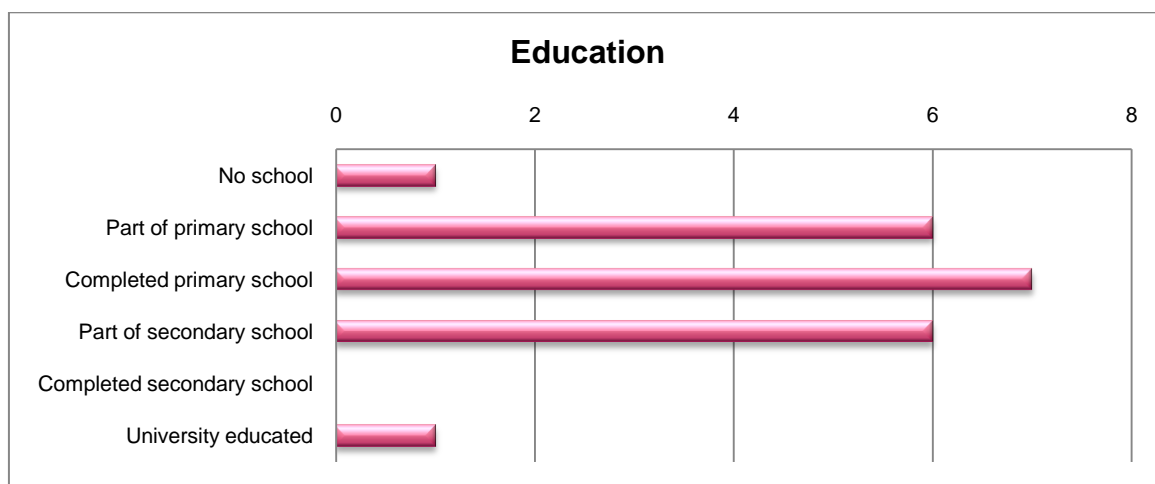


Figure 4 Education levels of interviewees



## 4 Findings and implications

### 4.1 Poverty dynamics in Can Tho

#### 4.1.1 Poverty in Can Tho

##### *Overall poverty levels*

In 2005 the overall rate of poverty in Can Tho was 10.46% according to official DoLISA statistics, which is higher than for other comparable cities of the same classification (ISF-UTS 2007). For example, Danang has a poverty rate of 4.78% of households and Haiphong a rate of 10.26% (ISF-UTS 2007). Table 2 and Figure 5 indicate the rates of poverty in Can Tho from 2006–2010. Overall for Can Tho the incidence of poverty fell from 10% to 6% between 2006 and 2010.

While the poverty rates in all districts have fallen since 2005–06, there is still a significant disparity between them. Only 1% of households in Ninh Kieu are living below the official poverty level, but in the urban districts in O Mon 8% of households were living in poverty in 2010.

**Table 2 Rates of poverty by district in Can Tho 2006-2010 (source: DoLISA)**

District	2006	2007	2008	2009	2010
Ninh Kieu	2%	2%	2%	2%	1%
Binh Thuy	8%	7%	6%	5%	3%
Cai Rang	10%	9%	8%	7%	5%
O Mon	15%	13%	13%	11%	8%
Thot Not	10%	8%	7%	6%	5%
Co Do	17%	15%	14%	12%	12%
Phong Dien	10%	9%	7%	6%	4%
Vinh Thanh	14%	14%	14%	9%	7%
Tho Lai				11%	9%
<b>Total Can Tho</b>	10%	9%	8%	7%	6%



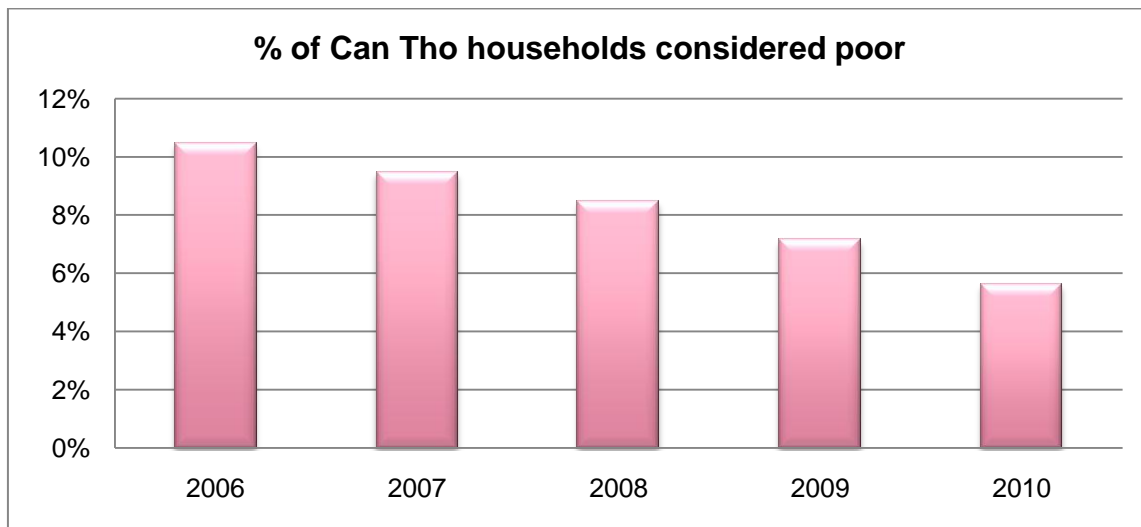


Figure 5 Rates of poverty in Can Tho 2006-2010 (source: DoLISA)

### *Poverty and education*

Survey data provides information about the relationship between education level and income, indicating that even within the subset of households identified as 'poor' based on income, respondents from households with higher total incomes are more likely to have achieved higher education levels. For each income bracket, Figure 6 shows the proportion of respondents in each education level. In the two lower household income brackets the proportion of heads of households with an education level of primary school or lower is 40–50%. University education and vocation school do not appear at all in the lowest income category. This is in contrast to the upper two levels of household income where more than 50% of respondents have an education level of senior secondary school or higher.



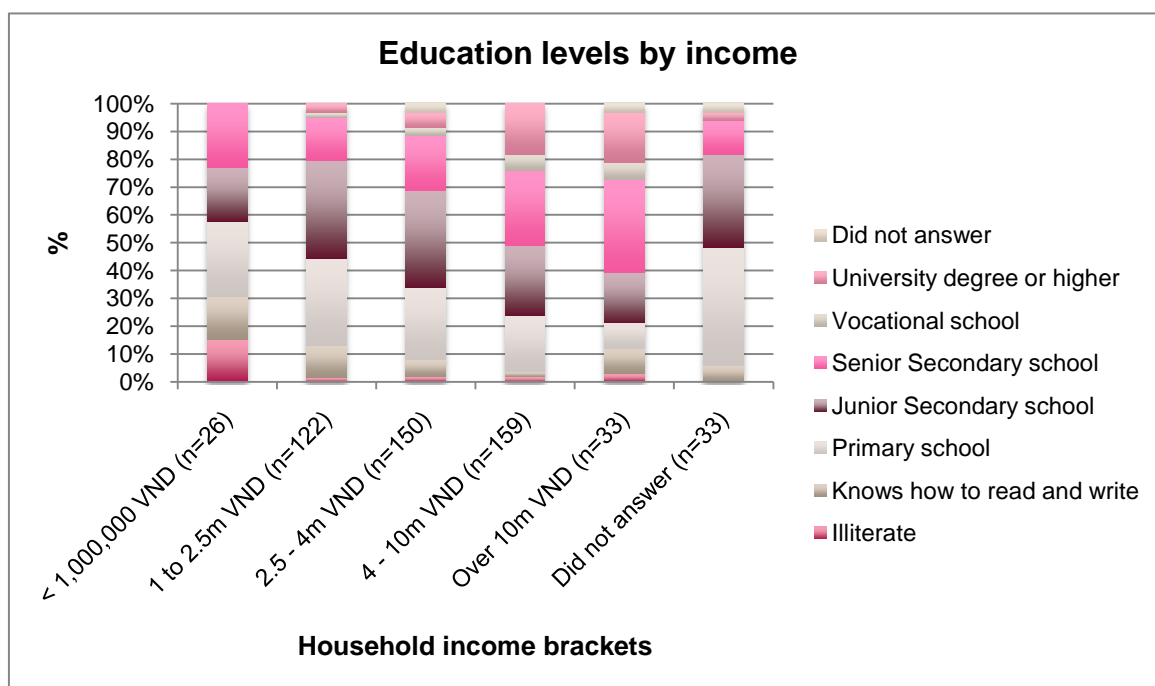


Figure 6 Education levels of survey respondents by income

### Housing and dwellings

In addition to income and education, housing is a significant component of all multi-dimensional analyses of poverty and it is clearly fundamental to understanding access to water and sanitation services. Though there is no consistent data set about housing and housing conditions, each of the data sources used in this report provides insight into housing conditions in Can Tho and the situation for poor households.

Census data for 2009 provides information about the degree of permanence of housing structures (Table 3), indicating that the majority (71%) of urban houses are ‘semi-permanent’ in nature, with a further 22% less-permanent or simple. It is important to note that although most houses are officially not ‘permanent’ this does not indicate that the occupants of these houses are temporary residents, as discussed below.

Table 3 Housing by type in Can Tho (source: Census 2009)

	Permanent	Semi-permanent	Less-permanent	Simple
<b>Total</b>	7%	61%	15%	18%
<b>Urban</b>	7%	71%	11%	11%
<b>Rural</b>	6%	41%	21%	32%

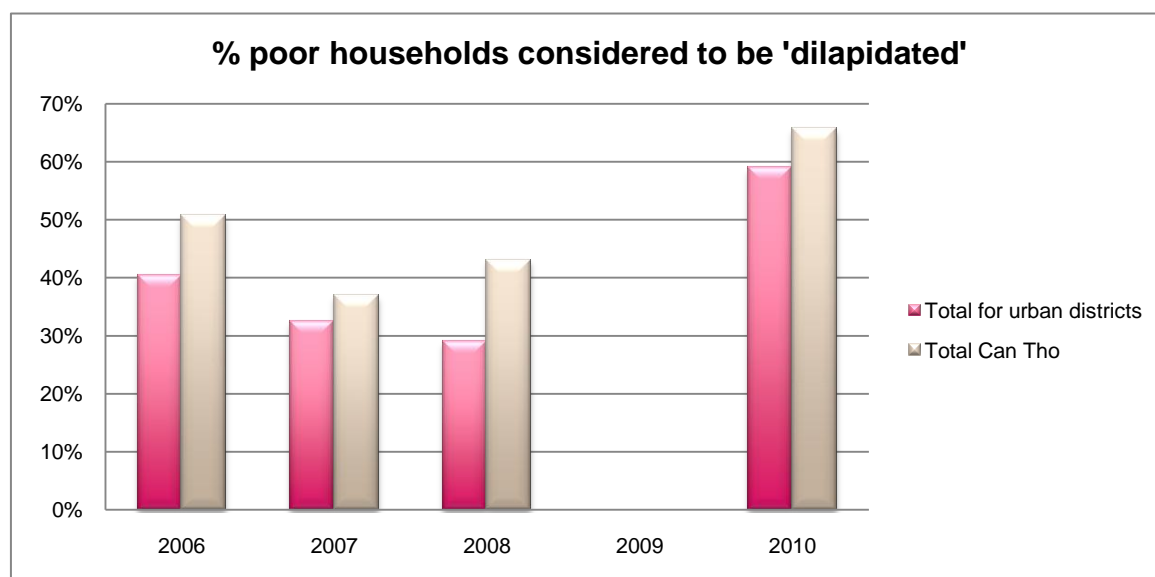
Insight into the situation specifically for poor households with reference to housing structure can be gleaned from DoLISA data, which identifies the proportion of poor households living in dwellings which are considered to be in disrepair or ‘dilapidated’. Between 2006 and 2008, around a third of all poor households in urban districts were classified as living in ‘dilapidated’ dwellings, with this figure rising to nearly 60% in 2010,



as shown in Table 4 and Figure 7. At the district level, Table 4 indicates that Ninh Kieu is the only urban district in which less than 50% of poor households are living in ‘dilapidated’ dwellings. The large proportion of low income families residing in poor quality houses has implications for water and sanitation services as well as vulnerability. The number of viable options for providing water and sanitation services is reduced for households with impermanent structures (e.g. rainwater tank or septic tank installation may not be feasible). As discussed below, poor quality housing increases the exposure and vulnerability of households to severe weather events and the impacts of climate change.

**Table 4 % poor households living in dwellings considered to be 'dilapidated' (source: DoLISA)**

District	2006	2007	2008	2010
Ninh Kieu	18%	4%	11%	17%
Binh Thuy	36%	42%	38%	57%
Cai Rang	44%	18%	23%	63%
O Mon	29%	29%	26%	60%
Thot Not	60%	48%	37%	76%
Phong Dien	71%	39%	37%	90%
Co Do	61%	35%	64%	58%
Vinh Thanh	54%	48%	54%	64%
<b>Total for urban districts</b>	<b>40%</b>	<b>32%</b>	<b>29%</b>	<b>59%</b>
<b>Total Can Tho</b>	<b>51%</b>	<b>37%</b>	<b>43%</b>	<b>66%</b>



**Figure 7 % poor households considered to be 'dilapidated' (source: DoLISA)**



Survey data confirms that poorer households are likely to be living in less permanent residences. As shown in Figure 8, over 50% of households in the two lowest income brackets are living in temporary and semi-permanent housing. Those households with higher overall income are more likely to live in permanent dwellings.

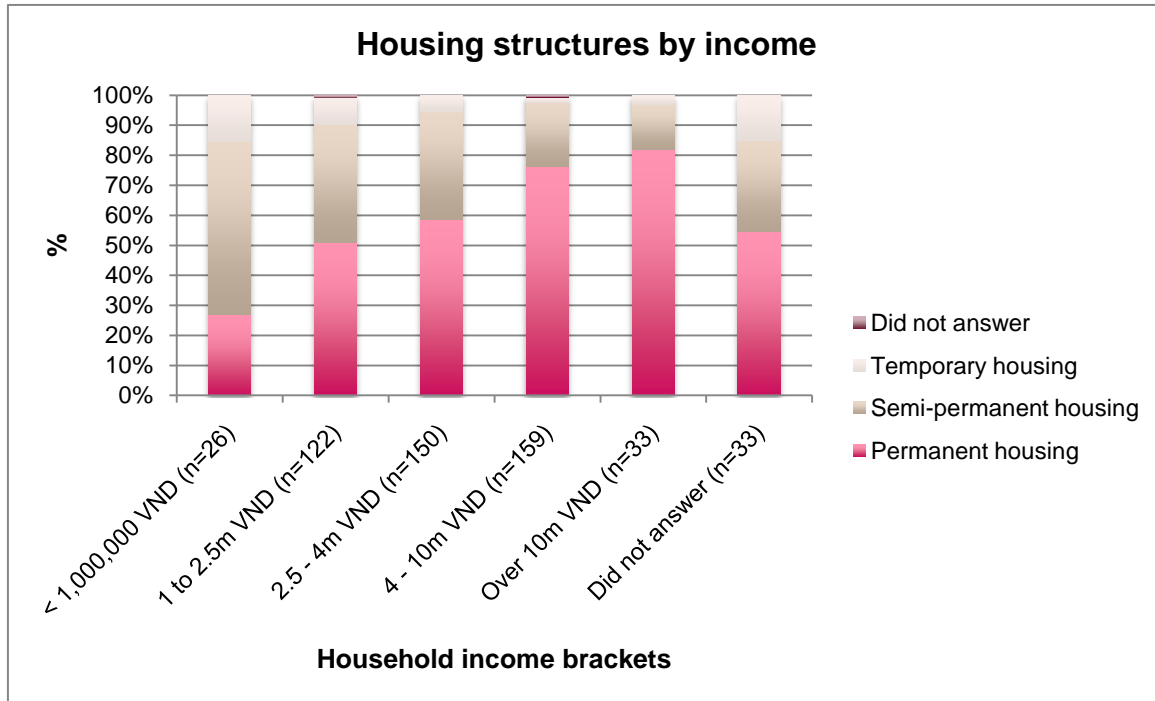


Figure 8 Housing structures by income bracket for poor households (proportions)

*Poverty and ethnicity*

Ethnicity is an important part of the poverty picture in Can Tho, with people from ethnic minority groups (i.e. of ethnicity other than Kinh) over-represented amongst poor households. According to 2009 census data, 3% of the total Can Tho population is from ethnic minority groups, with Khmer people forming the largest community (2% of the total population or 66% of the ethnic minority population). This figure doubles for low-income groups, with DoLISA data for 2006–2008 indicating that ethnic minority households represent 6% of all poor households, as shown in Table 5. This suggests that the rate of poverty amongst ethnic minority households is around 12%. The representation of ethnic minority households is particularly high for Co Do and O Mon districts, the two districts with 10% or more poor households being Khmer. Insights into the links between ethnic minority status and poverty are discussed below with reference to findings from interviews with Khmer households in O Mon.



**Table 5 Ethnic minority households as % of poor households (source: DoLISA)**

District	2006	2007	2008
Ninh Kieu	4.89%	5.53%	5.08%
Binh Thuy	1.05%	1.30%	1.88%
Cai Rang	0.84%	1.31%	1.40%
O Mon	10.48%	10.55%	9.77%
Thot Not	1.04%	1.14%	1.36%
Phong Dien	1.28%	1.83%	2.34%
Co Do	12.98%	12.47%	13.13%
Vinh Thanh	1.59%	1.97%	2.54%
<b>Total for urban districts</b>	<b>4.43%</b>	<b>4.87%</b>	<b>4.62%</b>
<b>Total Can Tho</b>	<b>5.68%</b>	<b>5.92%</b>	<b>5.98%</b>

### *The experience of poverty: livelihoods, access to resources and stress*

Interview data provides qualitative insights into the characteristics of poor households and how poverty is experienced in terms of livelihood, access to resources and stress. From interviews, it is possible to identify common characteristics of poor households and the experience of being poor.

For poor households, sources of income are typically seasonal, sporadic and unreliable. Typical responses from interviewees asked about their work included “my job is irregular” or “my work is not continuous”. Interviewees earn income from employment as rice porters, labourers, construction workers, bicycle taxi drivers or from micro-businesses such as selling small groceries, lottery tickets or handicrafts. It is typical for households to pursue multiple sources of income to cope with the unreliability of any one job. For example one interviewee worked as a bicycle taxi driver as well as serving coffee and also selling ornamental fish.

Most households reported experiencing stress related to their situation as low income households. Stress came from many directions, including health, income, food, education, ability to cope with flooding and overall quality of life. As one interviewee shared:

*Sometimes we feel stressed about meals, to cope with these times we have credit/debt from the grocery store.*

Another said:

*We have quite a lot of difficulty in our life ... We can get a loan from a loan shark if we need it but it has high interest of 20% per month.*

Most households interviewed experience illness that can be attributed to a lack of basic services or to poor housing, with one respondent noting:

*Sickness is normal for poor people.*

While many were able to seek no-cost treatment at local hospitals, some expressed concerns about their ability to afford necessary medications. One man (shown in Figure 9



below) was largely confined to his bed, and relied on handouts from the local hospital for basic food.



**Figure 9 Elderly man in O Mon**

The majority of households interviewed lived over or near to waterways, with some occupying very marginal land that had been provided by relatives. Houses in these locations are very vulnerable to flooding and to changes in local environmental conditions. This is discussed further below with reference to social vulnerability.

The household structures of interviewees were observed by the interview team, with most classified as 'semi-permanent'. However the definition was difficult to apply – many houses were mixed in their construction, for example some had a tiled and/or cement floor with rusted corrugated iron roof, or no floor with at least one solid wall. More insight can be gleaned from the length of time families had been living in the dwelling. Most respondents had lived in the same dwelling for more than 20 years or an unspecified 'very long time', indicating permanence of dwelling in situations where the structures themselves are at best semi-permanent or at worst very temporary with incomplete walls, roofs and floors (such as those shown in Figure 10, where residents had been living for many years).



**Figure 10 Typical dwelling structures for interviewed households**





Of the 23 households interviewed, nine were Khmer and 14 were Kinh. As noted above, ethnic minority groups (of which Khmer people form a significant proportion) are over-represented within the total number of poor households in Can Tho. Responses across Khmer and Kinh households revealed similar challenges related to the experience and impacts of poverty.

## 4.2 Access to infrastructure and water related behaviour

### 4.2.1 Poor households and access to water

Data from DoLISA, the CSIRO/CTU survey and interviews indicate variable access amongst poorer households to water and sanitation services. Table 6 shows official data (DoLISA, 2010) indicating the proportion of households classified as poor that are without access to 'clean' water (with the measure of 'clean' not defined in the available dataset). For the urban districts, 27% of poor households were without access to 'clean' water in 2008. The rate differs significantly between districts, with only 2% of poor households in Ninh Kieu lacking access compared with 30–40% in other urban districts. With the exception of Ninh Kieu, the rate of poor households without access to clean water is significantly higher than the figure for the total urban population of Can Tho City. Recent Can Tho Water Supply and Sewerage Company (WSSC) information indicates that in the city overall 20% of urban residents are without access (Neumann et al. 2011). This implies a correlation between poverty and lack of access to water in Can Tho that reflects global findings (WHO/UNICEF 2010).

**Table 6 Proportion of poor households without access to clean water (source: DoLISA)**

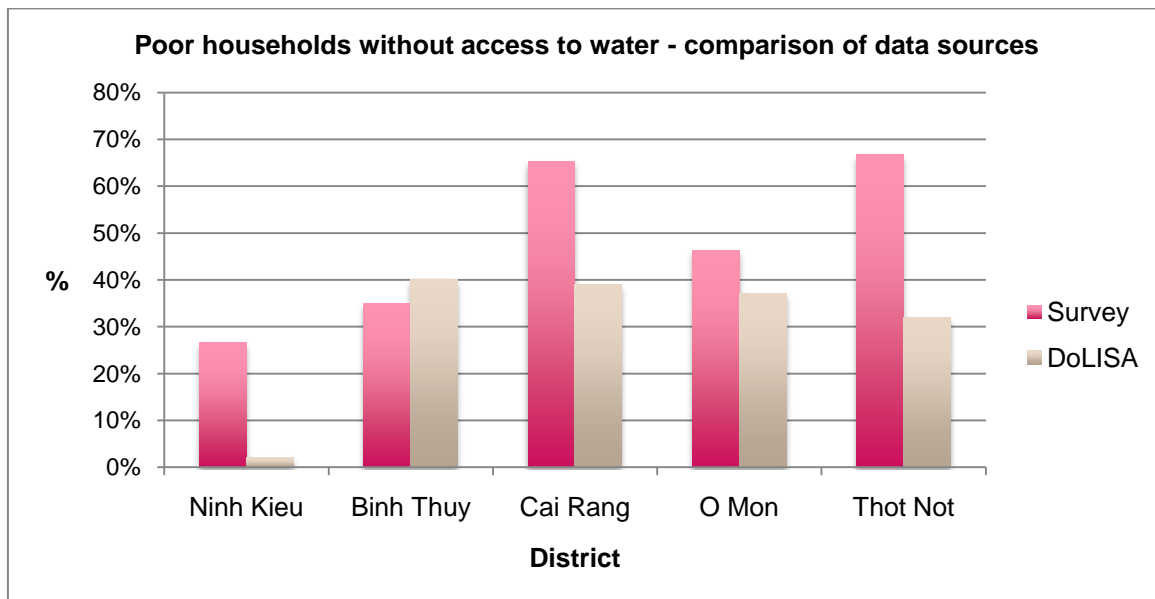
District	2005	2006	2007	2008
Ninh Kieu	7%	7%	4%	2%
Binh Thuy	41%	39%	35%	40%
Cai Rang	77%	62%	42%	39%
O Mon	37%	29%	31%	37%
Thot Not	53%	45%	36%	32%
Phong Dien	65%	62%	37%	44%
Co Do	41%	43%	23%	40%
Vinh Thanh	60%	60%	39%	14%
<b>Total for urban districts</b>	38%	32%	27%	27%
<b>Total Can Tho</b>	49%	45%	32%	32%

Note: no data was available for 2009 and 2010

Survey data provides an additional source of information about access to water amongst lower income households, and suggests that the access rates to clean water for poorer households may be lower than indicated in the DoLISA data. To analyse the survey data we used the WHO/UNICEF JMP definitions of 'improved' water which include household connections, public standpipes, boreholes, protected dug wells, protected springs and rainwater collections. Figure 11 compares DoLISA data from 2005 (households without access to 'clean' water) with 2011 survey data (households without access to 'improved'



water sources based on WHO/UNICEF JMP definitions). While the definitional differences make direct comparison difficult, with the exception of Binh Thuy district, survey data indicates potentially lower levels of access to safe water than cited in official statistics.



**Figure 11 Comparison of proportion of poor households without access to clean water**

The semi-structured interviews provide insight into the water use practices of poor households. Figure 12 shows the primary water sources for drinking and non-drinking purposes for interviewed households. In total, 15 of the interviewed households had a piped water connection (such as that shown in Figure 13), while eight did not. Most households with a piped connection used piped water for drinking, with one preferring bottled water due to concerns about the quality of piped water. Of the households without a piped connection, one used bottled water for drinking, with three collecting rainwater (as shown in Figure 14) and four using river water treated with alum. One house used bore water for non-drinking purposes (Figure 15). Another house nearby had a bore well that was currently not functioning (with no plans to fix the pump) as shown in Figure 16.



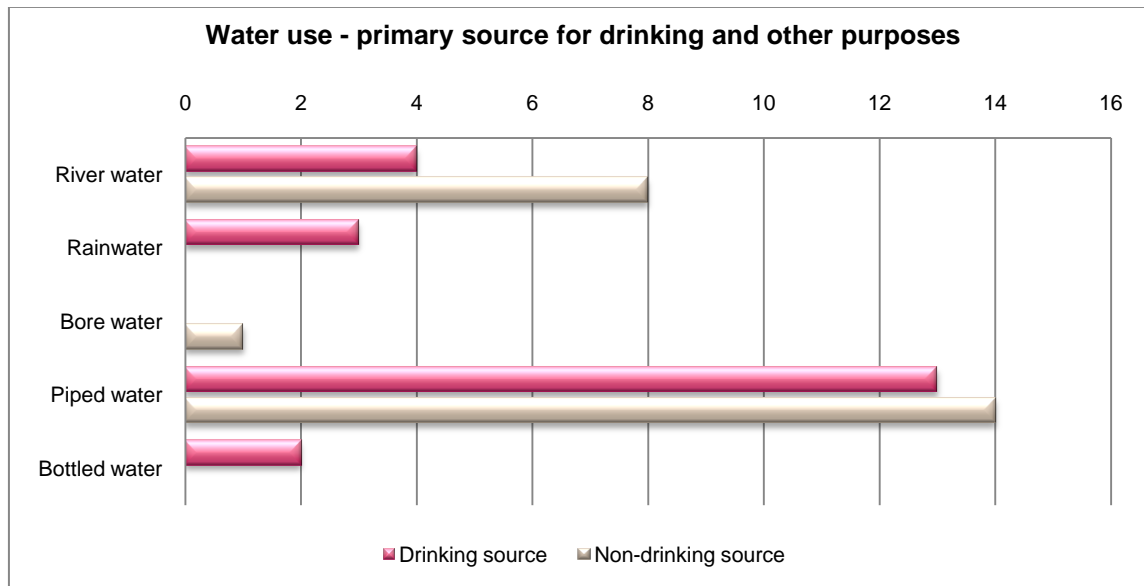


Figure 12 Main source of water for drinking purposes



Figure 13 Piped water connection



Figure 14 Clay pots for collecting and storing rainwater





**Figure 15** Functioning bore well



**Figure 16** Broken bore pump and well

Of the 15 houses with a piped connection, nine were relatively new connections in place for one to four months. Those with new connections reported previously using river water for most purposes:

*Four months ago we used the river water for everything after treating it with alum, now we use tap water.*

One family with a new connection reported their previous practice of carrying water from a river further away from their home due to concerns about the quality of locally available water:

*Some time ago we used the river next door but because it is highly polluted we instead carried water from the big river further away and then treated it before use.*

For most households interviewed, it was common practice to use multiple sources of water, matching the source with intended purpose. While piped water (when available) was identified as the *main* source for non-drinking purposes, interviewees used river water for at least some purposes (e.g. washing) to save on water bills. As one woman said:

*I'm cautious with money, so in flood times we use river water for bathing and washing to save on the water bill.*

Another household noted a seasonal change in their water use, relying on piped water in the dry season, but using a mix of piped, river and rain water in the wet season:



*River water in the wet season is okay, but in the dry season it's too dirty. It's black, we can't use it for anything. Then we use piped water for everything.*

Responses to questions about the affordability of piped connections were mixed, and given the small number of households with long established connections it is difficult to draw conclusions. Monthly water bills for most households were between 3,000 and 20,000 VND, with one household where 16 people lived reporting an average monthly bill of 70,000 VND. Four households interviewed were 'card holding' poor (i.e. they fell below the official poverty threshold and had received registration as such from the authorities) and were eligible to receive a water meter free of charge and pay a reduced water tariff. Others reported trying to minimise their piped water use by supplementing it with other sources in order to reduce the overall cost (as described above), and some noted difficulties in paying the bills, sometimes delaying payment for a month or more. One household described prioritising paying for water over electricity as the electricity utility offered more leeway before cutting service:

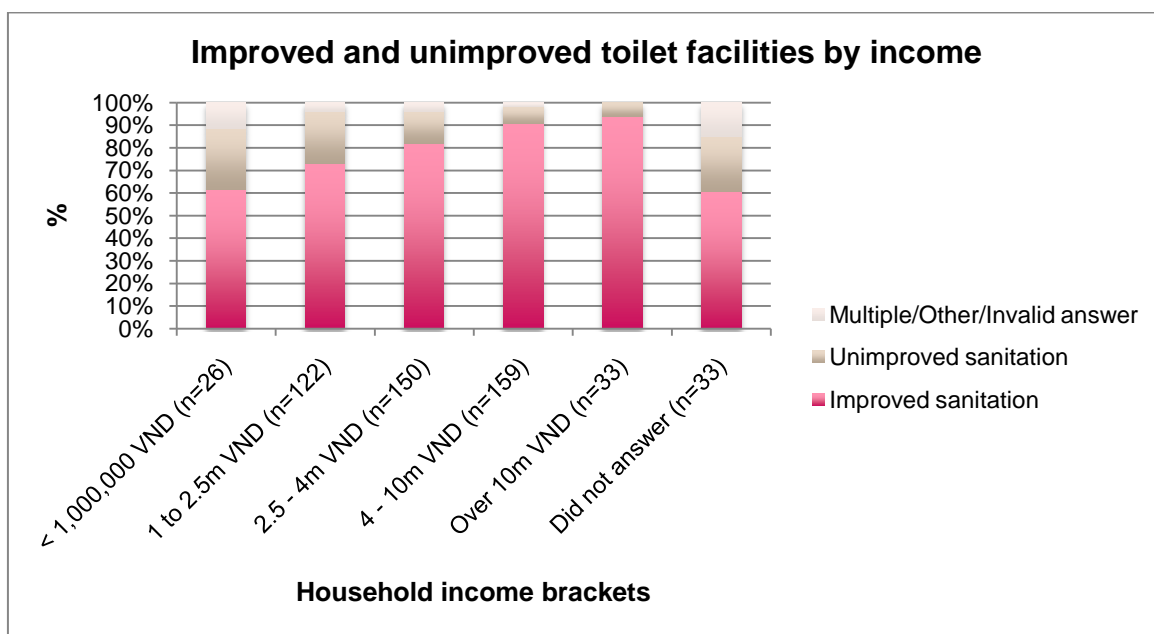
*With electricity we can owe for two months without cut-off, but not for water, so we find a way to pay the water bill.*

Interviewees identified a link between water quality and health, with sickness most commonly attributed to a decline in the quality of river water over time and particular concerns about quality during low tide and the dry season. Illnesses reported included stomach upsets and skin disorders.

#### **4.2.2 Sanitation and wastewater services**

It is important to consider two aspects of access when assessing sanitation and waste water services. One is the facilities available in the household, and the other is the management of waste produced. Survey data provides insight into sanitation facilities within poor households, with most survey respondents using a flush toilet connected to a septic tank. As with the analysis of water services, we used WHO/UNICEF JMP definitions of 'improved sanitation' as the basis for relating access to sanitation services to income. Improved sanitation facilities include connection to public sewers, connection to septic systems, pour-flush latrines, simple pit latrines and ventilated improved pit latrines. Unimproved sanitation facilities include bucket latrines (where excreta is manually removed), public latrines and open latrines. Using these definitions, of the 523 surveyed households identified as poor, 423 used improved sanitation and 22 used unimproved facilities (with the remaining 78 using multiple facilities or providing invalid answers). While most households used improved facilities, the proportion of households using unimproved facilities increased amongst those with lower incomes, as shown in Figure 17.





**Figure 17 Households using ‘improved’ and ‘unimproved’ toilet facilities by income**

The survey also asked respondents whether they used shared toilet facilities. Of the 523 poor households included in the survey, only 39 shared facilities. For those that did share facilities, the numbers of people sharing one toilet ranged from 4 to 20 with an average of 11 people per toilet. Qualitative insight into the sanitation perceptions and practices of households that did share toilet facilities is provided below with reference to interview data, with most interviewed households using shared hanging fishpond toilets.

Beyond the household, there was a significant gap in service provision around wastewater transportation, treatment and disposal. Across Vietnam, 77% of households in urban areas use septic tanks to pre-treat blackwater and an estimated 96% of domestic wastewater is untreated (beyond the household septic tank) and discharges directly into local waterways (USAID and EAWAG 2010). In Can Tho, there is currently no wastewater treatment, though a treatment facility to service the central Ninh Kieu district is under construction. A 2009 survey in Ninh Kieu found that 95% of households had septic tanks (with a 29% emptying rate) and 54% were connected to public sewers (GMBH 2009). Survey data for households identified as poor indicated an even lower connection rate. Of the 433 households that had toilets connected to septic tanks, only 34% (147 households) had tanks connected to a drainage system.

DoLISA data for poor households in Can Tho includes a measure ‘no drainage’. However the definition of ‘no drainage’ is unclear and the numbers of households classified as having no drainage were very small (0–3%). These figures do not reflect other information about rates of wastewater service in Can Tho, so they have been excluded from this report.

Interview data provides insight into perceptions and questions of affordability around sanitation for poor households. Of the 23 households interviewed, 21 used hanging



fishpond toilets such as those shown in Figure 18. One household had a toilet with a septic tank, and another had access to a toilet in a neighbour's home.



**Figure 18 Typical shared hanging fishpond toilets in the Mekong**

Interviewees were mixed in their perceptions around the adequacy of their sanitation arrangements. Some were satisfied, citing the fishpond hanging toilet as the “habit of the community” and therefore acceptable, with an additional benefit of reducing the need to purchase fish food (for owners/operators of the fishpond and associated toilet). Other households reported difficulty using the hanging toilets, particularly at night and during the rainy season. People with disabilities in interviewed households (five households) reported significant difficulty, and it is likely that containers used for defecation by disabled people were emptied by other householders directly nearby the house rather than being taken to the hanging fishpond toilet (as reported by at least one household).

When asked about future plans and hopes, while some households identified a desire to improve their sanitation arrangements, this aspiration was typically much lower down the list of priorities than making structural improvements to the dwelling. Six households cited raising the floor as their first priority to protect their house from the impacts of flooding. Others placed fixing the roof or walls higher on the list. As one interviewee noted:

*The first thing is to get a better roof to avoid rain, then level the yard, then repair the bore well, then a bathroom, and then a toilet.*

This aligns with findings internationally about the lack of expressed household demand for and willingness to invest in improved sanitation compared with water supply (for example see Welle 2008), and the need for sanitation improvement programs to focus on the social aspects of sanitation promotion including demand creation and behaviour change.

Affordability is also a significant part of the sanitation picture for poor households. Four interviewees reported that microfinance was available for constructing a toilet within their house, but that they were either unable or unwilling to participate in the scheme due to concerns about their ability to make repayments. This has implications for both sanitation and water supply schemes that require household investments either directly or through microfinance or subsidised loan schemes.

### 4.3 Social vulnerability

Questions relating to social vulnerability were explored in interviews to establish the link between poverty and vulnerability (identified in Adger 2009; Brooks 2003) in practical



terms for Can Tho, and to determine the specific and contextual dynamics of vulnerability. Interview data suggests that poor households are indeed highly vulnerable to the impacts of climate change predicted for Can Tho, including an increased risk of flooding, a reduction in the quality of surface water, changes in river flows and a more intense dry season (Neumann et al. 2011). Key dynamics are location (typically on marginal land proximate to waterways) and livelihood situations with respect to insecurity of employment/income and resource dependency. These are explored below with reference to insights from interviews.

### 4.3.1 Location and housing type

All households interviewed lived on relatively marginal land, commonly over or adjacent to waterways. Many dwellings were not structurally sound, with temporary floors, roofs or walls as described above. In some cases land had been given to the respondent's family by relatives as the owners could not afford land elsewhere. A number of dwellings were situated such that one or more rooms were entirely over canals with wooden floors and corrugated iron walls such as that shown in Figure 19.



**Figure 19 Interview household situated over waterway**

The proximity of dwellings to waterways, combined with their poor structural quality, intensified the experience of seasonal and tidal flooding. Most households interviewed reported that they sometimes experienced severe seasonal flooding (such as that shown in Figure 20 and Figure 21) and had learnt to co-exist with floods. Coping strategies included vacating flooded areas within the dwelling and moving to dry rooms until water subsided, or staying with relatives. Some interviewees reported a high degree of acceptance of flooding:

*Our motto is to co-exist with the floods.*

Others experienced serious difficulties. For example one elderly couple that were confined to their bed when water levels were high:

*When the house floods the water level comes halfway up the posts of the bed. This happens one month each year, and last month's flood was the highest yet.*







**Figure 20** The backroom of a house, under approximately 30cm water



**Figure 21** Due to flooding, the occupant of the blue house was staying with his brother next door at the time of interview

When asked about the future impact of flooding, a number of households shared aspirations to build up their floors as a barrier. Others were less focused on practical responses, but shared concerns:

*I don't want to think about it, we sleep on the floor so better not to think about it.*

The impacts of flooding reported in interviews included poor health (respiratory and skin disorders), reduced mobility and loss of income. Those reliant on rice or fish industries for employment in particular cited difficulties:

*Since my son is a porter, during the flood season the warehouse stops working and then he is unemployed.*

The marginal location of households interviewed also meant that any changes in water quality and local environmental conditions directly impacted on them. Many households noted a decline in local environmental conditions, for example degraded water and river environment quality or a decline in fish numbers:

*The quality of the river water here has become poor compared with 15 years ago when we moved here.*

Some linked the decline in environmental quality to the prevalence of hanging fishpond toilets, while others cited solid waste (littering) and industrial pollution as their main concerns. As one interviewee stated:



*The water here [that I live above] is connected to the fish pond where the toilet is, and it's quite dirty and smelly.*

Interviewees observed that water quality is poorest at low tide and during the dry season. For this reason, families with access to piped water that typically saved on bills by supplementing piped water use with river water, sometimes relied solely on their piped connection.

### 4.3.2 Livelihood insecurity and resource dependency

Almost all households interviewed experienced insecurity and stress related to their sources of income. Many relied on multiple sources of income, taking work as the opportunity arose but with no guarantee of regular or continued employment. As one interviewee stated:

*Life is difficult because of unemployment, my job depends on the flood and the warehouse.*

Jobs typical of households interviewed included porter (carrying rice), small scale vendor (e.g. groceries, coffee/drinks or lottery tickets), construction worker or factory worker (e.g. in a fish or rice processing factory). Some interviewees were unable to work at all due to illness, disability or age, and these households relied on food and handouts from either the government, the local temple (in the case of at least one Khmer household) or a nearby hospital (for one elderly couple).

For both employment and also in some cases food, the majority of households interviewed were either directly or indirectly dependent on local resources. High resource dependency has been identified as a key indicator of social vulnerability, with households dependent on the local environment more exposed to environmental changes and shocks associated with climate change (Marshall et al. 2010).

Households directly dependent on local resources are those using surface water for some or all purposes, eating locally caught or grown fish and vegetables and making use of local resources for income generation (e.g. selling locally caught fish or basket weaving). Of the households interviewed, eight supplemented their diet with locally caught fish from paddy fields and the river. As one interviewee said:

*My father traps eels and fish. We eat this quite a bit and also sell them for extra income. We work hard to find this food, and also grow vegetables.*

Indirectly resource dependent households are those where the primary sources of income rely on the success of local crops or production (e.g. those working as rice porters or in a fish or rice processing factory). These households experienced particular stress during times of flood as described above.

Households that are either directly or indirectly dependent on local resources are particularly vulnerable to the climate change impacts identified as likely for Can Tho. The impacts of changes in water quality are particularly significant for households relying on local waterways for some or all household water uses – including those without access to



piped water or those that can't afford to use piped water for all purposes. Changes in river flows and water quality are likely to have a negative impact upon aquatic ecosystems, which will affect households that rely on local fish for food and/or work in fish-related industries. Any increase in the frequency or severity of floods poses particular risks for those households already experiencing significant stress related to flooding in terms of both household inundation and impacts on livelihood.



## 5 Conclusion and next steps

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This research into the poverty dynamics of water, sanitation and climate vulnerability in Can Tho identifies the specific situation for urban poor households in the city and establishes that there is a significant relationship between poverty, access to basic services and social vulnerability,

A significant proportion of urban households in Can Tho, particularly those living outside Nin Kieu, can be considered poor based on measures of income and other dimensions relating to living standards, including household structure and access to basic services (water and sanitation). A particular focus on the poor and the relationship between poverty and urban water systems in upcoming phases of the study is therefore key to ensuring the relevance of the study for longer term policy and planning in Can Tho.

The findings from this study of poverty, water, sanitation and vulnerability are relevant to the upcoming phases of the climate adaptation study including Activity 3 (climate-adapted integrated urban water system analysis at the city scale) and Activity 4 (capability building through development of alternative water service options for climate change adaptation in a peri-urban or new development area).

In developing scenarios for Can Tho based on development trajectories and predicted climate change impacts, a 'poverty lens' can be applied to consider how alternative scenarios might be experienced by the poor, and how they might respond.

A poverty lens can also be applied to the selection of a case study site and analysis of service options at the case study scale. If the case study site is confirmed to be Chau Van Liem ward in O Mon province as has been proposed, this would provide an opportunity to build on data from interviews with poor households by undertaking complementary analysis relating to possible infrastructure configurations, their affordability and the behavioural dynamics that may affect the viability of alternative service options.

For example, dwelling structure needs to be taken into account when considering viable service options, with a significant number of poor households living in structures that are temporary, semi-permanent or in a state of disrepair. Similarly, water use practices and perceptions gleaned from the qualitative study indicate that many households draw from multiple sources and match water source to intended use. Decisions about what water source to use are informed by what is available, what is affordable, and the observed or perceived quality of different sources.

With reference to institutional analysis, different water service options and scenarios will have specific implications for poorer households, and these will affect the policy responses to potential options. Gaining insight into the current situation for poorer households enables the examination of likely implications of different service options for poor households so potential policy drivers and barriers related to water service scenarios can be anticipated and predicted.



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## **Annex 1 Interview question guide**

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