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SOCIAL INEQUALITY AND WATER SENSITIVE CITIES IN AUSTRALIA

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GENERAL DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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ABSTRACT

Sustainable, resilient and liveable cities should not just be for those with the capacity and resources to access them, but for everyone. Yet in modern urban contexts where economic, material, social and cultural resources are highly varied between communities, how do we ensure these opportunities? This thesis contributes to knowledge about the relationship between social inequality and domestic urban water use practices. It investigates how residents in communities varying in social advantage and disadvantage in urban areas perceive, interact and engage with water in their daily lives and the implications of this for urban liveability, sustainability and resilience. This comes at a time in which Australian metropolises (and others around the world) commence transitions to more community centred water resource management contexts through the creation of water sensitive cities. Despite a recognised requirement for community engagement and stewardship in these transitions, knowledge about the relationships between socio-cultural drivers such as social inequality and water resource contexts have been limited- particularly in the cities of developed countries. Accordingly this thesis seeks to understand *the implications of social inequality for transitions to water sensitive cities*.

This research was funded by the Cooperative Research Centre for Water Sensitive Cities (CRCWSC), a multidisciplinary partnership between research institutions, the water industry and resource management sector. Research was undertaken in two Australian cities—Melbourne and Perth—to explore water use practices in diverse communities. Using a conceptual model drawing on Social Practice theory and Bourdieu's concepts of capital, *habitus* and field, different elements of water use were investigated in six different suburbs. Sixty in-depth interviews (thirty in each city) were conducted with residents in suburbs of high, moderate and low social advantage (N=10 per suburb). Additional perspectives from water industry practitioners and community stakeholders were sought for further insights into daily life and the water resource contexts in each of these communities.

The key finding of this thesis is that social inequality has a profound impact on water use practices in shaping the lived experiences, needs and capacities of residents. The economic, material, social and cultural resources people possessed, shaped the sorts of liveability, sustainability and resilience they could achieve through their water use. I argue there is a social gradient in water use where advantaged residents consistently prioritise their water use for leisure, luxury and social connection, while the disadvantaged prioritise their water use to meet immediate welfare needs. Greater resource opportunities for the socially advantaged including financial capacities, technical literacies and support networks afforded them more autonomy and choice over their water use practices. By

contrast, for the disadvantaged a lack of resources including reduced finances, technical literacies and support networks meant their water use practices were often more basic, cost effective and arduous.

I discuss water use practices within the context of historical, political, social and biophysical characteristics of each city. These contextual variables entwine with social inequality to determine the practices that are accessible and likely for residents. Furthermore, I argue that inequality is perpetuated in water use practices across city, community and household domains through water resource settings that favour the experiences, needs and capacities of the socially advantaged. In effect the disadvantaged not only have less liveability, resilience and sustainability, but are also less able to improve their circumstances through accessing new technologies and engaging in water sensitive transitions. I conclude this thesis by considering the theoretical and practical implications of these findings in light of existing frameworks and agendas for water sensitive transitions.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ABS – Australian Bureau of Statistics

ANT – Actor Network Theory

BOM - Bureau of Meteorology

BPT – Bourdieu's Practice Theory

CBD – Central Business District

CRCWSC – Cooperative Research Centre for Water Sensitive Cities

DELWP – Department of Environment, Land, Water and Planning

IUWW – Integrated Urban Water Management

ML - Millilitres

MM - Millimetres

MUHREC – Monash University Human Research Ethics Committee

NATSEM – National Centre for Social and Economic Modelling

NWSD – National Water Use Survey Data

OLV – Office of Living Victoria

SEIFA – Socio-Economic Index of Areas

PT (or **NPT**) – New Practice Theory

UN – United Nations

SES – Socio-Ecological Systems

WCED – World Commission on Environment and Development

WSUD – Water Sensitive Urban Design

CHAPTER 1. INTRODUCTION

This chapter introduces urban water resource management in the Australian context and the challenges it faces in urban areas. In response to these issues the challenge for transitioning to a water sensitive city is posed and the Cooperative Research Centre for Water Sensitive Cities (CRCWSC) is introduced. The key water sensitive principles of sustainability, liveability and resilience are outlined, which serve as the vision of the CRCWSC. I then offer an overview of Project A2.1 *Understanding Water Use Cultures* of which this PhD research forms a part. The research question and objectives emerging from this research context are presented, followed by an overview of the research and an outline of each chapter in this thesis.

1.1. The Challenges of Transformative Change in Urban Water Systems

We live in the era of the city. The 21st century marked the first point in recorded history where the proportion of the world's population living in urban environments surpassed that of the population living in rural environments. In Australia 63 percent of the population now live in large cities and towns—a figure expected to increase to 80 percent by mid-century (Wong et al. 2013; Brown, Keath & Wong 2009). Indeed the consequences of this great urbanisation are now widely known. Extensive environmental degradation, coupled with the uncertainties of climate change and rapid population growth continue to present critical challenges to the sustainable development of both modern and developing urban metropolises throughout the world (Sofoulis 2011; Brown, Keath & Wong 2009; Wong & Brown 2009; Crase 2008; Troy 2008).

 Among these key challenges are those surrounding the sustainable management and resilience of the world's natural water resources and water environments. In the context of Australia—where extensive drought and flooding episodes are common—there is a growing body of water professionals and scholars who are engaged in the challenges and complexities of transitioning urban water resource systems, which are now widely recognised as unsuitable for meeting the future demands and challenges for a sustainable urban existence (Sofoulis 2011; Brown, Keath & Wong 2009; Wong & Brown 2009; Crase 2008;).

In spite of the technological and infrastructural advancements in the service of sustainable development goals over the last 20 years, progress remains slow (Kfouri 2016; Brown, Keath & Wong 2009; Wong & Brown 2009). Many cities remain 'locked-in' to perpetual cycles of investment in conventional approaches premised on the historic technocracies of centralised 'Big Water'

organisations and their infrastructures. For the most part, this has prolonged any significant diffusion of more sustainable initiatives, innovations and practices (Sofoulis 2011; Brown et al. 2009; Wong & Brown 2009).

Adding to this complexity is a growing shift in the roles and responsibilities of resource managers. This change in perception is due to the realisation of a more diverse range of benefits and services that water resources (and thus the sector) can offer urban environments. As Troy (2008), Crase (2008) and many others acknowledge, the traditional repertoire of water resource management, built on feats of heroic engineering to ensure supply security, flood mitigation and public health protection, are long gone. Moreover, in contemporary urban settings are the added dimensions of ensuring healthy waterways, social amenity and recreation, greenhouse neutrality, economic vitality, intra and inter-generational equity and a demonstrable long-term environmental sustainability (Troy 2015; Sofoullis 2011; Wong & Brown 2009; Crase 2008; Troy 2008).

In accordance, the once 'formalized behemoths of unquestioned authority and expertise' (Troy 2008, p. 90)—Big Water—are now acknowledging the requirement for a co-responsibility and (incrementally) a co-management of water resources with other sectors and even citizens that were once reduced to an 'undifferentiated population of dependent, ignorant and non-responsible beneficiaries of one-size-fits-all services' (Sofoulis 2011, p. 796).

1.1.1. A water sensitive city

Unsurprisingly, the emergent philosophies of an integrated urban water cycle planning and management (IUWM), which aims to bring together multiple stakeholders under the auspices of a whole of water cycle approach, has received widespread traction in recent years as a mechanism to best protect, maintain and enhance the multiple benefits that comprise the broader water contexts (or total urban water cycles) of modern cities (Sofoulis 2011, 2015; Wong & Brown 2009). Complimenting and at times underlying these approaches are the principles of water sensitive urban design (WSUD)—an interdisciplinary social and physical science concept that seeks to bring 'sensitivity to water' into urban design, through the integration of urban design with the disciplines of the engineering, social and environmental sciences concerned with water resource and environmental management (Wong & Brown 2009; Wong & Ashley 2006).

The emergence of the concepts of IUWM and WSUD have also been of influence at the macro scale, inspiring innovative lines of thinking about sustainable whole-of-city or urban scale transformations (Wong & Brown 2009). For instance, in recent years the concept of a water sensitive city has received growing recognition as a vision within which the attributes of urban water sustainability,

liveability and resilience can be pursued (Sofoulis 2015; Wong et al. 2013; Wong & Brown 2009; Brown, Keath & Wong 2009). Wong and Brown (2009) note the three principles of a water sensitive city to be:

- Cities as Water Supply Catchments: meaning access to a range of different water sources at a diversity of supply scales;
- Cities Providing Ecosystems Services: meaning the built environment supplements and supports the functions of the natural environment; and
- Cities Comprising Water Sensitive Communities: meaning socio-political capital for sustainability exists, and citizens' decision-making and behaviours are water sensitive (Wong et al. 2013; Wong & Brown 2009).

Encompassing IUWM and WSUD, these principles mark a significant step away from the philosophies and paradigms of conventional urban water management systems and pathways. Instead, a socio-technical approach is employed to recognise the intricate interrelating variables of water resource technical settings (systems, infrastructures, technologies) and the societal elements invested in them (diverse communities, political settings, economic and socio-cultural contexts, historical settings and path dependencies) that collectively define urban water contexts (Markard, Raven & Truffer 2012).

Transitioning cities to water sensitive contexts requires a dual-consideration of these dimensions and an understanding of their complex interactions along with the implications change may bring. Wong and Brown (2009) characterise this approach to change through the concept of a 'hydro-social contract' that encompasses the pervading values and implicit agreements between communities, governments and business on how water should be managed (Wong & Brown 2009). Table 1.1 characterises this contract in relation to the water sensitive city and current water resource management paradigms that are observable in the Australian context. This provides a basis for considering the transformations required to achieve the vision of a water sensitive city (Howe, Skinner & Ewert 2012).

Table 1.1. Water Sensitive City Attributes Compared to Current Urban Water Management Paradigms

Attributes	Traditional Regime	Water Sensitive Regime
System Boundary	Water supply, sewerage and flood control for economic and population growth and public health protection	Multiple purposes for water considered over long-term timeframes including waterway health and other sectoral needs i.e. transport, recreation/amenity, micro-climate, energy, food production, etc.
Management Approach	Compartmentalisation and optimisation of single components of the water cycle	Adaptive, integrated, sustainable management of the total water cycle (including land-use) designed to secure a higher level of resilience to future uncertainties in climate, water services requirements while enhancing the liveability of urban environments.
Expertise	Narrow technical and economic focused disciplines	Interdisciplinary, multi-stakeholder learning across social, technical, economic, design, ecological spheres, etc.
Service delivery	Centralised, linear and predominantly technologically and economically based	Diverse, flexible solutions at multiple scales via a suite of approaches (technical, social, economic, ecological, etc.)
Role of public	Water managed by government on behalf of communities	Co-management of water between government, business and communities
Risk	Risk regulated and controlled by government	Risk shared and diversified via private and public instruments

Source: Howe, Skinner & Ewert (2012, p. 9)

The *Water Sensitive Transitions Framework* depicted in Figure 1.0.1 developed by Brown, Keath and Wong (2009) provides a tool for assisting urban water strategists with this challenge. It identifies the attributes of more sustainable 'city stages', and the associated capacity building and institutional reforms required for transitions to sustainable urban water management contexts (Brown, Keath & Wong 2009; Wong & Brown 2009).

A typology of the dominant socio-political drivers and service delivery functions are presented that characterise the hydro-social contracts of the different states that cities transition through when pursuing change to water sensitive futures. The framework serves as a nested continuum to demonstrate that the former hydro-social contracts of city stages influence those in subsequent transitions (Brown, Keath & Wong 2009; Wong & Brown 2009).

Brown, Keath and Wong 2009 (2009) argue that the basic structure of the hydro-social contract remains relatively unchanged as cities transition through the initial 'water supply', 'sewered' and 'drained' city stages. However, with the expansion of the 'waterways' city to encompass values for environmental management and social amenity, the hydro-social contracts become significantly challenged with the encompassing of a greater breath of water supply needs and benefits, and

government and non-government stakeholders that require a more fundamental restructuring of institutional responsibilities and functions.
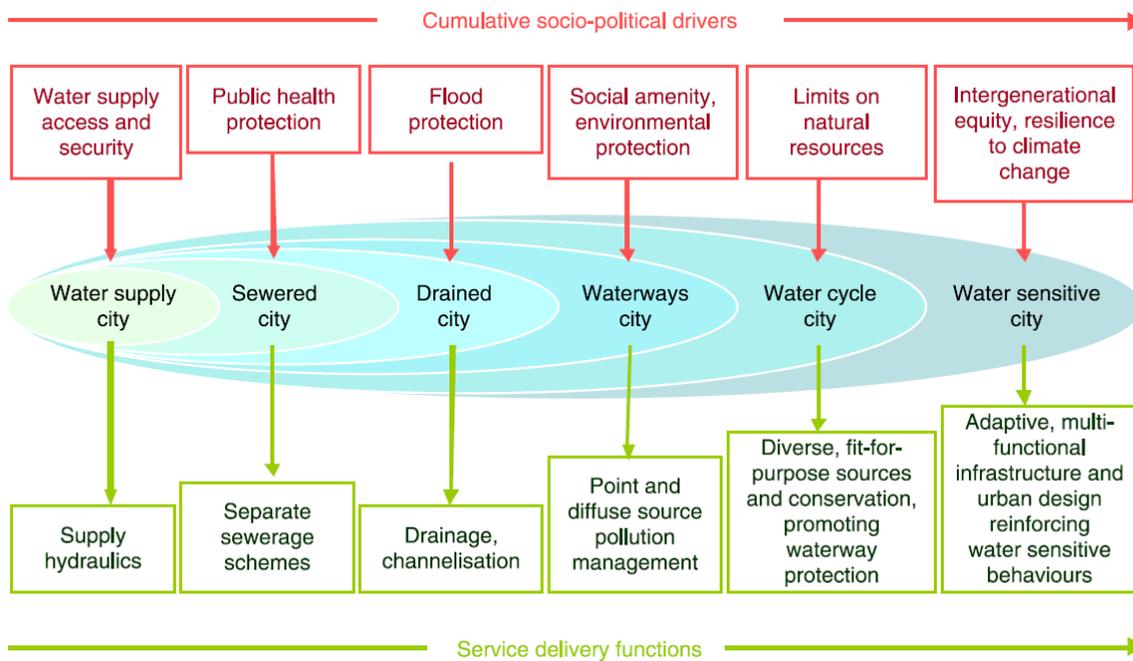
Figure 1.0.1. Water Sensitive Cities Transitions Framework

(from Brown, Keath & Wong 2009, p. 850)

The requirements for a 'water sensitive' city to have an 'adaptive' hydro-social contract, premised on flexible institutional regimes and coexisting diverse infrastructures, suggest ongoing challenges to existing institutional structures, roles and responsibilities (Wong et al. 2013; Brown & Wong 2009; Brown, Keath & Wong 2009; Healey 1997). Not the least of these are those oriented around the significant investment and engagement of the community, who Brown, Keath and Wong (2009, p.855) suggest will need to be *'sophisticated and engaged … and supportive of a sustainable lifestyle',* embedded in an urban form that is cognisant of these values, and their associated practices. With most contemporary management contexts now only beginning to relinquish the traditions of a top down, mutually exclusive supplier-consumer dynamic, the visions of a water sensitive city for much of the developed and developing world remain a monumental strategic challenge, requiring a major socio-technical overhaul, considerably different to those that have come before it (Brown, Keath & Wong 2009; Wong & Brown 2009).

1.2. The Cooperative Research Centre for Water Sensitive Cities

While there is not yet one example of a water sensitive city in the world, there are cities now possessing distinct attributes of a water sensitive approach and progression towards water sensitive

trajectories. In the Australian contexts (and now more broadly), many of these initiatives have been facilitated through the Cooperative Research Centre for Water Sensitive Cities (CRCWSC). A multidisciplinary partnership between the Australian Federal Government, research institutions and the water industry (including their stakeholders), that brings together over 100 partners to synthesise knowledge and develop tools that will guide future transitions to sustainable, liveable and resilient water sensitive cities (CRC 2015).

There remains much debate around the principles of liveability, sustainability and resilience, which many consider to be largely ambiguous, subjective and normative in relation to their wider uses and applications (Boyer et al. 2016; de Haan et al. 2014; Johnstone et al. 2012; Markard, Raven & Truffler 2012). Some framing of these terms is, therefore, necessary to offer a more detailed articulation of what constitutes the vision of *sustainable, resilient and liveable water sensitive cities*.

1.2.1. The vision: A sustainable, liveable and resilient water sensitive city

The World Commission on Environment and Development is credited with applying the concept of *sustainability* to guide development towards more sustainable outcomes. This was largely concerned with three intersecting pillars of environmental, social and economic viability. Since then, this 'triple bottom line' approach to sustainability has been selectively adopted and adapted across varied management sectors and disciplines (Lockie 2016; de Haan et al. 2014; Brundtland 1987). Boyer et al. (2016), for example, describe several and at times contradicting avenues and applications of 'social sustainability', while de Haan et al. (2014) further evidence its ambiguity citing instances where treasury or budgetary portfolios have focused on 'economic sustainability' while those concerned with environmental agendas have instead focused on 'ecological or environmental' sustainability (see also Lockie 2016).

Although it is apparent that no one definition can account for its many applications and subjects, the translation and operationalisation of sustainability through the Brundtland (1985) definition of sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' provides a useful starting point. It defines a relationship between society and environment that suggests a co-benefit to human needs alongside broader societal and external systems (de Haan et al. 2014; Brundtland 1987). Similarly, Wong and Brown (2009) refer to sustainability in terms of 'initiatives for protecting and conserving natural resources and promoting lifestyles, and their supporting infrastructure, that can endure indefinitely because they are neither depleting resources nor degrading environmental quality …' (Wong & Brown 2009, p. 673). They suggest, that while such a notion in some instances

may be out of reach, it sets a vision for which each step towards it benefits the ultimate and ever moving goal of sustainability (Wong & Brown 2009).

Like sustainability, definitions and applications of *liveability* are diverse. From an urban development standpoint this makes it exceedingly difficult to define and measure (de Haan 2014; Balsas 2004). Considering the recent review of common measures of liveability by the Victorian Competition Efficiency Commission, Johnstone et al. (2012, p. 4) conclude that:

> liveability is so inherently subjective, that its definitions and classifying of its attributes do little to determine its meaning. This is because … it is the varying values, cultures, disciplines and perspectives that pave the pathway to liveability … in essence, liveability is dependent on the needs of the people for whom liveability is being sought.

Yet despite its ambiguity, many scholars note a key theme across its various definitions and applications in that 'quality of life', 'wellbeing' and/or the satisfaction of people and their needs are central considerations (de Haan et al. 2014; Johnstone et al. 2012; Vuchic 1999; Veenhoven 1996).

This inherent anthropocentric (or human centred) focus suggests that liveability indeed bears some correlation to its sustainability counterpart. As de Haan et al. (2014) describe, both liveability and sustainability have a role in the satisfaction of human needs, and possess a temporal relationship, where sustainability is concerned with the long-term intergenerational conditions (i.e. 'needs of the future'), while liveability is focused primarily on the 'here and now' (de Haan et al. 2014). Consistent with this perspective they propose a societal needs approach to theorising liveability and (to a lesser degree) sustainability objectives in water sensitive transitions frameworks. This serves to highlight the niche that water resource management occupies in these outcomes and how water sensitive transitions can enrich sustainability and liveability for urban societies and citizens. Accordingly this framework serves to define the water sensitive ideals of liveability and sustainability for this research (de Haan et al. 2014; Johnstone et al. 2012). The framework and its relation to Brown, Keath and Wong's (2009) water sensitive city continuum is outlined in Appendix 1.

Finally, the third and relating principle of *resilience* has similarly received growing attention in sustainable transitions and sustainable development fields in recent years. An active and comparatively less ambiguous scholarship has emerged in the last decade out of interests to extend both theories and concepts of resilience—originally embedded in ecological discourses—to societal or human oriented socio-technical and socio-ecological systems (Cole & Nightingale 2016; Lockie 2016; Hogan et al. 2013; Janssen 2007; Adger 2000). The concept of 'social resilience' has emerged out of these processes, defined as 'the ability of groups or communities to cope with external

stresses and disturbances as a result of social, political and environmental change' (Adger 2000, p. 347). Lockie (2016) similarly refers to resilience from a systematic standpoint, as 'systems being able to absorb disturbances and/or reorganize to preserve essential functions and characteristics following disturbance' (p. 116). Such thinking plays an important heuristic role as a counter narrative to sustainability and liveability in resource management transitions, by shifting the focus from resource availability (in this instance for the satisfying of societal needs) towards the scope of available response options that can ensure the continuation of these processes amidst change and uncertainty (Cole & Nightingale 2016; Hogan et al. 2013).

To elaborate, Wong and Brown (2009) acknowledge resilience as a central requirement to water sensitive cities for considering vulnerabilities to climate change and population growth. A resilient city has the systems capacity to seek opportunities for innovation and new development trajectories in instances of major disturbances (such as flooding, drought and waterway health degradation), while for vulnerable cities these events can lead to major social and environmental consequences (Wong & Brown 2009; Adger 2006). They suggest that the resilience of a system is determined by:

(i)   The amount of disturbance a system can absorb and still remain within the same state;

(ii)   The degree to which the system is capable of self-organisation (versus lack of organisation or that out of social, political or environmental disturbance)

(iii)   The degree to which a system can increase its capacity for learning and adaption (Wong & Brown 2009).

Consequently this narrative seeks to extend considerations beyond simply 'what' water sensitive cities, and cities transitions will entail (liveability and sustainability), to consider the complex rationalities of 'how' this can be achieved and maintained for future generations (Cole & Nightingale 2016; Wong & Brown 2009).

By this design, a water sensitive city will ensure residents possess the opportunity to satisfy existence, relatedness and growth needs in ways that are economically, socially and environmentally viable (i.e. sustainable), thereby ensuring capabilities for future generations to do the same. This will be achieved through resilient integrated socio-technical and socio-institutional settings that can account for environmental and political uncertainties and projected population growth.

1.2.2. Program overview

In order to pursue the vision of *sustainable, resilient and liveable water sensitive cities,* a tri-phased research program has been developed spanning knowledge synthesis, research development, and implementation and adoption processes. Under the auspices of the CRCWSC thirty-five discrete

research projects have been developed which are spread across four core research focus areas that include Societal Transitions, Water Sensitive Urbanisms, Future Technologies, and Adoption Pathways. Each project places water resource practitioners, policy makers and regulators alongside researchers in inter-disciplinary teams with expertise spanning multiple specialty areas (CRCWSC 2011).

Program A is the 'Society' stream that is engaged with understanding and delivering the societal transformations needed to support water sensitive cities. Research initiatives are concerned with developing new insights into community attitudes and behavioural change, governance and economic assessment practices, management systems and technological innovation. Multi-disciplinary projects have been undertaken with the goal to deliver governance models, policy tools and practical guidance that will facilitate social, institutional, regulatory and economic reforms (CRCWSC 2011).

1.2.3. Project A2.1: Understanding social processes to achieve water sensitive futures

This research formed part of Project A2.1. *Understanding social processes to achieve water sensitive futures*. The objective of this project was to develop an understanding of the rich social, cultural, economic and historic forces that underpin modern domestic water resource contexts and lifestyles in Australian cities. Research outputs provided a characterisation or typology of water use cultures and contexts (Dean et al. 2016b). The research offered insights into the forces shaping the urban sprawl and layout of modern metropolises; the meanings and processes surrounding daily water use practices; lifestyles in Australian cities; and the role of socio-cultural variables such as gender, ethnicity, geography and social inequality in orienting these practices (Frost et al. 2016; Supski & Lindsay 2013). The research was designed to inform future interventions and strategies that will support the engagement, adjustment and adaptation of different communities to water sensitive lifestyles (CRCWSC 2011).

An understanding of the cultural domain and the complexities of everyday experiences that shape user perceptions and values is crucial for understanding resource consumption, and developing necessary resource management strategies that will foster values and capabilities for water sensitive urban lifestyles. An initial literature review carried out by Supski and Lindsay (2013) as part of this project highlighted four significant spheres of influence believed to shape and embed the cultures for water use observed in urban contexts. These are depicted in their diagram 'Understanding Water Use Cultures'.
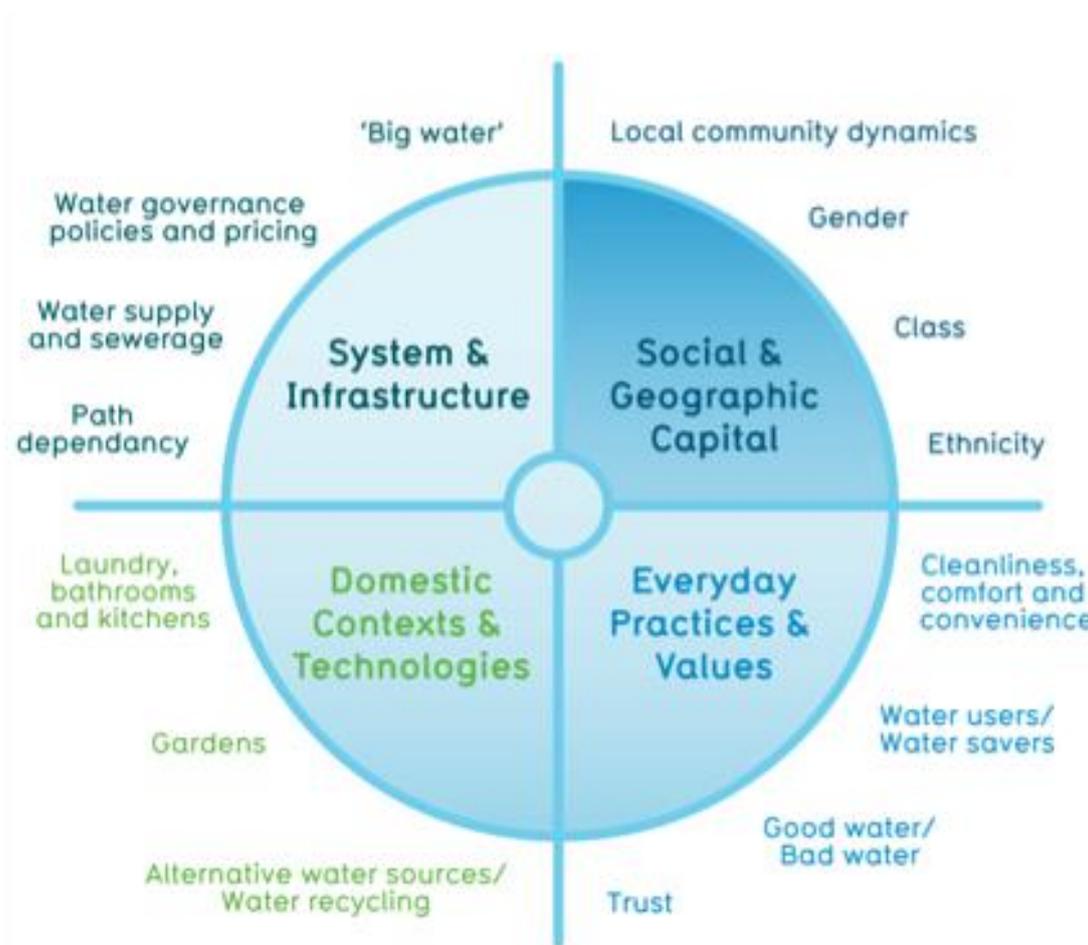
Figure 1.0.2. Understanding Water Use Cultures

(from Supski & Lindsay 2013, p. 4)

The model (Figure 1.0.2) suggests that relationships between people and water are derived from the explicit social interactions and daily practices of users and groups within the broader sociotechnical water systems they are embedded. As I discuss throughout this thesis (in particular Chapter 7), these relationships are rarely fixed, but rather subject to regular change and variability as they are exposed to continually shifting (or transitioning) biophysical, socio-political and technological regimes. The meso-level of households and communities serve as an important focal point in this sense as it is here that these interactions specifically occur, and certain water use practices (that reflect contextual water cultures) are rendered meaningful over others (Supski & Lindsay 2013; CRCWSC 2011; Head 2008; Allon & Sofoulis 2006).

As I detail in the following chapter, knowledge on processes and relationships between socio-cultural variables and water resource contexts is currently limited within the Australian setting. This is particularly the case for socially marginalised communities in which rates of scholarly participation

and community led opportunities for knowledge building have been numbered (Sofoulis & Williams 2008).

Furthermore, International development and environmental justice fields of thought have long recognised the socially marginalised to be not only most impacted by environmental change and disaster events, but also possessing fewer opportunities for the alleviation of their circumstances comparative to their wider community (local and global) (Harlan et. al 2015). As contemporary perspectives in political ecology- such as Bryant & Bailey (1997), Forsyth (2008) and many others- acknowledge, environmental change does not affect societies in homogenous ways, but rather political, social and economic differences account for uneven distributions of cost and benefits to communities and individuals. As I argue in this thesis these assumptions are also relevant for contemporary Australian contexts, therefore recognising and understanding these differential vulnerabilities and capabilities, in relation to contextual water resource practices is of paramount importance for ensuring social inclusive water sensitive cities and transitions

1.3. This Thesis

1.3.1. Research aim and questions

Against the background described in this chapter, this PhD research has sought to understand the relationship between social inequality and urban water use, and the implications of this for cities engaged in water sensitive transitions. Accordingly, the following research aim has been pursued:

> *To understand the implications of social inequality for the transformation to water sensitive cities.*

To achieve this aim, three specific research questions were identified. I outline these in this sub-section and describe the key objectives, methods and insights sought for these to be answered. An indication of how each question is addressed throughout this thesis is also provided, which I summarise in sub-section 1.3.3.

1.   What is the role and nature of social inequality in urban water use practices?

Having initially developed a general account of social inequality in two urban Australian case study contexts (Melbourne and Perth), a key objective of this research was to understand the influence of social inequality on the urban water practices in Australian communities and households. Insights were sought into the water use practices that existed in both households and communities varying in social advantage and disadvantage in Melbourne and Perth.

As I detail in Chapter 3, a social practice is comprised of materials, meanings and competencies (Shove, Panzer & Watson 2012), which form interdependent relationships that routinise behaviours (Reckwitz 2002). To investigate water use practices—or daily practices in which water was a central element—insights were sought into these diverse and complex interdependent relationships. Water use *materials*—or 'things and their uses'—included objects, infrastructures, tools and hardware, the body and water itself. While water use *meanings* were observed from the attitudes and values, emotional and motivational knowledge, and social and symbolic significances users ascribed to their daily water uses. *Competencies* encapsulated forms of understanding, know-how and practical knowledge, and were observed through forms of background and historical knowledge, water literacy and education and community connectedness (Shove, Panzer & Watson 2012).

The key themes observed in the relationship between social inequality and domestic water use are discussed in Chapter 6 of this thesis. Further considerations are offered in Chapter 7 where I consider how this relationship plays out amidst the unique contextual variables of each city.

2. How do the different city contexts in Melbourne and Perth shape inequality and water use practices?

Considerations of the links between the observed meso-level dynamics of inequality and practice, and the broader societal level water resource cultures and sociotechnical settings were sought, to consider how inequality and water use practices were contextualised and shaped by the distinct water resource management paradigms of each city. As I discuss in Chapter 3, a significant strength of a modern theory of practice, is its ability to draw distinct connections between localised (meso-level) routines or practices, and societal scale conventions (such as socio-technical and socio-institutional systems) to consider interventions and pathways for sustainable, or in this instance water sensitive, societal transitions (Spaargaren 2011; Shove & Walker 2010; Sofoulis 2005; Shove 2003b).

In the theoretical framing of this research (Chapter 3) I return to Supski and Lindsay's (2013) framework for 'Understanding Water Use Cultures to consider their proposed dynamics through a lens of Social Practice as developed by Elizabeth Shove and colleagues (Shove, Panzer & Watson 2012). A review of the water resource literature in Chapter 2 suggests that similar water resource dynamics also perpetuate inequalities between divergent class groups. In this sense, the theoretical framework developed for this thesis serves also as a tool for considering the structural influences of existing hydro-social contracts and their relationship to social inequalities and water use (or water sensitive) practices. Considerations into how these broader contextual water variables are implicated in existing relationships between social inequality and practice are outlined in Chapter 7.

3. **What are the implications for sustainability, liveability and resilience in Australian urban communities?**

To frame this research, efforts were taken to consider the scope of social inequality in both the Melbourne and Perth case studies. A major objective was to understand how the social, cultural, economic and material resources (that define the social advantages and disadvantages of households and communities), influenced living standards in socially divergent communities in each city. The relationship between social inequality and these resources—or forms of 'Capital'—are discussed in further detail in Chapter 3 (see 3.2.2). While occurrences of their influence on water use practices are discussed in the literature review presented in the Chapter 2.

Forms of social capital were investigated through the social relations, networks and connectedness individuals and groups possessed to certain institutions (e.g. extended family, community, employers, political institutions etc.). Cultural capital was observed through tastes, preferences, lifestyles and the symbolic values expressed in lived experiences and daily practices. While material and economic capital was observed through incomes, perceived financial stability and the ownership and accessibility of material goods. In Chapter 5 these are presented through the personal experiences and accounts of residents in socially advantaged, moderately advantaged and disadvantaged households and communities. While in Chapter 6, I consider how these more specifically are related to, and influence the urban water use practices of households and communities varying in social advantage and disadvantage, and in Chapter 7 the broader sociotechnical contexts of each city. Consistent with the vision for the CRCWSC I consider how these dynamics and relationships influenced capabilities for sustainability, liveability and resilience in these communities.

1.3.2. Research overview

Achieving the research aim of this research project required the development of in-depth understandings of the nature of social inequality in Australian urban contexts; the role it plays in shaping urban living standards; and how daily water use—and the broader resource management contexts that embed it—are implicated in it. This has involved both a prospective and retrospective analysis of the socio-technical, environmental and socio-cultural variables that comprise these relationships in Australian cities.

The initial stages of this research focused on existing theoretical and scholarly perspectives. A literature review was conducted to draw out existing relationships between social inequality and urban water use, with a predominant focus on discourses concerned with Australian urban settings.

As has been previously acknowledged, direct insights into the influence of social inequality are limited in urban water discourses, however, the literature does suggest a relationship between household water consumption practices and the sorts of economic, material, social and cultural resources people possess and have access to. These resource settings and corresponding practices are also found to be influenced by the broader domestic contexts, systems, infrastructures and technologies that comprise socio-technical water resource settings. A theoretical model inspired by contemporary perspectives of social practice theory and Bourdieu's concept of capital has been developed to conceptualise these dynamics.

To explore these relationships qualitative research was undertaken in two Australian cities of Melbourne and Perth, which exemplify the challenges described in Section 1.1, in the midst of transformative 'water sensitive' change. Each city also possesses unique socio-technical and environmental characteristics, allowing for a more considered representation of the characteristics of Australian urban environments and the nature of social inequality within them. Using the conceptual model developed in the preliminary stages of this research different elements of water use, such as the materials, meanings and competencies, are investigated in the broader social context of six different suburbs.

In each city, semi-structured interviews were conducted with residents in high socially advantaged (n=10), moderately advantaged (n=10) and socially disadvantaged (n=10) suburbs, to understand the materials, meanings and competencies that comprised daily water use practices and the influence of social, cultural, material and economic resources that shaped them. Suburbs were determined through the Socio-Economic Index of Areas (SEIFA) data conducted as part of the 2011 Australian Census. Additional perspectives were sought through informal fieldwork, interviews (n=20) and discussions with community and water industry stakeholders who were invested in these communities. These additional forms of data collection were particularly oriented around gaining insight into the domestic contexts, systems, infrastructures and technologies that embedded water use practices and daily life in each of the studied communities.

The key finding of this thesis is that social inequality has a profound impact on water use practices in shaping the lived experiences, needs and capacities of residents. The economic, material, social and cultural resources people possessed, shaped the sorts of liveability, sustainability and resilience they could achieve through their water use. I argue there is a social gradient in water use where advantaged residents consistently prioritise their water use for leisure, luxury and social connection, while the disadvantaged prioritise their water use to meet immediate welfare needs. Greater resource opportunities for the socially advantaged including financial capacities, technical literacies

and support networks afforded them more autonomy and choice over their water use practices. By contrast for the disadvantaged a lack of resources including reduced finances, technical literacies and support networks meant their water use practices were often more basic, cost effective and arduous.

This relationship between social inequality and water use practices was also influenced by the historical, political, social and biophysical water resource characteristics of each city. These contextual variables entwine with social inequality to determine the practices that were accessible and likely for residents. Furthermore, I argue that inequality was perpetuated in water use practices across city, community and household domains through water resource settings and cultural dynamics that favoured the experiences, needs and capacities of the socially advantaged. In effect the disadvantaged not only had less liveability, resilience and sustainability, but were also less able to improve their circumstances through accessing new technologies and engaging in water sensitive transitions.

Through the realisation of the three research questions, findings emerged that present practical implications for water sensitive cities, in light of existing frameworks and agendas for water sensitive transitions. I suggest that resource managers will need to transcend the existing technical preoccupations of existing transitions frameworks to address the social and political processes which contextualise societal, community and household water use cultures, and define community capabilities. A water sensitive culture is required that better accommodates the diverse experiences, needs and capacities of urban communities to build and foster capabilities for a water sensitive engagement, stewardship and practice. A potential framework and future research agenda are prescribed to assist in these endeavours (see Chapter 8).

Accordingly this thesis makes contributions to both academic scholarship and to water management practice. From a scholarly perspective it:

1) Extends social practice theory scholarship in highlighting the significance of contextual (or 'background') dynamics and processes that influence the circulation of practice components (i.e. materials, meanings and competencies), and the need for their consideration in practice based theoretical considerations.

2) Extends socio-technical scholarship with propositions of the links between socio-technical systems and social inequality in modern urban contexts.

3) Creates a framework and research template for enriching empirical understandings of socio-cultural dynamics in water and natural resource management systems discourses.

This will be of particular benefits for developing insights into socio-cultural drivers such as ethnicity, gender, age, geographic diversity and other socially marginalised groups, currently lacking in this field (Supski & Lindsay 2013).

4) Offers added lines of consideration for modern discourses on social inequality in the developed world. In particular, how this social phenomena shapes experiences of natural resources and resource management agendas in urban environments.

From a practical perspective the insights developed from this research not only contribute to the knowledge synthesis of Project A2.1 in the CRCWSC, but more broadly promote a platform for addressing a paradox that has existed in urban water resource management since its establishment in the emerging cities of the 19th century.

1.3.3. Thesis outline

This PhD research is presented across eight thesis chapters. Table 1.2 summarises the thesis content, indicating how each of the research questions (and their objectives) are addressed. At the beginning of each chapter I provide a short overview of content and highlight its contribution to the overall thesis narrative.

This chapter serves as the introduction to the thesis. I provide background and context for considering the research aim and questions, as well as an overview of how these are addressed.

A review of the literature of socio-cultural, socio-technical and socio-economic perspectives on urban water consumption and water resource management is presented in Chapter 2. The purpose of this review was to highlight relationships between social inequality and water use to guide the development of research questions and theoretical perspectives.

The conceptual framework used to address the research questions is presented in Chapter 3 and includes a review of the theoretical mechanisms in contemporary (or 'New') Practice Theory and Bourdieu's Theory of *Habitus* and Field upon which the former is based.

The methodology presented in Chapter 4 outlines the tools and frameworks that were used to address the research problem. I begin with an epistemological framing of this research including a consideration of relevant constructs, theories and perspectives. The overall research design is then presented and an overview of key research considerations and the methodological techniques used to address the research questions are described. Specific approaches for data collection, data analysis and the maintaining of research reliability and validity are also explained.

Chapters 5, 6 and 7 present the research findings. Chapter 5 provides insights into the daily lives of residents in advantaged, moderately advantaged and socially disadvantaged communities by drawing on the lived experiences, accounts and perspectives of residents in these case study communities. I reflect on accounts of daily satisfactions in personal household settings and community and public amenity, as a means of demonstrating the nature of social inequality in Australian urban contexts. I conclude by reflecting on the implications of these findings in the contexts of community capabilities for water sensitive transitions, liveability, sustainability and resilience.

In Chapter 6 the relationship between domestic urban water use practices and social inequality is presented. I outline the similarities and differences in water use practices and practice dynamics observed between socially disadvantaged, moderately advantaged and advantaged communities, and draw out their relationship to liveability, sustainability and resilience in these communities. I conclude by reflecting briefly on the implications of this for water sensitive transitions and the theoretical value a theory of social practice offers in these considerations.

Chapter 7 considers the relationship between social inequality and domestic water use practices observed in the Chapter 6 in the contexts of the unique historical, biophysical, political and social variables of each city. This offers insights into how social inequality is entwined with the contextual variables and processes of Australian cities and how water use practices are contextualised across city, community and household domains. I present the dynamics and processes observed in both the Greater Melbourne and Greater Perth contexts, before considering the theoretical and practical implications of these findings in the contexts of water sensitive transitions.

The thesis conclusion in Chapter 8 describes the scholarly and practical implications of this research in relation to the vision and ideals of a water sensitive city. The limitations of the research are also described and a future research agenda is proposed.

Table 1.2. Addressing Research Questions and Outcomes

Thesis Chapter Title / Thesis Question	2. Literature Review *Literature Review*	3. Theory Dvpt *Theoretical Framework*	5. Findings *Social Inequality in Australian Urban Contexts*	6. Findings *A Social Gradient for Urban Water Use Practices*	7. Findings *Urban Water Use Cultures and The Social Gradient*	8. Conclusion *Conclusion*
1. What is the role and nature of social inequality in urban water use practices?	1.1 Review existing water use and water resource management literature to draw out existing perspectives and insights into the relationships between social inequality and water use practices in Australian urban contexts.	1.2 Synthesise conceptual understandings of urban water use practices and social inequality from a review of theoretical literature 1.3 Design a theoretical model to frame investigations into the relationship of social inequality and urban water use practices		1.4 Identify the common water use meanings, materials and competencies that comprise water use practices in advantaged and disadvantaged household and communities 1.5 determine how economic, social, material and cultural resource shape water use practices.		1.6 Define the implications of these findings for water sensitive Cities/Transitions.
2. How do the different city contexts in Melbourne and Perth shape inequality and water use practices?					2.1 Identify the significant environmental, social, political and historical components that have shaped sociotechnical water resource settings in each case study 2.2 Determine the influence of these variables on urban water use practices. 2.3 Determine the relationship of socio-technical resource settings to social inequality.	2.4 Define the Implications of these findings for water sensitive cities/transitions.
3. What are the implications for Liveability, Sustainability and Resilience in Australian urban communities			3.1 Determine the material, economic, social, cultural resources of communities in each case study. 3.2 Develop a generalised account of the scope of social inequality in Australian urban communities. 3.3 Identify how social inequality influences household and community capabilities for liveability, sustainability and resilience.	3.4 Identify the role of water use practices in these dynamics.		3.5 Define the implications of these findings for Water Sensitive Cities/Transitions.

CHAPTER 2. LITERATURE REVIEW

This chapter presents a review of the literature on domestic urban water use and social inequality in Australian urban contexts. The purpose of the review was to understand the existing socio-demographic, socio-cultural and socio-technical empirical perspectives, and identify existing avenues for considering the influence of Social Inequality in these research fields. Existing relationships and knowledge gaps are identified, which led to the development of the research aim and questions set out in the previous chapter, and guided the composition of the theoretical framework presented in Chapter 3.

2.1. Social Inequality and Urban Water Use: A Global Perspective

Equal access to water resources is a pressing global issue. From an international development and social justice perspective, the challenges of access to clean water and sanitation services have been a central concern in efforts to reduce global inequalities between the developed and developing world for some time (Castro 2015; UNICEF & WHO 2004). Consequently a broad sweeping and robust empirical discourse has surrounded these pursuits, focused largely on the efforts of aid relief, national governments, international organisations, non-government organisations, charities, foundations and/or individuals to develop long term technical solutions to poverty reduction through enabling sustainable development (Kfouri 2016; Bradshaw 2007; Hulme & Shepherd 2003; Collier & Dollar 2002).

Underpinning these discussions and their subsequent actions lies the United Nations (UN) Sustainable Development Goals, which in September 2015 recently replaced the Millennial Development Goals implemented in 2000. The now 17, time bound goals (2015-2030) and their specific targets and indicators (totalling 169) have been adopted by countries worldwide to serve as the technical framework for reducing global poverty linked to hunger, education, child mortality, maternal health, the environment, inequality, global partnerships and disease (UN 2017; Sachs 2012).

Among these goals is the specific objective to 'Ensure (an) availability and sustainable management of water and sanitation for all', which comprised 6 key targets listed in Table 2.1. These build on the UN's former Millennial Development Goals which include to 'halve by 2015, the proportion of populations without sustainable access to safe drinking water and basic sanitation' (Kfouri 2016, p. 5), offering targets in line with recent progress, and a more embedded commitment to the principles of sustainable development (Sachs 2012). As a result, these goals have collectively driven a

significant increase in aid funding, and global support for a number of water and sanitation projects throughout the developing world since the year 2000 (Kfouri 2016). Despite these efforts, however, overall successes have been varied, with still over 750 million people without access to improved water sources and 1 billion without basic sanitation services (UN 2017; Kfouri 2016).

Table 2.1. The UN Sustainable Development Goals: Goal 6. Water and Sanitation

Goal 6 Ensure availability and sustainable management of water and sanitation for all	
6.1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all
6.2	By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
6.3	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
6.5	By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
6.6	By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
6.a	By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
6.b	Support and strengthen the participation of local communities in improving water and sanitation management

Source: UN (2017)

Accordingly, it is developing nations, their inequalities and the challenges they present for water access and sanitation in urban areas, that serve as the dominant empirical discourse for considerations between social inequality and urban water resource management. This comes of little surprise, in considering what Franceys and Gerlach (2008), Castro (2017) and others describe as the greater deprivation in urban water provisions between the rich and the poor in less developed urban cities. But what then of the influence of social inequality in cities where sustainable development goals have supposedly been more sufficiently satisfied?

Indeed while lines of deprivation may be less pronounced and the consequent divergence in living standards less profound in the developed world, inequalities in urban liveability, resilience and sustainability remain. For example, an emerging body of research suggests that higher rates of urban

greenery, and thus the increased liveability and resilience it offers (such as reduced urban heat exposure and enriched amenity), are greater in more affluent suburbs (Locke & Grove 2016; Byrne et al. 2016; Jenerette et al. 2011). While Teller-Elsberg et al. (2016), Savacool (2015) and colleagues describe a growing 'Fuel poverty' experienced by the urban poor in developed cities, where an insufficient access and affordability of reliable (and more sustainable) energy resources has further compounded reduced living standards leading to increased mortalities and poorer health standards due to a greater exposure to the elements (Teller-Elsberg et al. 2016; Savacool 2015).

Scholarly perspectives on the links between social inequality and natural resource implications, have stemmed largely from social and environmental justice and political ecology based sociological traditions (in the USA particularly)(see 1.2.3) However, there is still little research into how water is implicated in the liveability, sustainability and resilience of advantaged and disadvantaged communities in wealthy countries, such as Australia. In Australia particularly, a limited account of socio-cultural dynamics and processes in contemporary water resource perspectives have emerged but little is known about how processes of wealth, power and privilege (for example) influence social relationships to water and water practices alike. Consequently, these considerations have been critically underrepresented in water resource policy and management to date.

Instead, the pre-described technical preoccupations within the literature and sector have positioned societies (including their diverse citizens) and their processes at the back of the priority list. The 'socio' of socio-technical systems has been predominantly engulfed by the greater fascinations of the 'technical', where users are reduced to mere receivers of supply side solutions and economic rationalities (Supski & Lindsay 2013; Sofoulis 2011). This, as Shove (2010), Sofoulis (2008), Head (2008) and Strengers and Maller (2011) have acknowledged, is restricting sustainable development by limiting more holistic perspectives of how in fact both systems and their societies temporally, culturally and systematically co-shape one another (see also Sofoulis 2011; Shove & Walker 2010; Sofoulis 2005) and in the context of water sensitive transitions, how they might also seek to do so in the future.

Economic discourses have dominated the empirical research on water use since the early 1960s with a focus primarily on urban residential demand and the elasticity of water under fluctuating pricing rates (March, Perernau & Sauri 2012; Nieswiadomy & Molina 1989; Headley 1963). However, a more recent account of the interrelating socio-demographic, climatic and technical variables on supply processes have allowed for some progress away from the economic and technical imperatives of traditional debates. Accordingly, more holistic and encompassing considerations of societal processes and determinants of urban liveability, sustainability and resilience are observable. While

these have been largely context specific, and at times conclusively limited (Wasimi & Hassa 2012; Allon & Sofoulis 2006), their inclusion in the literature has made possible some insights into the relationship of social inequality and water use in Australian urban contexts. I discuss these relationships in further detail in the following through a review of the existing socio-demographic and socio-technical literature.

2.2. Material and Economic Resource Availability and Domestic Water Use

In the extant literature less socially advantaged households and communities have been consistently recognised as being more resourceful with their water use (Willis et al. 2009a, 2009b; Troy, Holloway & Randolph 2005; Domene & Sauri 2005; Loh & Coghlan 2003). Similarly, profiles of low water users often presented characteristics common to less socially advantaged households and communities (including lower education levels, lower incomes, smaller household sizes, and new migrant families and communities) (Beal, Stewart & Fielding 2013; Garcia, Llausas & Sauri 2013; Gregory & Di Leo 2003; Gilg & Barr 2006). Yet these traits were also consistent with low rates of participation and engagement in sustainable discourses and pro-conservation attitudes (Fielding et al. 2012; Willis et al. 2011; Gregory & Di Leo 2003), suggesting that lower water use in these groups was not directly driven by water sustainability or agendas for green consumerism but instead by saving money. The relationships between socio-demographic and socio-technical factors pointed towards the availability of material and economic resources as determinants for the sorts of consumption practices and values people possessed.

2.2.1. Income and economic resources

In the available literature higher income households in developed countries are regularly reported to possess higher consumption rates. In many cases a linear relationship exists in which the rate of consumption rose according to increases in income (Willis et al. 2013; Mazanti & Montini 2006; Nauges & Thomas 2000; Renwick & Archibald 1998; Nieswiadomy & Molina 1989; Headley 1963). While it is likely that many variables influence this relationship, the financial burden attached to urban consumption is clearly a determining factor. As Renwick and Archibald (1998, p.9) noted in their economic analysis of domestic water pricing, '…low income households [were] almost five times more responsive to price increases than high income households' suggesting that low income earners were far more effected by existing water pricing, and accordingly would actively seek to reduce consumption related expenses.

A clear distinction was also made between indoor and outdoor consumption rates. End-use studies such as Willis et al. (2013), Fielding et al. (2012) and Troy and Randolph (2007) demonstrated that

households in higher income brackets in Australian cities consume more water outside of their houses, while the variation of indoor water consumption remained similar or not statistically significant between income levels. Indoor uses are often determined by basic necessities such as health, food preparation and sanitation, while outdoor uses can often be attributed to measures of luxury items such as watering gardens, swimming pool maintenance and car washing (Mayer & De Oreo 1999; Loh & Coghlan 2003; Willis et al. 2011; March, Perernau & Sauri 2012; Supski & Lindsay 2013).

It is evident that unequal opportunities for consumption exist, as the higher incomes of more socially advantaged groups allowed them greater access to material luxuries, and an increased predisposition to consume water. As Renwick and Archibald (1998) demonstrate, the advantaged were less impacted by water price and pricing regulations, suggesting that the socially disadvantaged not only had less access to materials for water use, but through market forces water was also less available to them.

2.2.2. Household density

Out of reduced individual financial capacities, less advantaged households often have a larger number of occupants per capita and were able to achieve more effective economies of scale (Smith & Ali 2006; March, Perernau & Sauri 2012). These socio-structural dynamics (in the context of material constraints) encourage more resourceful household water use practices. March, Perernau and Sauri (2012) present such an example in their investigation of the relationship between immigration and age on water consumption. They draw attention to the influence of reduced household structural features (i.e. water fixtures and appliances etc.) and less resource intensive economies of scale achieved through higher density occupancy.

> … in general terms, this group (new migrant families) is economically characterised by low income … These families are expected to be more sensitive to water-pricing mechanisms than the more well-off families … cultural and religious practices could shape their domestic water consumption patterns … Finally, immigrants tend to occupy the densest areas of the city, in small and overcrowded apartments; the characteristics of the built environments they inhabit limit their water consumption as well … (p. 241)

Though as Arbéus, García-Valiñas and Martínez-Espiñeira (2003) argue, there is a threshold to this dynamic where demand for water is proportional to the increase in the number of people per household.

Regulatory pricing measures that commonly included an increasing block rate or tariff scheme (where, consumption is metered in litre blocks, and with each block the price of water per litre

increases) were problematic in this instance (Ferrara 2008; Renwick & Archibald 1998; Nieswiadomy & Molina 1989). Despite more resourceful water use per capita (as a result of more efficient economies of scale) denser households had higher average consumption rates and were subjected to the increased prices of higher block rates (Ferrara 2008; Nauges & Thomas 2000). Through these institutional arrangements individuals (or households) were affected unequally and the already lenient material settings of the disadvantaged were compounded through exposure to heightened consumption prices as a consequence of their higher density living conditions.

2.2.3. Household structures and material resources

Those with greater economic and material resources were found to access a greater range and higher quality of technologies, infrastructures and appliances that influenced their water use practices (Willis et al. 2013; Loh & Coghlan 2003; Lyman 1992). For the less advantaged, lower rates of home ownership, reduced incomes and increased occupancy of higher density dwellings (apartments, flats etc.) limited opportunities for accessing these materials (Troy & Randolph 2007).

Though while those with more economic and material resources had enriched capacities for more extensive forms of consumption, Willis et al. (2013) identified that higher income groups were also more likely to own and purchase water efficient appliances and retrofit their homes with water saving technologies (Willis et al. 2013). Additionally, demand side policy measures such as rebates and incentives for water efficient household stock (e.g. water saving showerheads, water tanks and water efficient dishwashers) were also less accessible for non-homeowners (Troy & Randolph 2007), suggesting overall that the more materially resourced, socially advantaged consumer had more opportunities for engagement in water sustainable practices.

However this is not to suggest a direct relationship between increased economic and material resource access and pro-sustainability (or water conservation) practices completely. Despite a greater capacity for water sensitive household resources or "green and blue infrastructure", rates of consumption and water efficiency measure were considerably varied for the socially advantaged. For example, Willis et al. (2009b) recognised that the relationship between backyard size and water tanks size (i.e. the opportunity for outdoor water use) had a significant influence on the actual amount of water conservation that could be achieved by water tank ownership. Whereas Fielding et al. (2012) and Beal, Stewart & Fielding (2013) in their investigations of behavioral perspectives on water end-use (in Brisbane, Queensland) discuss the influence of offsetting behavior, resulting from perceived curtailment efficiency—where potential savings from water efficient technologies are undermined out of corresponding increases in water use.

Understandably material and economic variables are found to possess a relationship to domestic water consumption. However, these alone cannot account for the broader complexities of consumption dynamics (including both use and saving measures). A growing scholarship in domestic consumption fields has recognised the additional influence of unique historical, cultural and societal processes that underpin user perceptions, values and behaviors (Sofoulis 2011; Syme & Nancarrow 2011; Davidson 2008; Head 2008). In the following section, I discuss these socio-cultural variables observed in the recent water use literature, and consider their relationships to social inequality.

2.3. Social and Cultural Resource Availability and Domestic Water Use

Social and cultural resources influence household and domestic consumption processes in diverse and often complex ways and, as has been suggested, are only now beginning to be investigated and encompassed in water resource debates and considerations. Of particular interest have been processes such as education, cultural and historical heritage and contextual socio-political experience believed to underpin or shape domestic water uses in urban contexts (Supski & Lindsay 2013; Sofoulis & Williams 2008). I consider these in the following.

2.3.1. Education and water literacy

The relationship between education and water consumption is complex. On one hand, the successes of education campaigns and programs for fostering sustainable water literacies and practices have been widely acknowledged (Dean, Fielding & Newton 2016a; Willis et al. 2013; Troy & Randolph 2007; Randolph & Troy 2008; Troy, Holloway & Randolph 2005). While on the other hand, communities and households characterised by lower education levels and poorer water literacies were frequently found to be more water efficient in much of the empirical literature (Beal, Stewart & Fielding 2013; Garcia, Llausas & Sauri 2013; Gregory & Di Leo 2003). Indeed it is likely that the water use outcomes of education campaigns, programs and initiatives are themselves inherently tied up with intersecting contextual variables, dynamics and processes. The emerging literature surrounding these relationships does, however, offer some lines for considering social inequality and domestic water use.

Sofoulis (2011), for example, argues that water education campaigns and initiatives are targeted to the more materially resourced and technologically engaged consumer. This, she considers to be partly the outcome of an 'institutional mini-meism' where resource managers assume that the water literacies, technical understandings and education levels of the user are similar to their own, and thus initiatives are developed and implemented accordingly (Sofoulis 2011; Allon & Sofoulis 2006). In addition, more discrete measures for literacy building, such as the provision of billing information,

are often limited to home owners and residents in detached dwellings and the more educated who respond well to quantitative information (Sofoulis 2005, 2011; Ferrara 2008).

By contrast lower socio-economic communities tend to have lower rates of education, a greater number of higher density dwellings, and higher rates of tenancy (Wilkinson & Marmot 2003). Troy and Randolph (2007) and Head (2008) have recognised these variables to be limiting of opportunities for establishing water based 'nature thinking' and sustainable water capacities. Higher education levels situate users in material and social contexts that provide opportunities for engagement in current frameworks of sustainable discourse, providing exposure to technical infrastructures and appliances, and systematic and environmental processes that equip them more readily with a water literacy deemed necessary for a sustainability and/or consciousness (Randolph & Troy 2008; Sanders 2007; Gregory & Di Leo 2003). While comparatively, those in disadvantaged communities, for whom exposure to these principals are more limited, possess lower water literacies and a more reduced capacity to engage with sustainability initiatives at the household level.

However, this is not to suggest an absence of water literacies amongst the urban poor altogether. A small body of research supports a heightened awareness of water conservation and sustainability in lower socio-economic contexts, linked to lived experiences from cultural and historical ties to water scarcity (Gregory & Di Leo 2003; Smith & Ali 2006; Head & Muir 2007; March, Perernau & Sauri 2012).

> These families were raised in an era when awareness and conservation of dam or tank water was a part of everyday life … Heightened awareness of the importance of water conservation issues and concerns, together with economic necessity as a result of significantly reduced income, may contribute in turn to the development of pro-conservation habits and behavior for many empty-nest households. (Gregory & Di Leo 2003, p. 1284)

Gregory and Di Leo's (2003) example refers to the influence of particular lived experiences that have effectively embedded sustainable water use values and know-how for practices as a result of reduced material and economic resource availability. March, Perernau and Sauri (2012) point to similar examples where new migrant households and communities that have come from backgrounds of water scarcity, exhibit resource efficient practices out of requirements to exercise economic restraint. In these instances, greater water resource management responsibilities were placed upon the householder (e.g. through personal dams, tanks and rural experiences of water scarcity), which reiterated the finite nature of water resources, shaping their values and know-how for water consciousness.

Moreover other forms of knowledge and non-water related processes of knowledge accrual (be it tacit or practical), may serve to foster the 'water literacies' many scholars deem necessary for a water consciousness, sustainability or what Dean et.al (2016b) describe as water sensitive citizenship (see chapter 6.5). A greater interrogation of the forms of knowledge and knowledge accrual diverse communities possess would serve to enrich initiatives for engagement and capacity building.

2.3.2. Water resource contexts and cultures

Water uses are shaped by specific combinations of predetermined (through social and cultural resources) ideas and perceptions that interact with the technologies, systems and infrastructures of their immediate urban setting (Allon & Sofoulis 2006). Supski and Lindsay's (2013) typology of water use cultures presented in the introductory chapter of this thesis highlight the key socio-cultural and socio-technical variables found to interact in these instances. The home serves as a point of intersection between socio-demographic and socio-technical contexts in this regard that Head (2008), Sofoulis (2011), Shove (2003b, 2003a) and others have noted as a valuable space for considering the socio-natural and socio-institutional networks that constitute urban waterscapes.

Yet, unlike the few examples described in sub-section 1.2.1, opportunities for experiences that embed values and know-how for water efficiency or sustainability are generally limited in modern urban settings. As I have described, modern water resource management regimes form part of 'Big Water', a series of water resource systems and infrastructures predominantly coordinated by centralised water management agencies, who assume supply and disposal responsibilities with limited opportunities for social interaction, engagement and natural resource affiliation (Allon & Sofoulis 2006.).

Through a monopolisation of these systems, Big Water also 'lock-in' entrenched water resource infrastructures from the source to the household, reducing opportunities for emerging initiatives that could reposition responsibilities for everyday water use to a more localised level (Allon & Sofoulis 2006; Head & Muir 2007). Consequently users are confined to urban water resource contexts that perpetuate a supply and demand based dynamic, limited in opportunities for more independent and sustainable household water use initiatives (Allon & Sofoulis 2006; Sofoulis 2005). This is particularly the case for the disadvantaged, who with reduced incomes and less opportunity for capacity building experiences (e.g. education, community networks, and lived experiences through employment and travel) are further denied the few solutions available (Fielding et al. 2012).

In times of water scarcity these dynamics augment and perpetuate inequalities, as centralised management bodies deny their responsibility for a wasteful, unsustainable system and instead

impose user-oriented initiatives that expect the individual to either compensate or compromise their water use values and behaviours (Head & Muir 2007; Allon & Sofoulis 2006; Sofoulis 2005). Head and Muir (2007), for instance, recognise that gardens and outdoor areas represent such a case in which, without an investment in expensive household technologies, the forms of social enjoyment and socio-natural interaction (including resulting water literacy and stewardship opportunities) these spaces offer, are heavily reduced out of state (or Big Water) sanctioned regulatory measures in water scarce periods (see also, Allon & Sofoulis 2006; Sofoulis 2005).

As Allon (2011) suggests, innovations at the household level for more efficient or sustainable water use practices are implicitly confined to the socially advantaged, who with high incomes and literacy levels, possess the capacities and autonomy to manage complex financial choices and unknown market risks in order to access these technologies and materials. While with limited opportunities for developing community literacies, reduced incomes and little space for technological innovation, alternative solutions for the socially disadvantaged are numbered.

2.4. Conclusion

The emergence of sociological, psychological and socio-cultural perspectives in water resource management debates has been a relatively recent occurrence (Supski & Lindsay 2013). For developed cities, such as those in Australia, much of the literature and the water sector itself has instead been dominated by the techno-centric agendas of engineering and traditional science based disciplines, preoccupied with the 'steps, stages and actors' of supply-end processes and variables, to meet the growing and insatiable needs of consumer demand (Sofoulis 2011; Shove & Walker 2010; Syme 2008).

While there are continuing efforts amongst the sector for the unhinging of these traditions (Sofoulis 2012; Allon & Sofoulis 2006), findings about user diversity and the multi-cultures of households have been limited, due to their abstract qualities and incompatibility within scientific or statistical demand management frameworks (Sofoulis 2012; Strengers 2011; Maller, 2011; Syme 2008). Insights into the processes of social inequality and its relationship to water have been limited in urban water resource discourses (particularly throughout the developed world), and so too in the agendas of urban water management as a result.

A review of the extant socio-demographic and socio-technical water use literature has highlighted a relationship between social inequality and urban water use. In these discourses inequalities are found in the opportunities and requirements people have to use water, access technologies and engage in resource management processes and initiatives (such as water sustainability or IUWM).

These are linked to the contextual economic, social, material and cultural resources householders possess and have available to them.

The literature also suggests that governing socio-technical arrangements both contextualise and mediate domestic water practices through systems, infrastructures and technologies that collectively shape user perceptions, values and behaviors of daily water use in households and communities. Yet, water resource management bodies often overlook the complex and diverse socio-cultural circumstances that influence water use practices and contexts (Allon & Sofoulis 2006). Instead, the more commonly implemented top down, one size fits all approach, confines opportunities for sustainable water use practices due to the inaccessibility and inequitable impact of these initiatives on less advantaged households and communities (Sofoulis & Williams 2008; Allon & Sofoulis 2006).

Opportunities for fostering community engagement through building understanding and competence in disadvantaged communities are limited as a result. As despite knowledge exchange (through education, historical contexts etc.), the lack of any socio-technical reform in current frameworks has reduced capacities for societal engagement in water sustainability, leading to its confinement to the socially advantaged, environmentally conscious guilty consumer (Willis et al. 2013; Sofoulis 2011; Allon & Sofoulis 2006). For water sustainable (or water sensitive) capacities and practices to be fostered within urban communities, existing socio-technical components (systems, technologies and infrastructures) are required to support and guide an access to them, or perceptions, values and behaviours can be lost.

Socio-technical transitions towards more water sensitive urban contexts require the co-evolution of all water users (not just the advantaged, highly educated and environmentally concerned), alongside societal processes, infrastructures and technologies. As demonstrated by this literature review, ensuring a more holistic societal engagement in water sensitive transitions will require a more comprehensive consideration of diverse user groups, their experiences, needs and capacities. However, as has been acknowledged, understanding of the dynamics and processes of diverse socio-cultural variables in these systems has to date been critically under-recognised. As it is localised household and community settings that serve as the juncture in which these variables intersect with the broader systematic frameworks of urban water resource settings, an examination of daily water use practices in these areas may serve to illuminate these relationships, and offer pathways for considering future opportunities and challenges for realising the water sensitive vision.

CHAPTER 3. THEORETICAL FRAMEWORK

3.1. Introduction

In this chapter I provide an overview of the existing theoretical concepts and perspectives discussed in the water use literature, including those that are useful for the investigation of social inequality and domestic water use. I conclude by presenting a conceptual framework for this investigation based on the theoretical perspectives of Practice Theory and Bourdieu's theory of Capital, *Habitus* and Field. A model is proposed that encompasses key variables identified in the review of the domestic urban water use literature in Chapter 2. It is used in this research to investigate the interrelating socio-technical dynamics believed to shape water use practices in domestic urban settings and their relationship to social inequality in a comparative case study of two Australian urban contexts (Greater Melbourne and Greater Perth).

The conceptual framework offers a co-evolutionary perspective in order to contextualise the practices of water users. In general, co-evolutionary perspectives have been limited in discussions on sustainable consumption. By contrast, most existing discourses have utilised either a structuralist or an individualist perspective.

Structuralist paradigms, as Spaargaren (2011) suggests, emphasise the role of technological and infrastructural innovations in sustainable progression. Consequently these tend to offer limited account of the critical role of human agency and *habitus* in processes of environmental change (Spaargaren 2011). While Individualist perspectives—such as the 'Attitude, Behaviour, Choice' (ABC) paradigm—comparatively situate the focus solely on the motives, attitudes and behaviours of individuals. These approaches have been criticised by socio-cultural researchers such as Shove (2010), Strengers (2012) and Spaargaren (2011) as sociologically naive in neglecting the profound influences of the wider chains of interaction that serve as systems of provision, both shaping and sometimes pre-configuring the choices and behaviours of individual citizen-consumers.

Further conceptual development and research is necessary for breakthroughs towards more sustainable consumption governance, which under existing individualist and structuralist paradigms has been limited (Strengers 2012; Spaargaren 2011; Shove 2010). Sofoulis and Williams (2008) and Spaargaren (2011) emphasise the requirement for a more balanced approach that accounts for both the bottom-up and top-down dynamics of change, and recognises the mutual influencing and co-shaping of human actors, on the one hand, and objects and technological infrastructures (or non-humans), on the other (Spaargaren 2011; Sofoulis & Williams 2008; Murdoch 2001).

There has been growing support in recent years for perspectives premised on co-constructionist theories adapted from Science and Technology studies (Shove, Panzer & Watson 2012; Murdoch 2001). Theories such as Actor-Network Theory (ANT) and the recent reconfigurations of Practice Theory (PT) place emphasis on the interrelation of humans and non-humans in creating social phenomena (Shove, Panzer & Watson 2012).

In the following two sections (3.2 and 3.3) I outline key principles and concepts of contemporary practice theory used to conceptualise the sociotechnical dynamics of urban water resource use and management in this thesis. I then discuss how social inequality is understood in this research drawing on both established and recent theoretical perspectives. I introduce the Marxian and Weberian conceptualisations of class before introducing the key element of Pierre Bourdieu's Theory of Practice which serves as the grounding theoretical lens through which social advantage and disadvantage are perceived in this research. In the final section (3.5), I outline the model used for the investigation of social inequality and water sensitive cities drawing upon the insights from these key theoretical perspectives.

3.2 Practice Theory (PT)

Since the early 2000s scholarly discourses rich in science and technology based traditions have sought to conceptualise relationships between humans and non-humans and socio-technical configurations derived from ANT (Bone, Inglis & Wilkie 2005; Latour 2005; Ritzer & Goodman 2004; Callon 2001; Murdoch 2001). Where other theories seek to explain societal processes through a distinction between, for instance, agency and structure or the micro and the macro, ANT instead considers how entities take their form and acquire their attributes and meanings as a result of relations (or networks) with other entities (Latour 2005; Murdoch 2001). Implicit in this understanding is the idea of anti-essentialism. That is, there are no inherent qualities in any entity, including people (Ritzer & Goodman 2004). In this sense ANT abandons the traditional sociological lexicon of distinguishing between nature and society, to instead view societal (including technologies and infrastructures) and natural processes as symmetrical entities, equally capable (at least from the traditional ANT perspective) of possessing agency or exerting influence (Latour 2005; Murdoch 2001; Callon 2001). This has influenced the development of a new materially encompassing theory of practice.

While the earlier more socially orientated Practice Theory perspectives such as those of Bourdieu (discussed in sub-section 3.4.2) and Giddens were limited in considerations of the influence of materials and objects (non-humans), more recent works of Reckwitz, Schatzki and Urry have in some senses contributed to a reformulation of PT to better encompass these entities (Shove, Panzer &

Watson 2012; Spaargaren 2011; Røpke 2009; Urry 2000). Reckwitz (2002), for example, defines social practice as:

> A routinized type of behaviour, which consist of, several elements, interconnected to one other: forms of bodily activities, forms of mental activities, "things and their use", a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge. (p. 249)

While there is no unified approach, this perspective can be articulated as a loose but definable movement of thought in recent years (Røpke 2009). Shove, Panzer and Watson (2012), for example, have refined this perspective into a series of three elements. They recognise 'things and their uses' simply as 'Materials' while place forms of 'understanding, know-how and practical knowledge' together as 'Competence'. 'Meaning' is ascribed to represent the social, cultural and symbolic significance of participation, encompassing things such as 'mental activities, emotion and motivational knowledge' (Shove, Panzer & Watson 2012 p. 24). In doing so, they suggest that practices are the interdependent relations between these three elements (Reckwitz 2002).

In the following I highlight the emergence of this theoretical perspective in recent resource consumption based social-technical considerations and reflect on the values and limitations in its application for this research.

3.3 Towards a Theory for Urban Water Use Practices: Conceptualising the dualism of co-construction and distinction in Socio-technical co-evolution

Researchers such as Elizabeth Shove (2003b), Zoe Sofoulis (2005), Lesley Head and Pat Muir (2007) have in recent years conceptualised the 'hybridised nature-culture' ideals derived from recent science and technology based theoretical perspectives to explain the socio-technical framework of domestic water use through a theory of Practice. They refer to this as a model for socio-technical co-evolution, recognising the requirement for sustainable transitions beyond the individual consumer, encompassing the technical frameworks and infrastructures of which the individual is embedded (Supski & Lindsay 2013; Allon & Sofoulis 2006).

A socio-technical co-evolutionary model describes the evolving interactions between Users with their practices, habits and expectations; Objects with their various material and symbolic qualities, and Systems referring to larger scale socio-technical assemblages of people and technologies, collective conventions, and institutional and infrastructural arrangements (Allon & Sofoulis 2006). Figure 3.0.1, adapted from Sofoulis and Williams (2008), seeks to define this concept through the use of double-headed arrows indicating the evolving interactions between Users, Systems and Objects (Sofoulis & Williams 2008; Allon & Sofoulis 2006; Sofoulis 2005).

'OBJECTS'
Symbolic and material
qualities of technologies,
objects
[Water fittings, water]

'USERS'
Habits, practices,
expectations
[Water-use habits]

'SYSTEMS'
Socio-technical
systems, collective
conventions and
arrangements
[Big Water, Big Shit]
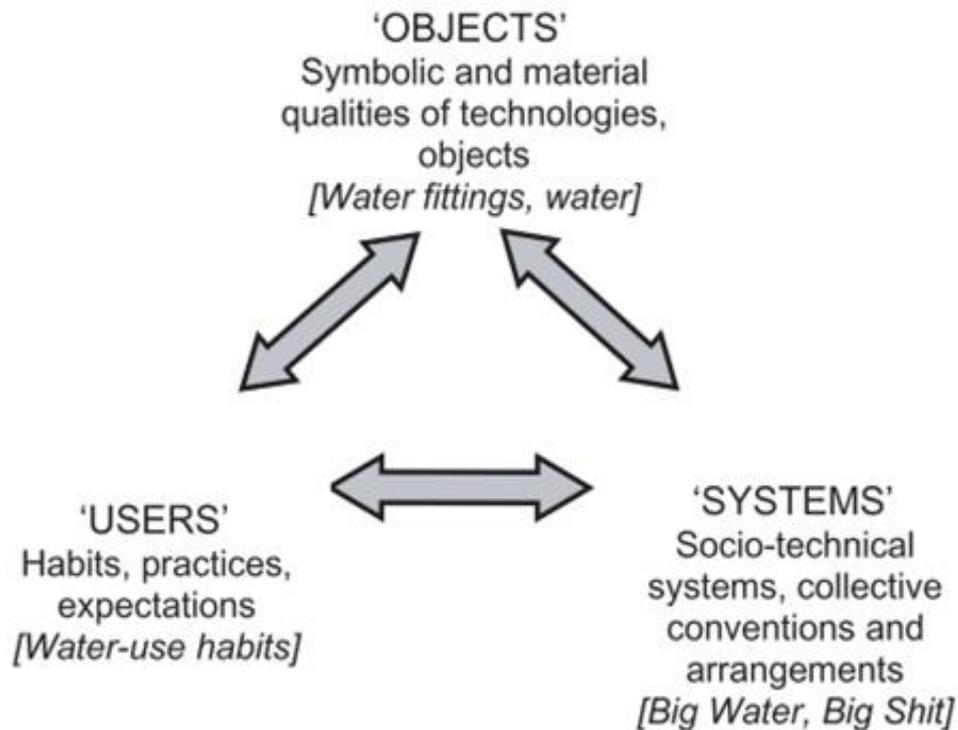
Figure 3.0.3. The Three Dimensions of Socio-Technical Co-Evolution
(from Sofoulis & Williams 2008, p. 54)

Premised on the understanding that human societies co-exist with many other non-human entities that are interwoven in our everyday lives (Supski & Lindsay 2013), the model was originally adapted from Shove (2003b), and based on a synthesis of ideas from Actor-Network Theory (ANT) along with a range of socio-technical, and science and technology based studies.

Importantly, through the socio-technical co-evolutionary approach the emphasis is not only on individual water use (or the 'User' i.e. humans), but must also incorporate real change to the systems, infrastructures and technologies (that is the 'Systems and Objects' i.e. non-humans) that have influence (or Agency) through embedding water use and water use practices (Lindsay & Supski 2013; Allon & Sofoulis 2006; Sofoulis 2005).

As illustrated in Figure 3.0.3 the 'co-construction of natural (or 'technical') and social processes'- as derived from recent ANT perspectives- is a foundational element of this model. Yet, in its reconfiguration through a contemporary Social Practice based theoretical gaze the constitutive role of material objects, as put forth by Latour in ANT, is considered without embracing the ANT based anthropomorphic notion that 'Objects' and 'Systems' 'act' in ways similar to that of humans (Shove, Panzer & Watson 2012; Spargaaren 2011). This sociological distinction compared to the hybridised 'socio-nature' based lexicon discussed in ANT allows for elements such as 'Meaning' and

'Competence' to frame our understanding of the interrelation of humans and non-humans (Shove, Panzer & Watson 2012; Schatzki 2010). In this sense, theories of practice encompass the co-constructionist ideology similar to ANT while simultaneously accounting for the importance of the role of human distinctiveness in shaping the social world, perspectives and practices (Spargaaren 2011; Røpke 2009).

This more recent perspective on PT is a valuable tool for this research, as it allows for a more reflexive distinction between humans and non-human agents in a co-evolutionary context (Shove, Panzer & Watson 2012; Schatzki 2010). As a result, entities of indirect influence such as socio-cultural variables can be then more effectively considered alongside socio-technical ones.

However, as Shove (in Hui,, Schatzki & Shove 2017) suggests defining and qualifying what counts as background (or 'indirect') influence on the components of practice is a largely subjective and situational process and like most things, a matter of judgement and purpose. Consequently, the contemporary perspectives on social practice, such as those of Reckwitz, Schatzki, Shove and colleagues, appear limited in their ability to both define and analyse some aspects of social and cultural practices and contexts. Accordingly, the synthesis of a more structured conceptualisation of social inequality for this research is difficult through this theoretical perspective alone. More socially oriented theories of practice, as seen in the earlier work of Pierre Bourdieu, do however offer some insights for exploring phenomena such as social inequality. In the following sections, I provide an overview of theoretical discourses on social inequality and offer a way of conceptualising social inequality in relation to the previously outlined co-evolutionary perspective derived from contemporary PT.

3.4. Theorising Social Inequality

3.4.1. Definitions and context

Social inequality refers to differences in distribution of economic, material, social and cultural (including symbolic) resources, which are often hierarchical in nature. This state of advantage or disadvantage is relative to the local community, wider society or nation in which an individual, family or group belong (Habibis & Walter 2009; Adhikari 2006). Within the Australian context Phillips et al. (2013) present social inequality in urban contexts as the existence of unequal opportunities and rewards for different social positions or statuses within a group or society. They mention structured and recurrent patterns of unequal distributions of goods, wealth, opportunities, rewards, and punishments (Phillips et al. 2013).

'Stratification' and 'class' are specific and technical concepts used in studies of social inequality to delineate these structured and recurrent patterns. Stratification refers to the model for hierarchical ordering of social relationships. Implicit in this model is the notion of a systematic and enduring pattern of inequality that is embedded in society and transmitted across generations and built into institutions (Habibis & Walter 2009).

Class refers to one's standing (the social strata) within this stratification model, and thus determines one's degree of access to material and symbolic reward (social mobility). Though the centrality of class as a determinant, its explanatory power, and its composition have been widely contested over the years, class is considered by many to define our patterns of daily practice and processes of socialisation (Habibis & Walter 2009; Sorensen 2000). It thus goes hand in hand with stratification in shaping and reproducing social inequality. In recent decades research on social inequality has expanded and diversified to include cultural elements, life stage and life style choices (Sorensen 2000). Most contemporary perspectives, however, can be linked to the foundational theories and ideas that first emerged throughout the modern period.

Throughout this period—the time of the Enlightenment until the Second World War—ideas about social inequality were central to sociology. The most influential theory within this is class theory (used interchangeably with social inequality and stratification theory) propounded through the ideas of Karl Marx (1818-1883) and Max Weber (1858-1917) (Habibis & Walter 2009). Marx, who is regarded by many as the founding figure of social inequality, regarded the distribution of economic resources as the sole determinant of all class stratification systems, recognising possession of capital (wealth that is used to produce more wealth) as the ultimate determinant of all forms of inequality. Comparatively, Weber (Germov & Poole 2007; Habibis & Walter 2009), while still structurally oriented, presented a softer approach highlighting political and social factors as having an independent influence on class stratification systems. In contrast to Marx's ideas, Weber saw economic resources as one of the many sources of power (alongside elements such as education, occupation, political affiliation and rank) that determined who received certain resources (Germov & Poole 2007; Habibis & Walter 2009).

Weber's more flexible approach has allowed it to become more widely used as a theoretical framework for research on inequality, though this has existed alongside rather than in opposition to Marx's more deterministic, economically centric model. Central to both these theories is the traditional structuralist perspectives of class and stratification, that is, that work and labour relations are central to the experiences and determination of class and stratification (Habibis & Walter 2009; Sorensen 2000). However, by the mid-1970s the weaknesses of structuralist understandings were

becoming more apparent as transformations associated with a globalised and post-industrial 'service-based' economy created a world in which the explanatory abilities of 'solid concepts' were more frequently questioned.

By the turn of the 1980s and 90s these changes had led many to the rejection of the traditional lexicons of social inequality and stratification theory. Many sociologists argued against the continued relevance of class, such as Jan Pakulski and Malcolm Waters, concluding that class no longer gave 'purchase on the big social, political and cultural issues of the age' (Habibis & Walter 2009; Pakulski 2004). It was argued that modern transformations in the post-industrial era had shifted what many perceived as the foundations for inequality as defined by Marx, Weber, Durkheim and their counterparts in the post-modern world. Habibis and Walter (2009) outline these shifts as:

- a shift in perception of the centrality of the economy to cultural variables;

- an emphasis of class-centric production to status/identity centric consumption; and

- as a shift from social inequality and life chances to social difference and life style choices.

This effectively paved the way for an array of 'post-structuralist' perspectives which challenged the traditional ideals of the structurally deterministic models of the past. New perspectives were instead centred on cultural and individualist perspectives based on the works of Giddens (1991; 1971), Foucault (1980; 1965), Bauman (1982; 1998) among others. These theorists recognised the influence of the subjective experiences of the individual in a post-industrial world, giving rise to new conflicts and contradictions that required entirely new frameworks for understanding social formations (Habibis & Walter 2009; Payne 2006).

However, the failure of new market wealth from globalised economies to trickle down to the less advantaged, the emergence of new groups of poor, and the stubborn persistence and worsening circumstances of existing disadvantaged groups (such as Indigenous Australians) have made perspectives on the illegitimacy of inequality over socio-cultural difference and lifestyle choice hard to sustain (Habibis & Walter 2009).

Culturally based theories have also been criticised due to their individualist arguments and denial of the role of structural forces (class and stratification). Some theorists have likened these to neo-liberalist philosophies in which social position is presented as entirely meritocratic (Payne 2006). Habibis and Walter (2009) note that;

> ... implicit in the concern (of these perspectives) is the assumption that in a postmodern world people make genuine choices about how they will live their lives. Here the question about who gets what and how and why they get it recedes into the background. Yet this claim is contradicted by a wealth of research that proves that for some groups the word "choice" is a misnomer and that to suggest they are exclusive architects of their fate is to deny the circumscribed circumstances of their lives and the structural parameters that bear influence. (p. 12)

Accordingly, new sociological understandings and possibilities for examining social inequality have arisen in recent years in an attempt to understand its stubborn persistence amidst new market values and a globalising eastern and western world. These new perspectives and ideals differ to those of former generations, in that they are characterised by an emphasis on multiple positionings. Instead of the application of a dominant paradigm, such as Neo-Marxism or post-structuralism for example, modern perspective bridge multiple domains—both theoretical and empirical—to define a multi-dimensional phenomena, involving the interaction of diverse variables that include class, gender, ethnicity and geography (Habibis & Walter 2009). Approaches for exploring social inequality are more eclectic as a result, and conceptual tools are interchangeable, relative to particular tasks.

The ideas of French sociologist and anthropologist Pierre Bourdieu have been considerably influential in this space. Bourdieu's work sought to bring within one theoretical framework both subjective experience and the constraining forces of society that shape and limit possibilities for action. One of the key strategies he used was an examination of social practice rather than focusing on either the individual or structure (Habibis & Walter 2009)—a perspective that has since influenced contemporary PT perspectives previously discussed (Shove, Panzer and Watson 2012; Shove 2003a). Notably it was this strategy, along with his acknowledgment of the centrality of culture as a major determinant of class, that enabled his work to straddle the structuralist, post structuralist divide of his predecessors (Habibis & Walter 2009).

Bourdieu acknowledges social hierarchies as multi-dimensional spaces, constructed on different forms of social, economic and material, and cultural capital, which represents an expansion on the Marxian economic determinism of class theory. In this respect, his views on social class are similar to Weber's in recognising non-economic resources such as knowledge and belief as unique sources of social power, with economic power having the most weight. He also agrees with Weber in that one form of power can be translated into other forms, with economic again being the most commonly used in conversions. However Bourdieu's perspectives on social inequality differs to Weber's in that his theory is more holistic, combining multiple dimensions of class, as a metaphor for the broader suit of social determinants. Secondly, through an emphasis on practice Bourdieu's perspective is relational rather than structural, giving emphasis to the way class is mediated by cultural knowledge

(Coulangeon & Duval; 2014; Habibis & Walter 2009; Robbinson 2000; Bourdieu 1984). As Habibis and Walter (2009) suggest, 'for Bourdieu it is not so much what people believe about their class position [the subjective, i.e. Weber] so much as how their forms of consumption serve as signifiers of social position' (p. 47). Bourdieu developed a number of conceptual tools to explain how these dynamics play out in everyday life. In the following I describe his concepts of 'capital', '*habitus*' and 'field' which are useful for conceptualising social inequality for this thesis.

3.4.2. Pierre Bourdieu and social inequality: Capital, *habitus* and field

Bourdieu's conception of inequality remains a key reference point for understanding modern processes and the dynamics of social inequality and division (Habibis & Walter 2009; Swartz 1997). In his rejection of both the subjective and objective, Bourdieu was critical of both Interpretive and Positivist approaches to knowledge acquisition, arguing instead for a reflexive position in which social research must study and criticise itself as well as it subject matter (Neuman 2011). For this reason, some scholars have been reluctant or even critical of the construction of Bourdieu's work to represent a rigidity of ideas and applications, since it is this notion that his work explicitly rejects (Habibis & Walter 2009; Neuman 2011).

Nonetheless, a theoretical construction is useful for considering the key aspect of his work on social distinction and inequality. For many scholars, Bourdieu's transcendence of the structuralist–post-structuralist dualism through a lens of practice, as derived from works such as *Outline of a Theory of Practice* (1977), serves as the corner stone to these perspectives. In accordance, many scholars elude to Bourdieu's work through a 'model' or 'theory' of practice as a means of approaching his more central concern surrounding the theorisation of capital, *habitus* and field (Shove, Panzer & Watson 2012; Habibis & Walter 2009; Devine 2004; Swartz 2002).

For conceptual clarity it is necessary to distinguish between two strands of Practice Theory used in this thesis to conceptualise social inequality and urban water use. While both Bourdieu's theoretical perspectives of practice and the more recent co-constructionist perspectives of practice (discussed in section 3.3) do possess some underlying similarities (with Bourdieu's work influencing the latter), from a theoretical perspective both represent two divergent lines of consideration. To distinguish between these throughout this discussion I refer to Shove and colleagues theory as 'New Practice Theory' (or NPT) and Bourdieu's work as 'Bourdieu's Practice Theory' (BPT).

Within BPT human sociality is perceived as the outcome of individual actions of capital accrual, with their *habitus* operating within a constraining, but nonetheless not absolutely determining context of values, termed a field. Accordingly, it is through the dynamics of Bourdieu's *habitus* and field that

practices, particularly socio-cultural practices (such as class division), are established (Ritzer & Goodman 2004; Browitt and Nelson 2004).

Bourdieu depicts *habitus* as the internal mental or cognitive structures, dispositions or properties through which people deal with the social world. This includes the series of internalised schemes and structures (such as gender, age, ethnicity, class) people possess to perceive, understand, appreciate and evaluate their surroundings (Ritzer & Goodman 2004). *Habitus* provides a pattern of dispositions that underpin the principles by which people make choices (Ritzer & Goodman 2004). Groups and individuals acquire their *habitus* through the long term occupation of a position within the social world, through which external structures are obtained from interactions with various fields, and internalised through processes of socialisation (Habibis & Walter 2009; Ritzer & Goodman 2004; Swartz 1997).

Field refers to the structured social settings in which *habitus* is obtained, and later operates. Bourdieu defines these as the arenas of socialisation, in which agents struggle for the attainment and monopolisation of various forms and combinations of capital (social, cultural, economic and symbolic resources) (Ritzer & Goodman 2004; Swartz 1997).

Along with *habitus* and field, the accrual and mobilisation of various forms of capital is a central component to Bourdieu's theory, reworking the Marxist notion of economic capital to include additional forms (Browitt & Nelson 2004). These include 'cultural capital'—cultural competencies such as taste preferences and lifestyle that differentiate one social class from another and are transmitted through the generations via the education system. 'Social capital'—the social relations, networks and connectedness of individuals and groups to certain communities and sources of support; and 'symbolic capital'—denoting the honour and prestige accorded to certain individuals (Ritzer & Goodman 2004; Browitt & Nelson 2004; Bourdieu 1984).

It is the accrual and internalisation of capital from these fields that confirms or re-defines one's standing in the social world. The *habitus* conceived from this ongoing process presents the key to class reproduction and stratification as it generates repeated practices that make up the social world (Ritzer & Goodman 2004). In this way, the dialectical relationship between *habitus* and field can additionally reflect objective divisions in class structures such as gender, age groups and ethnicities (Habibis & Walter 2009; Ritzer & Goodman 2004).

For this thesis the concepts of capital, *habitus* and field from BPT are useful for conceptualising socio-cultural distinction, and social inequality. Bourdieu's relational (rather than structural) stance through a focus on practice (from capital, *habitus* and field) allows observations into the dynamics of

social inequality through consumption based habits and routines (or practices), such as those surrounding daily water use observed in Chapter 2. This is also aligned to the co-constructionist perspectives of NPT, which offer a theoretical lens for conceptualising consumption processes (materials, meanings and competence) and their relationships to contextual systems, infrastructures and technologies (see section 3.3). In the following section, I propose a model that brings these elements together to frame considerations into social inequality and urban water use practices.

3.5. A Model for Researching the Implications of Social Inequality for Water Sensitive Cities

As I have previously described, the meso-level of household and community contexts serves as a valuable vantage point for observing the complex intersecting and co-shaping relationships between socio-cultural distinction and water resource socio-technical systems (Supski & Lindsay 2013; CRCWSC 2011; Allon & Sofoulis 2006). To consider the role and nature of social inequality in this relationship, and the implications of this for transitions to more liveable, sustainable and resilient water sensitive futures, an explanatory model has been developed to serve as a framework for addressing the research questions proposed in Chapter 1. This was derived from the relevant practical and theoretical literature, reviewed in chapters 2 and 3.

I return briefly to Supski and Lindsay's (2013) diagram for *Understanding Water Use Cultures*, presented in sub-section 1.2.3. In order to both identify and differentiate between the various elements that influence domestic water use cultures, Supski and Lindsay specify four interrelating segments. Of particular relevance to the present discussion is the 'Social and Geographic Capital' segment which encompasses the influence of social distinction—referencing socio-cultural dynamics such as class, ethnicity, gender and local community dynamics.

For this thesis, Supski and Lindsay's 4-segmented sphere *Understanding Water Use Cultures* (seen in figure 1.0.2) provides a useful starting point as a descriptive tool for considering the relationships between social inequality and socio-technical water resource systems. From a practical stance it was through a similar interrelation of variables that inequalities were seen to exist through water resource management systems in Chapter 2. Theoretically, its co-constructionist origins (see Supski and Lindsay 2013 p.22) and emphasis on 'cultural' water use also suggests its malleability to both BPT and NPT- perspectives I consider useful theoretical tools in the conceptualisation of social inequality and urban water use in this chapter.

In accordance I draw on the inspirations of these sphere's and the theoretical perspectives set out in this chapter to propose a *model for exploring social inequality and urban water use practices,* depicted in Figure 3.0.2. This provides an exploratory framework for analysing the relationship between social inequality, socio-technical contexts and urban water use practices; to consider the interaction of socially diverse communities with water resource contexts; and the nature of these relationships in shaping liveability, sustainability and resilience in Australian urban contexts.
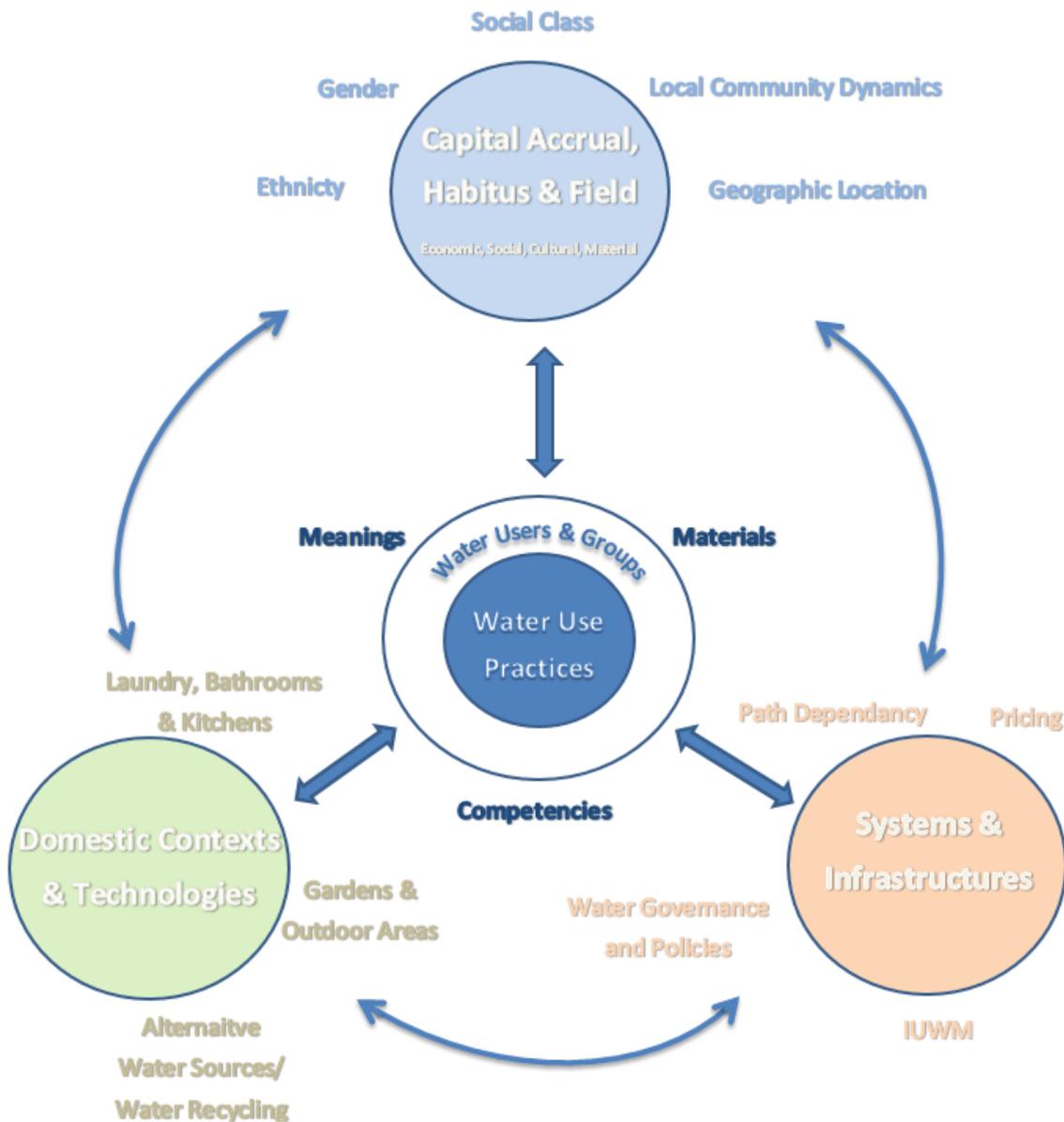
Figure 3.0.4. A Model for Exploring Social Inequality and Urban Water Use Practices

(Adapted from Supski & Lindsay [2013] and Shove [2003b])

In this model, Supski and Lindsay's (2013) four segments are encompassed to reflect the co-evolutionary dynamics described in Shove (2003b), which notably built on the perspectives of ANT

(as discussed in section 3.3). In effect, a mutually evolving dynamic exists between 'Systems and Infrastructures', 'Domestic Contexts and Technologies' and 'Capital Accrual, Habitus and Field'. While concomitantly it is these spheres that both structure and are structured by the 'Water Use Practices' of 'Users and Groups' as depicted centrally.

To conceptualise household and community distinction in this framework, elements of Bourdieu's Theory of Practice are added to Shove's co-evolutionary model. This is observable through the refinement of Supski and Lindsay's (2013) segment of 'Social and Geographic Capital' to conceptualise the contextual processes of 'Capital Accrual (through the interactions of) *Habitus* and Field' (described in sub-section 3.4.1). As has been acknowledged in this chapter, understanding the accrual and mobilisation of different forms of capital is important in studying the dynamic and inherent processes that define social inequality in urban contexts (Habibis & Walter 2009). Consequently this sphere broadly encompasses forms of 'Capital' (including social, cultural, economic and material) found to be of influence in the literature review.

As it is through (new) practice that the experiences of socio-technical systems are expressed (and observed in this research) (Shove, Panzer & Watson 2012; Shatzki 2010; Allon & Sofoulis 2006), water use practices are the central element of exploration in this thesis. Accordingly these are positioned centrally in Figure 3.0.2. Practices are situated within the sphere 'Water Users and Groups', representing the actors or 'carriers' who perform them (Shove, Panzer & Watson 2012; Ritzer & Goodman 2004). The double ended arrows illustrate the mutually influencing dynamic or, as Shove, Panzer and Watson (2012) suggest, the ability for practices to be 'both structured structures and structuring structures', in both shaping and constituting the social and physical world, while being shaped by it at the same time (Shove, Panzer & Watson 2012; Ritzer & Goodman 2004).

The three relating sociological theories described in this chapter are draw upon in this model. I encompass the co-constructionist perspectives from Actor-Network Theory (synthesised through a contemporary theory of practice propounded by Shove, Panzer and Watson), capital from Bourdieu's theory of capital, *habitus* and field (or BPT), and Shove, Panzer and Watson's (and colleagues) version of Practice Theory, to explore the socio-technical and socio-cultural dynamics that shape water use practices. The framework seeks to capture the interrelation of key components observed in the literature review (Chapter 2), to shape user practices and perceptions in varying social class divisions. The model also lays out the key components for investigation to address the research questions proposed in Chapter 1. It seeks to understand the similarities and differences in lived standards and capabilities between different social groups (of varying capital accrual), the role of water use practices (materials, meaning and competencies) in these dynamics, and the nature of

water resource contexts (the systems and infrastructures, domestic contexts and technologies) in these processes. In the following chapter, I discuss the methodological tools for exploring this framework. It is hoped that the insights obtained will enable the development of more inclusive and equitable approaches for sustainable water use.

CHAPTER 4. METHODOLOGY

4.1. Introduction

In this chapter, I discuss the methodological framework for this investigation. As research methodology rests on a foundation of ontological and epistemological assumptions (Neuman 2011), I begin by outlining the paradigms and perspectives that provide the foundations for this research. Two approaches characterise this research: an interpretive approach, which seeks insight and understanding of the local contexts, circumstances and practices of communities and households; and critical approaches, which seek to position and understand these perspectives and experiences in broader societal (or urban) contexts, technologies, systems and infrastructures.

I then move to outline the qualitative modes of inquiry this research adopts, and the case study design used for this investigation to explore social disadvantage and advantage. The qualitative approach enables the researcher to go beyond surface perspectives and develop deep understandings and explanations of social inequality and water use practices. In this section, I discuss the nature of social inequality in Australian urban settings and the method for its investigation in this research, including suburb selection through SEIFA classification.

The data collection tools used for this research are then discussed. These include semi-structured in-depth interviews, and ethnographic measures such as field observations and informal conversations. In-depth interviews were used to explore the materials, meanings and competencies that constituted the water use practices of different communities, and the role of material, economic, social and cultural resources in shaping these practices. The additional ethnographic methods were used to understand the broader domestic contexts of these communities and the water use practices associated with the systems, infrastructures and technologies embedded within each community. In the last section, I consider the methods for thematic analysis, researcher reflexivity and ethical considerations.

4.2. Methodological Constructs, Theories and Perspectives

In their discussion on paradigmatic confluence, Guba and Lincoln (from Denzin & Lincoln 2005) attest to a 'blurring of genres' in recent times, referring to the growing confluence between research paradigms and techniques. This is in part considered a result of the expansion of the social sciences and inquiry methodology across disciplines (such as sociology and psychology) and perspectives (such as Marxist theory and feminist theory) (Denzin & Lincoln 2005). Neuman (2011) and Babbie

(2013) also recognise this phenomena, noting that while each of these approaches represent divergent pathways in the outlook and assumptions around doing social research, their connections to social theories, techniques and sciences are not strict. In practice, the epistemological premise of this research incorporates elements of Positivist, Interpretative and Critical perspectives.

The Positivist lens, through which the confines of the scientific method initially evolved, provides the rigour and systematised inquiry for obtaining knowledge through facts and information. These processes have been translated and applied to social research, hence the term 'social sciences' (Babbie 2013). In this thesis, the Positivist perspective guides the investigation and exploration of social inequality and water use practices, as set out in Chapter 1.

Interpretative or heuristic perspectives see meaning as subjectively created with emphasis on the subject and context: It is the meaning-making, sense-making and attributional activities of the subject that shape action or inaction. Meaning, reality and validity are not absolutist in this sense but instead derived from community consensus (Denzin & Lincoln 2005). Such a perspective is consistent with this research in the exploration of meaning-making, sense-making and attributional activities on water use practices. As these activities (resources) are considered to be highly variable between different communities, I assume there are multiple realities (a relativist ontology) consistent with a Constructivist (Interpretative) paradigm (Denzin & Lincoln 2005). Additionally, the Subjectivist epistemology (that the knower and the respondent co-create understandings) ensures the participatory role of the researcher (heuristic device) in regenerating cross-cultural understanding (Denzin & Lincoln 2005). It is here that the researcher's reflexivity and triangulation through ethnographic approaches (discussed in section 4.2) are necessary to ensure the researcher's scientific rigour and empathic understanding of the subject's actions and contexts (Patton 2002; Neuman 2011).

In his writings, such as *Outline of a Theory of Practice* (1977), French sociologist Pierre Bourdieu is critical of both Positivist and Interpretive approaches in their lack of reflexivity, arguing that social research must be equally critical of itself as well as its subject matter (Neuman 2011; Bourdieu 1977). He argues that the quantitative empiricist confines of the Positivist approach fails to take into consideration subjective experience, such as social contexts, meanings, thoughts and feelings of real people, and that the anti-humanist, objectivist stance of this approach defends the status quo (Neuman 2011). At the same time, he recognises that Interpretive approaches are too subjective and relativist, and fail to examine ideas, thoughts and lived experience beyond the local, immediate or short term context, thus ignoring the broader and long-term structural conditions (such as poverty, oppression and violence) that embed and reaffirm contexts (Neuman 2011). Critical social science

conducts research to critique and transform social relations by revealing the underlying sources of social control, power relations and inequality (Neuman 2011; Denzin & Lincoln 2005). While it is Interpretive approaches that present an immersive quality for the investigation of different contexts, experiences and resources at a localised level, it is the dialectical materialist ontology of the critical approach that this research adopts to investigate the mutually influencing dynamic of macro-scale systems, infrastructures and technologies, which embed and reaffirm class contexts and daily water use practices. Through this process of inquiry, this research will seek to go beyond surface illusion and expose and identify avenues for structural change in order to enhance water resource management and quality of life in Australian urban centers (Neuman 2011; Denzin & Lincoln 2005).

4.2.1. Modes of inquiry

While these paradigms reflect divergent outlooks, assumptions and approaches to conducting social research, Neuman (2011) lists six commonalities they possess:

- *Empirical*: All are rooted in the observable reality of the sights, sounds, behaviours, situations, discussions, and actions of people. Research is never based on fabrication and imagination alone.

- *Systematic*: Each emphasise meticulous and careful work, and reject haphazard, shoddy and sloppy thinking and observation.

- *Theoretical:* While the nature of theory varies, all approaches place emphasis on using ideas and seeing patterns. None hold the view that social life is chaos and disorder.

- *Public:* All seek to make efforts to ensure research is explicit and shared, and oppose keeping the research process hidden, private or secret.

- *Self-reflective:* Each approach recognises the need for serious contemplation and self-awareness.

- *Open-end processes*: All encourage continuous change and openness to new ways of thinking and doing things. They see research as constantly moving, evolving, changing, asking new questions and pursuing leads.

Thus, despite their differences, each approach seeks to conduct social research in a manner that creates systematically gathered, empirically based, theoretical knowledge through public processes that are self-reflective and open ended. Historically, qualitative approaches in social science were regarded as complementary to more traditional quantitative modes of inquiry in achieving these outcomes (Denzin & Lincoln 2005). This, however, is no longer so apparent. Despite ongoing critiques of both approaches, many research fields—once rigid in opposition and/or firmly embedded in either qualitative or quantitative process and assumption—at least attest to the

complementary nature of the two approaches. Additionally, there is an increasing respect for the intellectual demands of the soft sciences, recognising that the fluidity and active nature of social life presents elements that are best explored through the borrowing of lived experience and ideas in natural (and fluid) settings (Neuman 2011). Furthermore, it is accepted that the methods that are adopted should be those which are consistent with the objectives of the study (Babbie 2013; Richards & Morse 2007; Neuman 2011).

Qualitative approaches are characterised by methods rich in soft data forms such as words, texts and images that describe experiences and perspectives of people in their 'real life' settings. Denzin and Lincoln (2005) note this to be a situational activity that locates the observer in the world, and through a set of 'interpretative, material practices' makes the world visible (p. 3). In this sense, the researcher provides the data collection instrument as they become immersed in the data to develop insight and understanding in an often inductive fashion (Neuman 2011; Babbie 2013). Qualitative approaches are thus more limited in their ability to generalise because of the context-sensitive approaches and necessarily smaller sample sizes. They can also be more time consuming and intensive because their data is often less organised and more 'dense' with description, requiring more analysis. Often analytical themes develop in an iterative fashion, requiring several rounds of immersion and analysis rather than being made explicit in the design phase. The validity of the research and its findings are thus highly dependent on the skill and competence of the researcher (Richards & Morse 2007; Neuman 2011).

These subjective and responsive qualities of qualitative research give rise to criticisms over lack of rigour in comparison to quantitative approaches. Questions of validity surround the 'trustworthiness' of the findings and its reliability in informing social policy or legislation (Denzin & Lincoln 2005; Neuman 2011). Richards and Morse (2007) and Neuman (2011) argue that an emerging body of literature supports the use of methods such as reflexivity and ethnographic measures (through long immersion in the setting) to overcome such problems, as well as data triangulation to ensure rigour in qualitative research. Triangulations can use multiple investigators working in collaboration (research triangulation); multiple data sources, such as interviews with key informants, documents, press or newsletter articles (data triangulation); multiple data collection methods, such as individual interviews, observations or a mix of qualitative and quantitative methods (methods triangulation); and/or theory triangulation, which uses alternative theoretical perspectives to interrogate the data (Neuman 2011; Babbie 2013). Finally, rigour is improved when the links between empirical evidence and the developed findings are made explicit in the research report (Neuman 2011).

4.2.2. Design in qualitative research

One of the values of qualitative research is its ability to develop deep understandings of contexts and 'real life' events to generate explanations and theory in an inductive way. These qualities were consistent with the objectives of this research in its requirements to investigate complex interactive and, at times, context dependent water use practices in divergent communities in Australian cities (Yin 2009). A qualitative research approach, exploring case studies through interviews and documentary fieldwork techniques, was utilised as a result. It required descriptive and analytic methods and an ability to generate understanding from events, participants and their contexts, to explore the impacts of broader processes and outcomes across contexts. Naturalist and holistic inquiry, context sensitivity and inductive analysis were all important features of the methods required for this research. These requirements led to the use of a case study approach (Neuman 2011; Yin 2009).

A case study approach is a research strategy that focuses on understanding the dynamics present within a setting (Liamputtong 2013; Neuman 2011). Case study research intensively investigates singular or small sets of cases, focusing on many details within each case and the context. As Neuman (2011) suggests, case studies can examine the internal features, surrounding contexts and situations of each case, allowing the researcher to link the micro-level actions of individuals or communities to macro-level, large-scale structures, processes and theoretical concepts. In this instance case studies provided a valuable tool for investigating the dynamic of socially disadvantaged and socially advantaged individuals and groups in relation to the major structural functions of water use systems and infrastructures and domestic contexts (as outlined in Chapter 2).

Case study approaches have also been widely recognised in recent years for their effectiveness in investigating contemporary phenomena (such as social inequality) within real life contexts (Liamputtong 2013). Yin (2009) and Neuman (2011) recognise the use of multiple cases to provide analytical advantages, robustness in findings and a more compelling reflection of the variable of interest. A case study approach was used in the urban capital cities of Melbourne (Victoria) and Perth (Western Australia) to offer reflections of social inequality in varying socio-technical and bio-physical contexts.

Multiple case studies can provide both literal and theoretical replications. That is, the ability for the observation of patterns and emerging themes across cases (literal replication) or contrasting results across themes, but for predictable reasons (theoretical replication) (Yin 2009). The use of multiple case studies provides a useful framework in this regard, presenting the ability to distinguish between reoccurring themes or drivers for social inequality (literal replications) in a reflection of the broader

Australian experience, and context-specific drivers (theoretical themes) across cases, in which socio-technical and bio-physical elements will differ, reflective of the local, contextual experience

The model for understanding water use practices put forth in Chapter 2 (see Figure 2.3) provides a theoretical framework to enable the defining of the elements and relationships in any literal and theoretical replication, which Yin (2009) emphasises is an important component for any multiple case study research. An embedded design is utilised as a result of the requirement for multiple units of analysis (Yin 2009) within 'Systems and Infrastructures', 'Domestic Contexts and Technologies' and user socio-cultural contexts (as defined through 'Resource Accrual'). It is anticipated that such variability will offer a means for both literal and theoretical replication, alongside additional insights between socially disadvantaged and advantaged communities in each metropolis. The process for determining case studies in each metropolis is outlined section 4.3**.**

4.2.3. Data collection techniques

This discussion will focus on the use of interviews and ethnographic/fieldwork techniques, as these were the primary data sources for this study. Neuman (2011) notes that while case studies may use a number of data collection techniques, such as immersive field-based approaches, participant observer methods and historical comparative studies, common to qualitative research designs, their selection should be dependent on the nature of the research questions. As previously suggested, this research sought deep understandings of the structural elements that shaped practices, experiences and context in the home and community, and thus it was the techniques described in the following that were considered most relevant.

In-depth semi-structured interviewing provided the primary qualitative tool of this research. In-depth interviewing aims to elicit rich information from the perspectives of particular individuals on the topic under investigation. The interpersonal nature of this method seeks to build an intimacy that is common for mutual disclosure, and in doing so, allows the interviewer to tap into the more embedded perspectives of interview participants. As a result, the method can offer insights into the participants' expectations, experiences and worldviews (Liamputtong 2013).

As this research sought to gain insights into the various forms of *habitus* and capital that shape the materials, meanings, and competencies that define water use practices (see Chapter 3.5), a standardised interview approach would prove too narrow and pre-determined. Alternatively, a more informal 'conversational approach' would lack the rigour to stimulate discussion and extract views on the required areas (Patton 1990; Liamputtong 2009). In-depth interviewing, in this instance,

allowed for perspectives and insights that were likely to be considerably diverse, complex and contextually specific (Neuman 2011).

Interviews were conducted in a semi-structured format, in which the questions were constructed around the responses of the interviewee. Stier Adler and Clark (2008) note this approach as being beneficial to circumstances that study heterogeneous populations (such as groups varying in social disadvantage and geographic location) and where group circumstances differ from that of the investigator. The semi-structured approach offers the flexibility to 'break the frame of the interviewer script' in order to shift the conversation to situate around the perspectives of the interviewee (p. 242). In doing so, questions can be adapted to more adequately understand the perspectives, circumstances and subjectivity of the interviewee in greater depth (Neuman 2011; Stier Adler & Clark 2008). Additionally, Liamputtong (2013) recognises the semi-structured in-depth interviewing technique to be a valuable method for 'accessing subjugated knowledge—useful for collecting information from vulnerable or marginalised people' (Liamputtong 2013, p. 96) and thus suitable for extracting the views of socially disadvantaged groups and communities, as in the case of this research.

Additional ethnographic lines of enquiry are used in the building of each case study and to triangulate findings (Babbie 2013). These include immersive-based information sources, such as informal discussion, field notes, photos and collection of documents, press and newsletters. Liamputtong (2013) and Neuman (2011) suggest that unobtrusive ethnographic or field-based methods benefit the researcher in encouraging cultural relativism (immersion of the researcher in the perspective of the researched), enriching relationships between the researcher and research participants, and assisting in the preliminary research design and refinement by offering more enriched perspectives of study locations and communities (Liamputtong 2013; Neuman 2011).

Neuman (2011) notes that ethnographic approaches enable the researcher to go beyond what can be easily observed externally and discover what the people being observed truly feel and mean internally (Neuman 2011). Such an approach can be beneficial in generating explicit (e.g. what we know and talk about) and tacit (e.g. unspoken cultural norms or symbols) forms of cultural knowledge. Clifford Geertz (1973) refers to this process as 'Thick Description' where the researcher seeks to understand as deeply as possible the meanings of culture to those who live within that culture. This, as Richard and Morse (2007) suggest, is conducted through the processing of mixed data sources (interviews, conversations, field notes, photos etc.) whereby through theoretical insights, the researcher is able to synthesise and extract the essential features of the situation, thus better understanding the context (Richards & Morse 2007; Neuman 2011 Babbie 2013).

4.2.4. Thematic analysis

While traditional approaches have been criticised for their positivist-objectivist stance, more recent interpretivist approaches have allowed meaning to be generated from the interaction between, for example, the interviewee and researcher (Babbie 2013; Neuman 2011; Richards & Morse 2007; Denzin & Lincoln 2005). Thematic analysis lends itself to describing heuristic strategies of inquiry in qualitative social research, independent of the sources of data that have been collected (Denzin & Lincoln 2005). For this research, the compromise between deductive logic and analytic induction provides a formulation for the exploration of interpretive social science and phenomena within localised contexts (as set out in Chapter 3.5 *A Model for Researching the Implications of Social Inequality for Water Sensitive Cities*).

Such an approach captures the systematic interaction between idea and data alongside the properties of research design and analysis (Denzin & Lincoln 2005). Unlike other more linear modes of analysis (e.g. collection followed by analysis and theory), the thematic approach is concurrent, iterative and integrative. Data collection, analysis and theorising occur in parallel, creating a constant dialogue of mutual influence that is continually refined until theory provides a reasonable explanation of the events studied (Neuman 2011; McGhee, Marland & Atkinson 2007; Denzin & Lincoln 2005). This approach also encourages researchers to remain close to their studied worlds and develop an integrated set of theoretical concepts from their empirical materials, which not only synthesises and interprets the materials, but also shows process in relationships. In the refining and development of theories, Strauss and Corbin (1998) recognise the importance of this approach to test and refine emerging theory for consistency, as it allows for examination of events in the data. They also suggest that 'data alone are insufficient' and encourage a broad engagement with the literature to establish as wide an array of existing theory as possible, to ensure robustness in the refinement process (Denzin & Lincoln 2005).

4.2.5. Researcher reflexivity

Glaser and Strauss (1967) and more recently McGhee, Marland and Atkinson (2007) describe the above cyclical process for analysis as the 'constant comparison method' (McGhee Marland & Atkinson 2007; Glaser & Strauss 1967). They go on to suggest that in comparison to more traditionalist (positivist) methods, core themes are grounded in data rather than derived from preconceived conceptual frameworks or hypothesis. This, they note, 'implicitly requires awareness of self and a consciously reflective process called reflexivity', as the creativity of the researcher plays an integral role in the emergence of categories, themes and thus theoretical constructs (McGhee Marland & Atkinson 2007, p. 335).

Put simply, reflexivity can be considered as an 'awareness of the ways in which the researcher as an individual with a particular social identity and background has an impact on the research process' (Robson 2002, p. 22). Research reflexivity has been recognised as a valuable qualitative tool for eliminating bias that may arise from the researcher and their chosen methods. This, as Wren (2004) suggests, can be attributable to the nature of qualitative research and its ability to lend itself to the perspectives of the researcher, the research activity and research context. Elliot, Joanna and Hollway (2012) also recognise this approach as an analytical resource for understanding data that is embodied, unspoken or unavailable to consciousness, such as influence of symbolic power and class which, similarly to research, can be subject to the settings in which it occurs. I move now to outline some of the key values, experiences, modes of understanding and methods for obtaining insight possessed by both myself and my methodology as a way of situating this research in a social context (Neuman 2011).

Values for sustainability and experiences of water resource management

My upbringing in the south-eastern coastal region of Victoria and the time I regularly spent in the outdoors embedded within me a close affiliation to nature from an early age. Experiences of environmental degradation through rapid and sometimes ill-conceived urban growth and marine degradation through the impacts of local ocean outfalls piqued my interest in environmental advocacy and activism at a local level. This developed in later years as a professional pursuit, through my undertaking of an undergraduate degree in environmental science and employment within the sector. Over the past ten years, my employment and engagement within the environmental sustainability sector—both at a local and state government level as well as within the private sector—have instilled and reaffirmed these values, as well as broadened my understanding of the challenges and opportunities present for environmental protection and urban sustainability, liveability and resilience.

From the water resource management perspective, my postgraduate research investigating the policy context of Western Port Bay (Victoria, Australia) and my later employment with the Central Coastal Board and Melbourne Water have been instrumental in shaping my understanding of the institutional and structural arrangements for natural (particularly water) resource management in Australian urban contexts.

As a water user I am a part of this research and part of the social world. My practices are shaped not only by my local contexts and the resources I have accessed (and have access to), but additionally the systems, infrastructures and technologies that embed water use practices in domestic contexts. Further to this view are past experiences of drought conditions in Melbourne and in the broader

context of Victoria, and the resounding policy measures and management approaches that were implemented. Though not without scrutiny, the Target 155 campaign, for example, has been recognised as a successful initiative implemented at the time to curb household consumption (Sofoulis 2011)**,** and in my personal experience proved influential in the establishment of competencies for urban water literacy and values for water conservation throughout the Melbourne metropolis. The shift in perspectives, attitudes and cultural values around urban water use within the broader community that I experienced at this time are also notable in the context of this research.

My stance as participant and researcher in terms of my professional and personal experiences, present both opportunities and challenges in the context of this research. These positions allow an enriched understanding of contexts, historical content and language associated to water resource management and domestic water use, as well as knowledge of demands, restraints and stakeholders that exist in each. As a researcher, I am not positioned as an outsider but rather possess shared experiences and the language of resource managers in both the Melbourne and Perth cases. Stakeholder perspectives and existing documents, for example, were attainable during this research as stakeholders were known to me or accessible through existing networks.

Though valuable for improving insights, such a perspective posed challenges in ensuring empathic understanding (or *Verstehen* as Weber suggests) in interpretative processes (Richards & Morse 2007). To understand the perspectives, views and socio-cultural constructs that defined user contexts for this research, the setting-aside or 'bracketing' (Neuman 2011, p. 109) of one's own values, assumptions and biases, in order to operate from a stance of minimal pre-conceptions was required (Neuman 2011; Richards & Morse 2007). Immersion in literature based on water consumption in the initial stages of this research allowed me to deconstruct my socialisation as both water-user and industry practitioner, while better understanding the relationship between social structures and consumption-based processes. The additional review of sociological and methodological materials as discussed in the theoretical framework (outlined in Chapter 3) and methodological groundings in the beginning of this chapter helped to better define the dialectical relationships between users and broader systems and infrastructures (both in terms of water use and social inequality), and their mutually influencing dynamic in shaping and being shaped by water use practices. The requirement for both empathy to research subject(s) and neutrality to findings therefore required consideration in planning, data collection, analysis and the thesis development stages of this research.

Values for critical sociology and experiences of social inequality

The divide in resources and opportunity was reiterated from a professional standpoint in recent years through my employment in community engagement and education positions in local government and Melbourne Water. During my time in these positions, I noted that areas of high social advantage (with broader access to resources) possessed higher rates of engagement in environmental stewardship, education and active sustainability measures, compared to those in areas of less advantage or social disadvantage. The increased demand for program delivery in these communities would often warrant an increase in resource provision, adding further to community capacities and the competencies of individuals. Communities of greater disadvantage, often characterised by higher rates of resource scarcity, health and welfare issues and socio-cultural barriers (Habibis & Walter 2009), had lower rates of participation and/or expressed alternative perspectives or approaches to engagement that were beyond the structural confines of the programs delivered.

Beyond these experiences, my encounters of inequality and social disadvantage have been rather limited. While my upbringing and schooling (particular secondary) have been in moderate to low socially advantaged communities, my socialisation has been in communities of moderate and high social advantage. As my accounts of fieldwork experiences (particularly participant recruitment) demonstrate, my networks, socio-cultural understandings and communities extend less frequently to the more marginal ends of social advantage and disadvantage. In the exploration of communities divergent to my own upbringing I made a conscious effort to ensure neutrality to the data and subject matter and be reflexive about different modes of understanding and approaches to the subject matter

Neuman (2011), in this instance, recognises the value in extended periods in the field to generate insights relevant to situation and context, and to ensure better understandings of the experiences and perspectives of those being studied. Patton (2002) also places emphasis on the value of extended immersion in establishing trust and familiarity with participants as a way of eliminating potential bias that may result from the researcher/participant power dynamic. This is considered of particular importance in marginalised communities for extracting information and generating insight beyond surface illusions (Patton 2002; Neuman 2011; Babbie 2013).

It should also be noted that the additional accounts and perspectives of stakeholders engaged in this research were at times shaped by their professions. As many were public figures, managers or advocates of certain organisations, it is likely that they had reputations to protect and agendas to satisfy, which would shape their accounts. In some instances, the political nature of the

stakeholder's role influenced their ability for disclosure, the language used and, in some cases, their willingness to participate. Like some community participants, it was their perception of me, my social position and my role in the research process that would influence their perceptions and responses (Neuman 2011; Patton 2002). In this sense, data collection and the use of the interviewing technique can be at best cross-sectional and embedded in social meaning (Patton 2002; Neuman 2011). Neuman (2011) suggests the development of an ethical framework in order to deal with these reactivity issues. This is described below in sub-section 4.3.8.

4.3. Research Methods and Approaches

So far in this chapter I have offered insight into the definitions, discourse and applicability of the methodological constructs, techniques and approaches that ground this research. I now detail the technical components of these elements for this research. I begin by positioning the methodology in the context of the research questions of this study (as set out in Chapter 1). The data collection and fieldwork processes are then outlined, including the selection of study sites and the processes for participant recruitment, interviews, fieldwork and data analysis. This section concludes with discussion of the ethical considerations to this research and the study limitations attributable to the processes of this methodology.

4.3.1. Methods in context

This qualitative study examines the implications of social inequality for water sensitive cities by exploring the role and nature of social inequality in urban water use practices, and the barriers and opportunities this presents for developing water sensitive Australian cities. Using the scientific method (a traditionally positivist construct) to delineate this social science based research, this study draws on both interpretive and critical research paradigms previously outlined in section 4.1. An interpretative method is used to obtain insights into the daily lives and local contexts of divergent communities—that vary in opportunities for economic, material, social and cultural resources—and to understand their daily water use practices. As these contexts are nested in wider structures, a critical approach is used to examine the relationships these communities and households possess within their broader urban water resource systems and infrastructures, domestic contexts and technologies.

A case study approach is used to adequately explore the phenomena of social inequality and water use practices. The urban metropolises of Greater Melbourne and Greater Perth were chosen, as their unique (and somewhat opposing) bio-physical and socio-technical water resource setting (which I outline later in this chapter), allowed for a broader representation of the characteristics of

Australian cities. To examine social inequality in each metropolis, a suburb of social disadvantage, moderate advantage and high social advantage was chosen. These were selected using the Socio-Economic Index of Areas (SEIFA), developed from the 2011 Australian Census by the Australian Bureau of Statistics. This allowed for both theoretical and literal modes of comparative analysis, which drew insights, themes and understandings from localised perspectives, and at broader urban levels through comparisons across suburbs and cities (Yin 2009). Findings were reflective of both localised (context specific) and universal (comparable) relationships. As foreshadowed in the introductory Chapter of this Thesis, Chapters 5 and 6 detail the literal replication undertaken in this research, which were observable through commonalities, recurring themes, and generalisable accounts at comparable scales of advantage and disadvantage in three suburbs within each city. By contrast, Chapter 7 provides a theoretical replication from each case study, by exploring city-specific processes and dynamics. . .

Data collection drew on a mix of qualitative field-based research methods aimed at gathering data within and across case studies. Semi-structured in-depth interviews were conducted, and sought perspectives and insight into the materials, meanings and competencies that comprised daily water use practices and the influence of social, cultural, material and economic resources that shaped these. Quantitative data was also used to inform site selection and guide semi-structured interview discussions. Ethnographic based fieldwork was conducted at the time of interviewing in each suburb locality. This would consist of the accumulation of field notes, personal accounts, literature and media, as well as informal interviews or conversations with community and water industry stakeholders who were invested in these communities. This was particularly oriented around gaining insight into the community dynamics and contexts, systems, infrastructures and technologies that embedded water use practices and daily life in each of the studied communities.

The concurrent undertaking of interviews and ethnographic data collection in each community allowed a cyclical process of knowledge generation, theory construction and refinement in the generation of new themes (Richards & Morse 2007). Coding and the thematic process were undertaken through the use of Nvivo, a qualitative data analysis software. An overview of the Melbourne and Perth contexts, parameters for site selection, data collection and analysis methods are discussed in further detail in the following sub-sections.

4.3.2. Investigating Australian urban contexts

Greater Melbourne and Greater Perth were selected as study sites. Three suburbs in each metropolis (N=6) representing areas of relative social disadvantage, moderate social advantage and social disadvantage were selected. The engagement of the water resource management sector in

the work of the CRCWSC in these cities offered additional benefits by providing access to industry practitioners and stakeholders during the data collection process. While both cities provide an accurate reflection of the Australian urban setting, each possesses unique bio-physical and socio-demographic characteristics that have in turn led to variability in both socio-technical, domestic and user-centred water use practices. These are summarised in the following. A map and summary of both Greater Melbourne and Greater Perth are provided in Appendix Two and Appendix Three respectively.

Greater Melbourne water use profile

The Melbourne region is Australia's second-most populous region, with a population equating to 19 percent of the total Australian population (Australian Bureau of Statistics [ABS] 2014c, n.p). Residents are slightly older on average and possess a lower annual income in comparison to Perth residents. Climatically, Melbourne is characterised by higher annual rainfalls and cooler average temperatures.

Water demand is primarily for urban use (90%), with a small proportion used in agriculture. Most of Melbourne's drinking water comes from pristine mountain ash forests in the Yarra Ranges, which have been closed to public access for almost 100 years. To meet demand, water is sourced from surface water storages in the region (which have a combined capacity of 857,408 ML) and entitlements to water in the Thomson Reservoir (capacity of 1,068,100 ML) and other smaller tributaries (Bureau of Meteorology [BOM] 2014; Collet & Henry 2011).

Secondary water sources include water held in Lake Eildon via an inter-regional agreement, by which up to 75 GL of water is supplied by pipe from Victoria's northern irrigation district. Groundwater contributes a small proportion (around 5%) of total water supply and is used mainly in agriculture. The Victorian desalination plant, which became operational in December 2012, is capable of producing 150,000 ML/year of desalinated water, which amounts to 33 percent of Melbourne's water needs. Good catchment-based water availability since this time has meant that desalinated water has not been used (BOM 2014, n.p; Porter 2013; Collet & Henry 2011).

At a domestic level, some degree of water literacy has been recognised amongst users, suggested to stem from water saving initiatives implemented during a recent period of extensive drought (spanning 1998 to the late 2000s) (Porter 2013; Collet & Henry 2011). During this time, concerns over the long-term security of Melbourne's water supplies led the Victorian Government (in 2004) to unveil a comprehensive plan with 110 water saving initiatives, in order to secure future water supplies. These included a range of education and incentive programs (e.g. rebates on water tanks

and water saving appliances) aimed at curbing user-based domestic consumption practices. Additionally, in 2005, permanent water-saving rules were introduced with penalties for non-compliance (e.g. restrictions on manual watering) (BOM 2013, n.p; Collet & Henry 2011). Examples of suburb level yearly consumption averages can be observed in Appendix 4.

Average rainfall for 2010, 2011 and 2012, however, saw restriction and initiatives eased as water storages in the region returned to above 80 percent of total capacity by the beginning of the 2012–13 year (BOM 2014, n.p). There are currently no urban water restrictions in place (BOM 2013, n.p). A shift to below-average rainfall across the region in 2012–13 contributed to a 40 percent decrease in runoff to surface water compared with 2011–12 and water storage volumes falling to 68 percent of capacity, suggesting some degree of reversion to former practices (Porter 2013; Collet & Henry 2011). Inflows to the Thompson Reservoir have continued to recover however, and the inter-region entitlement to water increased by 15 percent from 2011–12 entitlements. Good catchment-based water availability also meant that no desalination water was ordered in 2012–13 and recycled water was only a minor supply source (BOM 2014, n.p).

Greater Perth water use profile

The Perth region is located on the west coast of Western Australia. It is Australia's fourth-most populous region with a population equating to 8.5 percent of the total Australian population (ABS 2014c, n.p). The average income of residents is significantly higher than that of Melbourne. This is to be expected considering that four of the top five most advantaged local government areas in the country are found in Perth, and only three local government areas are seen to fall below the Australian average (ABS 2014b, n.p). The mean age of Perth residents is slightly lower than Melbourne, suggesting a slightly younger population on average. Comparatively, Perth possesses a drier climate to that of Melbourne, with a lower annual rainfall and higher average temperatures (BOM 2014, n.p).

In the last 30 years, the wider region has experienced a decline in rainfall that has resulted in declining stream flows, storage levels consistently below capacity and reduced groundwater recharge. The volume of water held in storages in 2012–13 decreased to 26 percent of capacity. The four largest storages (Canning, North Dandalup, Serpentine and South Dandalup), which together hold 60 percent of the region's storage capacity, were each between 10–23 percent of capacity at the end of 2012–13 (BOM 2014, n.p).

Over the past 10 years, ongoing below-average rainfall has seen a shift to a drier climatic regime, which has led to increasing pressure on the region's water resources and significant investment in

alternative water sources (Collet & Henry 2011). Accordingly, 50-60 percent of Perth's urban water supply (~285,000 ML/year) is sourced from groundwater aquifers, 15-25 percent from surface storages and the remaining 25-35 percent from Perth's two desalination plants (Kwinana and Binningup) (BOM 2014, n.p; Porter 2013).

During 2012–13, the Southern Seawater desalination plant (Perth's second desalination plant) operated at capacity for the first time. Desalinated water made up 34 percent of urban water supply, representing an increase of more than 20 percent from the 2011–12 year. In addition, a groundwater replenishment trial saw approximately 2 percent of the wastewater processed in the region treated to drinking water standards and recharged back into the groundwater system for further use. In August 2013, the State Government announced that groundwater replenishment would continue in the region as an alternative water source for public water supply (BOM 2014, n.p).

Despite large-scale investment in technologies and infrastructures, consumption reduction initiatives at a domestic level have remained comparatively scarce. This, as Porter (2013) suggests, is a result of the strong preference of Western Australians for 'a well-watered-garden culture' and economic viability for technological investment, in light of the minerals boom driven by Chinese economic growth (Porter 2013). Currently, domestic requirements are limited to regional garden watering rosters (BOM 2013, n.p). Examples of suburb level yearly consumption averages are depicted in Appendix 4.

4.3.3. Investigating social inequality

As detailed in Chapter 3, social class presents a primary indicator of social inequality. One's social class defines the amount and types of material, social and cultural resources available to an individual or group. Those of higher social classes often possess greater opportunity and accessibility to these resources and are thus considered in contexts of greater social advantage, while those of lower social class, in which opportunity for participation and accessibility is often more limited, are thought to experience greater social disadvantage (Swartz 1997).

The Australian Bureau of Statistics (ABS) has developed Socio-Economic Indices for Areas (SEIFA), which are widely used as a measure of social advantage and disadvantage for areas, including suburbs or municipalities. These indices measure 'people's access to material and social resources, and their ability to participate in society' (Pink 2011, p. 3). The ABS provides four types of SEIFA measures: Index of relative socioeconomic disadvantage; Index of relative socioeconomic advantage and disadvantage; Index of economic resources; and Index of education and occupation. These consider a range of variables that reflect degrees of social advantage, such as income, education

level, community connectedness, housing, health services, access to skills and employment and English proficiency (ABS 2014b, n.p).

For this research, all four SEIFA indices were used to distinguish between social classes within each metropolis. This was to ensure economic, material, social and cultural resources were considered in the framing of advantage and disadvantage in each city— consistent with the theoretical framework. Suburbs of low, mid and high socio-economic advantage were identified for both the Perth and Melbourne case studies (N=6, 3 suburbs per city). For each SEIFA index, suburbs are assigned a score and decile. The lowest 10 percent of areas are given a decile number of 1, the next lowest 10 percent of areas are given a decile number of 2 and so on, up to the highest 10 percent of areas, which are given a decile number of 10. This means that suburbs (and additional SIEFA areas) are divided up into ten equal sized groups, depending on their score (Pink 2011). To ensure consistency between the two metropolises, case study localities of socially disadvantaged suburbs possessed decile scores between 1 and 3 (thus occupying the bottom 30% of socially advantaged suburbs in the region), mid-high groups with deciles predominantly between 5 and 7 (50-70%) and high groups with deciles 8-10 (top 20%). To reduce instances of socio-economic heterogeneity within sample populations, suburb locations were based on suburb clusters where SEIFA index scores are similar and deciles consistent. As discussed in Chapter 3, higher rates of social inequality are identified in these areas, as access and opportunity for social, cultural, economic and material resources are often more limited. Mid-high socio-economic indexed areas appear closely aligned to the Australian average and are representative of the greater majority of the Australian population residing in urban settings (ABS 2014b, n.p). Additionally, it is communities within mid-high brackets that possess similar (standardised) consumption practices and maintain a greater level of engagement and literacy for daily water use practices, compared to those residing in more affluent communities that may comprise the top percentiles of SEIFA index scores (Willis et al. 2013; Fielding et al. 2012). Suburbs in the top percentile were also sought to offer a more stark comparison of social inequality (comparing the very low to the very high) and alongside low and mid communities present a reflection of each metropolis.

Selection of case study sites

The case study area identified to reflect social disadvantage for the Melbourne metropolis was Broadmeadows, with Campbellfield and Coolaroo as surrounding suburbs with similar scores. The case study area for social disadvantage in the Perth metropolis was Armadale, with the surrounding suburbs of Camillo and Brookdale. The site for communities of moderate social advantage in Melbourne was Coburg, with the north-western suburb clusters of Pascoe Vale and Brunswick.

Ballajura, with Malaga and Mirrabooka suburb clusters, was selected as the moderate social advantage site in Perth. Areas of high social advantage in Greater Melbourne were Camberwell and the neighbouring communities of Glen Iris and Deepdene, while Cottesloe was selected for Greater Perth, alongside Peppermint Grove and Mount Claremont. SIEFA scores and deciles are outlined in Appendix 5, while yearly water consumption averages are listed in Appendix 4.

4.3.4. Data collection and fieldwork

To identify participants, engage the population with the research and obtain local perspectives and information, small recruitment workshops were conducted at key social hubs and participant meeting places. Suitable locations were identified through direct observations and discussion with key community members and informants (as discussed below in in sub-section 4.3.5). These often included local shopping precincts, public libraries and other public leisure and recreation spaces. Recruitment workshops were conducted between March and May 2015 in the Melbourne suburbs and during June-July (2015) in Perth. A flyer was distributed to potential participants in order to provide information on the background and objectives of the research. This information was provided in order to elicit greater participation (Stier Adler & Clark 2008). In light of time and financial limitations, a recruitment agency was also approached to assist in the recruitment of participants for the Perth case study. This was as my lack of networks within each suburb, unfamiliarity with the city of Perth and greater time constraints (due to being based in Melbourne) meant recruitment workshops were less effective. As a result, all Perth participants were recruited through these services.

As previously outlined, a total of 60 in-depth interviews were conducted, encompassing community members of socially disadvantaged (N=20) moderately advantaged (N=20) and high socially advantaged (N=20) communities in Melbourne and Perth. Figure 4.0.1 outlines the spread of interviews for each metropolis. Interviews for the Melbourne case study ran from late April to June 2015 following participant recruitment workshops. Some field observations and informal discussions were undertaken in the month prior (March 2015) to better inform discussions with interviewees (Neuman 2011). Accordingly, this process was replicated in Perth with field-based investigations carried out in June prior to in-depth interviewing in August (2015). A greater amount of time was assigned for Melbourne interviews to allow for any necessary refinement or re-adjustment in light of time and financial restraints for the Perth fieldwork period.
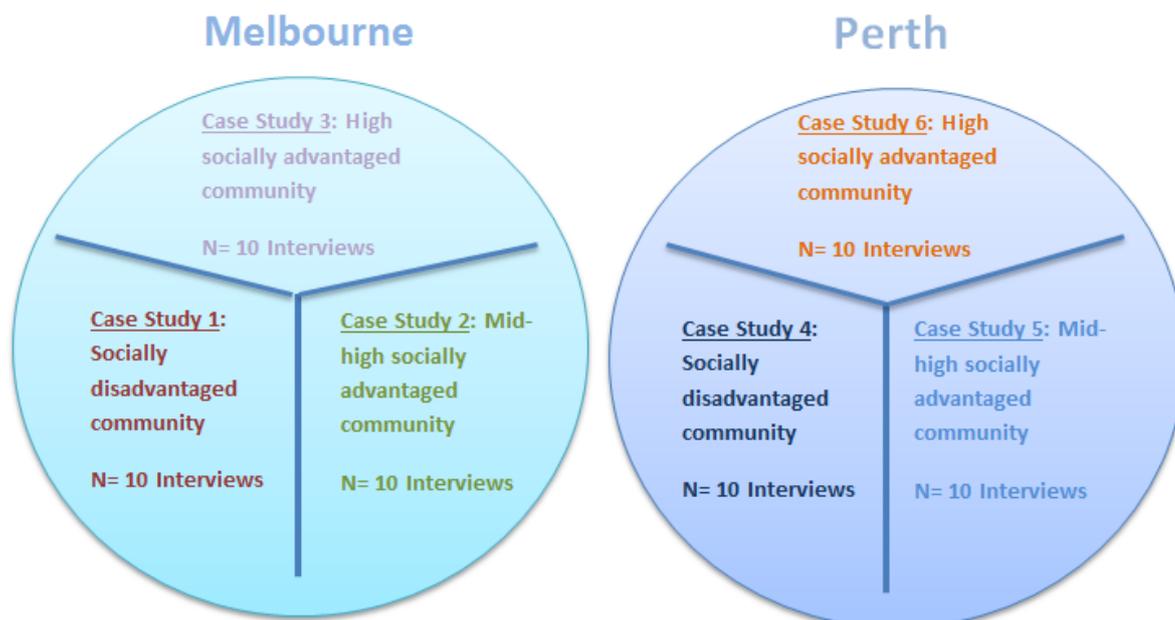
Figure 4.0.5. An Outline of Interview Proceedings

Key community informants such as water managers, local government personnel and community stakeholders were also engaged. This was an ongoing process throughout the data collection period as a means of enriching understandings of the systems, infrastructures, technologies and domestic contexts of each metropolis, and also assisting in participant identification for each case study. For Melbourne, this process was undertaken predominantly from March to June 2015, and for Perth from June to September 2015.

4.3.5. Study participants

Approximately 10 interviews were conducted in each of the case study areas (N=60). It was anticipated that this amount would align with time and budgetary requirements, while providing a general reflection of the target populations in each case study area (Oishi 2003). The demographic spread of participants in each community is presented in Appendix 6. Notably in the adherence to ethical standards, participants have been de-identified.

Interviews were conducted in person. Oishi (2003) notes the benefits of this approach in offering observations into non-verbal cues; opportunities for the use of visual aids, which can enhance participants' response options; and the ability to enhance interviewer-respondent rapport. To reduce the potential of instances where participants felt uncomfortable or intimidated by the interview process or as a means of obtaining a more enriched household perspective, participants were given the option to be interviewed alongside a partner, housemate or close family member(s)

(Neuman 2011). Eight participants (one in Cottesloe, one in Armadale, and two in each of the Broadmeadows, Coburg and Camberwell communities) chose this arrangement. Such an approach enriched insights by offering perspectives into family or household dynamics (Gillham 2005; Oishi 2003). Interviews were generally conducted on the premises of organisations or public spaces known to both researcher and respondents, however, in permitting circumstances where participants felt less comfortable in public settings or with the interview process, interviews were carried out in the homes of participants.

Direct observations, informal discussions with stakeholders and community representatives and existing literature were also used to provide additional lines of enquiry for this research. This was particularly valuable as a descriptive mechanism in obtaining insights into contexts and community dynamic, as well as the water use practices around broader water systems, infrastructures and technologies. Participating stakeholders from each city are outlined in Appendix 7. It should be noted that as some stakeholders had multiple roles and responsibilities, they were able to provide insights on multiple areas relevant to this research.

4.3.6. Interview structure and procedures

Interviews focused on gathering information across the six sites in order to identify patterns in materials, meanings and competencies that constitute daily water use practices between groups of varying social advantage. In particular, the aim was to establish the various forms of economic, material, social and cultural (including symbolic) capital that each group possessed, and investigate how these defined their water use practices in the home, the garden and the broader community. The interview plan in Appendix 8 details how such insights were obtained.

Participants undertook a 1.5-hour in-depth interview on average, which consisted of four components. Approximately 20 minutes were spent in discussing each component. In each component, participants were asked about their knowledge of water use and water saving (or sustainability). Prior to the interview, participants were given a brief survey to complete, which asked them about their socio-demographic and some behavioural characteristics relevant to this research. Neuman (2011) recognises the benefits of this approach in extracting this sort of information as an efficient method of enabling participants to feel more comfortable about answering questions that may prove delicate to some respondents, such as age, income and occupation (Neuman 2011). The participant survey is provided in Appendix 9.

An initial analysis of quantitative National Water-Use Survey data (NWSD) was used to inform and guide interview discussions. The NWSD was conducted in early 2014 as part of the CRCWSC Project

A2.1. *Understanding social processes to achieve water sensitive futures* (see 1.2.3). The aim of the survey was to better understand relationships between the water related knowledge, attitudes, and behaviour of varying social groups, to inform future programs aimed at encouraging better management of water quality and quantity. Participation in the NWSD was voluntary and surveys were administered online. Data collection was undertaken through engaging an online research panel company. A nationally representative sample of 5194 respondents was used. The final sample (after removing respondents with missing data) used in the data analysis was 4262.

4.3.7. Thematic data analysis

Interviews were taped through the use of an MP3 recorder and then transcribed onto a computer. Original recordings and additional information, such as researcher notes and interview responses, were securely stored in a different location and retained until completion of the project. To facilitate the processing of data analysis, survey questions were coded and appropriate links were made among concepts expressed in themes through the use of the computer software NVIVO (Neuman 2011). The use of coding helped organise and prioritise data so that key phrases and the frequency with which people used certain words could be easily retrieved. Coding provides a base for comparing large amounts of data that semi-structured interviews are likely to gather (Neuman 2011).

The conceptual framework for this research (presented in Chapter 3) provided the thematic grounding for the exploration of themes in materials, meanings and competencies surrounding water use practices. The cyclic and reflexive nature of data collection and analysis previously described in this chapter (see 4.2.4), allowed for the subsequent augmentation of interview themes to encompass new emergent themes as the analysis developed (Neuman 2011; Richards & Morse 2007; Denzin & Lincoln 2005). This was particularly useful in investigating the role and nature of broader systems and infrastructures, domestic contexts and technologies on the practices, perspectives and experiences of different communities and community members.

Multiple data sources and collection methods allowed for convergent lines of analysis, which as Yin (2002) notes, offers opportunities for pattern matching and thus theoretical rigour in emerging themes through triangulation. Pre-existing social research and historical accounts of water resource management in both Greater Melbourne and Greater Perth were utilised where available, as a means of ensuring the perspective and views obtained through interviews were reflective of the broader communities. The empathic neutrality outlined by Patton (2002) was also utilised in this instance to generate an open approach to the interview process, thus reducing the likelihood for conceptualisation or generality.

Habibis and Walter (2009) note the evolving nature of social inequality in Australia, referring to the historical significance of different periods and variables of influence in creating lines of causality that are reflective of the contemporary phenomenon. Forms of historical inquiry were used in this instance, through local and state government reports, newsletters, media sources and existing research, to better understand the contemporary contexts, cultures and perspectives recognised to ground experiences in the communities investigated. Personal accounts and field notes of these contexts gathered at the time of data collection were used to triangulate perspectives and assist in the development of generalisable accounts through inductive processes.

4.3.8. Ethical issues and procedures

This research sought insight on community contexts and water use practices primarily through the knowledge, reflections and experiences of people. Those engaged in this process included community members and stakeholders identified to possess perspectives relevant to this research. In ensuring the adherence to ethical principles, information provision procedures were implemented throughout the research processes in which people were directly or indirectly involved. These were namely processes of participant recruitment, interview and data collection, data storage and information disclosure. Ethical approval via application to the Monash University Human Research Ethics Committee was received on the 23rd of March 2015. An overview of the considerations and procedures associated with the methodological process is presented in the following.

Participation in the study was requested through direct approach in a public setting, email or phone contact and fliers sent via post. This was done in a non-coercive fashion in which participants had the opportunity to express interest or decline participation. Those who expressed an interest or willingness to participate were sent an explanatory statement (see Appendix 10) detailing the specifics of their involvement and offering information into the study itself. This statement included details about confidentiality. Participants were reminded that sensitive information would remain confidential. Confidentiality is a necessary requirement in marginalised communities where participants may be vulnerable or feel intimidated in research settings (Neuman 2011; Liamputtong 2013).

Prior to proceeding with interviews, discussions or surveying, written informed consent was sought according to proper ethical standards (Neuman 2011; Stier Adler & Clark 2008). Within this process, participants were reminded that involvement in this research was on a voluntary basis and they had the opportunity to cease involvement and withdraw information given at any stage. To thank interviewees for their time and to assist with any travel expenses, community participants were given a small gift voucher at the end of their interview. This was not considered to be an incentive

for participation as it was a small amount ($20), thus avoiding coercion. For those who wished to remain informed, further information on broader findings were provided following the data analysis process as a means of ensuring that participants felt valued and engaged in the research to which they had contributed (Neuman 2011; Stier Adler & Clark 2008; Gillham 2005).

Informal stakeholder discussion and community participant interviews were audio recorded to assist the researcher with accurate analysis. The consent form administered to participants prior to the interview sought permission for the interviewer to audio record and participants were also verbally reminded at the time. All but one participant consented to the use of audio recording and in that instance notes were taken. For analysis, interviews were transcribed. A transcription company was sought to assist in this process. To ensure confidentiality, the company was required to sign a non-disclosure statement.

Transcribed data and audio recordings were stored on a wireless drive, which was held under lock and key at the office of the primary investigator. Following the transcription process, participants were de-identified and any personal or identifiable information was removed from the transcripts prior to analysis. Much of the material was used to direct and inform the analysis and is thus reflected in a general way in the findings presented in the following chapters of this thesis. For those instances in which materials or participants were directly quoted, steps have been taken to ensure the anonymity of participants. In permitting circumstances, draft copies of sections were provided to participants for approval as a means to minimise risk or stress to subjects in the broadcasting or attribution of some material and ensure the accuracy of the citation.

4.3.9. Limitations

All research studies have limitations derived from their design, sample, instruments and settings. The limitations inherent in this study are related to the qualitative case study nature and its subject matter. The findings are not necessarily generalisable to other processes of social inequality, but rather serve the purpose of informing theoretical understandings in urban contexts.

In this regard, this research does not encapsulate the true nature of social disadvantage in the broader Australian context, as remote communities outside of urban centres possess the greatest rates of social disadvantage according to the SEIFA. This study instead sought to provide a generalisable account of the social advantage and disadvantage gradient apparent in the urban centres of Greater Melbourne and Greater Perth, and thus serve as a general reflection of the communities in Australian urban centres. Notably, as the data collection processes, such as semi-structured interviews, required participants to occupy a dwelling and have basic proficiencies in

English, it is likely that some marginalised communities, such as the homeless or refugee communities, may have been overlooked in this study.

Though triangulated with more recent local and state government socio-demographic data, decisions for case study locations were premised on Australian Census data from 2011. The exploration of social inequality in Australian urban centres was confined to the limitations of this survey as a result. As data collection took place in 2014/2015, it is possible that the contexts of social advantage and disadvantage in the case study localities (determined through SEIFA data) may have shifted during this time.

The qualitative nature of the data collected placed a reliance on the word of the participant to effectively understand the nature of household water use practices in each context. While steps were taken to ensure an accurate reflection of practices amongst participants (see sub-section 4.2.5), it is possible some practices may not have been discussed by the participant, or the true nature of their uses concealed out of guilt, time limitations or forgetfulness. Nevertheless, using a qualitative method and case study approach, this research provides a nuanced insight into the views and experiences of water practices by people from diverse advantaged and disadvantaged backgrounds.

CHAPTER 5. SOCIAL INEQUALITY IN AUSTRALIAN URBAN CONTEXTS

5.1. Introduction

The household and the associated neighbourly conventions that characterise it as a domestic setting have long been regarded as important spaces in which the inconspicuous dynamic of consumer habit and routine, and cultural and symbolic affirmation converge, intercept and unfold (Hamilton 2010; Shove 2003a, 2003b; Bourdieu 1984). Bourdieu (1984) believed class distinction and preferences are 'most marked in the ordinary choices of everyday existence'. While Allon (2011, p. 144) suggests that the conventions of domestic daily life are entrenched in processes of 'okonomania', where the home *'the oikos'* is the site for an enterprising form of self-management through the production, reproduction and consumption of goods, wealth and welfare. Indeed if water is one of the most important aspects of domestic engagement (Head 2008; Allon & Sofoulis 2006; Shove 2003a), then there is the requirement to understand the circumstances under which these 'engagements' occur for any understanding of its relationship with social inequality.

In this chapter I examine the experiences, values and perceptions of participants in this study to provide insights into life in socially disadvantaged, moderate advantage and highly advantaged communities in Australian urban centres. I discuss the forms of economic, material, social and cultural resources in these communities and their role in shaping the personal and private amenities that define daily life and living standards in them.

With similarities in resource availability and access (which I have deemed resource opportunity throughout this thesis), similarities between the Perth and Melbourne contexts were observed that offered a generalised account of social advantage and disadvantage in Australian urban areas. I begin by outlining the experiences and perspectives of participants in the socially disadvantaged communities of Broadmeadows (in Melbourne) and Armadale (in Perth). I then reflect on similar insights from the moderate socially advantages communities of Coburg (Melbourne) and Ballajura (Perth), before discussing the experience of life in the socially advantaged communities of Camberwell (Melbourne) and Cottesloe (Perth). I conclude by discussing the implications of these findings for the current experiences and future capabilities of communities for liveability, resilience and sustainability.

5.2. Living with Disadvantage: The Challenge of Frugality and Daily Demands in Broadmeadows and Armadale

The 2011 SEIFA reflects the Armadale and Broadmeadows communities as some of the most socially disadvantaged in Greater Perth and Greater Melbourne. Table 5.1 provides an overview of the demographic characteristics and a SEIFA score for residents in these communities. Compared to their broader urban contexts, these suburbs were well below average in areas such as education, employment and income, property value and ownership, social mobility and connectedness.

Table 5.1. SEIFA Scores and Demographic Characteristics of the Broadmeadows and Armadale Communities

Determinants/Suburbs	Armadale	Greater Perth	Broadmeadows	Greater Melbourne
SEIFA for Disadvantage (Score/Decile)	889/1	1,033/6	772/1	1020.3/6
% Tertiary educated	5.20	19.60	6.6	23.6
% Unemployed	11.70	4.80	16.1	5.5
% With high weekly income	5.3	23.1	3.7	19.4
% With low weekly income	25.9	17.9	34.3	19.2
% Non-English speaking	2.4	1.4	13.9	5.0
% With internet connection	62.30	77	57.2	76.4
Average property value	$325,000	$431,343	$370,000	$582,067
% Home owners	22.50	28.10	25.5	31.5
% Renting	35.15	26.7	34.6	26.5
% Social housing	7.4	3.6	14.9	2.9
Population	20,599	2, 039 200	22, 355	4,921 000

Source: ABS 2015a. n.p; ABS 2015f, n.p; City of Armadale 2015; ABS 2014b, n.p; ABS 2014c, n.p; ABS 2013, n.p; City of Armadale 2013)

The 2011 SEIFA ranked both Broadmeadows and Armadale in the bottom 10 percent of Australian suburbs in terms of education and employment levels, financial resource availability and general social advantage. According to residents these areas were perceived to be 'marginalised', 'unsafe' or 'poor' parts of the city. Samantha and Rebecca demonstrate an awareness of this, which was reported or observed by many residents. In their comments they reflect on the stigma associated with their communities:

> I've had to take the suburb off my resume. A lot of people go, "Armadale?" … It's always known as the poorest suburb and it has that image. Unfortunately, it's not going to go away. Never. Never. It's not going to be one of these suburbs that people go, "Oh. You live there. Oh, how nice". (Samantha, 49, Armadale)

> In the ten years that we've been here, we've actually seen this suburb go downhill, and that's because of the closing down of industry, more unemployment, crime and vandalism. Just recently, there was the social service report, this is up at the top, it's one of the most disadvantaged suburbs, and nothing has changed since the last social survey. Living amongst that can be quite depressing. (Rebecca, 58, Broadmeadows)

For those in these communities, this stigma was a lived reality. Many participants in both communities expressed a general dissatisfaction in living standards. Josie and Rebecca, for example, expressed this in their experiences of home life and the broader community:

> We came here because the house prices were cheap. That's the only reason, otherwise I wouldn't live here. I hate it … Armadale's very restrictive … It's a very low income area. Lots of problems and just stuff like that. There's no opportunities, no facilities, there's nothing … They don't offer anything. (Josie, 38, Armadale)

> There's a number of pressing issues. There's the issue of slum landlords. Some of the houses people live in are shocking, absolutely shocking. If you closed your eyes and didn't know where you were and drove around some of these streets, you'd think you were in a third or second-world country. (Rebecca, 58, Broadmeadows)

As these statements reflect, both communities were characterised by reduced resource opportunities. In Josie's experience this led to 'lots of problems' and a 'restrictive' living standards due to a lack of opportunities and facilities. Rebecca expressed similar frustrations from experiences of dilapidated housing and a neglect of the area, which she compared to living in 'a third or second world country'. This lack of opportunity, and the compounding stigmas associated with it compromised the sorts of autonomy residents had over their lived circumstances. Most were forced to prioritise the few resources that had to meet basic daily demands, allowing them little capacity to enrich their living standards through forms of comfort, convenience and enjoyment. The accounts and experiences of participants in both their households and community reflected these perspectives. Albeit a brief insight, this serves as a depiction of life in socially disadvantaged Australian urban contexts.

5.2.1. Entrapment for some, and opportunity for others: The housing and private amenity of the socially disadvantaged

Armadale and Broadmeadows were characterised by basic and budgetary housing styles. These were predominantly small detached dwellings with two to three bedrooms, though a small amount of

medium density style dwellings were observed in each location (ABS 2015a, n.p; ABS 2015f, n.p). As Table 5.1 suggests, housing occupancy was reflective of a community characterised by low incomes, where home ownership rates were significantly below average and levels of renting and social housing arrangements were high. For many residents the affordability of housing served as the main incentive for living in these areas. Damian, Alice and Nicola reflect this in their housing decisions:

> Did we want to move to this area? Probably no, but we did because it's a lot cheaper to live here than it is in other places in Perth. (Nicola, 37, Armadale)

> Yeah. We moved here purely because it's cheap. It's affordable. Plus, there is the Muslim community here, which is also good for me. (Alice, 29, Broadmeadows)

> Price. Yeah just straight up. Nothing else … When the time came to look at a house, I finally found someone to give me a loan, and this area was the affordable bit … This one came on at 260 [thousand AUD], I got them down to 250 for it. Anywhere else, even if I was looking at house and land [package], you were talking 300 up. So it was a good opportunity to get back into the market. (Damian, 55, Armadale)

As these accounts suggest, a low market value in these communities presented opportunities for low income earners to enter or remain in the housing market, while others would invest to prioritise expenses for use elsewhere (such as travel and family interests). Notably, some residents, such as Alice, also cited community values such as cultural connections and geographic conveniences for their choices for occupancy in these communities.

However, the affordability of these dwellings was not without its drawbacks. For many residents structural qualities and overall housing conditions were found to be considerably poor, relative to broader urban standards. At times this impacted on living standards through reduced household comfort, convenience and enjoyment. Lauren and Damian provided an example of this, commenting:

> I've got my own room now. Before I always slept on the couch all the time, back at the other house. I'm feeling much happier. My kids are happier too because they got their own rooms as well … There's a lot of problems. The water doesn't taste too good. Every time we drink it we feel like we want to vomit it up. We're drinking bottled water now. (Lauren, 45, Broadmeadows)

> As I said, it was an ex-rental. It was in really bad nick … The backyard was full of fleas. All the carpets in the bedrooms were disgusting really. (Damian 55, Armadale)

For renters, issues with structural and material qualities such as these were not only more prevalent, but often compounded due to financial limitations and an inadequacy of tenancy based services. This limited the capacities of occupants to access sufficient forms of maintenance and upkeep. Dale

and Lauren in the following comments discuss issues with dilapidated rental properties and renter negligence, which were a common experience in these communities:

> The house is falling apart … things are always broken … They weren't going to do anything about it but I got the Tenancy Union involved. I don't pay the water now because actually the real estate [owner] owe me money. I mean around 6,000. (Lauren, 45, Broadmeadows)

> I went out a couple of weeks ago to a friends place and did a bit of maintenance because she's renting the place and the bloody landlords take forever to do it … I went over and fixed a leaking tap and replaced a washer. (Dale, 48, Armadale)

Notably, local support networks as seen in Dale's comment, played an important role in the management of these issues for some residents. Though for most participants these networks were not as readily available. As in Lauren's case, a lack of support along with limitations to finances, time availability and education were frequently found to reduce residential capacities for overcoming the problems associated to poorer housing conditions. Residents were forced to put-up with these problems or compromise expenses elsewhere. In this sense not only were living standards compromised, but capabilities for their improvement were also significantly reduced.

In other instances, the few resources people had available to them were required for satisfying more immediate welfare needs. Often forms of enjoyment, comfort and convenience were compromised as a result, due to more immediate daily requirements such as ensuring health, paying bills and daily expenses. Kate and Sophie demonstrate these experiences in the relinquishing of 'nice' and 'luxury' values for more immediate requirements:

> Even if you're working, living on a wage, you just don't have that luxury of putting it into your house. People who obviously own their house are paying it off, if their fence falls down or something, they don't have the money to fix it. They're living on the margins, and that's what we've noticed getting worse over the years. (Sophie, 66, Broadmeadows)

> Nah, none. Who gives a rats? Which is a bit disappointing. [It] Doesn't take much to pick up a bit of rubbish. I mean, I'd do it myself if I had time, but I don't. It is really their responsibility. I don't leave it there. I try not to leave it wherever possible. So things like that, and [also] people just keeping their yards nice. As you probably noticed, there's a lot of houses that just don't. Ours is quite bare, we want to do stuff to it, but we haven't got the money to do so. (Kate, 46, Armadale)

With reductions to household amenity, forms of personal enjoyment and comfort were significantly reduced. The deterioration of aesthetic standards and amenity from these restrictions, also fed a perceived apathy throughout much of the community. As Kate and Sophie suggest in their comments, basic practices such as litter removal, garden and property maintenance—that might

otherwise enrich amenity—were commonly abandoned. Regular accounts of social disenchantment and disconnection were observed throughout these communities as a result. This drove a lack of salience for community connection, engagement and public stewardship. I discuss these dynamics in the following.

5.2.2. Degradation, disenchantment and disconnection: Experiences of the public setting in disadvantaged communities

Few participants looked upon the public settings of Broadmeadows and Armadale with favour or enthusiasm. While some geographic features such as local greenery (in Armadale), and proximity to the CBD (Broadmeadows) were valued, participant experiences and accounts more consistently reflected a community both disenchanted and disconnected by degraded local contexts.

Disenchantment was expressed out of frustrations over a lack of sufficient facilities and services, and a degradation or neglect of existing social amenity (through public and household infrastructure). The following experiences from Sarah, Nicola and Sophie provide examples of these concerns, which they considered to limit opportunities for social connectedness and enjoyment, welfare, community mobility and an amenity in public spaces:

> Because of the problems that happen here in the Mall … it makes it hard. Nothing's open here. Everything closes and there's nothing. You really can't go out anywhere. There's nothing. You have to go three suburbs over. The only thing that you've got here is your shopping centre, but everything else is boring. (Sarah, 49, Armadale)

> You see our waterway areas full of rubbish, and I'm not talking a couple of bits, I'm talking mounts of rubbish. I think they're coming from the storm water drains. People, they're a little bit naughty. They dispose of things in those areas, like I've seen burnt motorbikes, prams, tools … there's just (a mentality like) "I don't want this anymore, I'll Just dump it down there". It's not very pleasant. (Nicola, 37, Armadale)

> This suburb was built in the 1950's. There was all the manufacturing industry around here, so this was a housing commission suburb to provide workers for the factories. That was it. Nothing else was put in place … that was in the 1950s. Sixty years on, this suburb still has a wealth-based economy. If you drive around here now, you'll notice there is a lot of empty factories. Decrepit and empty … To try and provide jobs? I've just been looking at it and thinking—given the suburban sprawl now—I don't know how you would do that. (Sophie, 66, Broadmeadows)

Terms such as 'nothing', 'not pleasant', 'decrepit' and similar ones were commonly used to describe public contexts, which emphasised the frustrations and disenchantment observed in participant accounts. Notably, references to social 'problems', community 'mentalities' and historically influenced 'wealth-based economies' in these accounts highlight the role of complex situational

variables in shaping community perceptions and experiences. This suggests that resource access and availability in community settings is determined not simply on a 'have or have-not' basis of provision, but instead is inherently tied up in the socio-cultural dynamics that underpin community contexts.

In Broadmeadows and Armadale, community settings placed further constraints on opportunities for local resource access, through dynamics that reduced rates of public engagement and participation. Rebecca and Josie, for example, described concerns for their safety in spaces such as shopping precincts, public gardens and train stations:

> I don't walk at night and I take a lot of care of my personal safety. The [train] station. That's seriously scary. Since we've been living here, nothing has been done … They just keep pouring more and more social housing in. There's a place up there near Banksia Gardens that's just scary, it's covered in graffiti, there is always burnt cars and police up there. Stuff like that should be pulled down. (Rebecca, 58, Broadmeadows)

> The main area of the Mall that's in Armadale, I don't go down there, because often, there's a lot of people lurking around there. It's not appealing to the eye in the way that you think "Oh, let's go for a walk down there", it looks run down and too ridden with crime. I avoid that area. Often you get approached. They'll ask for money, or things like that. I don't ever say yes, but there's that one day someone will whack me over the head, or try to hurt either one of us, because they're that sort of people. So I don't like going there if I don't have to, and I often avoid it. It's just the feel of it I guess. You just don't get that feel that it's welcoming. (Josie, 38, Armadale)

In these settings, experiences of crime, vandalism and anti-social behaviour enforced concerns for public safety, reducing their willingness to spend time in their community. For Josie and many other residents, this led to an avoidance of these areas or a reduced access to the resources in them. During fieldwork, personal experiences in local shopping complexes and community hubs supported these experiences, as few instances of regular social interaction were observed.

A degraded local setting, limited in resources opportunities and rich in disenchantment, led many residents to pursue their daily needs outside of these communities. Tran, Josie and Rebecca, for example, describe leaving Broadmeadows and Armadale in order to access forms of social enjoyment, cultural and community connections, employment and daily supplies out of a perceived lack of these in their community:

> [In the area?] Nothing. Most of my travel is beyond here, because my community and my church is [on the other side of the city] … I have very few friends in the area, most of them are [on the east of Melbourne] in that area. During peak hour to get anywhere you need at least one hour and a half. I can't take any job if it is 8.30, 9.00 a.m. in the morning. I won't. (Tran, 67, Broadmeadows)

> There's not a whole lot down here, usually on the weekends when we do things with my son, we usually go closer to Perth. If there's things on, they're usually not in Armadale because there's not a hell of a lot that goes on around here really ... [It's] far away from everything ... we are far away from the city, far away from where the work is. (Josie, 38, Armadale)

> No, I don't interact with the community, and I find that really quite difficult. I don't have any friends in this neighbourhood. I still go back to [my former suburb], where I can walk down the street to the shopping centre and say "hello". I have found it very difficult shopping in this area because it's so damn depressing. (Rebecca, 58, Broadmeadows)

As these statements suggest, many participants expressed feeling of isolation, as observed from Josie feeling 'really far away' and Tran and Rebecca 'having very few friends' in their neighbourhood.

Through these processes, opportunities for an establishment of enriched social fabrics that might foster forms of connectivity and mobility were significantly reduced in these communities. In effect, residents were disconnected from one another. Few participants reflected strong ties to local social groups or neighbourly connections, and some even highlighted a reluctance to engage with their community as Alice and Nicola demonstrate:

> For me, especially in this street, there are a few people who have been living here since Coolaroo was established. They've been living here for over 40, 50 years. Some people I've never even met. I know nothing about them. That's why I think I just really wanted to do the community garden because it's just a way to connect us all together, like even with the closest—my neighbours, people that I've never met. I've never seen. I thought that was a way, like an icebreaker kind of thing between me and some of those neighbours. I wanted to reach the other people who I don't know, who've never met me. I think just to change that mentality or change that idea of someone who's wearing a scarf is a terrorist. There was one guy, and he's been living here for over 40 years. He was talking to me behind the fly screen. He didn't even want to open the fly screen. He didn't even want to see me. (Alice, 29, Broadmeadows)

> The people that live in the area are not really thoughtful of other people's feelings and situations. The lady across the road, she's a lovely lady, she's on her own and she gets harassed a fair bit, by people behind her and by the people on this street. Often, if we've got the front door open on a weekend, just letting some fresh air through, which truth be told, I dislike doing because I don't want to know what's going on out there, they'll [our neighbours will] come to the middle of the street, have a big barney, swearing, and using all sorts of nasty words ... You feel so uncomfortable in your own home, you can't have your front door open. (Nicola, 37, Armadale)

With the loss of these resources, living standards for those in these contexts were significantly compromised. Feelings of personal safety and comfort, as Nicola suggests, and opportunities for local connections and support, which Alice describes, were significantly reduced and difficult to establish. The lack these resources—that might otherwise offer forms of social enjoyment, mobility,

knowledge sharing and support—embedded residents into ongoing cycles of local degradation, disenchantment and disconnection. Cycles that appear to have existed in these contexts for some time, as observed from the ongoing stigma attached to these communities.

5.2.3. An overview of life in socially disadvantaged communities

Personal accounts of household and community settings from participants in the Armadale and Broadmeadows community offered a snapshot into the experiences, perceptions and living standards of socially disadvantaged urban citizens. For most residents a reduced availability and access to material, economic, social and cultural resources meant an entrapment in living conditions, characterised by reduced opportunities for enjoyment, comfort and convenience in daily life.

Notably, some participants sought to benefit from these contexts, as more affordable housing and the geographic location of these suburbs offered opportunities for them to better meet their lifestyle needs. However, for most residents degraded household and community settings and a lack of social connection, reduced living standards drove low rates of personal satisfaction.

Housing, though more affordable in comparison to broader urban standards, was often of a structurally poor quality, and regularly in need of maintenance. For some residents, forms of personal know-how and access to community support networks meant these limitations could be overcome. Though for the majority of residents, a reduced financial capacity, lack of community networks and more immediate welfare requirements, limited the capacity of residents to uphold enriched standards of personal amenity.

From a public perspective, this contributed to an already degraded community setting, characterised by experiences of crime and anti-social behaviour, and limited facilities, services and amenities that could otherwise enrich forms of community engagement, connectedness and stewardship. These impoverished settings perpetuated cycles of disenchantment and social disconnection, which not only limited existing living standards, but also reduced opportunities for their improvement through otherwise established means of social connection and mobility.

Residents in the Armadale and Broadmeadows communities were at a considerable disadvantage compared to more resource rich communities within their urban contexts. Enriched forms of liveability, resilience and sustainability were decidedly absent from these communities and, with few resources, so too were the capabilities of residents to transcend or moderate these circumstances.

5.3. The Balancing Act of Moderation: Experiences of Life in the Coburg and Ballajura Communities

Coburg and Ballajura represent communities of moderate social advantage for this study. Table 5.2 provides an overview of the demographics and resources that contextualise them. As evident in the figures, SEIFA data characterise these communities as moderately advantaged, somewhat consistent with the averages of their respective metropolises. Accordingly, Australian Census data suggests both are communities in which forms of economic, material, social and cultural resources were of moderate availability and variety.

Table 5.2. SEIFA Scores and Demographic Characteristics of the Ballajura and Coburg Communities

Determinants/Suburbs	Ballajura	Greater Perth	Coburg	Greater Melbourne
SEIFA for Disadvantage (Score/Decile)	1012/6	1,033/6	1006/5	1020.3/6
% Tertiary educated	10.30	19.60	29.8	23.6
% Unemployment	10.8	4.80	5.7	5.5
% With high weekly income	35.8	23.1	18.2	19.4
% With low weekly income	4.80	17.9	21.0	19.2
% Non-English speaking	4.8	2.4	8.1	5.0
% With internet Connection	81.40	77	72.1	76.4
Average property value	$490,000	$431,343	$761, 000	$582,067
% Home owners	25.80	28.10	33.3	31.5
% Renting	18.5	26.7	29.1	26.5
% Social housing	3.8	3.6	2.2	2.9
Population	18,994	2, 039 200	25,001	4,921 000

(ABS 2014c, n.p 2015; ABS 2015d, n.p; City of Swan 2015; ABS 2014a; ABS 2014b; ABS 2013)

This was particularly evident in terms of financial resources, educational levels, employment and housing tenure. The Ballajura community was characterised by middle-income working families, with a mix of technical and trade based, administrative and professional occupation choices. Coburg reflected a similar dynamic, however, the lure of a rapidly gentrifying inner-northern metropolis

meant a greater number of young professional, student and single occupant (mid-high density) households were interspersed throughout this community (ABS 2015d, n.p; ABS 2015b, n.p).

Most participants were embedded in their communities through enriched family, social and employment networks. While the nature and extent of these were varied, many possessed a strong and at times long standing sense of community connectedness and engagement. This included close ties to family, friends and neighbours, and an active involvement in community based groups, programs and initiatives. Many participants considered these networks a major factor influencing their decision to live in these communities. Helen and Lachlan demonstrated this, saying:

> We thought well let's move, but stay in the area because I work in Malaga, the next suburb over. My wife works in Noranda, two suburbs over, so we wanted to stay in the general area. My wife's parents live in Ballajura, her sister lives two streets away in Ballajura, so her family's all close, and they've grown up, the majority of their life, around here. I grew up in Dianella, so not far either. (Lachlan, 46, Ballajura)

> We've got really strong networks here already in such a short time. It's been really nice, just people that we want to hang out with. There's other parents at the school, we partly chose it because we wanted to hang out with those parents for the next ten years. Not just, "I have to, but we enjoy your company". There is a strong network around us. (Helen, 40, Coburg)

This connectedness offered enriched resources for community, employment, capacity building and social support. Satisfaction in living standards were generally high, as it allowed many residents to encompass private and community based forms of leisure and luxury, and go about their daily lives in more convenient fashion. However, these were not without their limitations, as moderate levels of resource availability influenced the extent and ways in which these values could be upheld. With moderate resource contexts residents would balance daily demands in ways that would best allow forms of enjoyment, comfort and convenience to be encompassed. I reflect on these dynamics in the following through participant experiences and accounts of household and community settings in these communities.

5.3.1. Balancing constraint with leisure and luxury: Experiences of housing and private amenity in Coburg and Ballajura

Housing styles were most consistently medium to large blocks, with mid-scale house sizes often encompassing multiple bedrooms, bathrooms and large living spaces. For Coburg a wave of older post-WW1 settlement housing, and the more recent development of apartment style, single occupant dwellings meant moderate and higher density dwellings were also present (Moreland City Council 2015; Calleja, Hubbard & Raworth 1990). As Jacob and Riley demonstrate, housing choices

were predominantly based on affordability, relative to their financial budgets, and the suitability and functionality relative to their needs.

> We wanted a bigger property and for the money that we could afford, it was pretty much Ballajura within our price range. We saw this house and put an offer on it straightaway and got accepted. (Jacob, 59, Ballajura)

> So it's a three bedroom house. It's 1940's. Things keep going wrong with it. Whoever did the plumbing was a complete moron. It's the worst plumbing. But it's cool. Like I said a big space, it's in a bit of a cheap area because no one actually wants to live on this street. It's got a big yard, floorboards, it's run down, but I think it was once nice. (Riley, 31, Coburg)

As Riley suggests, a mixture of old and modern developments, and a more moderate housing market in these communities meant most houses were of a reasonable structural standard. Though in some instances, plumbing and electrical issues, heating and cooling inefficiencies, deteriorated foundations and roof repairs were described by residents as occasions were household structural inconsistencies had impacted on daily comfort and conveniences.

The extent to which these would impose on living conditions was often linked to the resource contexts of individuals. Most participants possessed finances, community connections and/or personal know-how, which meant they were able to make improvements and ensure upkeep with ease. For a lot of participants, including Peter and Alee, this was reflected through the notion of their dwellings as a 'renovators dream' or requiring/having had 'a lot of work'.

> Like a lot of the houses around here, this is a post-WW1 house. I've enjoyed renovating it. I feel like I am getting some experience out of doing it. I like the feeling of getting things done and improving the house and adding value to it. It's something that you can't really do when you are renting. (Peter, 39, Coburg)

> It was really run down so we had so much renovating to do. We were a bit concerned (at first), but we are almost there. We had lots of friends and family in the area who could help us. (Alee, 31, Ballajura)

Where resident were more socially disadvantaged—by reduced personal finances, more limited support networks and/or a lack of know-how—structural issues appeared more frequent and impacted on living standards more significantly. As Hayley and Nicholas demonstrate, this included issues associated to more intensive design and foundational features, resulting in instances of flooding or ongoing renovation requirements.

> I had an inspector out here. He was saying that when they built these houses, I don't know, they just took shortcuts, and the house is slightly going off on an angle, and so it floods. It's happened a couple of times, I was sitting there and one was in my lounge room, and the second one was in my kitchen. (Hayley, 55, Ballajura)

> Yeah, the house is semi-detached so we share a wall with our neighbours. Occasionally we hear them yelling. The dad yelling at his kids, which is unpleasant and he occasionally hears us doing silly things like using power tools. Renovating our new kitchen at a bit of an inappropriate time and he'll let us know about it. I would prefer to have a wholly detached house. The other thing I don't like is that we have had to renovate and we are not natural or experienced renovators so it's difficult. We are both working full time in big busy jobs, so it's not nice coming home to dust over everything because you have drilled into a wall, or a kitchen that is not functional, or a toilet that doesn't flush. But we'll get there. (Nicholas, 33, Coburg)

Despite these occurrences, the size, location and price meant most participants were satisfied with their households and the amenity it offered.

A more modest resource context meant values for comfort, enjoyment and convenience could be more frequently prioritised in the material settings of households. Items such as pools (for Ballajura residents particularly), gardens, outdoor entertainment areas, and spacious indoor living areas were considered key attributes or 'selling points' for many participants. Alee and Nicholas demonstrated this, saying:

> We chose it because of the size of the property, and the fact that it had a nice backyard, and a lot of potential. It's got the pool … in Ballajura, every second person has a pool. Also, it's close to public transport, it's close to the shop, it's close to the parks and things like that. It had 2 bathrooms, the large en-suite, and we just saw it as a good place to do renovations. (Alee, 31, Ballajura)

> A lot of the neighbours have also got lots of native plants, their nature strips are really kind of cool and they obviously like native plants and looking after their gardens. Most people around here have quite a lot of pride in their houses. (Nicholas, 33, Coburg)

As they suggest, these were frequent attributes throughout these communities, as 'every second person' had pools in Ballajura and 'most people' had pride in their homes and gardens in Coburg. With a greater frequency of these attributes, forms of enjoyment, comfort and convenience were not only more observable but became increasingly embedded in daily normality.

With this normality came perceived standards and expectations for amenity. For example, Hayley and Riley describe expectation for garden presentation and upkeep they considered to be embedded in these communities.

> My community, I'll first of all start in my street. I've noticed that people in my street alone, I don't know whether they are renters or they're owners, I don't know, but I notice that people have changed a couple of things. One is people have either introduced this fake lawn onto their gardens, or have paved, or concreted, or somehow they've all just let their lawns go. They're not spending …

>They don't want to spend the money on the upkeep of the garden … everything just goes brown. (Hayley, 55, Ballajura)
>
>In terms of the garden I tend to just let the middle bit go. Like in summer it tends to just go dry and I'm like oh well whatever. [it] Saves on bills in the summer and I do actually care about water. I do water things which are functional. So I have got veggies around the side, I do water them because that is where I am getting my food from … Some people water their lawns a lot, even in summer they have got perfect lawns and I know they think I'm terrible. (Riley, 31, Coburg)

However, as these comments suggest, these expectations were not perceivable for everyone and nor were they attainable. Levels of resource access and availability had a relationship to this, as some residents were more able to uphold standards, while others simply lacked understandings, know-how and finances for these to be achieved.

For most participants' personal enjoyment, comfort and convenience were prioritised in some areas while in others were reduced out of financial, material and social limitations. Where resource opportunities were greater more extensive forms of comfort, enjoyment and convenience could be achieved through enriching the material contexts of their houses and fostering community connections. Though, as I describe in the following, the capabilities individuals possessed to achieve more fulfilling living standards were also influenced by their community settings.

5.3.2. The public setting, a family setting: Perspectives on amenity and liveability in moderate communities

The use of community spaces and values for public amenity varied amongst participants in Ballajura and Coburg. Shopping centres, cafés, libraries and local exercise facilities such as sporting clubs, parks and walking paths were described as places of interest for the area. Responses included:

>It's a nice place to have a child. My daughter is five, so if there is sunshine we are at a park, we hang out a lot of the time in that mally area, because we like to just go out and have coffee. We go to the library. You can borrow the chess sets from the library and you can play chess out on the tables there. We do all our shopping at the little market there and the Deli. Yeah, chat to people. My daughter gets free food because she is cute. (Jay, 37, Coburg)
>
>Yeah, my partner spends a lot of time at the indoor cricket club and he also plays outdoor cricket for Ballajura. Now, since I'm a stay-at-home mum I'm constantly out running in the morning and there's lots of different parks round here as well … Also, it's close to public transport, it's close to the shop, it's close to the parks and things like that. (Alee, 31, Ballajura)

Values for the serenity/quiet of the area associated to the distance from the city (Perth's and Melbourne's CDB), and greenery in parks, bushlands and sporting grounds were also highly valued;

> There's a couple of nice parks so we're very much into outdoors and parks is a big thing for me. There's a really nice park at Coburg Lakes. It's a big, big park, good children's equipment, but also nice for adults to be, like lots of big, old established trees. There are also a bunch of smaller parks everywhere ... it's very peaceful. (Helen, 40, Coburg)

> I see them watering the parks. For us to walk on and the grass for the kids to play sport on and stuff like that. (Natasha, 48, Ballajura)

> I guess it's a pretty down to earth area, there is a lot of young families with kids similar ages and stuff, yeah, lots of the time we're meeting up with people in parks in the area. So meeting lots of friends who have got families, and having friends over. I guess with the kids it's a good area. (Peter, 39, Coburg)

As Helen, Natasha and Peter suggest, these amenities were aspects that contributed to a family ethos of these areas. Many participants, such as Peter, expressed an appreciation of these facilities, as they offered enriched opportunities for social enjoyment and the building of community networks.

Although personal interests and values were less aligned to these life-cycle stages and choices, perceptions and experiences were rather different. Some participants instead felt socially and culturally restricted in these communities and were urged to leave these communities to fulfil their daily requirements and needs;

> It's not really a hub. As I said, it's a family oriented area. It doesn't have places that I tend to go to. They're closer to the city. The theatres, and restaurants that I go to, I tend to go to other areas to socialise. So my social life, and even friends, aren't in this area. (Hayley, 55, Ballajura)

> The distance from the city for me is something. I'm used to having lived a bit closer. I have to walk about twenty minutes to public transport which I find a bit inconvenient. Yeah, there's not so many bars in Coburg yet. There are a couple of cafés springing up here and there but on our street there is not much. There is a pizza place, there is a convenience store, but yeah not much in terms of social events going on ... we have to go closer into the city. (Maggie, 29, Coburg)

For Hayley, Maggie and some others, the lack of amenities suitable to their lifestyles reduced their enjoyment and appreciation of the area, and thus time spent there. Notably, the geographic location of these communities played a significant role in this dynamic. An increased distance from the Perth CBD for Ballajura residents reduced their capacities for mobility and exacerbated frustrations with isolation and constraint. While a closer proximity and connectivity to the Melbourne CBD for Coburg residents meant forms of social and cultural engagement were more easily accessible, and restraints more easily overcome.

In both instances, public enjoyment and community engagement was also limited through experiences and concerns for safety and wellbeing. Participants such as Riley and Natasha expressed an awareness of less favourable areas and residents in the community, and some concerns for youth issues, domestic crime and vandalism:

> I'm up the more northern end and occasionally it's a bit rough. I've been out walking my dog and I've seen a guy chasing after another guy with a baseball bat and start smashing into his car and stuff. So stuff like that happens, I've had my house broken into a couple of times. You can't walk up and down Bell Street as a women without getting wolf whistled the whole way. (Riley, 31, Coburg)

> Young people are very inconsiderate in this area. Their mums and dads are working, and they're not sort of like keeping their eyes on the children. It's a very young area, they will often destroy things at the park, they're rude, they steal from the shops. There's a lot of problems with it at our shopping centre down here at Ballajura City [Shopping Centre]. (Natasha, 48, Ballajura)

Experiences of antisocial behaviour, limitations to some amenities and services and distances to alternatives placed limitations on opportunities for daily fulfilment and forms of connectedness amongst the community. Notably these were greater for some residents than others. The increased requirement for some residents to leave the community to work and socialise (for example), and a disenchantment of others (who had less capacity to do so) limited community connectedness and engagement in these communities. Where these were overcome or less constraining for residents, daily satisfaction was higher.

5.3.3. An overview of life in moderately advantaged communities

The Coburg and Ballajura communities offered a resource context that was reflective of a moderate social advantage in Australian urban contexts. These were aligned to the averages of their broader metropolises. While each community possessed its own unique characteristics, the dynamics and processes attributable to a moderate social advantage were similar, offering an account of the lived experiences and opportunities in these circumstances.

A reasonable level of satisfaction in living standards was observed from most participants, as the economic, social, material and cultural resources to which they had access, afforded them opportunities to encompass forms of enjoyment comfort and convenience in daily life. These opportunities were greater for some residents more than others. Those with more money and enriched community connections could more easily ensure forms of enjoyment, comfort and convenience as they had a greater autonomy over their material settings and resource consumption. Though for others, these opportunities were more limited as a reduced local connectedness and/or

engagement, and poorer material settings compromised the sorts of opportunities they had. With less choices and autonomy over their resource contexts, living standards were reduced.

Participants had an interesting relationship with their immediate communities, which had a significant role in shaping these capacities. On the one hand, a greater sense of fulfilment and satisfaction was achieved where resource needs could be more immediately met by local networks, amenities, facilities and services. This was as the forms of enjoyment, comfort and convenience residents could obtain were more readily available and often of a higher standard. However, on the other hand, the extent these resources could be accessed was dependent on the existing circumstances (experiences, needs and capacities) of individuals, which mediated the extent of their community engagement, social networks and material capacities. Despite a generally moderate social advantage, these capacities were found to be varied throughout these communities and, thus, so too the advantages and disadvantages these communities offered individuals.

These dynamics provide an interesting point for considering the relationship of inequality to forms of liveability, sustainability and resilience. Although the broader averages of Coburg and Ballajura were reflective of a community with moderate resource availability, resources that could ensure a greater capability to enrich these outcomes were not immediately accessible to all. Instead, opportunities for accessing the social, cultural and material capital necessary for them were more intricately tied up in interrelating social and political processes of household and community contexts. The capabilities residents had to define their lived contexts were determined not just by the resources available to them, but also what they would (or could) access.

5.4. Living with Advantage: Lifestyles of Leisure and Luxury in Camberwell and Cottesloe

The Camberwell and Cottesloe communities provided the case studies of high social advantage. Their SEIFA rankings and demographics depicted in Table 5.3 define communities rich in resource opportunity. Residents were characterised by high education, employment and weekly income levels that were considerably above average in their respective cities. Accordingly, 2011 state and national SEIFA data ranked these communities in the top tenth percentiles for education, occupation, economic resources and general social advantage. The local government areas, of which these communities are a part, also possessed similar scores.

In her book, *Cottesloe: A Town of Distinction* (2007), Ruth Merchant-James describes the 'enviable lifestyle' observed in the modern Cottesloe community (p. 2). Indeed, it was this lifestyle (and one

similar in Camberwell) that was expressed through the accounts of participants residing in these communities. A satisfaction in living standards was high for residents, and so too the notion of '*Distinction*', which many participants, including Mathew and Jessica, cited as influential in their decisions to move to these communities:

> We wanted to live in Cottesloe … We wanted to live somewhere in the western suburbs … we've walked around. It's nice. It's a lovely spot. You couldn't ask for a nicer environment to hang out in. (Mathew, 47, Cottesloe)

> I do really like some of the western suburbs. It reminds me of where I grew up— down near Margaret River. I feel at home here and very comfortable … it's a beautiful area. (Jessica, 24, Cottesloe)

Table 2.3 SIEFA Scores and Demographic Characteristics of the Camberwell and Cottesloe Communities

Determinants/ Suburbs	Cottesloe	Greater Perth	Camberwell	Greater Melbourne
SEIFA for Disadvantage (Score/Decile)	1119/10	1,033/6	1112/10	1020.3/6
% Tertiary educated	45.7	19.60%	44.9%	23.6%
% Unemployment	1.8	4.80%	3.2%	5.5%
% With high weekly income	32.4	23.1%	39.9%	19.4%
% With low weekly income	24.0	17.9%	12.8%	19.2%
% Non-English speaking	0.2	2.4%	2.2%	5.0%
% With internet connection	80.4	77%	10.3%	76.4%
Average property value	$1,850,000	$431,343	$1,900.00	$582,067
% Home owners	37.1	28.10%	44.3%	31,5%
% Renting	29.5	26.7%	21.6%	26.5%
% Social housing	1.2	3.6%	0.7%	2.9%
Population	18,381	2, 039 200	20,029	4,921 000

(Source: ABS 2015c, n.p; ABS 2015g, n.p; ABS 2014b, n.p; ABS 2014c, n.p; ABS 2013, n.p;)

This was as the abundance and availability of resources for residents in these communities created a lived context with few restraints. Terms such as 'beautiful', 'nice' and 'lovely' were frequently used to describe their experiences, as living standard were premised on values for leisure and luxury, affording them heightened and consistent forms of enjoyment, comfort and convenience in daily life. This was observable through the experiences and values participants had in their household and community contexts.

5.4.1. Luxury and grandeur in the "leafy-greens": Perspectives on the housing and private amenities of the socially advantaged

With a greater availability of economic resources, little priority was given to the affordability of houses despite higher average prices, as reflected in Table 5.3. Instead, choices for dwelling types were more frequently determined by the style, functionality and amenities that would ensure comfort and enjoyment. As one resident commented:

'The ultra-modern giant McMansion' (Timothy, 38, Cottesloe).

Although Timothy's description served as a light-hearted take on perceived housing standards, it does in some ways exemplify the broader experiences of housing and private amenity in these communities. Many houses were considerably large, recently built, renovated or expanded to encompass multiple rooms and living spaces, as Grace and Anna suggest:

> Five bedrooms and a study, and lounge, garden and this open area. The house is divided into thirds. There's that third there, and this third and the next third. You can control the heating and air-con in each third. You don't have to heat the whole house. The middle bedrooms too small, we should have gone bigger. What else? Probably the living room where it is, I might have changed that, with an external access for a sunroom, but there's nothing really much. I like the house. (Grace, 60, Cottesloe)

> Well, it's an old Federation house that has been extended. It had been extended when we moved here. So it's quite a new extension which means that we didn't have to add any money to it. We built the carport, but it's got its own garage. My husband has vintage cars, so that was an ideal position for his cars. (Anna, 60, Camberwell)

Houses were also of a high structural quality, rarely seen to be in need of repair or maintenance. Leisure and luxury based features, such as architectural and historical features, pools, tennis courts and other entertainment areas were frequently discussed, as evident in comments by Nelson, Pip and Georgia:

> Ours was built in '77. It was actually quite a step-up in terms of architectural technology. It made the house full of light and airy. I like the fact that it's not a massive house. A lot of houses, you do see out here are enormous. It's actually

> not a very big house, but we use every corner as I said before, which I think is important. I like the fact the architect has been involved and I think you only know the value of an architect when you see houses that are poorly designed. (Nelson, 47, Cottesloe)

> We love Victorian style homes. That was one of the main reasons that we bought it. It was just, it had so many features that we really loved, like decorative ceilings and high ceilings. Led lights and these are actually parquet floors. Just nice features that make it feel special, in that sense. (Pip, 57, Camberwell)

> I love the floorboards actually. This is one of the reasons why I'm loath to actually pull down that house. The thought of having just a concrete pad which is hard. The floorboards … It gives. It's great on your legs and I do yoga. I've done yoga even with a yoga mat on concrete floors. It's just not the same. It feels absolutely beautiful on your body to walk on those floorboards. They're jarrah floorboards. There's give. That's one thing that I love about it. The house has a lot of character. There's a charm about it that you don't get in new houses. It's really like going back in time a bit. There's a certain charm. It's old fashioned and that's lovely in itself. (Georgia, 48, Cottesloe)

As these statements suggest, the material and economic resource contexts of residents in these communities allowed them to enrich their living standards with few limitations. Accordingly, more gratuitous forms of leisure and luxury were more attainable and frequently observed in daily lifestyles.

For most participants these features served to meet standards for 'nice', 'lovely' and 'beautiful' personal settings. Although some participants, such as Anna and Harley, expressed concern for the environmental and social implications of such extensive consumption processes:

> It's individual people. Quite often it's not to do with high densities or anything, it's just people are building six bedroom, six bathroom houses and they're disgusting. They are not considering anything about how they're going to keep the place green. They want to live in the leafy greens, they don't want to have to do it themselves. And we are finding increasingly, that there are certain cultures, certain types of people coming in that are doing that. (Anna, 60 Camberwell)

> My experience more comes down to growing up around here and the mentality of a lot of people that live here who think "we are from the western suburbs, we can do what we want". (Harley, 29, Cottesloe)

In this sense the notion of a 'McMansion' not only encompassed the perception of grandiose large scale houses, but also served to reflect the lack of perceived restraint in material consumption that some participants believed existed in these communities.

5.4.2. 'Everything we want': The social enjoyment and conveniences of public amenity in socially advantaged urban communities

Public settings were of a high standard in the Camberwell and Cottesloe communities. As I describe in the following, an abundance of facilities and services, enriched natural and built amenity, greater opportunities for local engagement and connectivity to surrounding areas, fostered living standards with increased forms of enjoyment, comfort and convenience in daily life. In the words of Grace (60, Cottesloe),

> 'Everything we want is here'.

As Grace's remark suggests, the convenience of local services and pleasant public amenity these values offered, meant basic daily needs were easily accessible. With a more immediate satisfaction of these, personal 'wants'—what de Haan et al. (2014) refer to as relatedness and growth needs— were a more common component of daily life.

Accordingly public features were most frequently discussed where they added value to social enjoyment, efficiency and comfort. This included the close proximity and connectivity of these suburbs to the city (CBD) and surrounds, as Harley and Pip describe:

> A lot of my friends live around here, because I went to school here and had lived locally, growing up around here as well. So from a social point of view it's pretty easy to get around, also the proximity to the city as I work in the city. It makes it a bit easier to get into work. I am directly off Stirling Highway and the public transport route so, it's pretty easy to get in most mornings. (Harley, 29, Cottesloe)

> One of the reasons we bought here was because the trees, but also because it was handy to all the other things that we needed. We had a list of things that we were looking for and that's what it's got here ... We needed ease of access to the airport, so we wanted to be close to the freeway. With ease of access to particular schools and/or universities, closeness to the city and other members of the family north of Camberwell and also in Camberwell. (Pip, 64, Camberwell)

Local 'boutique' retail stores, hospitality services such as cafés, restaurants and bars, and additional community facilities such as libraries and social clubs were also considered enjoyable features of these neighbourhoods for most participants;

> We rented here for about eighteen months. During that time, we decided we liked living here. There was a good school nearby, great public transport, good cafés, good food all that sort of stuff. So we were like, "Oh yeah, this could be a good place to stay". (Mathew, 47, Camberwell)

> Of course there are more cafés like upmarket cafés that have come into the area too ... Another nice thing that I haven't mentioned about Cottesloe is that we have the Cottesloe Civic Centre. During the winter months, they have concerts.

> There could be classical music or there could be contemporary. For about $15, you can go and listen to a very nice concert inside. They've got a Jarrah room which has very lovely acoustics … I also belong to a ladies' club. It was going to become bankrupt I think. Some friends of mine talked me into joining. I hardly ever go and it costs me a lot of money to be part of it. The UWA [University of Western Australia] has a club that has lovely facilities, and you can join if you've been an alumni. The Peppermint Grove Library also has activities. They have fabulous things like day outings and even weekends away. (Georgia, 48, Cottesloe)

The natural blue and green amenity of these areas, such as their proximity to beaches and rivers, street trees, and recreational parks and reserves were also deemed an asset in these communities for most participants. Nelson, Pip and Jennifer reflected on these values in terms of the recreational enjoyment, personal comfort through microclimates, and values for aesthetic appearance they offered:

> We like walking. We walk sometimes down to the beach because there's an overpass so we can walk straight to the beach. That's a huge amenity. It's basically one road to cross between here and the beach. If you're a kid or if you've got children it's great. I use the river. I do rowing and like to go for walks down by the river. It's lovely. What else? … I like to take in the sand, Café's around the place for Coffee … We use the green space for the kids and stuff. (Nelson, 47, Cottesloe)

> The street trees at this end of the street are a hundred years old. There are trees at the local park, there are elms there that would be a hundred years old. In fact, avenues of them. You can't actually put a value on those. (Pip, 57, Camberwell)

> I love the peppermint trees. I love walking down the streets. What people like is leafy suburbs. It's an old used expression, but trees are expensive to upkeep and they're not free. Trees aren't free. The cooling effect it creates is quite noticeable in summer. (Jennifer, 56, Cottesloe)

The enriched value of these public settings shaped the community dynamic in interesting ways. For one, it fostered diverse forms of community engagement, which meant participants possessed strong ties to family, friends, neighbours and social groups:

> Our street decided they'd have their own little committee because it's too hard to manage larger groups. Each street basically has its own issues. We're a bit of a rat run for traffic, both morning and night. There are all sorts of other issues that people want to talk about and manage as well. So the residents groups were formed to have some input into the original planning. Now it's a case of keeping an eye on what's going on and making sure that guidelines are adhered to and prevent too much inappropriate development. (Pip, 57, Camberwell)

> It's a nice street. Every year we take turns to host the Christmas party. Two years ago, we had it at our place. We just clear out the garage and set up tables and things. Everybody brings a plate, their own food, their own drinks, and usually they bring their own glasses and chairs and things. Everybody just brings their own stuff but they assemble here. You come in and out of the street the

> same way, so people are careful when they know the party is on. It's good. The kid's race up and down the streets … We've got good neighbours. I sometimes drive her kid to school when she can't manage it. He goes to school all the way over the other side. [One neighbour] who's home every day, he usually brings in everybody's bins on our bin days. (Grace, 60, Cottesloe)

As these examples suggest, participants often possessed lifestyles that were as equally invested in their communities as their own personal settings. As Pip demonstrates, residents obtained enriched forms of social support and enjoyment through these dynamics, which allowed them to enhance their immediate living standards through opportunities for comfort, enjoyment and convenience. While a more active and engaged community, as Grace suggests, meant they had a greater role in the planning and management of public amenity.

Through these dynamics, residents possessed capabilities to define or adapt both their personal and public settings in accordance to their own values. A consensus on tastes and standards were established and embedded throughout these communities as a result. As Collette, Alex and Georgia suggest, this was not only reflected through resident practices, but additionally an expectation of local organisations, business and councils:

> Things I don't like? Not much … I don't like the fact they've stopped taking the bins out now. They used to have this valet service on the bins. The reason was they didn't like the look of the bins left on the side of the road or something. They used to take them out and they'd empty them and put them back. It was very, very nice … but you're asking me to be picky, (overall) it's pretty good. (Collette, 66, Cottesloe)

> Well, traffic management is one of them. When they finally deal with the Bourke Road intersection that should help a little because there won't be quite so many bottlenecks and people rushing through this area. Anytime the traffic is really bad on the freeway people get off and then come through this area. If you are coming from the city in the afternoon the traffic is always bad. So we get a lot of traffic. Every time the freeway blocks up, basically. (Alex 43, Camberwell**)**

> The thing that I love about Cottesloe … Facilities like this, this lovely library. Napoleon Street just down there is lovely. It has lovely cafés and beautiful things, little shops. There's the Boat Shed, which friends of mine called the Robber Shed because it's terribly expensive, but really beautiful and has gorgeous produce. We are prepared to be robbed a bit with it. There are some lovely things. (Georgia, 48, Cottesloe)

With more extensive personal resources, these values, standards and tastes were often premised on aesthetic arrangements and materials settings while more socially enriching, were themselves more resource intensive. While the grandeur and splendour of these communities offered heightened living standards, and capabilities for autonomy and freedom, it came at a price that was not accessible for all.

5.4.3. An overview of life in socially advantaged communities

The Cottesloe and Camberwell communities served to reflect the experiences and opportunities accustomed to life in socially advantaged Australian urban communities. In both settings, enriched forms of economic, material, social and cultural resources interacted to shape a lived context where extensive forms of enjoyment comfort and convenience were normalised in the day-to-day lives of residents. People liked living in these communities as a result. High standards of public and private amenity meant there was a distinction and prestige associated to these communities. Dissatisfaction in these settings was also infrequent amongst participants.

A diversity of available resources throughout these communities and enriched capacities for their access meant personal values, tastes and desires were rarely compromised in household and public settings. This afforded residents a greater autonomy in their daily lives, and choices to define their lived contexts as they pleased. Though similar values, standards and tastes meant these were generally consistent in each community. Household settings for instance were commonly large and characterised by enhanced material and structural standards. The increased material capital this afforded residents, meant their homes possessed few limitations and alongside greater economic capital, residents were afforded opportunities to enrich their settings by encompassing more gratuitous forms of leisure and luxury in them.

Public settings were similarly accommodating of these values. The microclimates and aesthetic values offered through green and blue infrastructures, direct access to facilities and services such as libraries, restaurants and shopping precincts were but a few features that allowed residents to more effectively and extensively encompass forms of enjoyment, comfort and convenience in their daily lives. With enriched amenities, residents were also extensively engaged in their neighbourhoods, which offered them a greater community connectedness and enriched social networks.

Forms of social, material and economic capital interacted in these communities to define lifestyles of prestige and distinction. An enriched engagement of residents beyond their immediate household settings influenced a social consensus for standards, tastes and values, which were consistently upheld in both households and public spaces. The social, cultural and material capital this consensus offered, afforded residents greater capacities to satisfy needs such as health, security and autonomy in their personal circumstances through a more enriched local connection and engagement. While, on the other hand, the symbolic nature of these resource dynamics (i.e. a prestige associated with certain material settings and tastes) meant some residents were less capable of engaging in these communities.

With greater economic resources, social networks and education levels, the capabilities for ensuring liveability, sustainability and resilience were high throughout the community. This was as heightened resource opportunities (access and availability) afforded residents a greater autonomy over their circumstances, through a more immediate satisfying of basic daily (existence) needs and enriched capacities and choice for relatedness and growth needs (de Haan et al. 2014).

5.5. Conclusion

In this chapter, I have sought to shed light on life in the Australian urban centres of Greater Melbourne and Greater Perth. In each city participant experiences and perspectives were sought from socially advantaged, moderately advantaged and disadvantaged communities to consider the way social inequality permeated through these urban contexts and shaped living conditions. In both Melbourne and Perth three comparatively different accounts were provided for each of the communities, as their divergent economic, social, cultural and material resource contexts shaped unique values, opportunities and practices. However, as I have demonstrated, the corresponding resource settings (disadvantaged, moderate and advantaged) within the cities offered common themes for understanding the nature of social inequality on living standards in Australian urban centres.

The findings in this chapter suggest a more nuanced dynamic to the statistical conceptualisation of inequality previously outlined in this thesis. Although the demographic variables and SEIFA rankings draw distinctions between communities on a 'have' or 'have not' basis, residents have a far more nuanced and intricate relationship with their lived contexts. Indeed, the resources available in their current contexts interact with the existing economic, material, social and cultural capital they possess which determine the sorts of resources they are capable and likely to access. This interrelationship between resource availability and access (something I collectively refer to as 'resource opportunity') for residents shapes unique (though similar at a community level) experiences, needs and capacities, which determine the level of autonomy and choice individuals have over their living standards.

In this sense, inequality displays a fluid dynamic throughout these communities where advantage and disadvantage are not fixed by the resource availability of their immediate communities but rather vary within them. As Hamilton (2010) suggests, people's places in the social order are displayed largely by consumption decisions that reflect ideals and capacities of self-creation and lifestyle (Hamilton 2010). I argue the social gradient offers a useful representation of this relationship. Accordingly, the different communities observed in this research illustrate the

intersecting processes and variables that shape the opportunities, autonomy and choices that determine the living standards residents are able to achieve.

As I have demonstrated, experiences of these processes were considerably different at opposing points of the social gradient. The Armadale and Broadmeadows communities for example were positioned at the disadvantaged end of the social gradient, as the limitations to resource opportunities placed most residents at a social disadvantage. For most participants, capacities to meet daily requirements in a comfortable and convenient way were reduced, as were opportunities for forms of personal and social enjoyment and luxury. Many participants expressed dissatisfaction in daily life due to reduced resource access and availability (opportunity) which meant the autonomy and choices they possessed in their lived contexts were significantly limited, and so too their capacities to improve on these circumstances.

As the availability and accessibility of resources improved, participants were more able to enrich their living standards, as household and community limitations were not only less restrictive, but participants generally had more capacity to overcome them. This was initially observable in the moderately advantaged communities of Coburg and Ballajura where forms of capital, such as personal finances, community networks and public and household amenities, freed people from more compromised circumstances, allowing them to encompass forms of daily enjoyment, comfort and convenience. However, these were more available for some residents over others, as despite a similar availability at a community scale, the personal circumstances (lived experiences, needs and capacities) of individuals mediated their abilities to access them.

At the advantaged end of the social gradient both resource availability and access were extensive, affording individuals a greater autonomy and choice to characterise their personal circumstances as they saw fit. The exclusive communities of Camberwell and Cottesloe highlight the extent this paradigm was observed in these cities. With few limitations and enriched forms of material and financial wealth, heightened public and private amenity, and extensive community engagement and connectedness meant more basic daily needs were readily achieved and high standards of comfort, enjoyment and convenience could be encompassed through public and household settings. Relative to city standards, residents possessed 'the amicable life', as the heightened autonomy and choices their resource contexts offered meant they had more pleasant and fulfilling lived experiences, could more extensively satisfy their needs and had greater capacities to achieve personal satisfaction.

We see in these examples the display of certain forms of capital, which Bourdieu (1984) emphasises are markers of social distinction. However, the findings also provide some support to Hamilton's

(2010) suggestion that a taste for luxury has permeated (through contemporary processes of marketisation and media saturation) more extensively across societies. In this chapter, expressions of leisure and luxury were observable in both advantaged and disadvantaged communities. However forms (or tastes) of luxury were also mediated by the resource opportunities of individuals. A dialectical relationship between tastes for luxury and welfare needs (what Bourdieu (1984) describes as *taste for necessity*) existed, where the extent one was expressed over the other in consumption and lifestyle practices was determined by personal resource acquisition and the values (or perceptions of distinction) and capabilities it afforded individuals (Hamilton 2010; Bourdieu 1984). As I demonstrate in the following Chapter, it is this dynamic process of capital accrual and display that determines both the forms of materials, meanings and competencies that come into circulation (as entities) and those performed in practice, for divergent households and communities (Shove, Pantzar & Watson 2012).

What then are the implications of these dynamics for the water sensitive ideals of liveability, sustainability and resilience? As De Haan et al. (2014) suggest, the relationships between the liveability and sustainability of a society and the quality of life of individuals are determined by the capabilities that society provides its members to pursue their needs (necessities and tastes). Cole and Nightingale (2016) and Hogan et al. (2013) similarly, acknowledge that the resilience of societal systems are inherently linked to the adaptive capabilities of individuals and neighbourhoods. A key theme across these definitions (and their applications) is the enabling of 'capabilities' for liveability, sustainability and resilience. However, as this chapter demonstrates, the capabilities of individuals were significantly varied—dependent on their resource opportunities, and the contextual experiences, needs and capacities that they defined.

As I have suggested, the dynamics between household and community settings played a significant role in determining these capabilities. Where this relationship was strong the basic daily needs of residents (i.e. taste for necessities) were less burdensome, as they were supported at a community scale through facilities, services and support networks. Through these experiences, residents then had a greater personal capacity to encompass less immediate needs (i.e. tastes for luxury) into their lives, which were observed through the enhancement of forms of enjoyment, comfort and convenience. This was because residents had a greater access to the resources available to them, affording them an enriched autonomy and choice. In this sense the 'capabilities their society provided [them]… to pursue their needs' were enriched, and thus so too their abilities for heightened forms of liveability, sustainability and resilience (Cole & Nightingale 2016; de Haan et al. 2014).

Though with a greater disadvantage these capacities were comparatively more reduced. This was because household and community settings were more disassociated, reducing the resource capacities of individuals and placing a greater onus on those that were accessible to achieve daily needs (de Haan et al. 2014; Johnstone et al. 2012). In effect their capabilities for liveability, sustainability and resilience were diminished due to more restrictive contexts that constrained opportunities, autonomy and choice.

As I discuss in the following chapters, household, community and societal level water use practices have a direct relationship to these capabilities. In the following chapter I build on the perspective of the social gradient introduced in this chapter by considering its relationship to the water use practices of residents. I then move to reflect on the contextual dynamics—including water resource societal and community practices—that situated these relationships, and their implications for water sensitive transitions.

CHAPTER 6. A SOCIAL GRADIENT FOR URBAN WATER USE PRACTICES

6.1. Introduction

In the previous chapter I outlined the lived contexts of communities varying in social advantage and disadvantage in the Australian metropolises of Greater Melbourne and Greater Perth. The types of material, social, cultural and economic resources in these communities collectively shaped the sorts of liveability, sustainability and resilience residents experienced, possessed and could access. In this chapter I discuss the role of different resources in shaping water use practices in these communities. I present findings and offer reflections on the materials, meanings and competencies that comprised practices in social disadvantaged, moderately advantaged and advantaged communities. I conclude by considering the role and nature of social inequality in shaping urban water use practices in the Australian context.

In the following sections I lay out the connections between resources and the elements of water use practices (Shove, Panzer & Watson 2012). Table 6.1 summarises the materials, meanings and competencies that comprise water use practices in each community. I begin by discussing the socially disadvantaged communities of Broadmeadows and Armadale. Here the lack of available resources meant water was used to ensure basic welfare, through maintaining financial security, and improve (or uphold) health and wellbeing. I then discuss the water use practices observed in the moderately advantaged contexts of Coburg and Ballajura. In these communities the moderate availability of resources influenced a gradual shift in water use practices from those prioritised around ensuring welfare, to those with emphasis on enriching living standards through forms of enjoyment, comfort and convenience. Finally, I present the water practices observed in the socially advantaged contexts of Camberwell and Cottesloe, where an abundance of resources meant water was used to enhance life styles oriented around leisure and luxury.

Table 6.1. The Role of Social Advantage and Disadvantage in Shaping Domestic Water Use Practices

	Meanings	**Materials**	**Competencies**
Disadvantaged contexts (Armadale and Broadmeadows)	Water for welfare.	Reduced to basic cost effective appliances and approaches for achieving ease and convenience for daily demands.	Basic, yet inconsistent know-how and understanding for ensuring economic and material longevity.
Moderately advantaged contexts (Ballajura and Coburg)	Water for luxury and leisure relative to resource constraints.	Water appliances and approaches for leisure, and luxury relative to resource availability and welfare requirements.	Competencies for upholding leisure and luxury while alleviating resource constraints through the prioritising and distribution of resources to allow for both.
Highly advantaged context (Cottesloe and Camberwell)	Water for leisure, and luxury.	High-end appliances and products for enriching enjoyment, comfort and convenience.	In depth know-how and understandings of effective appliances, products and approaches for enriching leisure and luxury.

I propose that there is a social gradient in water use where, as the social advantage of households and communities improved, water uses practices shifted from those for ensuring basic welfare requirements to those that would encompass forms of enjoyment, comfort and convenience. I conclude with an overview of this dynamic in the context of the key findings outlined in Table 6.1, and offer some practical and theoretical points for consideration in the context of sustainable, liveable and resilient water sensitive cities.

6.2. Social Disadvantage and Water Use

The Armadale and Broadmeadows communities were characterised by a limitation to resource opportunities, positioning them at a social disadvantage in their respective cities. These suburbs provide the primary point for observing the dynamics of social disadvantage and daily water use practices. As I described in Chapter 5, a general lack of economic, material, social and cultural resources restricted living standards and limited capacities for health, welfare and financial security

for much of these communities. This had a clear impact on water use practices. Water use materials, meanings and competencies were consistently justified and prioritised for saving money, meeting basic health needs and ensuring wellbeing.

Values for comfort, enjoyment and convenience were infrequently expressed as a result. These were predominantly upheld inadvertently, through water use appliances and approaches that were inexpensive and considered to meet the requirements for daily life. For some participants, showering and gardening practices provided these opportunities. In the following example, Nicola describes a therapeutic 'luxury' element to her shower use, though her shower time is still significantly reduced out of lifestyle demands and the need to be resourceful:

> It's 5 minutes out of here. I don't have to listen to [my son], "Mum, I want food. I want this". 5 minutes out. I've never really thought of it as a luxury, but I guess that's probably quite true. (Nicola, 37, Armadale)

The ideal of 'luxury' in this instance is equated to practices oriented at meeting basic mental health needs that, as I later demonstrate, marks a significant step away from the water use conventions that characterise forms of leisure and luxury in more advantaged contexts. In this sense, Nicola's living standards were considerably more reduced in comparison to those in others areas of her city.

In some similarity to leisure and luxury values, water sensitive (or water conscious) household practices were observed where they would not compromise the welfare based priorities of these residents. These were specifically linked to the bio-physical and socio-technical contexts of each metropolis, which I discuss in further detail in the following chapter. In the following I discuss the more common prioritisation of water use practices observed in these communities, which situated around achieving standards of welfare in order to meet daily responsibilities.

6.2.1. Ensuring financial security

All participants—both disadvantaged and advantaged—emphasised values for reducing costs associated to their water use:

> You try to save as much water as you can so you don't get a big bill. That's about it. I don't know what else to say. Before I used to wash it 3 times, 4 times a week, 5, just depends. That was before, but not now. Once we got the high bill I said, "I have to cut down". (Lauren, 45, Broadmeadows)

> As I said before, mainly cost. Now they've [New appliances] got the energy stars on them. Take a bit of notice of that. I don't know, but I assume there might be a water use rating on things like a dishwasher or washing machine. (John, 62, Armadale)

However, as Lauren and John suggest, cost reduction was the primary driver in the observed practices of participants that were socially disadvantaged. This was frequently observed through the use of basic cost sensitive appliances, or their substitution for manual approaches such as hand washing. In the following examples, Ali and Dorian reflect competencies for ensuring financial efficiency through the choice of appliances, and the way they use them. Ali describes the use of basic appliances where use frequencies and extent are reduced to minimise consumption for cost saving, while Dorian comparatively substituted appliances for more basic cost effective dishwashing approaches:

> We didn't want anything fancy. It does the job ... Not because of the environment ... to save money ... but for us, we only put it on once a week so it's not an issue. (Ali, 28, Armadale)

> The water we do use isn't for the washing machines. For the [clothes] washing and for dishes, I've learned a lot about it, which I have been doing good with. Before I used to leave the tap running when I did the dishes. I don't do that anymore it's bad for the environment ... I knew that for a while, but I was a bit lazy to do it that way. I think it was maybe too much water bill as well. Now it's better. (Dorian, 48, Broadmeadows)

Notably, both participants express awareness for environmental consequences in these practices. However, more environmentally oriented practices were either devalued or could not be prioritised out of more immediate needs for ensuring welfare through reducing cost impacts. Financial capacities were indeed a determinant for the capacities and standards of sustainability communities could uphold. For the socially disadvantaged, reduced resource opportunities limited the economic and social viability of more environmentally viable water practices, and thus their capabilities for sustainability were more reduced.

6.2.2. Achieving health and wellbeing

Alongside reducing cost impacts, all participants discussed water uses for achieving basic health and wellbeing. This included practices for alleviating physical and mental stresses. Ritualised bathing and gardening practices were most commonly referred to for these purposes.

Many participants described shower uses for ensuring physical health by reducing climatic (heat and cold) impacts and alleviating physical constraints such as sore backs, necks and migraines. Samantha and Alice provided examples, in commenting:

> Really, it gets hot in Armadale, very hot. Yeah. Very hot. We've got evaporative air conditioning and it doesn't help ... I like to shower in the summer a lot. Basically, when it's really hot, I'll have a shower and put clean clothes on. [Though] We basically bear the heat sometimes. Yeah, bear the heat. We live like

> that because we know, from other people, some people can get thousand dollar electricity bills. We're not going to do that. No way. (Samantha, 49, Armadale)

> I had some physical issues after giving birth. It sort of still affect me the way my posture is and everything. Giving baths is just a big task for me to do. [My kids] have their showers every second or third day. (Alice, 29, Broadmeadows)

Similarly, the sorts of appliances people possessed and the way they used them were also shaped by the existing physical constraints of some participants. This included both the types of appliances and decisions for their use. As Lauren and Damian reflect, this was most commonly observed in their justification of consumer (or product) choices:

> The [tap] water doesn't taste too good. Every time we drink it we feel like we want to vomit it up. That's the same with my kids. My son doesn't like water. He'll drink bottled water, but he won't drink that. I'm drinking bottled water as well. I'm never drinking the tap water because it doesn't taste too good. (Lauren, 45, Broadmeadows)

> Basically a top loader is all I've ever known. I'm not getting any younger and I've got a back problem, so bending all the time to put the stuff in and out would have been an issue. (Greg, 55, Armadale)

Elsewhere, gardening practices were also recognised for their role in ensuring physical (through heat mitigation) and psychological relief, as Rebecca and Samantha demonstrate:

> I found it very difficult shopping in this area because it's so damn depressing. I also taught in this area as well, at an intervention unit where I'm dealing with the very pointy end of people who are very disenfranchised. I work and come home to the same thing. Thankfully I have my garden. It's my space. I'm much happier there … It's a bit of everything. It's shady; we've got a huge tree in the front yard. That acts as a bit of an air conditioner, that's been good. Our house doesn't have an air conditioner. It is green and it is cool. (Rebecca, 58, Broadmeadows)

> We're really hot. You know you need to have some green. You have to use a lot of water, and that's the thing. The natives can stand this temperate and it is really important, because really, in the end, we like to have a bit of greenery. We don't like to have full cement. (Samantha, 49, Armadale)

Rebecca's view of her garden as a place of refuge suggests a greater emphasis on her gardening practices for personal health and wellbeing. This was out of her need to compensate for conditions in her surrounding community (discussed in Chapter 5.2). Samantha's suggestion of 'full cement' and the need for 'some green' suggests a similar objective, in requirements to compensate for the execratory heat impacts of her broader 'tree-less' context through the acquisition of personal 'greenery'.

Physical and mental stresses such as these were not only more frequently described by participants in these communities, but also found to be more debilitating. This was potentially the result of a more prolonged and labour intensive working life, and limitations to basic services and facilities (see Chapter 5.2) which compounded health constraints.

In some respects, the frequent discussion of these issues in the context of daily water use highlights the disparity in resource availability experienced in these communities. As with reduced opportunities for a more effective mitigation and alleviation of health issues (e.g. resource intensive technologies, health specialist and consultations) the socially disadvantaged placed a greater requirement on daily water use for these purposes (e.g. hot showers to relieve back pain and the watering of personal spaces to alleviate the stresses of an otherwise poor liveability). The reduced capacities of the socially disadvantaged to deal with climate impacts, physical constraints and mental stresses, meant they were more vulnerable (or less resilient) to economic, social and environmental fluctuations and change in these cities.

6.2.3. Fostering liveability

All participants described using water to achieve daily work and home-life responsibilities, such as upholding standards of personal and household hygiene, cleanliness and presentation. However, the resource shortages for participants in these communities limited the ease, efficiency and extent in which these standards and responsibilities could be upheld. Water uses reflected a trade-off between these values, as participants sought to use water to meet their daily responsibilities, while adhering to approaches that would save money, and maintain health and wellbeing. In effect standards of liveability and sustainability were compromised.

As in other communities, dishwashing and clothes washing appliance choices (for instance) were linked to demand. For example, those in large families, with younger children and/or full-time employment reported more frequent clothes and dishwashing needs. Larger appliances such as top loader washing machines and some dishwashers were used in these instances. However, these contextual factors interacted with requirements for resourcefulness and, accordingly, appliances were costs sensitive in nature or substituted for more arduous approaches such as extensive hand washing:

> It's a top loader ... It's a big one, maybe four, six [litre]? You've got a lot of [clothes] washing when you have a big family. You need to wash two, three, times a week, maybe ... Yes, and the cooking and the dishes and we've got a dishwasher, but I don't use it as much now ... it's just the two of us, we will just rinse them. But when we are having a gathering of the whole family here, we'll run the dishwasher [often]. (Tran, 67, Broadmeadows).

> When my front loader broke down I had to do it by hand. It was very hard ... I just did it. (Sophie, 66, Broadmeadows)

Know-how and understanding for practical and technical forms of household resource efficiency were learnt from knowledge sharing between family, friends and other community networks. As Kate and Lauren suggest, this included lived experiences of budgetary appliance types, methods for upkeep, use and installation that would ensure a greater financial efficiency, ease and convenience in meeting daily needs:

> The guy that was doing the renovations for me. He was also a plumber ... he showed me how to install it. (Kate, 46, Armadale)

> It would break down a lot. Plus my main reason I don't want to go through that again—My dad's one has just had it as well. It's not even ... I think it's about a couple year old. Now he's got a top loader. He's much happier. (Lauren, 45, Broadmeadows)

However for the disadvantaged, a reduced community connectedness and less extensive social networks (see Chapter 5.2) limited the social capital they possessed to build these competencies. Under these circumstances, the demands of daily life proved a more strenuous activity. The requirement to cut costs led many participants to compromise their living standards through more socially and materially intensive processes.

For example, many leisure and luxury oriented water uses were deemed less immediately important to daily subsistence, and were ceased, non-existent or significantly downsized. This included practices for personal enjoyment and amenity. Gardening and general household upkeep were regularly discussed. Notably, reduced water competencies and understandings meant many participants lacked know-how for water efficient gardens or gardening appliances. Few also had an understanding of the associated benefits of green spaces for urban heat mitigation (Loughnan, Nicholls & Tapper 2012; Jenerette et al. 2011). As Damian and Krystal demonstrate, this contributed to an abandonment of water use practices in gardens:

> I don't any more. I used to. I used to like to [do gardening]. Yeah, with a hose. I just don't want my water bill [to increase] to me they are going to die anyway, the grass. Because it's so hot, so why waste water and get it green. (Damian, 55, Armadale)

> I don't really water the garden at all. I don't really use the water that much outside. We've got taps but they are a little bit broken. I see people out with the hose out, to use for the garden. I didn't say it to them but I just think, "Why would you do that?". (Krystal, 20, Broadmeadows)

Within households, materially intensive consumption processes were also observed. This was for two reasons; firstly participants could not afford more durable and economically efficient appliances, and secondly many did not possess the know-how for cost efficient repair options. Faulty, broken and discarded appliances were common in many homes as a result. As John and William suggest, the frequent replacement and recurring expenses for hired maintenance contributed to a continued financial constraint:

> We got rid of the old washing machine, because it kept needing repairs, that didn't make a lot of sense ... Fisher & Paykel aren't that cheap to come out and look at things ... we probably spent, I reckon, close to 600 on it each time they repaired it. (John, 62, Armadale)

> We did have one [dishwasher]. We bought one a long time ago ... It was just too much dramas. Then, we bought another one a few years ago and we were gonna attempt to [install] it but didn't know how ... we just threw it away. (William, 55, Broadmeadows)

Resource limitations were also seen to impact on household dynamics. Out of a greater financial priority, gender based roles associated to water use were more pronounced in these communities. Many participants' described instances where female occupants undertook the majority of cleaning responsibilities in their households, as Tran, Alice and Kate reflect:

> The washing, the cleaning. Yes, and the cooking and the dishes ... this is my job as a housewife. (Tran, 67, Broadmeadows)

> I don't have a dishwasher. I'm the dishwasher here. I feel it's my job to do it. Obviously because my husband's at work, so yeah, I'm here at home. My mum was a single mum, I was one of four. She did it all by herself, hand washing, dish washing and all that stuff. I think I just don't want to be judged ... I'm at home already. It's not like I'm not able to do it. (Alice, 29, Broadmeadows)

> Well, you've got my husband working. We are sort of low income. I keep up the house. My husband keeps the yard. So, everything's perfect, inside, outside. I'm not a fanatical cleaner. I clean. I don't want to be like a person that uses all the [cleaning products] and everything. (Kate, 49, Armadale)

Notably, the role of male occupants as the financial provider (as Kate and Alice suggest) often saw their involvement in decision-making processes for appliance and approach types for cleaning and washing oriented practices, despite less of a practical engagement with them. This was partly because male oriented responsibilities were more consistently found to be those of a technical nature such as basic maintenance procedures and financial management, which included the monitoring of bills and enforcing frugality. Monitoring shower frequencies and length for cost saving was a regular example, as Krystal demonstrates. Samantha also reflects these ideals in describing her household dishwashing practices:

> My husband doesn't want a dishwasher. He doesn't believe in them. In the end, I've now learned not to use a dishwasher and that's the way it is … He says they're just a waste of water and power. (Samantha, 49, Armadale)

> The first thing that comes to mind is the shower. So when my siblings and I have showers my dad will come around and knock on the door and tell us "get out, you've been in there too long". But with me I like my long showers. (Krystal, 20, Broadmeadows)

Through these forms of constraint the liveability of these participants were diminished, as opportunities for autonomy, choice and enjoyment in daily life were more reduced. Financial constraints restricted opportunities for greater social mobility through embedding processes such as gender roles in households. These constraints were compounded by a lack of better quality more efficient appliances and approaches —due to higher maintenance and replacement costs, or a resignation to more onerous 'hands-on' practices.

6.3 Water Use and Moderate Social Advantage

The Coburg and Ballajura communities serve as the key focal points for communities of moderate advantage for this study. Generally speaking, most participants possessed a reasonable level of satisfaction in living standards through improved community and material contexts. The values they placed on community connectedness, housing layouts and public amenity were reflective of these circumstances, though also seen to be limited in forms of economic, material, social and cultural resources which placed some constraints on living standards.

The water use practices of residents were reflective of this moderate resource availability. Participants prioritised their uses for ensuring convenience, comfort and enjoyment in daily life. As Alee reflects in the following example, this was observed through leisure interests like swimming pools and gardening, luxury values through extensive showering and clothes washing, and the use of efficient and convenient appliances:

> Yes. We use water mainly for showers. My partner has about 3 a day. Bathing her [my daughter] now, and we use it for our dishwasher. We always put it on the eco-cycle though and try and use it wisely. Probably, now, we've got a lot more washing so I use the washing machine, probably, once every 2 days. We use it for the pool, that's another factor in summer, constantly filling it up. (Alee, 31, Ballajura)

However, limitations to resource availability and access impacted the extent these values could be upheld. This meant that some practices had a greater emphasis on financial stability, health and wellbeing while others prioritised comfort, enjoyment and convenience to enrich living standards. Experiences of water use practices in these communities reflected a tipping point between social

advantage and disadvantage on the social gradient. Where more resources were available, water practices for enjoyment comfort and convenience were more frequently observed and to a greater extent. Though, where these were more limited, welfare based requirements—similar to those observed in less advantaged contexts—were more consistently prioritised.

 Notably, water sensitive (or water conscious) values were reflected amongst some participants in these communities. The practices associated to these values and their dynamics are discussed in greater detail in Chapter 7. In the following, I discuss the water uses attributable to forms of enjoyment, comfort and convenience and the dynamics observed amongst participants in Ballajura and Coburg for upholding these to enrich living standards.

6.3.1 Improving living standards through leisure and luxury water use

In households where resources were available, water uses were prioritised for luxury and leisure. These ensured improvements to living conditions through greater enjoyment, comfort and convenience in daily life. Seasonal permaculture and ornamental gardening practices were regularly observed and discussed in Ballajura and Coburg as forms of leisure activities that encapsulated these values. Pool and spa ownership was also a common feature for Ballajura residents, as Max demonstrates:

> She [my wife] loves plants, she's got a veggie garden, but she'll go through stages where it's working and she's out there, and then in the winter she's not very into it, obviously because it's cold. In summer, yeah, herbs, I don't mind herbs either. I'll go out there and look after them a little bit, because then I'll use them in cooking. I grow a few rose bushes out the back too, because that's one plant I do like … The idea of adding a shower in the shed was because if you're out in the garden, it was nice that I could just walk in the shed, strip off, have a shower, and be clean and not have to traipse crap through the house. It's good for entertaining with the spa and things too. (Max, 57, Ballajura)

Max describes water use practices for leisure based gardening, cooking, spa and shower use. Forms of enjoyment are observed in gardening through the 'veggie garden', herb growing for 'use in cooking', and growing 'a few rose bushes' through tastes for amenity. Comfort and convenience are also embedded in these water uses. Garden practices are seasonal; when it is comfortable for them to 'be out there', while added shower uses created a greater ease and convenience when undertaking these. An enriched community connectedness is reflected through an emphasis of these values in times of social 'entertaining'. This included 'not traipsing crap through the house' to prevent the reduction of enjoyment and comfort (cleanliness and amenity) elsewhere in the house.

Ensuring personal cleanliness, tastes and comfort in amenity, and an ease and efficiency in daily life were luxuries many participants also justified through their water uses. These were reflected

predominantly through the material contexts of their homes, as greater resource availability meant that many participants had opportunities for better quality appliances, and an ability to use them frequently to meet their desired living standards:

> It's not strange for him [my husband's] to have 3 showers in a day … he also has a bath every second day. I'll probably have 1 just before bed … I'm about 5 minutes, depending if I'm washing my hair because that takes longer. My partner likes to stand there for a while so, probably about 10 minutes. Especially, in winter when he's cold, you want to warm yourself up. He does it to wake himself up in the morning as well, and because we both go running every day and we feel like you've got to wash away the sweat and stuff like that just to feel clean and what not. (Alee, 31, Ballajura)

> I never had a dishwasher. I grew up always having to do the dishes, so as we built this house, the first thing I said, "We're having a recess for a dishwasher, because I'm never washing a dish ever again" … The wife hates putting dirty dishes into the dishwasher, so yes, we waste a lot more water because we rinse a lot of the plates before they go in there … what sold her on that dishwasher was it's got a UV cycle, so once it's finished it then runs like a UV antibacterial light over it just to kill anything left in the bottom. (Lachlan, 46, Ballajura)

The dishwashing and showering practices of Alee and Lachlan, are reflective of these experiences. Alee expresses values for comfort and enjoyment in shower uses by 'standing there for a while", 'warming up' and 'waking up' as part of daily uses. While Lachlan places emphasis on comfort and convenience through choices for machine washing practices and to 'never hand wash again'. Notably, perceived notions of wastage or excessive use are justified out of a desire to uphold these values, which reflects less of an emphasis on the requirement for reducing cost. A greater focus on cleanliness and hygiene are also observed from both participants, through more regular and extensive showering and dishwashing (including pre-rinsing). In households with more resources there was less restraint on the affordability of use, and an access to better quality appliances, such as those with 'UV cycles', ensured an efficiency in achieving desired standards of cleanliness. This allowed a more enjoyable and comfortable amenity for these participants that enriched daily living standards.

6.3.2. Ensuring welfare in moderate social advantage

In moderately advantaged communities limited resources did have some impact on the extent and frequency of enjoyment, comfort and convenience that participants could achieve with their water use practices. In some households a lack of resources meant that some water uses were required to meet more basic welfare needs similar to those observed in disadvantaged contexts:

> Well, I actually hate the dishes so much that I was seriously considering getting a dishwasher, as there was no room on the ground, just one that would sit on the

> bench. But I'm pretty broke, I bought a car and a drier and that was the last two years of my savings, so I just have to put up with them .(Jay, 37, Coburg)
>
> So it's a front loader, it's the highest stars I could find in terms of efficiency. That was to save money but also because I wanted it to be a water efficient one. (Patrick, 73, Ballajura)
>
> If you have a very hot child I'll put a sprinkler where she's going to run around— so I just put it on for as long as she is going to play. I will just try and position it somewhere in the garden that needs water. (Riley, 31, Coburg)

In Jay's comments, the frugal value of hand washing meant it was prioritised over an investment in a dishwasher, which might otherwise allow greater comfort and convenience. Similarly, Patrick describes financial incentives in his clothes washing practices; while Riley describes cost effective practices for mitigating heat impacts, thus ensuring health and wellbeing.

In these moderately advantaged suburbs, welfare base priorities such as saving money and ensuring health are also observed alongside values for enjoyment (in practices for ensuring personal amenity through 'garden watering') and convenience (in luxury items such as 'driers' and 'water efficient front loaders'). This was because greater financial resources and enriched sources of community connectedness meant that resource limitations were less significant, and welfare based requirements were more readily achieved. Accordingly, residents possessed improved living standards as moderate resource access and availability allowed them a great autonomy in their daily lives, and opportunities for enjoyment, comfort and convenience. I discuss the dynamics observed for ensuring these processes in the following.

6.3.3. Achieving the balance: Improving living standards and ensuring welfare

The moderately advantaged householders carefully balanced water use practices to achieve financial security, health and wellbeing while simultaneously enriching living standards through enjoyment, comfort and convenience in their daily life. Where forms of the latter could be more consistently achieved, living standards were higher. Notably, specific water use appliance types and approaches for achieving this balance were somewhat varied between participants. This was because they were influenced by unique socio-cultural backgrounds and lived experiences, which influenced capital accrual and shaped immediate preferences, understandings and perceived priorities for water use. In this sense the dynamics described in the former sections are reflective not of specific appliance types and uses, but instead of the way moderate social advantage shapes water use practices. In the following sections, I describe how common resources and competencies are used to maintain or improve living standards through water use.

Similar to the experiences of some socially disadvantaged residents, community networks provided enabling opportunities for moderately advantaged participants to build competencies and capacities for ways water could be used to improve living standards. Moreover, with a more enriched connectedness in these communities, networks were more extensive and frequently possessed by individuals. Participants often cited active connections to family, friendship, employment, community and local business groups, as Peter and Hayley demonstrate:

> Well there is a Nursery [and community garden] in Coburg called Peppertree Place which is a native nursery, so we would probably go there and get some information. We have got friends that are into gardening too, like [Friend], she is a botanist, so she has got a good knowledge of Australian drought tolerant plants. (Peter, 39, Coburg)

> Somebody told me. I think it was my lawnmower man, he said "use dishwasher water in your garden, that's a great way to keep your lawn green ... Instead of using that expensive fertiliser stuff, you can put it on and that keeps your lawn moist". He told me that many years ago. Lately I've been using it. (Hayley, 55, Ballajura)

A broader commitment to values for connectedness and engagement existed in these settings, which appeared absent in less socially advantaged contexts. This was as community settings were more supportive for community interaction and engagement (see Chapter 5.3) allowing resident to better realise their value as an important resource advantage for improved living standards. As the accounts of Hayley and Peter demonstrate, this included access to technical and practical forms of understanding and know-how for practices that could allow for improved comfort, enjoyment and convenience with the resources available, while effectively ensuring financial security, health and wellbeing. While competencies for individual practices such as these were common, this was also observed at a broader household level through know-how for distribution and prioritisation of water uses:

> I collect buckets of water outside for my garden. Big buckets of water and when it rains [I place them in] all the places where there is a little crack on the patio and the water comes through. Big buckets, and then when they fill up I'll tip them on the plants. Because we have a lot of plants ... I like to keep things green ... it's so large and it's mostly paving if we made it all concrete it would be too hot...

> For washing, I do 3 and a bit loads a week. If I don't have a full load, but I know it's going to be a week before I have another lot, I'll do a half load ... If it's been raining and I've got a big bucket of water from the sky outside and his clothes are really dirty, I'll put some detergent in there, do them outside ... I find that rainwater is so soft, it makes everything so soft and beautiful. I wash my hair in the rainwater regularly. I have to go outside and carry in a bucket of water but I love it. It's so soft, and cheap compared to the tap water ... It's just a thing my mother taught me. (Susan, 62, Ballajura)

Susan describes practical know-how acquired from family networks for collecting and using rainwater for comfort and enjoyment. This is observed through multiple household practices such as 'keeping things green' in outdoor areas and bathing in 'soft' and 'beautiful' water. In the process, health and welfare based requirements such as cooling and saving money were also achieved. Less prioritised values such as convenience and ease in tap use are substituted for more intensive practices of 'carrying in big buckets', as it allowed for welfare values to be achieved alongside luxury uses, which would allow money saved (financial resources) to be distributed for leisure and luxury elsewhere.

With a more frequent sharing, enforcing and affirming of competencies through community networks, a greater consistency in values, preferences and tastes for leisure and luxury were observed. For many participants, these were considered part of broader community standards that were adhered to out of values for ensuring an enriched connectivity. This was most frequently observed in water use appliances and approaches that ensured enjoyment, comfort and convenience in public settings:

> One thing I am hoping to do—because I have lots of friends who come and visit—is have another shower and toilet put in the guest room. (Julie, 63, Coburg)

> My sprinklers used to be on twice a week for 20 minutes, but now I only have them on for 16 minutes at the front, and only 8 minutes at the back because no one sees the back. (Natasha, 48, Ballajura)

In these examples, Natasha's garden watering uses reflected community values for presentation through a prioritisation for greenery where publicly viewable. Julie, additionally reflects these values within her household out of a desire to uphold convenience and comfort for social enjoyment with friends. However, in these contexts, a greater social advantage is also expressed through a capacity for more enriched materials such as 'sprinklers' and extra 'showers and toilet(s)'. Where resources were less permitting in these communities, an adherence or even perception of these standards was less common. Hayley and Jay reflect these experiences in commenting:

> I've noticed that some people in my street—I don't know whether they are renters or they're owners—but I notice that people have changed a couple of things. One is people have either introduced this fake lawn onto their gardens, or have concreted, or somehow they've all just let their lawns go. They're not spending … They don't want to spend the money on the upkeep of the garden. (Hayley, 55, Ballajura)

> I honestly don't pay much attention but I wouldn't be very surprised … I think there is a big mix around Coburg. Some people water their lawns a lot, even in summer they have got perfect lawns. They take great pride in them, and I know

> some people think I'm terrible. They have called the real estate on me if I haven't mowed enough. I don't control my lawn, I don't have time to mow it and am not gonna waste money watering every few days. One corner has gotten so bad I need a whipper snipper but I don't have one so I have let it go. (Jay, 37, Coburg)

In both comments a greater financial imperative on water uses for welfare based requirements meant that uses for a cohesion to community standards of cleanliness in appearance were less prioritised. Arguably Hayley's lack of familiarity and connectedness with her neighbours (in being unsure 'whether they are renters or they're owners'), and Jay's lack of community engagement (in 'not paying much attention') suggest a reduced connectedness of these residents with their communities, influenced by a lack of adherence to community standards.

This provides an interesting point for consideration in terms of the social gradient described in Chapter Five. In these 'moderate' income suburbs, social connection varies between households, despite similar opportunities for social networks at a community scale. Social advantage and social connection appeared to be mutually re-enforcing. Increased resources allowed participants a greater capacity to enrich their gardens and household aesthetic (through water uses), which in turn allowed them opportunities to foster community connections and social networks. By the same token, increased community connections offered competencies for more effectively and efficiently meeting welfare needs, and thus opportunities to use water for leisure and luxury based practices. In this case not only were standards of liveability, sustainability and resilience greater for those with more social advantage, their capabilities to achieve and uphold these through water use (and other resources) were also greater.

6.4. Water Use and High Social Advantage

I move now to reflect on the water use practices of those occupying the most advantaged end of the social gradient. Here enriched resource access and availability characterise lifestyles with few limitations to daily comforts, enjoyment and convenience. The Camberwell and Cottesloe communities served as the primary point of observation for socially advantaged water use practices. In these contexts high education, employment and weekly incomes, and an enriched amenity and community connectedness (see Chapter 5.4) allowed a high satisfaction in living standards, through improved liveability, resilience and capacity to be sustainable.

In these suburbs there was an even greater emphasis on leisure and luxury. However, a general lack of resource constraint in these communities meant that these values were more typically embedded in daily processes, forming a part of accepted lifestyle characteristics. In accordance, water uses in these communities were characterised with terms such as 'nice' 'lovely' and 'beautiful'. This was

because these resources, like others, were regularly prioritised to satisfy personal standards of enjoyment, comfort and convenience in households and community settings. Responses were regularly as follows:

> Well I'll have a shower most mornings, like most people. You can't start the day without having a shower really. I would kind of think about the day, what I have got planned which is beyond the requirements of actually having a wash. So for me it was part of a ritual … I get in at work early these days so I'm a lot quicker than I used to be, maybe five-ten minutes. (Harley, 29, Cottesloe)

Harley's shower 'ritual(s)' reflect values for enjoyment and comfort associated with leisure and luxury. While 'daily' shower times 'like most people' uphold perceived community standards for cleanliness (or taste in appearance), and ensure an ease (comfort and convenience) and efficiency to meet daily employment demands.

Despite a collective emphasis on leisure and luxury, the intricacies of water use practices (meanings, materials, competencies) were somewhat varied between individuals. As I have previously suggested, this was as these were more broadly influenced by lifestyle and life stage needs and responsibilities, experiences of contextual social and political processes and personal tastes. In this sense, the practices of participants serve not as an account of specific water use, appliance types and approaches; rather, these offer insights into the embeddedness (frequency and extent) of water uses in values for luxury and leisure oriented lifestyles out of a social advantage.

As with other contexts, water sensitive (or water conscious) practices were also observed from some participants. Though where these were found to compromise the previously described values and standards for enjoyment, comfort and convenience, they were less supported or upheld. These are discussed in greater detail in Chapter 7. In the following, I describe this orientation to leisure and luxury as observed through water use practices for daily comfort, enjoyment and convenience.

6.4.1. Enhancing the enviable life: Water uses for leisure and luxury

In Chapter 5 the standardisation of leisure and luxury in socially advantaged lifestyles was described, which was observable through the enriched resources and daily living standards residents in the Cottesloe and Camberwell communities possessed (see 5.4.4). Water use practices in these suburbs were no exception. Uses for enjoyment, comfort, and convenience were consistently prioritised for these purposes with some similarity to those experienced in the moderately advantaged settings previously discussed (see section 6.3). Though by comparison, a more unrestrained resource access and availability in Cottesloe and Camberwell meant forms of enjoyment, comfort and convenience were upheld in appliances and approaches more frequently and to greater extent.

The enhanced financial capacity of participants was a significant driver for these practices. This was immediately observable through participant experiences and views on water consumption prices. Compared to the less advantaged (see sections 6.2 and 6.3) participants in Cottesloe and Camberwell expressed little concern for the financial impacts of daily consumption. Harley and Nelson express these views and, through the use of 'they' and 'people' give emphasis to a perceived consistency in these experiences throughout their broader communities:

> Water is ridiculously cheap to the consumer, that's the other thing. If you made it more expensive then they would perhaps think about what they are consuming. (Harley, 29, Cottesloe)

> People just tend to use water and that's it. It's available like electricity and we can get as much as we want to pay for … I don't believe until you get a price trigger that people will significantly change their behaviours. (Raymond, 47, Cottesloe)

This increased capacity meant that those in these communities possessed a greater capability to ensure basic daily requirements (cleanliness, hygiene, health and welfare), which allowed for a more extensive and frequent allocation and consumption of resources to enrich lifestyle qualities. The households of participants in these communities (see Chapter 5.4.1) were consistent with this perspective through their regular orientation around leisure and luxury based materials and approaches.

Direct water uses for ensuring leisure and luxury were observed through the enhancement of material contexts, by appliances, products and approaches that would allow a daily comfort and enjoyment of household amenity. In outdoor areas, this regularly included ornamental gardening, pools and spas noted for their therapeutic and leisure value, and additional materials (such as water features and functional technologies) for aesthetic enhancement through greenery, style and serenity. Indoor water uses included frequent and lengthy bathing practices such as showering and bath use, and an enriched efficiency, functionality and practicality of daily appliances that offered aesthetic value and a greater ease and convenience in use. Forms of leisure and luxury were more enriched and embedded in the normality of daily life in these communities through increased resource prioritisation for these assets. Lexi and Georgia offer examples of this enrichment in the following:

> The back yard, we say it's our extra room. As soon as you can be out there, we'll have a drink by the pool, even if we're not in the pool. We're very much water people, and it just adds to the ambiance in the most lovely way, so we really like that. We've got nephews, the kids will still come over and swim. If [my daughter's] in town, she will have people over. They'll be in swimming. The kids

will have their Australia day parties out there. We really enjoy it. (Lexi, 51, Camberwell)

Inside we love to cook. When I'm having people over for dinner and I'm cooking, I might put my big stuff in during the day, and then we'll be clear for when people are coming for dinner. I don't think that's a major use of water really at all. I only use the dishwashing machine. I hardly ever hand wash anything ... We bought the dishwasher and I doubt we gave too much care to water rating. We wanted something that was going to be effective rather than efficient and do a good job ... Hopefully, if you pay more, it's not going to breakdown. That was pretty much our thinking. There would have also been an aesthetic component for me. I did the kitchen and I was quite caring about aesthetics. (Georgia, 48, Cottesloe)

In their water uses, Lexi and Georgia spoke of personal enjoyment and comfort in outdoor recreation, cooking and household amenity. These are enhanced through the social engagement of friends and family networks ('having people over') in these pursuits, which was common for participants in these advantaged suburbs. The consistency of expensive appliances and materials also enhanced daily (aesthetic) enjoyment, and meant these practices offered greater comfort and conveniences. For example, both participants mention 'aesthetics' and 'ambience' achieved through their household appliances and materials, alongside a more common ease and convenience in 'hardly ever hand wash[ing]' through 'effective' appliance types that reduce the need for more labour intensive requirements. Enjoyment, comfort and convenience in daily water use was of a greater standard in these communities, as a greater community connectedness and resource rich material contexts enhanced the extent in which these values could be achieved.

This was also observable through the frequency in which these values were applied throughout households. Compared to less advantaged contexts, a greater financial capacity meant that water use appliances and approaches more consistently upheld leisure and luxury values without compromise. This included the embeddedness of these values in uses for daily requirements (such as cleanliness and hygiene), and also uses that were more specifically and purposefully designed to enhance leisure and luxury. Examples included:

We've got our 70,000-litre pool ... When it's clean and on the right day, it's got some visual appeal ... there's also the water fountain out the back, we have to fill that up from time to time. (Grace, 60, Cottesloe)

Appliances that we use every day, I'll pay more for. It's got to do with how well it does its job every day. I've bought things that are meant to last a long time and I've just hated using them every day. That just means I hated them for a long time but if they're well-built and they're just good at what they do (then I will buy them) ... There are certain devices that I don't care about, but things like dishwashers and clothes washers you do use every day so it's worthwhile spending more. (Mathew, 47, Cottesloe)

Through fountains and swimming pools, water uses in Grace's comments were prioritised solely for leisure and luxury based enjoyment, such as creating 'visual appeal'. Here, her financial capacity allowed for resource expenses beyond daily requirements to enrich leisure and luxury values within her home. Similarly, Mathew's capacity to 'pay more' for appliances that were 'well built' and 'good at what they do', meant a more regular and embedded comfort and convenience could be achieved in daily practices, such as washing and cleaning. These experiences not only reiterate an increased extent of leisure and luxury (through more effective appliances and approaches), but also reflect a greater frequency of these values across households.

Heightened financial capacities and enriched material and social contexts for the socially advantaged meant that forms of comfort, enjoyment and convenience were more richly embedded in daily life, through water uses prioritised for leisure and luxury. Consistent with the broader experiences of social advantage (seen in Chapter 5.4), these were underpinned by contextual social and political processes that oriented tastes, values and approaches for liveability, sustainability and resilience throughout these communities. I move now to discuss the role of water use in these dynamics.

6.4.2. Keeping up with the Joneses: Water use for social cohesion and community connectedness

For many participants, particularly those in the Camberwell and Cottesloe communities, water uses such as those described in the previous section formed part of a broader accepted standard or lifestyle, oriented around social and personal forms of leisure and luxury. Chapter Five reflects these values at a broader community scale, recognising an adherence to heightened standards for enjoyment, comfort and convenience in both household and public settings. Though a more intricate observation of daily water uses, reflected an incorporation of these personal standards in broader social values, which were established and reinforced through enriched community dynamics.

I reflect on these processes through the observations of participant's values, tastes and standards for hygiene and appearance. Consistent with the experiences described in the former paragraph, water use practices for hygiene and appearance were regularly prioritised on similar values and standards for enjoyment and comfort in both personal presentation and household amenity. Jessica and Simon describe these standards in their accounts of water uses for bathing and gardening choices:

> [on daily showering] Yeah, it's just anything that you do for yourself or your personal hygiene such as exercise or brushing your hair or putting on makeup like girls do. It's just one of those things of taking care of yourself and showing pride within yourself I guess … As I said, it's very expected in my employment where your personal appearance can really matter. (Jessica, 24, Cottesloe)

> I guess it's about fitting with an aesthetic around here. There will be some colour, there will be some bushes. It won't just be concrete, some grass and then a door. A lot of the houses have large fences, there might be something running along, sort of growing through the fences. Something were someone has planted something and maintains it regularly. (Simon, 24, Camberwell)

In describing these tastes and standards, they attest to broader social influences from employment and neighbourly networks. This was observed in most communities, though appeared more consistently and, to greater effect, in socially advantaged contexts. Here, an enriched community connectedness and engagement meant that the previously described frequencies and extent of leisure and luxury were affirmed as common daily standards. As Ruby and Sarah reflect, water uses were both directly and indirectly shaped by neighbours, family, friends and other community networks:

> Yeah, we've noticed that [everybody has nice gardens] I notice sometimes that the house with the bigger lawns—because we have very big verges here in Cottesloe—their verges are all green as well [like ours] … I do notice that they're green. No one enforces them [water restrictions] around here. The neighbours in our street water theirs every day so we do too. (Ruby, 61, Cottesloe)

> I will have quite long showers. For me, I wash my hair every second day so it looks perfectly clean … I told my boyfriend, that people wash their hair every 4 days because it's better for the hair. He's like "That's so disgusting". (Sarah, 26, Camberwell)

These practices reflected a community consensus in standards and tastes as seen in the broader lived context described in Chapter 5.4. An adherence to these social standards ensured the prosperity of a connectedness and engagement in these communities, which enriched living standards. Consequently, water use practices that were not aligned to these principles were rarely observed in advantaged suburbs. As Ruby demonstrates, this included regulatory measures such as water restrictions, which due to their limiting nature were not adhered to in the example from Ruby, despite the known financial implications.

This prioritising of water uses around standards and values for neighbourhood connection suggests a significant departure from a mediation of practices on financial imperatives that is more commonly observed in less advantaged contexts. In effect, water use shifts from economic capital to a form of cultural capital, enriching living standards by strengthening community networks through an adherence to social (and symbolic) values of community engagement, aesthetic value and presentation. In concluding this chapter, I discuss the broader dynamics of this relationship in the context of the social gradient and consider the implications it presents on community and household capabilities for liveability, sustainability and resilience.

6.5. Conclusion: The Role and Nature of Social Inequality on Domestic Water Use Practices

In Greater Perth and Greater Melbourne, all residents engaged in water uses for enriching their daily lives. However, the variability in economic, social, cultural and material resources throughout these communities meant residents had different lived experiences, needs and capacities that influenced the sorts of water use practices observed. In comparing the practices of suburbs (or communities), varying in forms of social advantage and disadvantage, a distinct gradient was noticeable in people's daily water use. This gradient was influenced by the degree to which domestic water use practices contributed to the forms of liveability, sustainability and resilience that individuals achieved in these communities. For communities that had comparable resource opportunities (access and availability) the standards, priorities and ways in which these values were reflected through water uses were similar. However, these were considerably different between communities (and households) that varied in social advantage and disadvantage. The fluidity of living standards within each community also meant that water use practices were not fixed, but rather transitory based on the degree of social advantage and disadvantage individual households possessed.

Table 6.1 presented in the introduction of this chapter highlights the key themes that emerged from the data surrounding domestic water use practices for each context. It should be noted that basic socio-technical commonalities, such as an understanding of what water is and a common ability and ease in which to access it, were experienced from all participants in the case studies, and are thus assumed in this discussion. The themes reflected are those with significance to the social, cultural, material and economic resources observed in households and throughout communities. At times, water sensitive practices were also observed in these contexts. These were intrinsically embedded in the key themes, but were also linked to the complex socio-technical and bio-physical elements of their immediate city contexts. I discuss the impact of city contexts in more detail in the next chapter.

In this chapter, I have discussed broader social processes such as the establishment and adherence to social standards, drivers for community connectedness and observed capabilities and standards for liveability, resilience and sustainability. An analysis of the role and nature of social inequality on domestic water use has added new insights into the dynamics of these processes. However, it should be noted that given their embeddedness in broader social and cultural contexts it is likely that additional elements beyond the scope of this research (including the dynamics of life stage, ethnicity and gender, for instance) may also influence water use. Incentives for community connectedness, for example, are likely to exist beyond the enrichment of living standards in the ways described, while standards and capabilities for liveability, resilience and sustainability were influenced outside

the role of domestic water use practices. Nonetheless, the dynamics and processes discussed provide insights into the experiences of varying social advantage and disadvantage in urban contexts and the implications this presents for water use practices.

A major finding of this chapter is that social inequality impacted on water use practices, by shaping diverse water use needs, experiences and capacities of individuals, which oriented the sorts of meaning, materials and competencies that were available, accessible and likely to comprise practice. Figure 6.0.1 provides an overview of the social gradient for water use and the key relationships between social inequality and water use practice.

Figure 6.0.6. The Social Gradient for Water Use Practices

In socially disadvantaged communities, reduced resources meant that living standards were reduced for most individuals. Water uses along with other household resources were prioritised for ensuring basic welfare needs such as financial security, health and wellbeing. Though as the level and quality of material, social, cultural and economic resources increased for households (and throughout their communities), the meanings of these water uses shifted from ensuring basic welfare, to those for enriching daily lives through enjoyment, comfort and convenience. This was because the greater availability and accessibility of resources, freed people from financial pressure, which enabled them to more effectively achieve reasonable standards of health, wellbeing and security with less pressures on water use (including the resources required for them) to do so. Participants then possessed flexibility in the meanings they could assign to their water uses. For many this resulted in practices that would enrich living standards through satisfying leisure and luxury oriented needs.

Opportunities for enriched community networks (alongside other financial and material resources) influenced these dynamics as these networks enabled the more effective mitigation of disadvantage and enrichment of daily enjoyment, comfort and convenience, through providing social support, local expertise and insights. Accordingly, these experiences oriented forms of know-how and understandings (competencies) of how and for what purpose water was used to enrich living standards. With greater social advantage, water use practices became more socially oriented in nature, as the forms of cultural capital this offered, heightened the resource opportunities individuals possessed to enrich their living standards. Though for the disadvantaged, time restraints associated with immediate welfare demands reduced public amenity; and a reduced community engagement meant opportunities for community connectedness were more restricted and, thus, so too the establishment of these networks. Practices were instead more financially oriented (as economic capital) and competencies for enhancing living standards reduced.

With varied water use priorities, know-how and understandings, the capabilities residents possessed to enrich their daily life through water use were similarly skewed by the social gradient. The materiality of water use practices observed in different communities demonstrated this dynamic. In socially advantaged communities greater financial capacities, technical literacies and domestic contexts (through connectedness and amenity) afforded residents greater opportunities to obtain more efficient, sustainable and, at times, innovative water use materials (appliances, infrastructures and other resources). These offered greater comfort, enjoyment and convenience in daily life, and could contribute to more enriched forms of liveability, sustainability and resilience. By contrast for those with less social advantage, the pressures of a declining resource access and availability reduced the capacities of individuals to support these. Household water use materials were more often confined to basic, cost effective measures such as hand washing and watering, or cheap budgetary appliances. For many disadvantaged participants these water uses were more physically arduous and time consuming, or structurally problematic with limited durability. The extent to which water use could enhance liveability or enrich forms of sustainability and resilience were far more limited.

What then are the implications of these findings for contemporary perspective of social practice? Most significantly it was found that resource settings play a role in contextualising practices for urban communities by shaping user experiences needs and capacities. This points to the requirement for a greater consideration of the role and influence of what Shove, Pantzar & Watson (2012) and Shatzki (2010) deem the 'carriers' of practice, that is, the individual through which practices are performed. Notably, conceptualising individuals as mere 'carriers' or 'practitioners' has

steered much of the New Practice discourse away from concerns such as inequality in recent years. Instead, New Practice theorists have had a greater preoccupation with 'the convergences of conventions' and their circulation (Shove, Panzer & Watson 2012; Spaargaren 2011; Hargreaves 2011).

From a socio-technical perspective this repositioning of the individual—as the likes of Spaargaren (2011), Ropke (2009) Shove (2008) and others have acknowledged—has been a valuable process. Offering a means at which to overcome the dominant, yet restrictive agency-structure dualism to reconfigure discussions for sustainable systems interventions and transitions (see Chapter 3.2). As this research demonstrates, a 'New' Practice theoretical consideration of socio-technical systems provides a useful lens for overcoming the inherent risks of technological determinism in Water Sensitive transitions frameworks through a more holistic account of demand side patterns and the implications they present for technical innovation.

Though as Shove herself (in Hui, Schatzki & Shove 2017) suggests, technical innovation is of little value if practitioners lack the resources required to engage in them. Considering the findings of this chapter, I argue that there are limitations to a 'co-evolution' of technological and societal processes (socio-technical) approach if social-cultural dynamics, such as inequality, are not more adequately taken into account. After all, the resource opportunities attributable to social advantage and disadvantage played a significant role in mediating the sorts of materials, meanings and competencies that were in circulation and adopted into practices throughout urban households and communities. In effect these dynamics underpin the sorts of capabilities and desires individuals possess to adopt (or 'carry') and support the very practices these systematic interventions and transitions seek to promote (i.e. those for enriching sustainability, liveability and resilience).

The lack of account of the divergent capabilities of (community) practitioners in recent socio-technical considerations is problematic in the contexts of water sensitive transitions, which recognise the requirement for a community engagement or what Dean et al. (2016b) describe as a societal transition to a water sensitive citizenry to foster an ongoing access and embedded stewardship for innovations and implementation through technical literacies and capabilities for co-governance and management. In either case, there is the significant requirement for a shift of communities away from old water resource understandings and expectations which, as I demonstrate in the following chapter, are inscribed in current and historical water resource management templates (Cole & Nightingale 2016; Shove & Walker 2010). I argue that demand side questions about how domestic water uses and capabilities evolve, take hold and may be

reconfigured are of equal and related importance to those that deal with the design, proficiency and transition of technical systems.

Consistent with the perspective of Shove and colleagues, I argue that the New Practice based consideration of domestic water consumption offered in this chapter provides a useful means for conceptualising the dynamics of demand which can better guide both societal and technical processes of water sensitive socio-technical transition (Spaargaren 2011; Shove & Walker 2010; Ropke 2009; Sofoulis 2005). However, in also considering the role and nature of social inequality on these practices, I extend on this perspective. I argue that resource managers and transitions advocates alike will benefit by considering not just the meanings, material and competencies that comprise practices, but the added complexities of situated and interacting contextual processes of inequality that water use experiences, needs and capacities.

Evidencing these claims are the recent yearly water consumption figures for the suburbs of both the Melbourne and Perth case studies, presented in Appendix 4. For each city, both the extent and dynamics of consumption (i.e. who uses more and less) were unique, suggesting that while social inequality (or the social gradient) described in this chapter indeed exerts influence on urban water use, it also intersects with the unique features of its context to contextualise experiences, needs and capacities, and define urban water use practices and capabilities. In the next chapter, I reflect on the intersecting features for the Melbourne and Perth case studies. I consider the relationship of water resource contexts with the social gradient and how water sensitive transitions are implicated in this.

CHAPTER 7. URBAN WATER USE CULTURES & THE SOCIAL GRADIENT

7.1. Introduction

In the preceding chapters I have discussed the commonalities in experiences of communities varying in resource access and availability, and the role and nature of these commonalities in shaping daily water use practices. While there were distinct similarities in the broader dynamics of social inequality and water use at a household and community level (i.e. the social gradient for water use), there were also inherent properties within the context of each city that contextualised these dynamics, shaping experiences, needs, capacities and, thus, the practices of households and communities uniquely. In this chapter, I discuss the differences between the cities, which include the dynamic bio-physical and socio-technical water resource drivers that shape water use cultures within Greater Melbourne and Greater Perth. I consider how these variables and cultures interact with social inequality, influencing the sorts of opportunities and capabilities communities possessed.

I begin by presenting the experiences of these in the Greater Melbourne context. Here, recent periods of water scarcity and water security have influenced reforms in institutional and community dynamics in water resource management. A growing priority has been placed on IUWM which has utilised a more enriched community engagement to enhance forms of liveability and sustainability through an ongoing commitment to decentralised systems, infrastructures and technologies. I then consider the Greater Perth experience, where the continually drying climatic regime and sandy, absorbent soil structures of the western plain have interacted with a water resource management context that has been so far limited in community investment. Instead, an emphasis has been placed on centralised major infrastructures to meet growing consumer demand.

Both cities have offered unique experiences for their communities, shaping broader cultures for water use that are reflected both at an institutional level and in the daily practices of residents. In each setting I consider the nature of the social gradient within these, and the implications and challenges social inequality presents. I conclude this chapter by reflecting on the two cities in the context of the water sensitive transitioning to more liveable, sustainable and resilient urban contexts.

7.2. Water Use Practices and the Social Gradient in Greater Melbourne

The early adoption and implementation of an integrated or 'whole of water cycle' resource management initiatives and WSUD concepts in Melbourne are believed by many to have set the pace for resource management agendas throughout Australia. These were largely the result of existing socio-technical contexts at the time of the millennial drought and the years that followed, which led to a greater engagement of the Melbourne community in water resource management agendas (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013; Rijke, Farrelly & Zevenbergen 2013). This has had a profound impact on the lived experiences of the Melbourne community, in turn shaping contemporary domestic cultures for water use, which were observable through daily household practices.

In the following sections, I discuss the significant events of the interrelating socio-technical and bio-physical dynamics that have defined the broader water use cultures of the Greater Melbourne community that were experienced at the time of this research. I consider the implications for communities of varying advantage and disadvantage and discuss the future barriers and opportunities for ensuring the continued transition to more water sensitive contexts.

7.2.1. Remembering the drought: The role of lived experiences in shaping household and community practice

Melbourne's major 'Millennial Drought' began in 1997 and continued to worsen until 2007 (see Figure 7.0.1) (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013). As short periods of below average rainfall were common for Melbourne this was not immediately recognised. However, by 2002 low rainfall conditions had persisted for six years, and with the projected growth in Melbourne's population and the potential of increased water scarcity through climate change, the Victorian Government recognised a pressing need for addressing water security. This led the State Labour government, to take a more active role in water management functions. An expert panel was assembled and through an extensive consultation process with all water management authorities, a set of five regional water strategies was established.
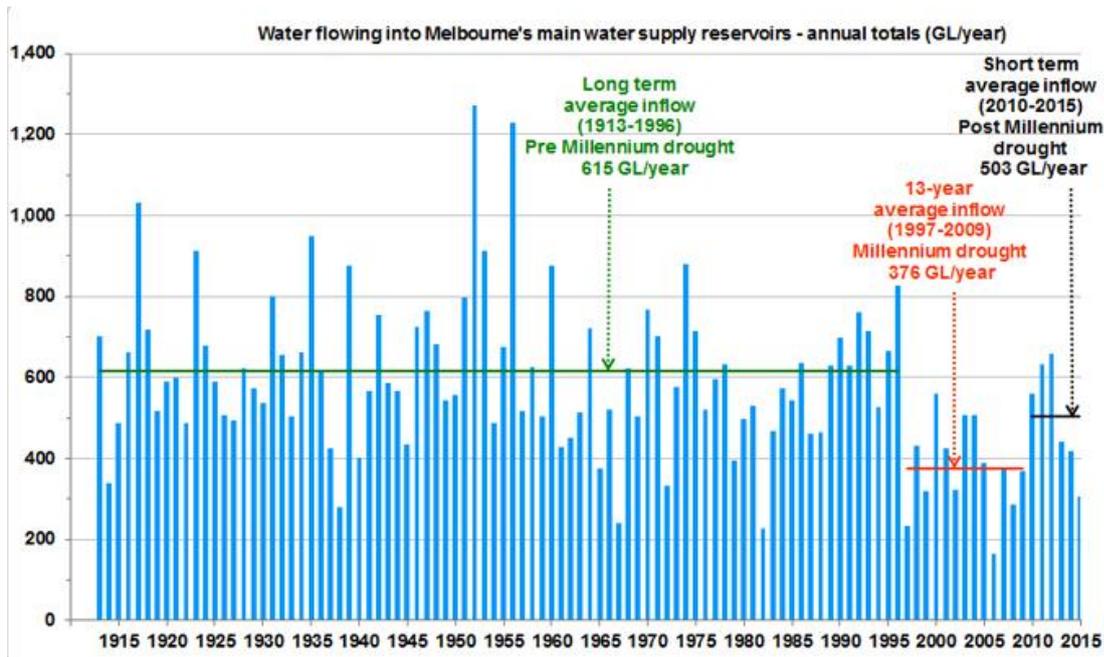
Figure 7.0.7. Melbourne's Annual Water Supply Figures (1915–2015)

(Melbourne Water 2016)

Through these processes and strategies, water authorities acquired a much broader mandate and set of considerations and targets to encourage water conservation and efficiency. Despite recommendations for future water recycling and efficiency measures, the initial strategies did not include any plans for water supply augmentation. As conditions worsened in 2005-2006, these were revised to include a series of potential supply options such as recycled wastewater and harvested stormwater alternatives (which had been in trial phases prior to this time), and the potential for larger scale options such as desalination technology in the years following 2015 (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013).

In a step away from more traditional strategic approaches, water authorities also implemented an extended portfolio of community oriented engagement and efficiency measures. For the first time in 20 years household water restrictions were introduced and made permanent by 2004. Water pricing strategies such as rising block tariffs (portioned consumption prices) were implemented to drive incentive for reducing water consumption. Rebates for water efficient showerheads and water efficiency labelling and standards for household appliances (e.g. washing machines) were introduced. Remarkably, through the provision of educational materials, financial incentives and capacity building programs, the government, Melbourne Water and the water retail companies were collectively encouraging households, businesses and industries to reduce their water consumption despite the collection of lower revenues (Furlong, Gan & De Silva 2016; Ferguson, Brown &

Frantzeskaki 2013). One long-standing water industry practitioner reflected on their experiences of this time:

> There was a massive reduction in usage as a result of all the things that were done during the drought. In addition to drought restrictions, there was [sic] a whole lot of education programs. There was appliance replacement. There was [sic] rebates. Drought restrictions were one of the bigger ones obviously. There was a 40% reduction over ten years. (Water industry practitioner, Melbourne)

Much of the literature describes the awakening of water saving values for the Melbourne populous around this time. Due to an increased awareness and understanding of drought and water scarcity issues, and willingness for engagement in solutions by the community, the average daily per capita consumption dropped by 22 percent between 2002 and 2006 (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013). Findings from this study support those research findings, as many participants reflected on their experiences of the millennial drought when discussing their values for water conservation, or in justifying their current water use practices:

> I live in Australia since 2007, and I remember one year, [there was] not much rain. The government set a 155 (litres per day) target. At that time I learned [that] in Australia, [we] don't have much water, so now it's better to save. (Louise, 33, Broadmeadows)

> I remember during that time it was just socially very unacceptable to be seen to be wasting water, particularly outside the house. We used to keep our bath water and then siphon it down through a hose so that I could water the garden with it. We still do that now … I remember standing out front with a garden hose … Just getting yelled at by this man walking past. He wouldn't even let me say, it's recycled water from our bath. (Helen, 40, Coburg)

As Louise and Helen suggest the lived experiences of drought conditions instilled a legacy for water consciousness within the Greater Melbourne community, which is observable even to this day (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013).

However, this was not without its drawbacks. In most accounts, participants described experiences where their liveability, sustainability and resilience had been significantly reduced at this time. These experiences were consistent with the values people placed on water use described in Chapter 6. As the following experiences from Alice (disadvantaged community) and Anna (advantaged community) reflect, households of a greater disadvantage often emphasised financial stresses and heat impacts associated with heightened water prices and extended dry periods. While those in more advantaged communities more frequently stressed the aesthetic impacts and inconveniences associated with the practical water saving methods required to uphold pleasant amenities due to heightened restriction on private and public outdoor watering practices:

> The first thing that comes to mind is the showers. So when my siblings and I had showers my dad would come around and knock on the door and tell us "get out, you've been in there too long" ... I'm not sure whether it's because we are wasting water, or because he had to pay for the water. (Alice, 29, Broadmeadows)

> It was just during the drought. With the restrictions and given the amount of time that was available for watering, it wasn't sufficient for some areas of the garden, or the fact that you would like to water the lawn. There were parts of it that would get a little bit scorched and because I was opening my garden, with Open Gardens Australia, I was having people paying to come and visit the garden. I needed it to look reasonable. The bucket in the sink seemed a good way to put that water wherever I chose. I could put it on the lawn if I wanted. That's how that started. (Anna, 60, Camberwell)

The variability in living standards across different communities (see Chapter 5) meant that the effects of the drought were experienced differently throughout the social gradient. Due to the nature of their lived context (and thus the water uses associated), the impacts of the drought were more harshly felt by the disadvantaged.

Nonetheless, the general reduction in water use that transpired, compromised living standards at all points of the social gradient, and proved a significant driver for a community engagement in water resource issues and water saving practices that have since influenced a water conscious culture within the community.

The immediate impacts of drought conditions alone, however, cannot be held entirely accountable for the water use cultures observed. In 2006, for instance, as drought conditions worsened Melbourne experienced its lowest rainfall to date, and overall water storage levels dropped to 29 percent of capacity. Such was the severity that the recently implemented resource strategies had not anticipated this level of threat to water security and were deemed insufficient. A sense of crisis ensued, resulting in a growing political investment and heightened media attention in water resource management agendas. Melbourne's major newspapers published water storage levels on the front page, allowing the community to track daily changes, while a looming state election fuelled political debates and public commentaries (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013).

In June 2007 the existing water resource strategies were deemed inadequate for future water security requirements and overridden by the State Government. Planning commenced for a 150 GL desalination plant to be built in Melbourne's south-east, which would transfer potable water 85 km to Melbourne's nearest Reservoir (The Cardinia Reservoir). At the same time, proposals for a major inter-basin pipeline to connect Melbourne's system with the Goulburn River was also canvassed as a

means of ensuring water security to Melbourne until completion of the desalination plant in 2012. Collectively these would amount to an infrastructure investment of AUD $4.6 billion in capital, and provide a combined capacity of approximately 64 percent of Melbourne's water consumption (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013; Cook 2014).

The urgency in decision making and general fast-tracked nature of these major infrastructure projects meant that there was very little community consultation, or broader sectoral engagement into their rationale, size or location. Furlong, Gan and De Silva (2016) describe a lack of transparency in decision making processes experienced by practitioners at this time and the political intervention that transpired in water authorities, who were told what they could and could not talk about publicly in relation to these proposals (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013). Nonetheless, the desalination plant and north-south pipeline progressed through the planning, design and approvals phase and construction of the north-south pipeline was completed in early 2010.

In the years that followed, a fraught construction process amid an existing lack of public clarity and poor justifications for both projects sparked widespread public outcry. The community expressed anger and frustration over the need for a substantial taxpayer investment due to a perceived unpreparedness by government. Concerns about the environment and social implications of both the desalination process and the accessing of much needed water resources from rural areas also received considerable media attention and heated debate.

The 2010 election resulted in a shift in government. Public commentators and the newly elected Liberal party (who were keen to discredit their predecessors) added further influence to the public discourse, arguing that the projects were unnecessary and alternatives such as recycled wastewater and stormwater harvesting initiatives would have provided a better outcome for the community (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013). Since this time, both of these investments have gone largely unused, with the exception of a 50 gigalitre discharge of desalinated water into one of Melbourne's water storage damns in March 2017. The first since its completion in 2012 (Hobday 2017; Furlong, Gan & De Silva 2016).

Nevertheless, it was the controversial nature of these projects that created public engagement in water resource management, increasing the salience of water issues for community members and stewardship for community oriented solutions observable in recent years. William and Nicholas, for example, give emphasis to these experiences in their own understandings and values of drought severity and effective water management solutions:

> One time I saw it on TV once. I can't remember where I saw it now. It was saying something about the drought and all that. The farmers, it was hard on them. A lot of money [paid for the pipeline]... A lot of money was wasted and things like that. (William, 55, Broadmeadows)

> The Desal plant is unnecessary to me. It was such a waste of money. I guess it was bad timing in that by the time it was ready the drought had ended. My mum used to check the water storage levels on a daily basis and tell us what it is. (Nicholas, 33, Coburg)

In broad terms the socio-technical contexts of this time has left a cultural legacy for water consciousness amongst the community that was observed in contemporary practice. The expanding mandates for community investment, along with the resulting strategies, incentives and targets throughout this time, not only created a lived context which reiterated the severity of circumstances to citizens, but also built capacities for technical and practical measures to mitigate the impacts of these circumstances and uphold relative living standards. Through these newfound competencies a lasting commitment to water sustainability values was established, which despite times of greater water security in recent years, are still observable in current practices. Helen and Mathew reflect on the culture surrounding water use experienced in their community:

> Well, I suppose it's something engrained in us all. It's just that mindset of only using what you need and not taking any more. I suppose it's a sense of social obligation really, isn't it. That it is a common resource that everyone needs. In order to survive we have nothing. We can't exist without water, so we need to individually all be conscious about it so that collectively we can have some. It's a sensible way of using that resource. (Helen, 40, Coburg)

> You don't actually see too many people watering their gardens all the time, even in summer. I think overall, both the change in water fees and the campaigns around water use in homes and generally, has resulted in a lowering of the individual use of water here, which is great. (Mathew, 47, Camberwell)

In Mathew's experience, a 'change in water fees' and 'campaigns around water use in homes' were viewed as key drivers for shifting public perceptions of regular garden watering habits. An adherence and reinforcement of these perceptions embedded values for reduced garden watering in the cultural fabric of his community, as emphasised in his perception of community reductions as 'great'. Helen similarly refers to the water conscious culture in her community through the 'engrained mindset' and 'social obligation' to 'collectively' save water, which she considers the 'sensible' way to use water in her community.

However, as I demonstrate in the following, these cultures were less accessible for the socially disadvantaged, as the resources opportunities in these communities shaped user experiences and

capacities for water saving practices accordingly. Pip and Louise present the common experiences at varying ends of the social gradient:

> I couldn't justify using mains water if there were alternate ways of reusing water … During the drought we installed five water tanks in our backyard. We also installed the recycled water unit which processes wastewater to A1 drinking water. (Pip, 57, Camberwell)

> I think the government should be in support of people to buy a water tank. Maybe even free. I don't know. I did see one [incentive program], they have from the government, but I didn't save much so I couldn't afford to do it with the rent. We just stopped washing the car or less for the gardening. That's pretty much it. To be honest, I don't think we could cut much else. (Louise, 33, Broadmeadows)

With a greater social disadvantage, the opportunities for residents to build necessary literacies and afford technical water saving solutions were reduced. As Louise describes, an emphasis was instead seen on more basic practical solutions such as reuse through bucketing or measures for curbing consumption. By contrast, greater social advantage brought a heightened capacity for purchasing and using effective technical solutions such as those for stormwater harvesting and wastewater recycling, as was demonstrated by Pip.

Social inequality interacted with the socio-technical context in Melbourne in interesting ways. Despite a heightened commitment (and broader culture through IUWM agendas) from Melbourne's resource management authorities to engage and empower the community to deal with water scarcity, the drought had a disproportionate effect on the socially disadvantaged. The disadvantaged felt the effects of the drought more severely through the experience of heighted heat impacts and rising water bills (as outlined in Chapter 6.2). Moreover, their reduced technical literacies and financial capacities (as in the case of Louise) meant they were also less able to mitigate these circumstances through access to more effective technical solutions (such as those Pip implemented). In this context, those whose living standards were most reduced also possessed the most reduced capabilities to improve their circumstances.

Despite these implications, the broader management initiatives implemented throughout the drought period, have laid the foundations for innovations in Integrated Water Management for Greater Melbourne in the years to follow. In the following sections, I discuss the implications of this for different communities.

7.2.2. An integrated culture and liveability in a water cycle city: Institutional mechanisms for fostering community engagement and building capacity

As mentioned the heightened restrictions on the watering of public and private outdoor spaces were enforced as the severity of the drought worsened throughout the latter stages (2006–2007). This led to what many commentaries refer to as the 'great browning' of Melbourne as private gardens and public greenery went thirsty. The implications of this were more pronounced than a mere decline in aesthetics. As Ferguson, Brown and Frantzeskaki (2013) note:

> Trees that were over 100 years old and provided shade, greenery and character to the city came under serious threat. Urban ecosystems were degraded through lack of water and important social infrastructures, such as community sportsgrounds and recreational lakes, were too hard or dry to be utilised. (p. 7307)

The importance of water in the provision of ecological services, urban amenity and microclimate control were recognised at an institutional level which in the years following led to the mandate in government for the water sector to consider liveability, health and environmental sustainability in their service provisions. These were explored through large-scale collaborative, industry, government and research programs throughout 2010 (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013; Johnstone et al. 2012).

At the same time the newly elected Liberal government, looking to distance itself from the large-scale water infrastructure investments of the previous government, put forward its 'Living Melbourne Living Victoria' policy, premised on the integration of alternative water sources (namely wastewater recycling and stormwater harvesting projects) for the improvement of liveability in urban areas. In doing so it sought to leverage off the perceived 'failure' of the former government using the example of the desalination plant to associate the previous government with the outdated paradigm of large, centralised water supply projects. Although, Furlong, Gan and De Silva (2016) note that there was growing support and a shift of the water sector to the ideologies of integrated whole of water cycle initiatives and Water Sensitive Urban Design (WSUD) prior to this. Renewed political support for these paradigms paved the way for the embedding of these ideals in both the culture and structure of Melbourne's water authorities (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013). As one water sector practitioner noted:

> Melbourne Water recognises the value that these waterways and open spaces, and our corridors and land all provide in building up the social fabric of Melbourne and the region. We've now got programs, for example, around liveability. We never had that five years ago because we've recognised the importance of that to our community. (Water Industry practitioner, Melbourne)

As this comment suggests, despite shifts in both the political landscape (Labour regained government in 2014 and is currently in power) and institutional governance arrangements, there has been little pushback from these initiatives, which are still considered the norm in all levels of planning and water related services (Furlong, Gan & De Silva 2016).

In the years that followed the existence of an additional AUD $700 million from the Federal government budget for the subsidising of water saving initiatives, alongside existing state government policy targets, led to what Furlong, Gan and De Silva (2016) described as a policy window for the implementation of these projects (also Ferguson, Brown & Frantzeskaki 2013). The Melbourne community experienced a groundswell of water recycling and stormwater harvesting implementations, with over 108 stormwater harvesting schemes in operation over the time, many of which were owned by local governments and private entities (Ferguson, Brown & Frantzeskaki 2013). Additional programs such as Melbourne Water's 'Living Rivers' program, which began in 2006 to subsidise local governments to implement WSUD projects, further contributed to the initial water sensitising of domestic contexts (including the construction of over 633 raingardens, with many more planned as part of new developments), and a clause in the Sustainable Neighbourhoods provision was implemented that required all major new residential development to include stormwater treatment.

With this groundswell of activity, the previous Liberal government recognised the need for an over-arching body that could better coordinate efforts and drive a necessary generational reform for IUWM. The Office of Living Victoria (OLV) was established in May of 2012 to fulfil this purpose. However, a fraught implementation process and heavy scrutiny over its functionality meant that this was short lived. In the 2014 state election the Labor government was reinstated and the OLV—having suffered a damaged reputation—was absorbed back into the Department of Environment, Land, Water and Planning (DELWP) (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013). Despite some progress in recent years, a lack of broader coordination to IUWM has remained elusive. This, as the following stakeholders' experiences suggest, has been recognised by many in the water sector as a perceived barrier for the more effective realisation of these outcomes for the Melbourne community:

> Everybody throws this one up, but institutionally there's probably not such strong alignment yet. We need to crystallise the agenda, and then identify, through government's design, the appropriate responsibilities and accountabilities … So far there's a lot of noise, but there's not much harmony. The sooner the government can harmonise some of that institutional responsibility, it'll be a lot easier. (Water industry practitioner, Melbourne)

> Councils are not required … nowhere in their [mandates] is there anything around integrated water management for example. Some council's play a very active role in that space because they can see the value for their local communities and their local communities want those sorts of things. For example in Knox City Council (eastern suburbs near Camberwell) they are really looking at integrated water management techniques, they're getting a lot of funding from Melbourne Water and other sources to look at how they can better deliver outcomes for their community. They understand the value and they can see that the assets that go along with these are really valued and appreciated by their community. (Water industry practitioner, Melbourne)

Furlong, Gan and De Silva (2016) supports this perspective, describing a lack of any agreed framework for IUWM that could clarify regulatory roles, responsibilities and expectations (also Rijke, Farrelly & Zevenbergen 2013). In its absence, on-ground implementation and uptake has proven sporadic, based instead on the existing resource capacities, technical capabilities and willingness of local governments and communities.

There is a marked disparity in the resource opportunities local councils have in advantaged and disadvantaged suburbs for these processes. Many practitioners reflected on their experiences of IUWM and WSUD amid resource and implementation challenges:

> I think it depends on the social economic drivers of each area, so the poorer councils their focus might not be on integrated water for example. If you could have a kindergarten that would service their community that they need desperately because it's a poorer social economic class and there's a lot of growth going on as a result of that, then they would obviously choose community centres and those sorts of things over environmental integrated water management type solutions. (Water industry practitioner, Melbourne)

> It depends on the capacity of the council itself, it depends on the revenue that they have. So very inner city, cutting-edge councils obviously like [The City of] Melbourne have a massive revenue—they're driving integrated water management throughout their city. They're looking at solutions which are probably far ahead of all (the others). They have a really well connected community that understand and are interested, they have the funds and resources at their disposal to do it and they have the technical capabilities. (Water industry practitioner, Melbourne)

Despite regulatory measures for WSUD in new developments, and capacity building opportunities such as the Living Rivers (previously mentioned) and Clear Water programs (a local government and industry capacity building program funded by the water authority), the Melbourne context has remained in a state of transition that has progressed slowly since the initial instilment of WSUD and IUWM in the period preceding the Millennial Drought (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013; Rijke, Farrelly & Zevenbergen 2013). As these experiences demonstrate, the existing socio-technical context (which include the political, institutional and policy responses to

drought and council-community dynamics) has largely limited the adoption of these paradigms to communities that possess an existing capacity for them. The increased resource opportunities for those at the higher end of the social gradient mean they possess the necessary technical and financial capacities for public implementation, and a community connectedness for cohesion to water sensitive values to support implementation.

Elsewhere, the institutional and community culture for liveability, sustainability and resilience realised through IUWM, has had less traction. Notably, these comprised the communities of Melbourne that could benefit most from them. As an example, I present the alternate experiences of a similar WSUD initiative in the Broadmeadows and Camberwell community:

> Nearly everyone around here has tanks and there are a number of tanks that have gone in Camberwell, Canterbury and Glen Iris. There are people really actively managing it or at least trying to do something about it, mostly because in the 'leafy greens' we are trying to preserve what has been here, with the trees, we don't want to end up with the dry, concretey look ... [Also] You can't put a value on them on hot days. (Lexi, 51, Camberwell)

By contrast in the disadvantaged community of Broadmeadows:

> We've just had trees planted on our street again for the third time. They get pulled out a lot. People just don't care around here. (Rebecca, 58, Broadmeadows)

In Lexi's experience an enriched technical know-how of urban cooling benefits, value for amenity in public space, and greater connectedness amongst Camberwell residents, has instilled what she perceives as a cohesion and stewardship for these assets amongst the community, which in turn was seen to shape a personal culture for water sensitivity. By contrast Rebecca's experiences in Broadmeadows reflect a lack of community salience to these values. Instead, the low rates of engagement in public spaces, poorer community connectedness and reduced technical literacies that resulted from reduced living conditions (see Chapter 5.2 and Chapter 6.2), shaped a community dynamic that was not able to foster the community engagement and stewardship necessary to support these initiatives.

Capacities for an engagement in integrated solutions were highly varied as a result. One community participant expressed a thought-provoking quote in relation to this observation:

> It's really hard to do something about something which you cannot perceive. (Bel, 30, Camberwell)

The broader water use values of Melbourne's communities (outlined in Chapter 6) warrant some consideration in this regard. As the vision for WSUD (or more holistically a water sensitive city) is to

promote liveability and sustainability through technical solutions that enrich enjoyment, comfort and convenience in public settings, households with water uses that are more aligned to these values are likely to possess a greater understanding and support for uptake. In this regard the vision of water sensitive city is more 'perceivable'— as Bel suggests in the above statement— to the socially connected and technically literate, socially advantaged resident, comparable to those in less advantaged circumstance whose emphasis on water use is more intrinsically derived from personal welfare needs.

However, implementation of WSUD is not always straightforward even in advantaged areas where there are greater resources and opportunities for education and engagement. For example, in Camberwell aesthetic views about streetscapes had an impact on council priorities. One industry stakeholder demonstrated this in her experiences with the Camberwell community:

> I've only been with them a year but in the capacity scheme of things they're a fairly high capacity council that have got passionate people on board. One of the things that I've noticed is their lack of streetscape works. I think there was [sic] some very powerful community residents that weren't happy with the rain gardens. There are quite a few vocal community groups around Boroondara Council. I don't know if they're implanting any rain gardens at the moment. I think they felt that they're expensive to maintain and the community don't understand them, or they don't like them, or it's difficult to make them look nice or whatever. I feel that their capacity is dwindling in that perspective, there's more of a focus on credible water recreation amenity those sorts of things as opposed to water quality. (Water industry practitioner, Melbourne)

In this example community resistance to streetscape WSUD technologies had hindered effective implementation, as these did not meet existing community values for the aesthetics of their streetscapes and thus were not aligned to the water use values for enjoyment and aesthetics within the Camberwell community. The lack of any stewardship and commitment to these water sensitive technologies in the community meant that the council did not support their implementation.

As water management continues to transition Melbourne communities to whole of water cycle, water sensitive regimes, there will be a growing requirement to ensure an effective engagement and stewardship throughout the community to these values for effective integrated urban water management. The nuances of community values, experiences, understandings and existing capacities that currently surround daily water use will need to be accounted for to ensure both advantaged and disadvantaged communities are able to do so.

7.2.3. The environmentally conscious guilty consumer? Or a new generation of water sensitive citizens

The lived experiences of the millennial drought have instilled a value and a capacity for water saving in the Greater Melbourne community, which are observable to this day. The existing socio-technical arrangements during the drought—which included political agendas, institutional mandates and policy settings for water efficiency—mobilised the community to save water. At the same time practical and technical solutions were offered, that presented an opportunity for the alleviation of these circumstances, and through their implementation (and the lived experience of them) these values and capacities were embedded in the cultural fabric of Melbourne's water use.

For much of the community at this time, a water consciousness formed part of the liveability, sustainability and resilience of daily life. However, levels of disadvantage had an impact on the sort of opportunities individuals had to achieve this. For the socially advantaged, greater access and availability of resources meant the need to save water could be met with greater ease and efficiency through more expensive technical solutions that were more effective, and ensured comfort and convenience. By contrast, those experiencing greater disadvantage focussed on practical solutions that, while cost effective, would often prove less comfortable and convenient, as well as more limited in effect. Through resource limitations, drought impacts where not only experienced to greater effect for the socially disadvantage, but they also proved harder to mitigate.

Since this period the broader bio-physical context has shifted, drought conditions have reduced, and socio-technical contexts have adapted accordingly. A recent return to more regular and consistent rainfalls, and a newly developed desalination plant waiting in ready, has de-politicised water agendas, with a perceived lack of urgency for action by the government. Existing media sources have also responded accordingly, with a business as usual mentality that appears less publicly scrutinised (Furlong, Gan & De Silva 2016). At the same time, the lessons learned from the crisis of the drought have enriched systems and infrastructures with new capacities, agendas and institutional cultures. Mandates for community efficiency and restriction have been replaced with agendas for liveability and sustainability, policies from 'browning' have shifted to those for 'greening'. Similarly, support for centralised infrastructural investments have shifted to de-centralised, integrated whole of water cycle, or water sensitive initiatives (Rijke, Farrelly & Zevenbergen 2013). With reduced political and institutional emphasis for community investment, many practitioners speculated on the existing lived context:

> I think because the emphasis has died off. We're not in drought and things like
> that, people are still willing and think that we should be saving, but there is that

idea that there's no rebates and no incentive to do it anymore. It's not being encouraged. (Water industry practitioner, Melbourne)

It's not the same focus now as what it was a few years ago. Having said that, we get water data supplied from the retailers, the municipality in general does use less water than Melbourne average; despite the fact there is actually quite a lot of people gardening in this area. (Water industry practitioner, Melbourne)

Sofoulis (2011) argues that the modern water saver in drought conditions is expected to be the 'environmentally conscious guilty consumer'. In many respects such a statement can be applied in the context of the Melbourne experience. As past and existing socio-technical contexts have shaped a community that while engaged in water resource management issues, lack the sense of immediacy it once had for water sensitive practices. For most participants, a consciousness and capacity for water sensitive practices remained, but with a lessened restraint on living standards comparable to drought times; consequently, water saving values were reduced to those that would align to the broader values for water uses described in Chapter 6 (welfare vs leisure and luxury).

In many households, more onerous practices, such as physically intensive practical re-use techniques, and those that might reduce personal comfort and enjoyment, such as reduced shower times or garden water routines, were abandoned. This was most evident for those at the higher end of the social gradient that placed a greater emphasis on their water use to encompass these values:

We used to be really good with the bucket and everything but then the girls got a bit older and I just don't like having buckets of water sitting around when she's [the youngest daughter] this age. We don't remember to put it on the garden. I would really like to do something with grey water with our washing machine, because that is probably somewhere with water we use the most. Which is only going to get worse in terms of usage. It was all talked about when we had the water restrictions, but now I guess it sort of feels like we all go "Oh well we are fine now". I guess we are still aware of it, but it felt like everyone was so good then, and then they lifted the restrictions, and there just doesn't seem to be that sense of urgency to it. I think there still is a sense of urgency, but we just don't recognise it as much, if that makes sense. (Peter, 39, Coburg)

By the same token, technical approaches appeared to possess a greater longevity, with ongoing use since drought times and new installations. As Mathew and Valda suggest, the convenience and aesthetic values technical solutions offered meant that water saving values could be upheld without compromising other living standards:

Having 30,000 litres here is probably significantly more than we need, but we need to put in retaining walls, we've got a product that does that. It's actually less expensive than building a brick retaining wall. Plus I get 30,000 litres of water storage. I would like to be able to use that as potable water and we will probably put a filtration system in the kitchen here and actually filter that water. The other thing we're probably going to do is put a Greywater system in because

we've got room around the back for a little Greywater system to sit there out of the way as well. We would use that for probably subsurface irrigation around the front. (Mathew, 47, Camberwell)

For the back yard I use the tank ... The tank I've got now is a plastic one and the one I had there [in my old house] was a Colorbond one. I use a tap a bit in the front because I need to get a gate on the side. I haven't got a gate on that side. Once I've got a gate I'll get a second tank for the front. (Valda, 66, Coburg)

These experiences were less common at the lower ends of the social gradient. For the disadvantaged, both the affordability for installation and a reduced capacity for the maintenance of some existing appliances meant that water saving technologies were not only less common but also, where existent, often underutilised due to structural issues. Dorian provides an example in commenting:

I was quite surprised. When I got the water tank, I thought "this is going to save a bit of money" [but] it didn't. All the costs are in your supply charges, and it kept leaking so (we thought) "what's the point anymore?". (Dorian, 48, Broadmeadows)

Recent annual consumption data presented in Appendix 4 is consistent with these findings as, despite greater house sizes and more extensive water use settings in socially advantage Camberwell, consumption levels were relatively similar to those observed in the disadvantaged Broadmeadows community, with 2016 water consumption averages being 182kl and 181kl respectively. This suggests that the consumption practices of the Camberwell community—though more frequent and extensive (see section 6.4)—were more efficient, and in some respects water conscious through a greater literacy, and access to better appliances and water saving technologies. By comparison, the reduced literacies, and a poorer access to more efficient materials meant the capacities of the disadvantaged to be water conscious were more reduced. Interestingly, the moderately advantaged Coburg community possessed an annual consumption of only 147kl for 2016—significantly lower than both Camberwell and Broadmeadows. Several factors are likely to have shaped this outcome. For one, residents had smaller household sizes and material contexts, and some degree of financial emphasis on practices similar to Broadmeadows. At the same time, a greater literacy and access of efficient and water saving technologies (see section 6.3)—more comparable to Camberwell—meant residents could reduce their water consumption more effectively. Consumption levels were much lower in Coburg as residents were not only likely to use less, but could do so in a more water conscious (or efficient) manner.

Despite these community differences and a reversal of some practices, broader water consumption in Melbourne has remained significantly reduced since the times of water scarcity. One water utility

practitioner engaged in servicing the region encompassing the communities in this case study, provided data on Melbourne's consumption history throughout this time. I present these in Figure 7.0.2 with key discussion points to illustrate Melbourne's water consciousness.

RESIDENTIAL DEMAND – AVERAGE LITRES OF WATER PER CAPITA PER DAY

Initial household efficeicny measures imposed through regional strategies

Increased community engagement through heightened restrictions, target 155 campaign and appliance incentive schemes

Post drought period and relaxing of water efficiency measures
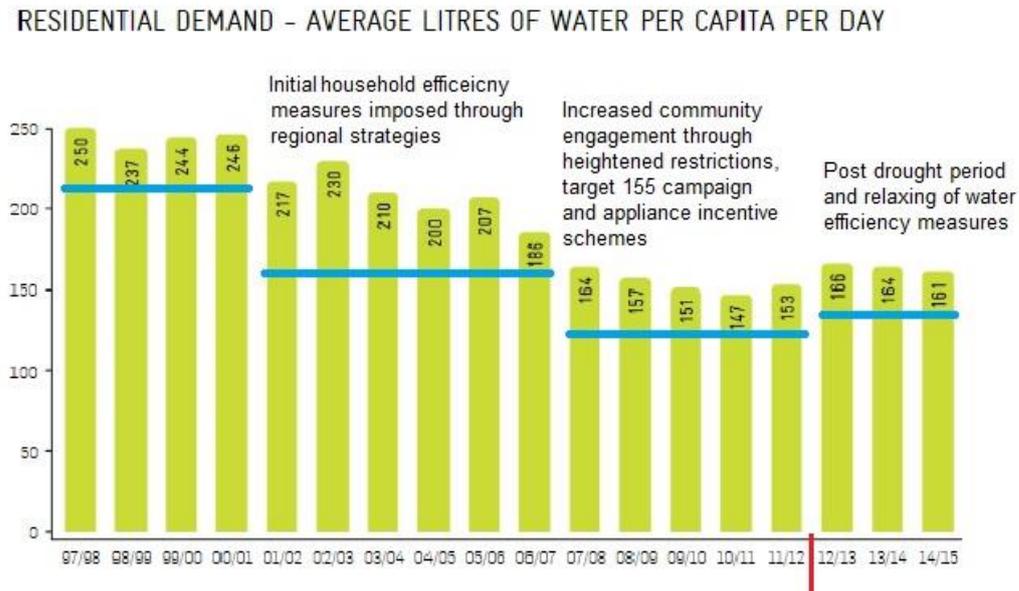
"The bounce back is that bit there, so it's gone from 147 up to 166, but that (2011-2012 year) was a hot summer compared to normal. Since we've had progressively cooler summers. This year, the estimate is 162. So the drought sort of brought it down that much, and the unwinding of restrictions has only taken it back up that much, so the behaviors are pretty much locked in. Certainly, all the appliance contribution has locked in" (Water industry practitioner)

Figure 7.0.8. Community Average Daily Consumption both during and following the Drought.

(Adapted from Yarra Valley Water 2016, p. 99)

In considering the 'bounce back' described here by this practitioner, it can be argued that Melbourne's institutional commitment to a community engagement has laid the now emerging foundations for what Dean et al. (2016b) describe as a 'water sensitive citizenry'. As throughout the Melbourne community, the current state of water security has led to a loosening of household water efficiency measures despite their ongoing consciousness that could see a realigning of saving efforts in times of need (Dean et al. 2016b). This conceptualisation contrasts with Sofoulis's (2011) notion of the 'environmentally conscious guilty consumer' previously mentioned in this chapter. Instead of a conflict between being 'environmentally conscious' and a 'consumer', the concept of a 'water sensitive citizenry' instead positions individuals as an integrated and engaged component of the water resource system rather than an external customer or 'consumer'. Like other elements of the

system, water users are positioned not in conflict with their environment, but instead are a part of and responsive to it through a competence and capacity for adaptive water use practices.

However, as the experiences of user competencies and capacities suggest, the luxury of an engagement and adaptability is not as easily attainable for the less advantaged as it is for others. In this sense, it is the capacity of individuals to access and uphold certain practices, afforded through their social advantage and disadvantage, that mediates their capabilities, and thus whether or not they are a 'guilty' or 'water sensitive' consumer. Progressing water sensitive implementations for Melbourne will require resource managers and those advocating for such transitions to be cognisant of these disparities, and develop initiatives that can better account for the situational variables and processes that can both permit or limit opportunities for individuals and communities to be water sensitive. In the next section, I discuss the context of the Perth metropolis and draw out the differences and similarities between the cities in socio-technical and bio-physical contexts and the impact of the social gradient.

7.3. Water Use Practices and the Social Gradient in Greater Perth

In Greater Perth, the interplay between socio-technical and bio-physical factors over the years have been distinctly different to Melbourne and so too have the experiences and associated values and practices of communities within this metropolis. A continual hot and drying climatic regime and sandy soils, for example, have shaped Perth's water supply and the specifics of household practices in the desire of residents to use water for leisure and luxury and basic welfare that would ensure living standards (see Chapter 6).

7.3.1. The Australian dream in the desert city: Water politics and the lived experience.

Historically the Perth community has considered large green gardens, lawns and open spaces for pools and entertaining areas part of their urban identity (Morgan, 2016; Bettini 2013; Gregory & Di Leo 2003). In her book of water use in Western Australia, Ruth Morgan (2015) describes the historical significance of year-round greenery and European style gardens and alludes to the symbolic value of both for the amicable life. Morgan notes that while observable throughout the wider Australian context, both exist equally and with no greater irony than in the water scarce, 'sandy city' of Perth. Despite a continually drying climatic regime and permeable sandy soils— likened by some to 'a sandy bath'—there is a strong culture of water intensive gardens, pools, greenery and lush open spaces throughout the community, which is present to this day (Morgan 2015; Bettini 2013).

Inherent within these cultural values are the water uses associated with them, which are expressed throughout the community and comprise aspects of their liveability, sustainability and resilience in Perth. As discussed in Chapter 6, these were varied in accordance to the lived contexts and resource opportunities of different households and communities. For those with greater social advantage, personal pools, green gardens and amenity had importance for enriching social capital through ensuring a community connectedness, while encompassing personal elements of comfort, enjoyment and convenience in their daily life. At the more disadvantaged end of the gradient, however, these were limited to less financially intensive forms, and prioritised for their value for heat mitigation and mental wellbeing.

Recent annual consumption figures (presented in Appendix 4) were also reflective of these dynamics. For example, it was the socially advantaged community of Cottesloe that had the highest average consumption in 2016 of 304kl, followed by the moderately advantaged suburb of Ballajura (272kl) and then the disadvantaged suburb of Armadale with the lowest consumption rates (201kl). Notably, each community had significantly higher rates of consumption compared to their Melbourne counterpart, which is suggestive of the water intensive culture observed in this city.

Since the post-war period, a continually cheap and relatively unrestricted supply of water to the Perth community has been conducive to heavy water use. Alongside a new found affluence—both in past years, and more recently through a minerals and mining boom—a rapid and extensive urban expansion of the Perth metropolis has transformed the Perth landscape in to the aptly titled 'wildflower state' equipped with a 'green oasis' of manicured suburban lawns and flower beds (Morgan 2015; Bettini 2013). Throughout this time, over half (and at times up to three quarters) of Perth's water consumption was used in garden and outdoor spaces (Morgan 2015), a trend relatively consistent with the recent experiences and accounts of the Perth community. In the following remarks, Jessica from Cottesloe and Alee from Ballajura demonstrate these inherent and long standing values which comprise part of Perth's water use culture:

> A lot of properties within the area are larger homes than mine. They've got swimming pools that they're going to filter and fill and all that sort of stuff. We don't have a front garden, we got a small sort of strip that we have to look after which is pretty unique in this area. So I don't feel the pressure from my snooty neighbours to have a perfectly manicured garden like the rest of the town. They all probably do feel that pressure to make sure that their front gardens are looking immaculate at all times. (Jessica, 24, Cottesloe)

> My partner's a bit fanatical about the pool so he's always filling it up, making sure there's enough water in there … you can't live in Ballajura and not have a pool. (Alee, 31, Ballajura)

Extensive groundwater reserves that lie beneath the sandy soils of the Swan Coastal Plain have sustained the suburbs amidst a drying climatic regime. This has been through a relatively unrestricted and unregulated use of personal household (and licensed community) bores. Morgan (2015) again notes the historical significance of this practice, which since times of early settlement have continually reinforced Perth's water use culture through a free and continued access to water that could ensure the year round prosperity of greenery, gardens and pools alike. As reflected in the following comments from Collette and Susan, a continual drying of climatic conditions and an institutional endorsement for personal and largely unrestricted groundwater access has ensured that community support for and use of groundwater persists to this day, despite a rapidly expanding urban population.

> There are a lot of bores here. Everyone has them because if you have a bore, you can water three days a week. If you don't, if you come off the main water supply, you can only water twice a week. (Collette, 66, Cottesloe)

> We love ours. We filled our swimming pool with it because of the spring water. Our quality of water is fantastic. If we didn't have to use Scheme water, we could use bore water and shower in it, but we haven't connected it. We just haven't got there yet. We might not even do that. It's one of those things we could do if we wanted to be really environmental. (Susan, 46, Armadale)

There is a widely held and accepted mentality throughout the community that Perth should have a green aesthetic, which through extensive personal bore water use and city supply can be maintained at both an immediate household level and more broadly at the community level throughout public and recreational spaces. In more recent years this has proven contentious in the management of Perth's water resources as a continual 'drying' climatic regime since the 1970s and rapidly expanding urban population has limited resource capacities and the viability of these ideals (Bettini 2013). In expressing these concerns, one water resource manager commented:

> It's going to be expensive as there would be no appetite from the community … They were encouraged back in the 70s to put in these bores to give them autonomy and they're not going to give that up easily. Yeah. There's this perception that the groundwater is always going to be there, because it always has been, so far. People don't understand that it's not anymore, and that's the thing that's really concerning. Again it's all about [meeting] their (communities) expectations, and then there's all these other issues about what everybody wants in their garden (in reference to European style gardens, pools and lawns). (Water industry practitioner, Perth)

Some state and local government strategies have bought water resource issues into the public realm more recently as a result. Despite an awareness and concern for water scarcity within the community, existing political, institutional and policy agendas have contributed to a lived experience that perpetuates a normative cultural behaviour for unrestrained household water use practices and

a lack of perceived responsibility for ensuring water security. Bettini (2013) makes note of the hydro-social contract in this context (see Chapter 1.1.1) concluding that it places unrealistic expectations on water supply managers and infrastructure as a result of water intensive values and practices held by the community. In the following, I reflect on the institutional arrangements that have shaped these experiences, before considering the barriers and opportunities for renegotiating a more water sensitive hydro-social contract in the context of advantage and disadvantage.

7.3.2. 'Water forever whatever the weather': The 'drought proofing' of Perth

Throughout Australia's water management history, the politicisation of water has been well documented, and at times widely criticised for its short sightedness through reactionary decision making, as state governments step in to 'solve' the water crisis amidst popular public support (Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013; Bettini 2013). Experiences throughout the Millennial Drought in many of Australia's capital cities can attest to these claims. Water recycling campaigns in South-East Queensland, and the previously described desalination technologies in Melbourne, providing clear examples (Bettini 2013; Furlong, Gan & De Silva 2016).

At the peak of the Millennial Drought (2001) water politics were brought to the forefront of Perth's water resource management sector, as the city reached a tipping point in its water crisis. Dam levels reached record lows and existing data sources signalled a possible step change to much drier climatic conditions (see Figure 7.0.3).
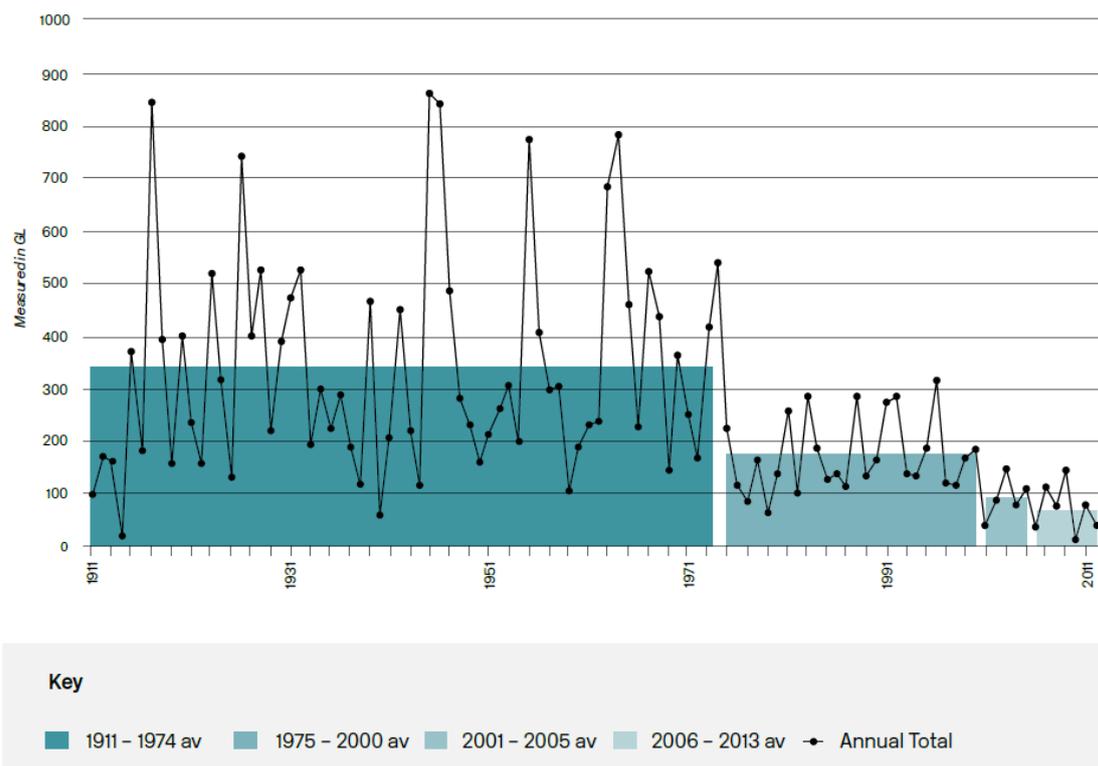
Figure 3: Historic inflow to Perth's dams (Source: Water Corporation)

Figure 7.0.9. Dam Water Storage Levels (1911–2011)

(Taken from Rogers et al. 2015, p. 10)

Decision makers quickly realised that existing resources were no longer sufficient in securing Perth's water supply and new sources needed to be developed. Moreover, the additional realisation that ensuring water security could ensure votes saw a greater political investment in water resource management issues. Community awareness of water supply issues developed through a heightened media coverage of these now politicised matters, which continue to shape community opinions and understandings. In the following statement, Damian describes a regular point of political debate observed in the media regarding proposals for a pipeline to supply Perth with drinking water from the Ord River in northern Western Australia. Notably, this was seen to shape his understanding of Perth's water resource issues, as it had for most participants:

> I can't remember where I was the first time I heard about that [pipe] down from the Ord [River], but it came up in the media a lot ... It was in the politics. Probably a state election a few years ago. It's always been rumoured around ... Basically every summer someone will bring it up because of the fact that Perth is barely starting to have any water ... Somebody will bring it up some week, and another week they decide no that's not what we need, and it comes back to the Desal plants. (Damian, 55, Armadale)

However, in 2005, a failed election campaign proposal for a major pipeline to bring water from the state's north by the then Coalition government, was considered by many to have 'cost an election,' influencing a taboo around issues of water management at a political level (Morgan 2015; Bettini 2013). Many stakeholders made reference to what they considered a risk averse management agenda in water governance during this time. In seeking to avoid public controversy, the Perth government maintained a protective strategy focussed around big infrastructure to meet growing community demands. The following perspectives from two of Perth's water industry stakeholders reflect these experiences:

> We have a premier who will do anything in the world to avoid water scarcity issues. He lost an election on water, and he will never let that come back up again. He's also been quoted as saying, "I will never allow us not to be able to water our gardens". That's why our communities are not engaged, that's why we've got two days a week [basic community water restrictions]. We won't ever change from that. He won't ever cut the water off. (Water industry practitioner, Perth)

> Somebody told me and I don't remember which politician it was, somebody said we've got a message for you. We don't want people running out of water ... We don't want to put in any water restrictions, the problem is fine ... We'll just build as many desal plants as we have to. (Water industry practitioner, Perth)

A technology-centric 'security through diversity' agenda was adopted by government in the years to follow, and in 2006 Perth broke new ground in the implementation of Australia's first seawater desalination plant. Since this time, Perth has seen the addition of a second desalination plant which collectively provide 30 percent of Perth's drinking water, and groundwater recharge schemes which involve the recycling of wastewater for managed aquifer recharge (Rogers et al. 2015; Bettini 2013).

Notably, Morgan (2015) reflects on the non-controversial nature of the implementation of these large technical solutions, which compared to experiences in Melbourne were not met with community resistance. The environmental and social implications of these infrastructures has warranted substantial public backlash in other Australian cities, during their implementation. For example, in the Queensland city of Toowoomba, recycled wastewater programs were ceased due to strong community opposition, despite water shortages and the prospect of severe water restrictions. Likewise, the Melbourne introduction of desalination technology (see sub-section 7.2.1) faced both strong community and political opposition due to its environmental impacts (Morgan 2015; Furlong, Gan & De Silva 2016; Ferguson, Brown & Frantzeskaki 2013).

The perspectives of both stakeholders and community in the Perth context, offered some points for consideration. For example, many practitioners expressed a concern as to a lack of overarching

environmental stewardship within the Perth community. As the following remarks demonstrate, a general lack of engagement and information on these issues, and a growing material culture resulting from the recent mining boom has been influential in shaping community disengagement:

> In Perth everybody always tells me this example when the catchment water was so bad they had algal blooms, and about half a dozen dolphins died in the Swan (Perth's major river) and somebody said it was page seven news. Where if that happened in the Yarra [Melbourne's major river] it would be front-page news and everyone would be all over it. (Water industry practitioner, Perth)

> You speak to different people in State Gov departments and other agencies and they say, "We've got a completely apathetic community here". Keep in mind it was a mining community and it's changed now. People used to come in here to make money and they don't really care about the environment. It stems from that, it's all about the material wealth so they're very disengaged". (Water industry practitioner, Perth)

This community disinterest was believed to hinder any socio-political drive for more sustainable outcomes (Bettini 2013). While at the same time political priorities to avoid controversies through the previously described "protective" strategic direction of the government and Water Corp (the government owned water utility) was also recognised for its tactical white-anting of a broader community engagement in resource management agendas. The following stakeholders attest to these experiences:

> They just did it. They went and did it. I've got people I know who worked as consultants on those, and they were told, "You are not allowed to mention either of those projects out in the public". They were so cloaked, the whole time, until each plant was actually operational, then they could talk about it. It keeps the community out. They're very good at doing that. (Water industry practitioner, Perth)

> Look, they [Water Corp] have done an awesome job on two things. They are doing really well on the water efficiency side—they've made people think about their water use, and they've also convinced the community that we don't have a water problem. Water forever. That's their slogan, "Water Forever". (Water industry practitioner, Perth)

However, as the last comment suggests, management practices have not been entirely absent of community investment. Though patchy, household water restrictions were reported to have been implemented at earlier stages in the millennial drought period. Two day a week sprinkler rosters were introduced in 2001, reduced to one day a week in 2010, along with a complete sprinkler ban throughout the winter (Bettini 2013). While significant in the face of the broader water resource agendas experienced, both stakeholders and some community members were in agreement that Perth residents have been spared the more extensive restrictions experienced in other Australian cities:

> I travel a lot, and I see it around the world. Interestingly in Australia, I think I travelled over east recently. They had harsh water restrictions far worse than we had over here. Now we've got them ourselves, but not as harsh. Over Easter I noticed that you couldn't even use the hose to wash your car, and I noticed in places that I visited that some places had really harsh water restrictions, and then I realised that we didn't have it so bad over here, even though we've got water restrictions in place. It's not just about me, it's about everyone else. (Natasha, 48, Ballajura)

> There are lots of mixed messages for people currently. I suppose one aspect is [that] in Perth, compared to the water restrictions they were on over in the east during the drought. It was nothing. I knew it would happen in Perth, everyone always says, "Perth people didn't do manageable restrictions". (Water industry practitioner, Perth)

In more recent years, the 2009 *Water Forever Whatever the Weather* strategy developed by Water Corp (the government owned water utility) presented a portfolio that would seek to effectively drought-proof Perth for the next fifty years. Consistent with the largely central agendas of former years a core focus of this were plans for major investments in research and infrastructure to ensure a water security through alternative water supplies, though some demand management strategies aimed at reducing community consumption were also noted. Amongst other initiatives, this included the introduction of year round garden watering rosters, seasonal sprinkler bans and incentives for water efficient household appliances (Water Corporation 2011).

While these water saving initiatives present a step away from the more traditional techno-centric focus to water resource management, they are largely novel add-ons in the face of the community expectations for plentiful water use in their daily lives. As a result, these initiatives had varying support and adherence amongst the Perth community:

> We did have the water saver on the shower thing. We took it off ... Yeah, we took the water saving shower head off because it interrupted the flow. I prefer to have a short shower that is effective rather than run around. Occasionally when I'm cold, I will have a shower to warm up. That is quite an indulgent thing. (Jennifer, 56, Cottesloe)

> They are enforced but no one ever really bothers around here. We have mainly got small lawns in our street so we don't worry about that. But I notice sometimes that the house with the bigger lawns—because we have very big verges here in Cottesloe—they're verges are all green as well. We don't complain about that or anything, but I do notice that they're green. (Ruby, 61, Cottesloe)

For Perth, the transition to a more engaged and water conscious community appears still in its infancy both in an institutional sense and throughout the wider community as a result. This is largely due to the culmination of political agendas, institutional settings and community expectations which over the years have shaped a water use culture in Perth that is seemingly at odds with these values. I

move now to reflect on the implications this presents for communities and households that vary in social advantage and disadvantage and the challenges for the transition to more water sensitive hydro-social cultures.

7.3.3. Renegotiating the hydro-social contract, barriers and implications for the social gradient

The interrelationship between the bio-physical environment and the systems, infrastructures and technologies that comprise water resource management, have played a seminal role in shaping modern water use cultures that were observed throughout the Greater Perth community. An extended drying climatic regime has led to the recent politicisation of water, resulting in a techno-centric approach to its management. A risk-averse policy agenda perceived to shy away from more integrated approaches has left the Perth community largely disengaged in broader resource management issues. With this lack of salience and perceived responsibility, long standing values for green spaces and plentiful water for both a personal and public amenity have presented a challenge for resource managers in the face of a rapidly expanding population and ongoing water scarcity.

On the one hand, practitioners are constrained by community expectations, based on long held norms for demand that may no longer be realistic. On the other hand, rather than working towards shifting these unrealistic expectations and negotiating a more appropriate hydro-social contract, water managers have employed strategies to meet these demands and avoid controversy by opting for potentially less sustainable, more financially intensive options.

This has come at a cost to the community, as despite some engagement in water sustainability and significant reductions in per capita consumption in recent years, the costs of 'drought-proofing' the ever-expanding Perth metropolis has seen average household water bills triple since 2005-2006, adding to the already high cost of living in the Perth metropolis (Morgan 2015). The increasing cost of water security through existing socio-technical regimes, which seek to reduce dependencies on yearly rainfall inflows, presents some likely implications to the living standards of this community. One practitioner, for example, notes:

> Up there in the north there's no water, because it's all been allocated to drinking water, and so they need to find a source of water to irrigate their parks. The council and the state government have recognised that that's really important, because these parks are important for people. We'll find the water from somewhere but it won't be cheap. (Water industry practitioner, Perth)

At greater risk are the cities marginalised whose water use practices (and thus capabilities for liveability, sustainability and resilience) are already restricted through an existing financial leniency, reduced resource opportunity and increased vulnerability (See Chapter 6.2 and Appendix 4). Many stakeholders also suggested that less favourable bio-physical and socio-technical contexts were also

compounding these limitations through restraining resource opportunities for improved living standards:

> We've developed most of our easily developed land. Anything that's high from groundwater. It doesn't have any wetlands, doesn't have any waterways, minimal vegetation, that's all been developed. We're now into low-lying areas on the fringes. You've got clay soils, so infiltration is difficult. You've got lots of creeks and waterways or old degraded wetlands here. They get permission to build on top of what was a degraded wetland and the government says "Yep, you can build on top of that. Go for it". Those are very messy sites that require very careful drainage planning. Many local governments have really struggled to deal with that ... a lot of new developments have flooding issues in these areas. (Water industry practitioner, Perth)

> We are sort of creating almost an unliveable city I think on the outer suburbs in some situations. It's cheaper land, cheaper housing, people theoretically can less afford electricity and electricity prices are going up. A lot of them are also unlicensed for bores. So provision of trees is the last thing for consideration [for the occupant] and you can't put them on the block because the houses take up too much space these days. So it's got to be pushed on to the public realm—on the roads and things like that. If you are stuck in a house in an area that is just generally hot it's going to be getting more and more expensive to cool yourself down and people will be becoming more and more less well off. (Water industry practitioner, Perth)

With a rapidly expanding urban population—of 2.2 Million by 2031 (Rogers et al. 2015)—the densification of these and existing communities presents a likely threat to the amicable Perth lifestyle under existing resource management frameworks. A requirement for the investment in infrastructures and technologies that will effectively alleviate these restraints, while promoting a stewardship and building competencies for a more water sensitive hydro-social contract has been all too realised by the water sector (and other government departments) in recent times (Rogers et al. 2015; Bettini 2013).

A shift to more decentralised IUWM and WSUD initiatives for achieving these outcomes has received growing support. However, many stakeholders note existing institutional barriers that have limited capacities and present current challenges for this socio-technical transition:

> Coming back to your question about local government interactions. The local governments struggle with Water Corp when they want to do something that will reduce storm water runoff into those drains or improve the quality because Water Corp say these are the conditions of our licence and anything that goes beyond that we won't approve. Department of water has tried to do some work building that relationship to help facilitate that. When it comes down to it, Water Corp owns the assets. (Water industry practitioner, Perth)

> What happened was the developer would come in and Water Corp would say, "this is what we want". They go, "Okay, no worries, we'll do that". Then

> Department of Water would go, "No, that's wrong. It's not water sensitive.". Then the local government go, "Oh, we didn't like that. It's going to cost us too much to manage"... It was very painful for the developer to go through, and in the end these things (WSUD/IUWM) would fall through ... So it's lacking that leadership. Someone in the right position, with the right amount of influence, and the right skills, to just keep bringing people along, keep driving the agenda. (Water industry practitioner, Perth)

As these experiences suggest, a lack of strategic alignment at an organisational scale to drive strong and coordinated action between the many invested stakeholders was a common factor inhibiting integrated water sensitive outcomes (Rogers et al. 2015). Underlying this was a lack of broader institutional leadership for these initiatives, which could otherwise provide an established narrative, rationale and coordinated vision for integrated, water sensitive investments (Rogers et al. 2016). Some stakeholders noted:

> Perth is quite a difficult institutional context to get your head around and it's partly because of all these relationships and political issues. You get that in other cities, but I've always felt Melbourne Water works well with local councils. They understand each other so you get the same messages coming through when you talk to them. The issue with Perth is the message is so disparaged that to try and make sense of what's going on can be really difficult. (Water industry practitioner, Perth)

> A lot of it comes down to personalities, I suppose, to a large extent. Some people have particular issues with some other people, or one person might have an issue with an organisation as a whole and that makes it more difficult to work. Financial capacity comes into it as well, because some of the others might have access to funding that others might not have. Some might have people who have the skills and knowledge to follow up, and some just have other more immediate issues they need to deal with. So that definitely plays a role. (Water industry practitioner, Perth)

Without any overarching framework or authoritative body, both organisational capacities and willingness for these initiatives were considerably limited. Existing implementations were fragmented, premised, as these comments suggest, on inter-organisational relationships, short-term policy windows or investment from private entities. Some stakeholders perceived this disparity to be related to the social gradient. For instance, despite efforts across the Perth metropolis, broader institutional capacities, and opportunities for implementation were more regularly observed where communities were of greater social advantaged. The following accounts from practitioners demonstrate this perspective:

> Getting back to the equity situation. I guess if you are looking at it from a spatial perspective, in terms of the areas that are most needing of that but least able to pay. I guess that eastern growth area—we haven't yet had a lot of demand for access of the [recycled] water for irrigation in the less well to do sort of areas. We have had a proposal for accessing treated wastewater from a Subiaco oval

> and park and a number of councils in the western suburbs which would be the well to do suburbs. (Water industry practitioner, Perth)

> Yeah it's pretty varied ... There's the western suburbs councils. They do try to do stuff at a more regional level in terms of drainage capacity, but in terms of getting involved with the community behaviour I don't think so. The communities there have grown up and they expect these green things. (Water industry practitioner, Perth)

In similarity to the Melbourne experience, more resourced socially advantaged municipalities were seen to be the early adopters of new water sensitive technologies and innovations in public spaces. This was due to possessing heightened capacities (such as skilled staff, finances and industry networks) to support implementations in public spaces, despite a lack of broader coordination for these initiatives at the time.

However, the lack of a more extensive social engagement meant that existing capacities were largely refined to infrastructures and technologies that would bear little repercussions on existing water intensive community values. As the following experiences suggest, the few existing efforts to foster community engagement and stewardship for water sensitive values were overlooked or devalued by a community whose existing lived experiences reinforce predominant water intensive cultures:

> So going to something like that [community water sensitive forum in the western suburbs] was refreshing and left me feeling "hey people are really interested". But again from a different perspective I feel that people are like "hey we are in Cottesloe", obviously it's a very affluent suburb so there are people with their giant grass lawns and things like that, who are not necessarily willing to compromise. (Water industry practitioner, Perth)

> There's this community perception that your backyard will be dry and usable all the time and heaven forbid you have an inch of water sitting around for a couple of days. That's where we're getting a lot of aversion to water sensitive design is it means there may be a bit of water hanging around on the road or in the park or in their backyard. (Water industry practitioner, Perth)

The ideals of a water sensitive citizenry remain elusive in the greater Perth context as a result. The barriers to effective integrated (whole of water cycle) initiatives under existing frameworks have limited the opportunities for a necessary community literacy (understanding of the issue, know-how of effective and suitable solutions and a salience) to be developed, which could begin to drive early adoption. Notably, some community members expressed knowledge and awareness of household water sensitive solutions. However, as Nelson and Georgia demonstrate, these were confined to a few that possessed the advantages of specific employment or other opportunities that would offer experiences of them outside of their immediate community:

> I would be the first one to have full black water recycling to taps. I've seen what water recycling is about … it's just molecules of hydrogen and oxygen. That's all it is, after it's been cleaned there is no issue … The only reluctance is the cost in setting up a system … I would rather go on holiday … water is probably too cheap. That's the other thing. (Nelson, 47, Cottesloe)

> We tried to get a grey water plumber to come in so that we could have our wastewater going somewhere else, but we weren't really able to get somebody to do it for us. It's difficult in Western Australia. I believe it's easier in Victoria, but in Western Australia, we don't know who to go too to have that wastewater transferred so that we can put in on the garden. (Georgia, 48, Cottesloe)

Once back within their community, a lack of any community and sectoral support for these values limited both capacities and a perceived need for water sensitive initiatives. Despite some competencies, water sensitive appliances were rarely seen in Perth households.

However the legitimacy of existing household solutions for the average resident warrants some consideration in light of Perth's bio-physical features. As one practitioner, and an engaged citizen speculated, Perth's continually drying climate and sandy soils do challenge the suitability of some technical solutions that have been traditionally favoured in eastern states recently:

> The options for the individual to so something are small, and that's why it's frustrating. You chuck a rainwater tank on, "All right, well we can collect rain for three months of the year". That will come into our toilets for the winter. But then when we really need the water, where does it come from? (Water industry practitioner, Perth)

> Yeah, I just think it's very limited. We are in a Mediterranean climate … and a lot of our water does return to the aquifer because we've got very sandy soils. I've got a bit of mixed feelings with these water tanks and rain gardens. It's good if you've got to water a big garden and you use a lot of water by hand watering. [But] it's mostly only useful in winter and that's not when you're using it. (Nelson, 47, Cottesloe)

A fragmented institutional setting adds to the confusion for residents. On the one hand, it haphazardly encourages a water conscious community. While on the other hand, an adherence to more centralised, top-down solutions feed a relative community disengagement with water resource management issues and any real perceived responsibility for individual commitment. If the Perth community is to transition beyond a limited adherence to basic water saving initiatives, it may be that a socio-technical reform is required that will reorient the hydro-social contract to foster water use cultures that are supportive of a water sensitive engagement, stewardship and autonomy within households and throughout the community, rather than the systematic dependence, currently observed.

Amongst other things, this will require a reconfiguration of institutional processes and initiatives to ensure household and community solutions are suited to the bio-physical contexts and water capabilities (experiences, needs and capacities) of Perth's diverse community. As one stakeholder suggested, the wheels for this may indeed be in motion, with recent moves under new ministerial directions for legislative reforms believed to bring a greater institutional coordination and policy commitment to IUWM initiatives:

> We haven't had legislation or a Minster who's made it clear who does what. When Water Corp actually own that land, they just get very pig headed and say this is our land. This is how we want to do it. We try to convince them to do it otherwise. You get some people who are cooperative and you get a lot of people who are uncooperative. That's sort of that issue in a nutshell, and it's still unresolved. There's a lot of work going on in the background at the moment because we're going through a legislation review of all water legislation. Part of that review is seeing who should be doing what. (Water industry practitioner, Perth)

The outcomes of these remain to be seen, and with years of 'too little too late' at a community level, I suggest that existing water use cultures will be slow to change.

7.4. Conclusion

In this chapter, I have highlighted the interrelating socio-technical and bio-physical elements that have shaped unique urban water use cultures in each of these cities. These water use cultures were significant as they situated household and institutional water practices, shaping a path dependency for recent water sensitive transitions in these cities (Morgan 2015; Brown, Rogers & Werbeloff 2016; de Haan et al. 2014).

Table 7.1 provides an overview of the key findings. Consistent with the theoretical framework of this thesis (see Chapter 3), these cultures were established and reinforced out of the co-structuring relationships between household resource opportunities, domestic contexts and water resource systems, infrastructures and technologies. However, while similar variables were observed to exert influence in each city, the dynamic social and political processes between them were considerably different and so too were the water use cultures observed. These have set the scene for progress towards water sensitive cities, by defining the institutional (both city and local contexts) and community capabilities for them.

In Melbourne, an integrated approach to water scarcity during the drought sought the engagement of multiple institutions alongside the community. Since then a culture for decentralised and community engaged water initiatives that enrich sustainability, liveability and resilience has become

embedded in the city. For much of the community this has fostered a water consciousness, which—for those financially and technically capable, in particular—has led to adaptive practices that have subtly shifted alongside a return to more water plentiful regimes in recent years. Institutionally this decentralised and community oriented culture has promoted a unified and coordinated setting for decentralised IUWM and WSUD initiatives. Collectively this has since equipped resource managers and parts of the community to build some capacities and foster water sensitive implementations in domestic contexts. Many municipal councils, for example, possess policies and expertise for water sensitive technologies and infrastructures (Brown, Rogers & Werbeloff 2016), while in socially advantaged household and communities particularly, growing support and implementations were observed.

By comparison in Perth, a largely centralised system and commitment to overcome climatic and community pressures on water security has embedded a culture amongst community and institutions largely premised on the notion of "water forever whatever the weather". The remnants of a techno-centric minerals boom alongside a political inertia for community intervention has led to institutional agendas that focus predominantly around large-scale centralised infrastructures and technological investment. Through these priorities, resource managers have shied away from community engagement offering little community opportunity for an exposure to resource management issues and solutions. Instead, a continually green and water plentiful lived experience has encouraged the notion of infinite supply and fed a lack of perceived responsibility for much of the community. Although continuing climatic and community pressures have led to recent growing support for water sensitive initiatives, a lack of institutional capacities for decentralised, IUWM and WSUD initiatives, and a reduced community salience have hindered progress throughout much of the community. Water sensitive transitions are largely in their infancy, as a result.

Table 7.1. Socio-technical and Bio-physical drivers that define community water use cultures and contexts

	Melbourne	Perth
Bio-physical drivers	The impacts of the Millennial Drought followed by periods of heightened rainfall and perceived water security	Continued drying climatic regimes since the Millennial Drought. Sandy soils which contributed to extensive ground water supplies. Inland floodplain environments in new development areas.
Political agendas	Support for decentralised whole of water cycle systems and community engagement following controversial big infrastructure investments during the Millennial Drought	Support for centralised large infrastructural investments amidst a protective political strategy for water resource management that has shied away from community engagement.
Institutional settings	Leadership through a peak water authority to drive IUWM and facilitate integration through mandates and a culture for enhancing liveability, sustainability and resilience post-drought.	A culture for ensuring water security through continued infrastructure investment with reduced community engagement initiatives. Fragmented implementation of water sensitive initiatives in more recent years, due to a lack of leadership and any unifying strategic framework. Support and capacities are varied as a result.
Domestic contexts	Strong and unified support for IUWM and WSUD outcomes within local governments that were consistent with the broader institutional context. Adoption pathways and progress were still varied and influenced by community values, needs and capacities. Heightened capacities and more extensive adoption were observed in communities of greater social advantage as a result.	Varied support and willingness for local government investment in IUWM and WSUD. Limited capacities due to institutional barriers and lack of community engagement. Early adoption for IUWM and WSUD premised on acute policy windows, and existing resource capacities, which favoured socially advantaged communities.
Community cohesion and lived experience	Reduced living standards experienced during the millennial drought have shaped a water conscious culture, reflected through technical and practical household water saving solutions and WSUD. These cultures were harder for the socially disadvantaged to participate in due to limited opportunities for them. While at a community level WSUD and IUWM implementation was limited where it would not immediately align with existing water use values (leisure and luxury or basic welfare).	Despite some awareness of water scarcity issues, long held community norms and a limited engagement in water resource management agendas over the years have shaped and reinforced community value for water plentiful, green domestic contexts. With a lack of institutional coordination and leadership in IUWM and WSUD, opportunities for experiences and interventions, which may shift these intensive water use cultures, were minimal.

Generally speaking, Melbourne has progressed further in these transitions processes compared to Perth as a result (de Haan et al. 2014; Johnstone et al. 2012). Brown, Keath and Wong's (2009) framework for water sensitive transitions outlined in Chapter 1.1.1 (see Figure 1 or Appendix 1) supports these claims by acknowledging the implicit requirement for a shift from centralised, large scale infrastructures and institutions that seek to overcome environmental variation to a more integrated, adaptive and reflexive system—which has begun to emerge in the Melbourne context recently (Brown, Keath & Wong 2016; de Haan et al. 2015).

Indeed, both past and existing contextual dynamics have played a key role in defining the water use cultures throughout institutions and communities, which have mediated the path for modern water sensitive transitions in these urban context. This is also consistent with Brown, Keath and Wong (2016) who note that the transitions to new city stages are achieved by the mutual reinforcement of change between infrastructures, institutions and practices. They go on to suggest that this is enabled and facilitated by social and institutional conditions and organisational capacities, which in this chapter were configured by the water use cultures in each context.

Perth and Melbourne were found to be at different stages in the fostering of these conditions and capacities. The implications of reduced social conditions were a critical factor for Perth in this chapter, with stakeholders noting an avoidance of water sensitive initiatives that were likely to impinge on existing community water use values and expectations. While for Melbourne, although a water consciousness instilled within the community has proven a successful vehicle to foster the supportive conditions for water sensitive initiatives, the cited practitioner experiences of rain gardens being rejected in socially advantaged Camberwell and reduced capacities of both the community and local governments in less advantaged suburbs serve to suggest that some progress is still required.

As I have suggested throughout this chapter, average annual consumption levels in these communities (presented in Appendix 4) are reflective of the stages of facilitation and progress of each city. Accordingly, both the extent of consumption and their relationship to the social gradient were unique in each city. In Perth, a more centralised and less community invested water resource context and culture, that is reflective of a less progressed water sensitive transitional phase, has influenced high rates of consumption throughout the community, particularly when compared to the Melbourne suburbs of similar resource opportunity. The currently reduced forms of community investment and engagement have meant opportunities for communities to develop the necessary water literacies and stewardship, and access water sensitive household technologies and infrastructures have been largely absent or in their infancy. Instead, average consumption statistics

at this time are more suggestive of the capacities communities possess to consume water. Consumption possessed a linear relationship to the social gradient as a result—the more social advantaged the community was, the greater their capacity to use water and thus, the higher their average consumption.

Melbourne, comparatively was less straightforward, as having made greater water sensitive progress, a more decentralised and community oriented water resource system and culture saw water conscious values and community capacities for them reflected through average consumption rates. As a result, in all three communities, consumption was significantly lower compared to Perth. Furthermore, the relationship of average consumption to the social gradient was less linear. Instead, it served to reflect the capacities of these communities for water conscious consumption, which was determined by the needs they had for water use (welfare or leisure and luxury), their current lived experiences (e.g. house sizes and features) and the sort of opportunities (literacies and access) they had for water efficient or water saving technologies.

Consistent with these findings, a more situated examination of the contextual variables in these cities also demonstrated that the benefits of transitions to date have been largely received by the socially advantaged consumer. In Melbourne, significant on-ground progress was predominantly limited to councils with projects in more technically literate and engaged socially advantaged communities, despite a more widespread organisational capacity. Similarly, in Perth—where social and institutional setting were less facilitating—communities with a greater social advantage were more likely to have some techno-centric water sensitive initiatives in their communities.

The findings of this chapter suggest that the pathways for water sensitive implementation so far have been oriented to favour the capabilities of the socially advantaged. This was due to the greater alignment of the heightened technical literacies, financial capacities and corresponding water use needs and values of the socially advantaged with water sensitive outcomes and, as I note in the Melbourne context, the adaptive household practices of a water sensitive citizenry. This meant there was a greater community stewardship and support for public implementation and household uptake.

For example, the greater resource access and availability (resource opportunity) throughout these communities in Perth and Melbourne supported local government capacities to allocate resources for water sensitive initiatives. This was as existing micro-climates and public facilities were enriched through a heightened community engagement and stewardship for amenity in household and public spaces.

Additionally, more favourable bio-physical settings such as increased urban greenery, favourable soils and geographic locations contributed to this and meant there were reduced requirements for investment in more extensive measures for heat and flood mitigation, and technical implementation (such as infrastructure for recycled water access in Perth) compared to the less advantaged suburban fringes in Perth, and Melbourne's inner west.

Without these capabilities, communities (and households within them) possessed a reduced capacity for a commitment and support for water sensitive initiatives as they were less aligned to the experiences, needs and capacities of their contexts. As a result, successful implementations were less likely and opportunities for a water sensitive citizenry were more restricted. The contrasting experiences of street tree implementation in Melbourne serve as a notable example of management challenges observed in this regard.

In this sense, I extend on the perspectives of Brown, Keath and Wong (2016) to suggest that facilitating transitions to new city stages is not just a matter of ensuring organisational (or institutional) capacities, but also accounting for community capabilities to ensure capacities for a necessary uptake and stewardship. Notably existing barriers to implementation were not entirely confined to the less advantaged in this regard.

However, as the findings of this chapter reflect, water resource management has proven limited in the accommodation of diverse community capabilities in recent times. More often, city wide water use cultures have positioned resource management initiatives to perpetuate inequalities through universal approaches that favour the capabilities of the socially advantaged consumer. The "great browning" of Melbourne, and ongoing pricing increases, penalties and restrictions in Perth provide notable examples. For the socially disadvantaged a heightened requirement for water use to uphold basic welfare needs (see Chapter 6.2.2), and reduced resource opportunities to mitigate the impacts of heat on amenity and personal health (such as groundwater, pool and reticulation access in Perth; and the access to technical water storage and recycling solutions in Melbourne) meant their already diminished living conditions were more impacted by these policies. While through heightened resource opportunities and water uses focused on enhancing leisure and luxury, the socially advantaged were not only less effected, but could more easily mitigate impacts. In the following chapter I conclude this thesis by considering the theoretical and practical implications of these findings, and the opportunities they present for future research.

CHAPTER 8. CONCLUSION

8.1. Introduction

In this thesis I set out with the aim to understand the implications of social inequality for the transformation to water sensitive cities in Australian urban settings. To achieve this aim, three research questions were proposed, which were derived from the initial findings of the literature review. These were:

1. What is the role and nature of social inequality in Australian urban water use practices?
2. How do the different city cultures in Melbourne and Perth shape inequality and water use practices.
3. What are the implications for sustainability, liveability and resilience in Australian urban communities?

To address these, I undertook qualitative research in Melbourne and Perth, which are in the midst of transformative 'water sensitive' change. Each city also possesses unique socio-technical and environmental characteristics, allowing for a more nuanced representation of the characteristics of Australian urban environments and the nature of social inequality within them. Using, a theoretical model based on a contemporary perspective of social practice theory (as developed by Elizabeth Shove and colleagues) and Pierre Bourdieu's concepts of Capital, Habitus and Field, different elements of water use—the materials, meanings and competencies (which comprised daily water use practices)—were investigated in the broader socio-technical context of these communities. To consider the dynamics of social inequality in these communities, SEIFA data was used to develop case studies in each city comprising communities (or suburb cluster) of social disadvantage, moderate social advantage, and high social advantage.

8.1.1 Research limitations

Like all studies, this research was not without its limitations. For one, the nature of this small qualitative study by a solo researcher completing a doctoral thesis limited the cross-section of the Australian society that could be observed. As I have noted previously in Chapter 4, the refinement of this investigation to case studies comprising household occupants, with a basic English proficiency (oral and literary), able to personally use water, and living in suburbs in inner urban areas has meant that some marginalised groups, such as refugees, those with disabilities, the homeless and those in more remote communities and urban areas, were not represented in this study. Notably, insights into Australia's most long-standing and socially marginalised people are limited in this research and

have been generally underrepresented in IUWM debates to date (Keleher & Macdougall 2016; Baum 2015;).

Furthermore, the limited scope of an investigation into social inequality—on the grounds of advantage and disadvantage through urban capital accrual and water consumption practices alone— has meant that a broader analysis of other intersecting modes of inequality (such as gender, age and ethnicity) and structuring processes recognised to exert influence (such as health, employment, housing access, domestic violence and access to welfare services) were not included within the scope of this thesis either (Habibis & Walter 2009, Lin Smith & Fawekes 2007) (Supski &Lindsay 2013; Habibis & Walter 2009).

The analysis of socio-technical water resource management settings and urban dynamics generally observed in this thesis was also necessarily confined. While the Perth and Melbourne case studies provided valuable insight, the unique bio-physical, technical, socio-institutional and cultural elements of other Australian contexts limit the extent the findings of this thesis serve as a generalisable reflection of inequality and water resource dynamics.

An observation of these through a socio-technical lens of practice has also meant that more holistic epistemological perspectives on urban environments and their dynamics, as might be obtained through a socio-ecological systems perspective or indigenous knowledge for example, were underrepresented. Notably, these have received growing attention in studies on the social dimensions of environmental change, which as Cole and Nightingale (2016) suggest, offer valuable insight into the intersectionality of culture and environments (see also Brown et al. 2005). While perspectives on this intersection were observable in this thesis, they were largely narrow in scope and would benefit from further study.

Nevertheless, this research offers valuable insight into the way social inequality interacts with urban water practices throughout societal, community and household domains. It reveals important lines of consideration for ensuring more effective and socially inclusive future water sensitive urban transitions. In the remainder of this chapter, I reflect on these findings to draw out key considerations into the implications of social inequality for water sensitive cities. I begin by addressing the three research questions, before discussing the practical, scholarly and theoretical, contributions these findings offer, and future research requirements they point to. I close this chapter by reflecting on the broader significance of addressing inequality in water resource management.

8.2. Research Question One: The Role and Nature of Social Inequality on Domestic Urban Water Use Practices

For citizens in Melbourne and Perth water was used to achieve or enhance liveability, resilience and sustainability. Though in both cities, three significantly different living standards were observed between communities that were socially advantaged, moderately advantaged and disadvantaged due to the levels of resource access and availability (something which I have termed resource opportunity through this thesis). Social inequality had a major impact on how water would be used to uphold living standards and, in effect, the quality of living standards that could be achieved in each community.

Inequality was found to permeate everyday water use, as resource access and availability shaped the types of meanings, materials and competencies citizens possessed, and the ways these hung together to form their daily water practices (Shove, Pantzar & Watson 2012). A key finding of this thesis is that there is a social gradient in water use where the degree of resource opportunity (social advantage and disadvantage) people possessed influenced their experiences, needs and capacities and thus the sorts of water use practices they undertook.

Lived experiences (both past and existing) were considered the strongest influence on the forms of meanings, materials and competencies that made up these practices. For the disadvantaged these experiences were reduced to immediate family networks (including those from upbringing) and household settings. While for the more advantaged, a greater social connectedness and more extensive networks meant these experiences were also shaped by their communities. Consistent with Dean, Fielding & Newton (2016a), community water use knowledge was often broader in these communities due to their access to wider networks and lived experiences.

The water use needs within these communities followed a similar pattern. For those in disadvantaged communities, water was used to ensure basic welfare needs such as financial security and basic health. By contrast, those in advantaged communities used water to ensure leisure and luxury in daily life through water uses prioritised around comfort, enjoyment and convenience. In more moderately advantaged communities, residents often described a trade-off between the two, where some practices were prioritised for welfare needs, while others for leisure and luxury relative to the preferences and resource opportunities of the individual (or household).

The nature of many water use practices were also influenced by inequality. The socially disadvantaged not only sought to minimise water use expenses due to limited finances, but also had

less opportunities for the building of technical literacies. This meant that their capacities for sourcing and maintaining reliable or new technologies were limited, and practices that were less sustainable or more 'hands on' and practical in nature were often favoured as a result. By contrast, the more advantaged had greater financial capacities and technical competencies, which meant many residents invested in cutting edge and durable technologies and appliances.

In advantaged communities, I found that the enriched community connectedness and values for socialising and aesthetic enjoyment had a more pronounced role in shaping water practices. This was as these networks offered more enriched forms of social support (or resilience), daily enjoyment, comfort and convenience. In accordance, many participants would use water to strengthen these networks through prioritising practices that would ensure an adherence to social values, standards and tastes such as aesthetic appeal and cleanliness. Comparatively, in disadvantaged communities limited forms of social connectedness, a reduced value for public amenity and engagement, and the prohibitive costs associated with maintaining and enriching personal and household presentation meant the social nature of water uses were less prioritised. Instead, the greater impact of consumption related expenses, such as water bills and appliance costs, meant many participants placed a greater onus on the economic nature of water use.

Notably, the thesis findings support Dean et al.'s (2016b) findings that those disengaged in water related issues often possessed fewer financial and social resources, reduced living standards and a preoccupation with 'daily routine'. Though, as I argue, the contextual elements of water resource management are what shape the nature of 'engagement' and 'disengagement' and thus, the opportunities for the disadvantaged to be engaged. In this sense, it is not a lack of 'willingness' or 'preoccupation' limiting participation by the disadvantaged, but instead their resource management contexts which shape their experiences, needs and capacities and ultimately constrain their involvement.

8.3. Research Question Two: Urban Water Use Contexts and Cultures, and the Implications for Social Inequality and Practice

The impacts of social inequality were observed in both the Greater Melbourne and Greater Perth communities, however, the unique characteristics of each city contextualised the social gradient for water use leading to different outcomes and experiences. This was because the interrelating socio-technical and bio-physical variables of each metropolis (which included both historic and existing climatic factors, geographic location and geology, political climates and institutional settings) created a path dependency in water management which also influenced the unique water use (or resource

management) cultures of each city (Morgan 2015). These cultures set the socio-institutional and socio-technical parameters (the hydro-social contract) for how water would be managed and could be used in practice to enrich liveability, sustainability and resilience for the Perth and Melbourne communities.

In Melbourne, a heightened institutional agenda for community engagement and mobilisation to address water scarcity issues during a recent period of extensive drought has led to a modern water use culture premised on liveability through decentralised and community inclusive approaches that promote sustainability. This has resulted in an inherent water consciousness and literacy throughout much of the community. Where this culture was strongest, it was observable in current water use practices, despite the alleviation of drought conditions in recent years. Elsewhere, participants mentioned past practices or possessed a competency for water saving appliances and approaches. Many also expressed guilt for water conscious practices they had lapsed since this time. This was due to a perceived ongoing community support of these values despite the alleviation of drought conditions.

For Perth, a comparatively techno-centric water resource management context, has defined a culture for water use considerably limited in community engagement and capacity building initiatives over the years. This has shaped a different lived context for its communities, as despite ongoing water scarcity concerns, years of a reliance on large scale, centralised major infrastructures to 'drought-proof' the desert city has limited any perceived community salience for water conservation, leading instead to a more intensive household water use, premised on ensuring greenery, social enjoyment and comfort.

While a recent shift in political agendas has sought to drive an engagement and support for water conscious values, the existing culture—which remained largely at odds with these values—has limited opportunities for the development and acquisition of necessary competencies and technologies, and generally down-played any sense of perceived community need to save or manage consumption. Understandably, it is practices oriented around ensuring a greenery and comfort that remain predominant throughout this community and serve as an indicator of this urban water use culture at a community level.

Notably, participation in the different water use cultures observed in these cities was not immediately achievable for everyone. I argue that the interplay between water resource socio-technical and bio-physical contexts perpetuated inequality through a resource provision and management context that was favourable to the heightened literacies, financial capacities and

community contexts of the socially advantaged. As in both cities, the socially advantaged were more able to adopt practices that would allow them to participate in these cultures with greater ease and effect.

In Perth, barriers for the disadvantaged included heightened water prices and maintenance expenses (pools, garden reticulation etc.), reduced access to cost-free groundwater sources, and more extensive heat and flooding impacts. This reduced their capacities to achieve green and water rich amenities, and thus the extent they could participate in these cultural traditions of their urban context. Similarly, water conscious cultures instilled within the Melbourne community since the drought continue to favour the more resourced and technically literate consumer, leaving those with more reduced financial and technical capacities to adapt as best as they could through more arduous and less effective practical tasks, or to simply endure the social stigma of cultural detachment and social disconnection.

Social advantage acted as an enabler in this sense, as resource opportunities determined the capacities that individuals had to adhere to water use cultures, and thus the extent they could enrich their living standards (through the forms of liveability, sustainability and resilience their contexts afforded them). Notably, those who were more impacted by consumption expenses, heat and flooding impacts in these water resource contexts had less of a capacity to mitigate these constraints to satisfy their needs. In this sense, not only were the opportunities of the disadvantaged reduced, but their capabilities to improve on these circumstances were also more restricted.

8.4. Research Question Three: Enhancing Urban Liveability, Sustainability and Resilience through Water Resource Contexts

As these cities continue to transition to more water sensitive regimes, it is the cultural legacies of existing water resource contexts that have so far determined their progress. This was observable in existing successes of IUWM and WSUD initiatives to date.

In comparing both cities, Melbourne has progressed further in this process, benefiting largely from a less centralised approach in recent years that has fostered varying degrees of engagement and capacity at both an institutional and community level. Accordingly, at the time of this research varying implementation plans and processes were observed and noted in the literature to be emerging across the city's municipalities (Brown, Rogers & Werbeloff 2016).

Perth by comparison has made less progress in water sensitive transitions, as it is hampered by a water resource culture largely premised on centralised management approaches, in which the

capacities of water resource managers to evolve beyond traditional service-consumer dynamics and pursue more integrated outcomes has to date proven significantly reduced (Rogers et al. 2016). Consistent with Hancock's (1985) critique of centralised systems, this has had flow-on implications at a community level, as the political and social processes of this culture were found to limit any sense of embedded autonomy or perceived responsibility within it to advocate and foster change. To date, few water sensitive initiatives exist and, where observed, were largely restricted to initiatives that were favourable or uncompromising of the existing institutional and community agendas stemming from Perth's water use culture. This meant they were predominantly centrally managed infrastructures, limited in community engagement opportunities or stewardship requirements.

However, it is the existing experiences, needs and capacities (and the water use practices stemming from them) of communities within the Melbourne and Perth contexts that have determined on-ground successes to date. Implementations were largely confined to communities (such as Camberwell and Cottesloe) already possessing the necessary resources and literacies for water sensitive innovations to be valued and adopted both in households and communities. Elsewhere, communities (such as Broadmeadows and Armadale) have lagged behind—out of implementation complications and barriers—as the experiences, needs and capacities of community members and local government and other facilitating bodies have been less encompassing of the necessary technical literacies and resource capacities required for water sensitive urbanism to be accessed, supported and realised.

Water sensitive implementations have been problematic under these cultural processes. Generally, without a more situated account of diverse community capabilities, implementations have been universally prescribed on the assumptions of a socially advantaged level of liveability, sustainability and resilience throughout urban communities along with the technical, financial and social capabilities of communities to foster implementations. Yet the findings of this thesis suggest that in these communities universal living standards and capabilities were inherently not the case. Instead, social inequalities and other intersecting household and community processes (e.g. personal and community tastes, levels of autonomy and choice, life style and life stage) shaped communities (and households) with divergent forms of liveability, sustainability and resilience and water use needs, experiences and capacities to match. This defined the capabilities they possessed to support new (water sensitive) innovations and practices and, consequently, the corresponding forms of liveability, sustainability and resilience they could achieve.

In this sense, it is not simply the content of a water sensitive vision that has shaped outcomes to date, but also the conditions of its production. I consider this paradigm in greater detail in the

following by discussing the implications of social inequality for water sensitive cities. In addressing this aim I also reflect on the theoretical and scholarly contributions this research offers and consider how it may contribute to the establishment of more socially inclusive water sensitive cities (and cities' transitions).

8.5. Implications for Water Sensitive Cities' Transitions: Research Contributions and Future Directions

For the vision of an integrated liveable, resilient and sustainable water sensitive city to be achieved, communities will need to transition beyond existing water use cultures, which are not only inequitable in their effect, but orient resource managers and the community in ways that limit their opportunities to develop the necessary literacies and stewardship required for a water sensitive citizenry (Dean et al. 2016b).

The community engagement initiatives surrounding water scarcity observed in this research offer a notable example. As in both Melbourne and Perth, a portfolio of policy measures (household restrictions, urban 'browning', heightened water prices) was implemented to mobilise water conscious values and behaviours within the community. While these were deemed by some stakeholders to be effective measures for rapidly reducing urban consumption, this research has demonstrated that the political and reactionary nature to them meant that their ability to foster an ongoing commitment for water sustainability, or a 'water sensitive citizenry' have been varied in practice.

Furthermore, the largely reductionist nature of these water saving initiatives meant that citizens and policy makers were deemed separate rather than partners in collaboration or 'integrated' in these processes. In both cities, policy makers were found to exert influence from outside of their communities, positioning citizens as merely consumers or the targets of government advice and encouragement (Shove, Pantzar & Watson 2012). The decline in living standards and the limited capacities for engagement and general autonomy over their water resource circumstances that this posed for individuals influenced a disenchantment and lack of stewardship in many communities, which can be considered at odds with the ideals of a water sensitive context (CRCWSC 2014; Wong et al. 2013).

Authors such as Shove, Pantzar and Watson (2012), Sayer (2013), Spaargaren (2011) and Strengers and Maller (2012) have been similarly critical of these institutional approaches. They argue that they place emphasis on 'responsibilising' individuals through behaviour change initiatives that possess a

limited consideration of the contextual pressures that influence and ultimately structure individual values and choice. As this thesis has found, the implications are that those least equipped with the resources and power necessary to participate in resource management decision making processes remain largely overlooked by the planners, engineers and politicians who manage water. As a consequence, the opportunities and capabilities they have to be 'responsible', engaged and empowered citizens remain reduced, and thus so too their living standards (Sofoulis 2011).

I return to de Haan et al.'s (2014) societal needs framework, outlined in Chapter 1.2.1 (and presented in Appendix 1), as it provides a useful lens for considering the disparity between user capabilities and the risks posed to a water sensitive co-evolution of socio-technical systems. To reiterate, they develop a societal needs framework for water sensitive cities transitions, to assess the niche that water resource management occupies for the enhancement of liveability and sustainability in urban contexts (de Haan et al. 2014; Johnstone et al. 2012). From these perspectives they derive a hierarchical framework that distinguishes lower level immediate needs for basic 'Existence' (such as drinking water, public health and safety) to those at a higher level premised on societal wants and desires, including 'Relatedness' needs (encompassing values for recreation, social cohesion, beauty and comfort) and those for 'Growth' (which include choice and engagement in decision making, equal opportunities and identity) (Johnstone et al. 2012).

De Haan et al. (2014) acknowledge that a greater satisfaction of relatedness and growth needs permits greater liveability and sustainability, although these are unlikely to be desired if lower order (existence) needs are not satisfied (see also Johnstone et al. 2012). The social gradient for water use observed in this chapter to some extent mirrors these claims. My research found that communities possessing higher standards of liveability were more able to prioritise water use practices on values for recreation, social cohesion, beauty and comfort (which parallels with de Haan et al.'s category of relatedness and growth needs), due to a prior satisfaction of welfare needs. Though given this diversity, their application of this framework at a societal (or city) scale is not without its risks in the context of co-evolutionary water sensitive transitions.

In their assessment of Greater Melbourne for example, Johnstone et al. (2012) acknowledge that 'the relationship between city stages and societal urban water needs illustrates that basic water supply, sewerage and drainage systems meet existence needs'. Melbourne, accordingly, is in transition to the more progressive 'Water Way' and 'Water Cycle' city stages (see Appendix 1) which offer enriched forms of liveability to residents through a more 'sustainable and efficient access to existence needs', and a greater satisfaction (access and availability) of Relatedness and Growth needs (Johnstone et al. 2012).

While such assertions may represent the technical viabilities of water resource systems in these stages (and thus the cities possessing them), a more holistic consideration of their social viability (in terms of community resource opportunities, capital and community capabilities) as was undertaken in this research, I suggest, offers a more nuanced depiction of the relationship between needs and systems, in which each water resource city stage satisfied the needs of socially advantaged communities more so than others.

I found the intersection of water resource systems with the situated contextual variables in communities and households, determined the extent they could be accessed and used to meet these liveability needs. For the socially disadvantaged (whose water resource city stage interacted with reduced housing conditions, biophysical conditions that were more flood and heat intensive, reduced financial capacities and low standards of public amenity), existence needs were still very much a central water use priority, despite the provision of technical water resource settings (city stages) perceived to satisfy these needs and indeed improve the efficiency and sustainability of their delivery (de Haan et al. 2014; Johnstone et al. 2012; Brown, Keath & Wong 2009).

The lack of alignment between these technical and social assumptions are problematic for co-evolutionary initiatives if their prescriptions are based on principles of technical viability alone. Without a more considered account and mobilisation of the societal processes that underpin this disparity in capabilities the transition to water sensitive cities risk being class blind, thereby limiting successful implementations to more resourced, socially advantaged consumers, who possess the necessary opportunities, experiences, needs and capacities to access and support them.

I argue that to ensure a more socially inclusive progression to water sensitive cities, future implementations and initiatives will need to more effectively foster community engagements and empowerment by accounting for diverse community experiences, needs and capacities; and supporting tools, initiatives and institutional reforms and frameworks that may build an equality in community opportunities and capabilities. Ultimately, these will need to address the existing social and political processes (reactionary politics, institutional lock-ins, community connectedness and cohesion, financial and technical capacities) that have so far hindered engagements for much of the community to foster societal (along-side technical) transitions to water sensitive cultures.

8.5.1. Ensuring socially inclusive water sensitive transitions: Recommendations for future research

With an increasing requirement for community engagement as cities such as Melbourne and Perth progress to new water sensitive city stages, a renegotiation of the hydro-social contract to ensure more social inclusivity regimes is of the essence. However, as Cole and Nightingale (2016, p. 479)

point out, 'simply changing the rules of the game into fairer and more just distributive institutions' is inherently complex and often tied up in bureaucratic political and technical processes which, as this research highlights, are mediated by unique power dynamics, cultures and histories (see also Carey, Crammond & De Leeuw 2015). Walker et al. (2006), for example, suggests that without the necessary consideration of situated and often abstract contextual properties, resource management systems risk imposing regimes that may appear desirable to one segment of society, yet inherently not so for others (Cole & Nightingale 2016; Walker et al. 2006).

Past experiences in natural land management provide numerous examples where a failure to effectively embrace these complexities can create either disruptive processes of opposition and co-option from those who serve to lose from such changes, or ill-advised policy and institutional measures that exacerbated existing vulnerabilities and created new ones (Cole & Nightingale 2016; Sikor & Lund 2009). By example, Cole and Nightingale (2016) acknowledge instances where participatory and decentralised efforts to give greater rights and decision making power to the disadvantaged, simply repositioned the scales at which opportunities for further exclusion existed, leading to instances of local elite capture, or expanded state territorial control.

The inherent risks in these challenges points towards requirements for the continued investigation into the heterogeneous processes that occur between the systematic frameworks of urban settings and the socio-cultural dynamics of the people that occupy them, in order to identify effective pathways and processes that could guide a socially inclusive adaption to change. As one example, Supski and Lindsay (2013) acknowledge a limited representation of gender, ethnicity, age and geographic considerations in contemporary water resource management discourses. They suggest that further research into these processes would serve as a valuable entry point for building on understandings for adaptive change. The growing attention to indigenous perspectives in studies on the social dimensions of environmental change, suggest additional lines of enquiry that will prove of value both from a socio-cultural and epistemological perspective (Cole & Nightingale 2016; Brown et al. 2005). Similarly, fields of social epidemiology and public health—which for some time have been engaged in the challenging processes of ensuring more socially just and inclusive system transitions and institutional frameworks in Australia—also possess insights, tools and frameworks that may assist in guiding the necessary processes for systematic intervention and cultural reform to foster more inclusive water sensitive societal transitions and outcomes (Keleher & Macdougall 2016; Baum 2015). In the following, I reflect on the theoretical contributions of this thesis and propose a framework for guiding these research agendas and future management practices.

8.5.2. Theoretical contributions and a framework for future research agendas

In this thesis a theoretical model inspired by modern perspectives of social practice theory and Bourdieu's earlier concept of capital, *habitus* and field was developed to conceptualise the relationship between inequality and household water use practices (as seen in Chapter 3). Social scholars active in the water resource management field such as Shove, Pantzar and Watson (2012), Sofoulis (2011), Strengers and Maller (2012) among others have advocated for the use of modern practice theory perspective on the dynamics of socio-technical consumption systems in recent times. They argue that such an approach allows the researcher to establish links between the meso-level consumption rituals, habits and daily conventions of household and community, and the macro or societal level resource systems, to better observe consumer dynamics and develop interventions for sustainable transitions (see also Sayers 2013; Shove, Pantzar & Watson 2012; Sofoulis 2011; Spaargaren 2011). Additionally, Bourdieu's theory (considered by many as a separate and earlier conceived Theory of Practice), has been widely regarded for its influence on theorising modern perspectives of social inequality in the developed world through a focus on the cultural practices of consumerism, through the interlinked concepts of capital, *habitus* and field (Coulangeon & Duval 2014; Habibis & Walter 2009; Robbins 2000; Bourdieu 1984).

The key theoretical contribution of this thesis is explicitly bringing together a New Practice theory approach with an analysis of social inequality in the field of water use. By encompassing key elements of Capital, Habitus and Field from Bourdieu's Practice theory I was able to highlight the importance of dynamic and interactive cultural processes, that orient socio-technical systems, and accordingly the established socio-technical perspectives of New Practice Theory were extended. Shove's initial socio-technical model (used in this research) which possessed an empirical focus on the content of this relationship (e.g. the materials, meanings and competencies of Users, Systems and Objects) and its co-structuring dynamic (Shove, Pantzar & Watson 2012; Shove 2003a), was expanded when applied to the case studies used in this thesis, which highlighted the contextual elements that gave this 'content' power and autonomy.

In Chapter 5 I outlined community specific dynamics and resource opportunities that influence consumer experiences, needs and capacities. In 6 I demonstrated how the social gradient shaped householders' water use practices – including their meanings, materials and competencies, and their role in the liveability, sustainability and resilience households and communities possess. In chapter 7 I took a macro perspective to show how different city cultures and policies also interacted with the social gradient and water use dynamics. This is the first study to incorporate broader contextual

factors such as the social gradient, community dynamics and city cultures into a social practice perspective.

I found diversity in the co-structuring relationship between practices of Systems, Objects and Users. By focussing on the dynamics of social inequality and the resource and power imbalances resulting from hierarchical (city, community and household level) and interrelating cultural processes, I was able to observe how different communities and households possessed different water resource opportunities and capabilities. For individuals and communities particularly, this led to multiple, complex and contested understandings of the same water resource and biophysical contexts and thus, the materials, meanings and competencies that hung together as water use practice were varied.

Consistent with Cole and Nightingale (2016) the findings of this thesis highlight the importance of situating action frameworks to account for contextual variables and processes that orient both systems content and their relationships. However, I go further to suggest that the application of Practice-based perspectives, generally, could benefit from an extension of the empirical focus on the content of practice (materials, meaning and competencies), to one that may also encompass the broader dynamics and processes of the practice context such as inequality.

In Hui, Schatzki and Shove's (2017) *Nexus of Practice*, Shove's conception of 'background' or infrastructural materials provides a valuable first step in attending to these considerations. Notably, the largely subjective and 'situationally specific' (p. 158) nature to determining what variables are of influence and warrant consideration in these processes, highlight the added requirement for future research into ways of theorising the background materials that exert influence in bringing Practice entities of the foreground into and out of circulation (Hui, Schatzki & Shove 2017). As the findings of this research suggest, a similar theorising of background meanings, competencies and the processes that surround them (i.e. cultures) would also be of value for a situational perspective of the practices that comprise modern socio-technical contexts.

With this in mind, I expand on the model conceived in the theoretical framework of this thesis to propose a more holistic conceptualisation of socio-technical water resource practices, as derived from the findings of this research. This provides an additional theoretical contribution of the thesis, by offering a more comprehensive representation of the situational dynamic, evaluative and normative processes that shape water use practices in urban settings, as were observed from (but underrepresented in) the theoretical framework of this thesis. Indeed, Shove and colleagues

recognise these as having been limited in former practice based research, and thus a major critique of the theory to date (Shove, Pantzar & Watson 2012; Hui, Schatzki & Shove 2017).

While the former socio-technical framework outlined in Chapter 3 depicted the key variables that comprised water resource contexts (represented by four interacting spheres), this revised model offers a means for considering how these exert influence on practices through defining the hierarchical domains in which political and social processes were found to orient water resource variables for different communities and households and, in effect, shape user capabilities (experiences, needs and capacities) and practice. In effect, the proposed model serves as a framework for guiding future research processes and management interventions to ensure more socially inclusive water sensitive transitions.
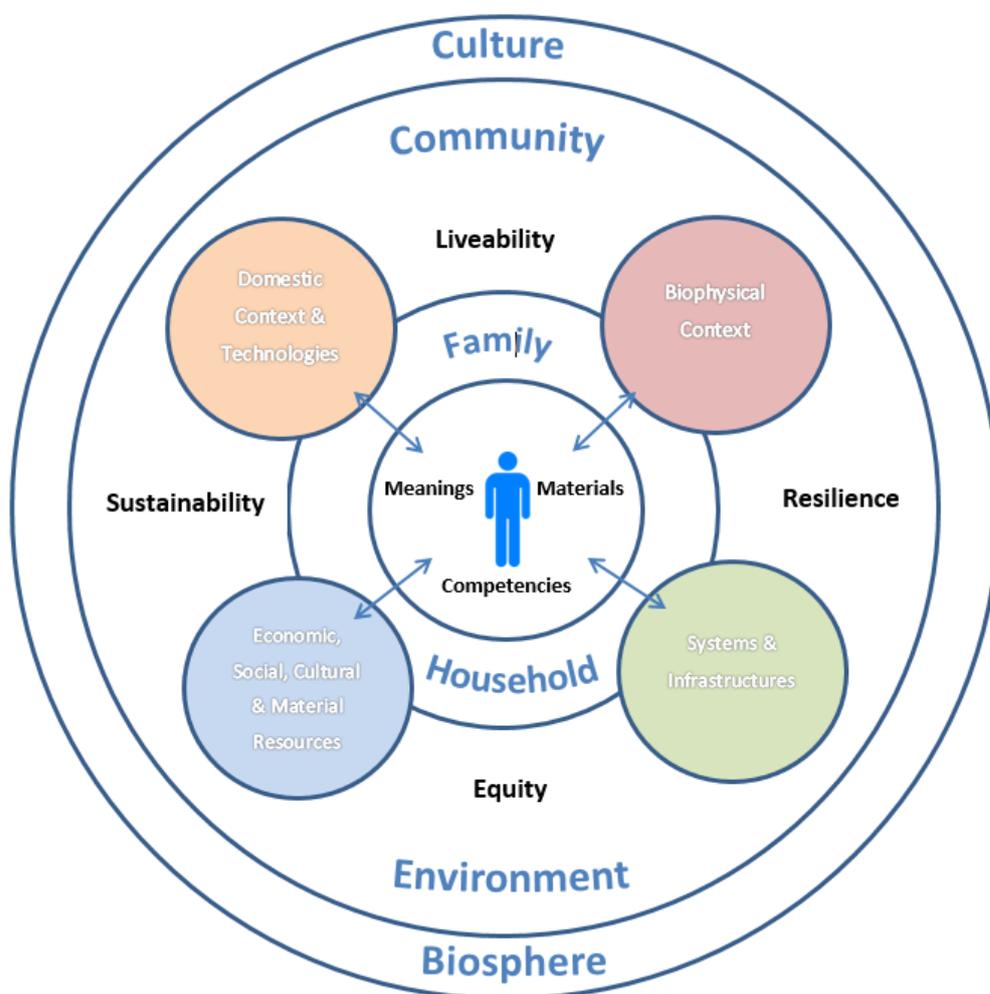
Figure 8.0.10. A Framework for Socially Inclusive Water Sensitive Practice

This model draws inspiration from ecological streams of thought, which traditionally focus on biological discourses, yet have emerged more prominently in recent social research as researchers

seek new perspectives on human and political ecology—what Dansereau describes as the intersection of environment and culture (Baum 2015; Brown, Keath & Wong 2005; Bryant and bailey 1997; Hancock 1985). Public health research has been particularly active in this space, with researchers such as Hancock (1985), Baum (2015), Keleher and Macdougall (2016) and Brown et al. (2005) having drawn on these perspectives in recent years to consider social health determinants and interventions. While Socio-ecological perspectives have also emerged more prominently throughout sociological discourses recently to address the complexities of sustainable development, social justice, environmental and political inequalities in both the developed and developing world (Castro 2016; Cole and Nightingale 2016; Lockie 2016; Forsyth 2008; Bryant and Bailey 1997)

In this new model (presented in Figure 8.0.1) socio-technical systems similarly extend beyond human-made variables to encompass the technical elements of the broader environment, thus allowing for a more holistic consideration of bio-physical variables and interactions alongside human derived ones. Notably bio-physical variables were observed to exert influence on the dynamics of social inequality and water use practices, however, were under represented in the original theoretical framework of this thesis.

The implications of this are that water sensitive societal transitions then become not just a process of technical and systematic adaption, but ones that must also consider the actual resources in relation to the climatic, geological and biotic variables of the lived context. The findings of this thesis and the new model link with research findings by Dean et al. (2016b), who acknowledge the requirement for both a community and resource management context capable of a technical (built and natural) stewardship and an adaptability to environmental conditions to guide future practices in an ecologically sound way.

Furthermore, the hybridised perspective of socio-ecology is capable of embracing the complex interrelations of environment and culture replicated in the model. Socio-technical dynamics are situated in hierarchical, interrelating spheres that serve to depict the tiered social and political processes that—while similarly underrepresented in the initial theoretical model—were observed in this research to contextualise these systems for different societies, communities and households. In doing so it conceptualises the dynamic and situated forms of power, knowledge transfer and agency that were inherent to these socio-technical systems.

Through the inclusion of these externalities, the model emphasises the requirement for those investigating and managing social transitions to be cognisant of these social and political processes. In this research, these perpetuated the existing inequalities through defining a water use culture

that oriented the hydro-social contracts of these cities in ways that favoured the capabilities, and presented greater opportunity for, the socially advantaged.

8.6. A Final Reflection: Ameliorating Social Inequality in Water Sensitive Futures

To consider the significance of this research, I conclude by briefly reflecting on a historical example of socio-technical water resource interventions. One of the more iconic tales in social health and water resource circles alike, is the landmark research of London anaesthetist John Snow, who in 1854 linked the outbreak of Cholera, which had regularly plagued the industrial epicentres of Britain throughout this time, to unsanitary water supply and sanitation systems. Snow traced the spread of disease across London's community to a particular water supply pump (the Broad Street Pump, in Soho, central London), that was later found to draw water from a contaminated section of the Thames River. Through his findings, Snow convinced town planners to remove the handle of the pump, which halted the cholera epidemic in its path (Baum 2015).

As a symbol of these events, Snow's pump stands handle-less to this day in its original location, and for good reason as it did lead to significant scientific advancements that shaped the quality of life possessed in modern urban contexts (Baum 2015). Social health researchers note the significance of Snow's method which went beyond common individual diagnostics to consider the influence of environmental and technical factors, leading to the emergence of social epidemiology (Keleher & MacDougall 2016; Baum 2015; Lin, Smith & Fawekes 2007; Brown et al. 2005). Major policy and infrastructural reforms also followed, as British elites soon realised that the threat of disease would remain unless adequate water supply and sanitation services were made available to the broader community. Arguably, it was these early socio-technical interventions and those like it that sparked initial transitions to major centralised infrastructures still prevalent in many modern urban contexts (Brown et al. 2005).

Though had Snow and other British elites endured the living conditions of their cities' urban poor, they may well have come to such actions sooner. Here contaminated water supplies and poor sanitation conditions had been long standing and their effects prolific. Prior to Snow's events, German sociologist Friedrich Engels—compelled by the poverty he had experienced—published *The Condition of the English Working Class*, which documented the plight of the urban poor in industrial Britain. Engels noted a great deprivation in the quality of living and working conditions in these communities. Notably, diseases and illnesses derived from squalid water supply and sanitation conditions (such as Cholera, Typhoid, Diarrhoea and Smallpox) were rife, reducing average adult life

expectancies from the broader London average of 36 to 16, and contributing to high infant mortality rates (Lin, Smith & Fawekes 2007; Engels 1987).

Yet the plight of the urban poor remained relatively absent in Snow's considerations, which were largely focused on the concerns of the common citizen. Furthermore, as Lin, Smith and Fawekes (2007) suggest, it was not the 'predicaments and comportments' of the disadvantaged, but rather 'the sanitary dangers these implied for the established citizens' that drove the systematic reforms and infrastructural transitions to improve living conditions (see also Baum 2015). In this sense, it was the experiences, needs and capacities of the city's advantaged that were accommodated, while the plights of the poor were overlooked—a dynamic similarly observable in the modern water resource contexts in this research.

Notably, this was by no means unique to Industrial Britain. Comparative accounts also echoed throughout the early water resource contexts of Australia's major colonies at this time. As examples, Lin, Smith and Fawekes (2007) cite accounts by historians who document the 'squalor' of Melbourne's and Perth's disadvantaged in the 1880s:

> From their secure ramparts, upper class Melbournians look down over the river flats upon the inner ring of dismal working class suburbs. Collingwood, Richmond and South Melbourne conspicuously lacked the fresh atmosphere, softening foliage and wide vistas of the hillside suburbs. Their low, flat terrain and soggy soil made drainage poor and enteric diseases a perennial hazard. Collingwood, the classic working class suburb, was "a sort of municipal Cinderella ... low in more senses than one"; its blighted environment and endemic poverty gave it the highest death rate in the metropolis ... Here, as in most parts of the un-sewered city, household wastes and seepage from cesspools were permitted simply to run away through open drains to the river. In the inner city its flow was impeded by unfavourable topography, blocked drains or poorly designed streets, and in winter the river itself regularly broke its banks, depositing a noisome cargo over the lower reaches of the flat. (Lin, Smith & Fawekes 2007, p. 33)

> "In winter most of the yards of Fremantle are one mass of filth" reported the municipal inspector. A bakery in High Street took the prize for squalor: "the yard covered in large pools of animal filth and sewage, and the cesspit, which is in the corner of the stables, smelling foul: the well here is within fifteen yards of the cesspit". (Lin, Smith & Fawekes 2007, p. 32)

Despite such claims, early socio-technical reforms in these Australian cities came not from the 'mass filth' or 'endemic poverty' experienced through such circumstances, but similarly out of 'the threat of ongoing disease' they posed to the surrounding community (Baum 2015; Lin, Smith & Fawekes 2007). By a similar account, it was the needs, experiences and capacities of the advantaged urbanite that shaped early water resource contexts in Australia's expanding urban centres, while the poor

remained largely overlooked and, consequently, their opportunities reduced and living standards deteriorated.

The similarity of these historical accounts warrant consideration in the context of this discussion, as implicit within them is a relationship to inequality that was observed in this study. In this research I found that water use cultures in modern resource contexts were more accommodating of the financial capacities, technical literacies and water use needs of the socially advantaged, while the disadvantaged were more limited in the sorts of water use practices they could uphold and, accordingly, the sorts of liveability, sustainability and resilience (living conditions) that could be achieved. Notably, it was also the disadvantaged who had less autonomy over their circumstances, while the advantaged were more engaged in decision-making processes, as was found in these historical depictions.

This is suggestive of a paradox in water resource management; that is, where the broad objectives of water resource contexts—to enrich the living conditions and public health of the communities they serve—are contradicted by a socio-technical dynamic that imposes inequities in opportunity and capability for these living standards to be achieved. The implications of this contradiction have, to a certain degree, been reduced with time, as inequality in modern water resource contexts is no longer the difference between a liveable amenity and disease-ridden poverty. Ongoing innovations and technical augmentations have reduced the disparity within these urban contexts. However, despite this progress, a reduced water liveability, sustainability and resilience for the urban poor, and the ongoing barriers to successful water sensitive implementations in under resourced communities, reflect the outcomes of a dynamic that, in its persistence, continues to limit the potential of water resource contexts.

The significance of this research then is that it offers insights for intervening in a social paradigm that has limited water resource management capabilities since the time of their inception (Brown et al. 2005). This comes at a time in which future innovations and augmentations will require greater social participation, stewardship and engagement in management processes and outcomes, as many cities including those in the Australian context begin transitions to more decentralised and integrated water sensitive regimes (CRCWSC 2014; Wong et al. 2013). Future management processes can ensure a greater social inclusion in modern water resource contexts and, thus, an improved liveability, sustainability and resilience for all citizens through taking into account and understanding the inner dynamics and nuances of inequality.

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APPENDICES

Appendix 1: Water Sensitive City Continuum and Societal Urban Water Needs
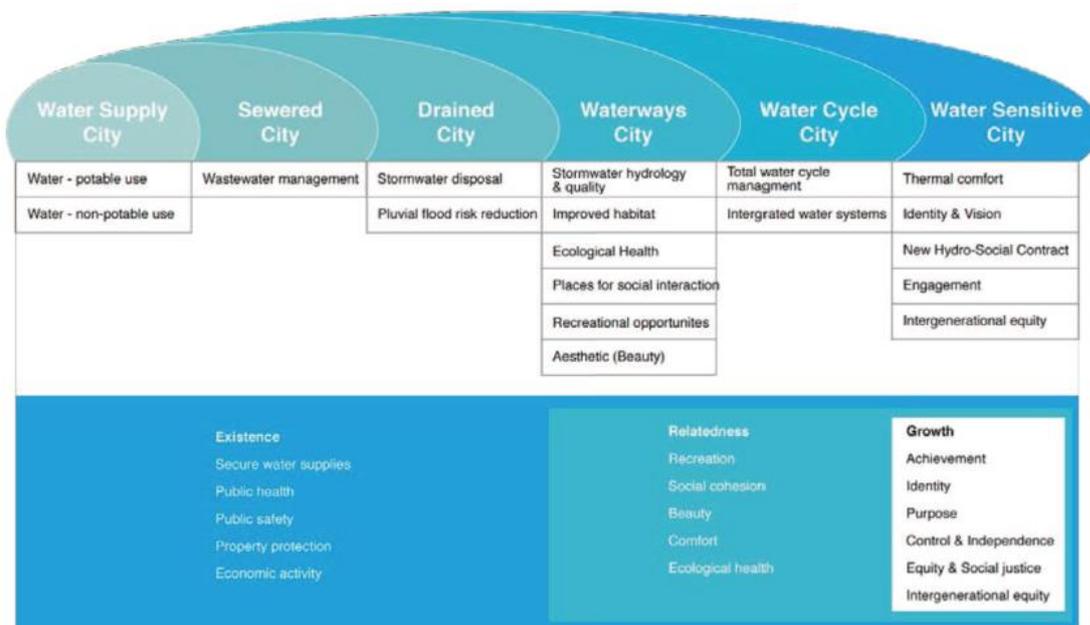
Needs category		Urban-water societal need	Description
Existence	Physical and material needs	Drinking Water	Safe, secure and accessible supply of water for direct human consumption
		Non-drinking Water	Safe, secure and accessible supply of water available for uses other than direct human consumption
		Public Health	Protection from polluted wastewater and stormwater; tolerable microclimates; public places that promote physical and mental health
		Public Safety	Protection of people from the hazards of water, e.g. during floods or storm events
		Property Protection	Protection of property and infrastructure from the hazards of water, e.g. during floods or storm events
		Economic Activity	Industries and jobs that rely on water servicing
Relatedness	Social interaction and inter-personal relationships	Recreation	Places for play, sport and leisure
		Social Cohesion	Safe and secure places for social interaction and human connectedness with people
	Societal-environmental inter-relationships	Beauty	Aesthetic urban environments promoting interaction with nature
		Comfort	A pleasant micro-climate and landscape for human thermal comfort
		Ecological health	Clean and healthy ecosystems with no negative impact on other ecosystems
Growth	Societal self-esteem and self-actualisation	Identity	Harmony with culture and tradition, to feel belonging. Proud association with urban water systems and environments
		Purpose and Ambition	Progress towards a shared vision of a water sensitive future
		Control and Independence	Choice and influence on decision-making about water infrastructure and services
		Equity and Social justice	Equal opportunity to access the benefits of the urban water system
		Intergenerational equity	Preserve the ability of future generations to meet their water-related needs

(from de Haan et al. 2014)

Appendix 2: Case Study Profile Greater Melbourne

Annual groundwater consumption (ML)	15,478
Population	4,100,000
Annual urban consumption (e.g. Water recycling) (ML)	408,878
Average income	$54,104
Mean Age	37.3
Average Max temperature (°C)	19.4
Average Min temperature (°C)	10.2
Annual rainfall (mm)	648.7
Above ground water storage volume (ML)	857,408
% of storage capacity	68% (582,979)
Annual surface water consumption (ML)	436,625

(compiled from BOM 2014, n.p; ABS 2014c, n.p; BOM 2013)

Appendix 3: Case Study Profile Greater Perth
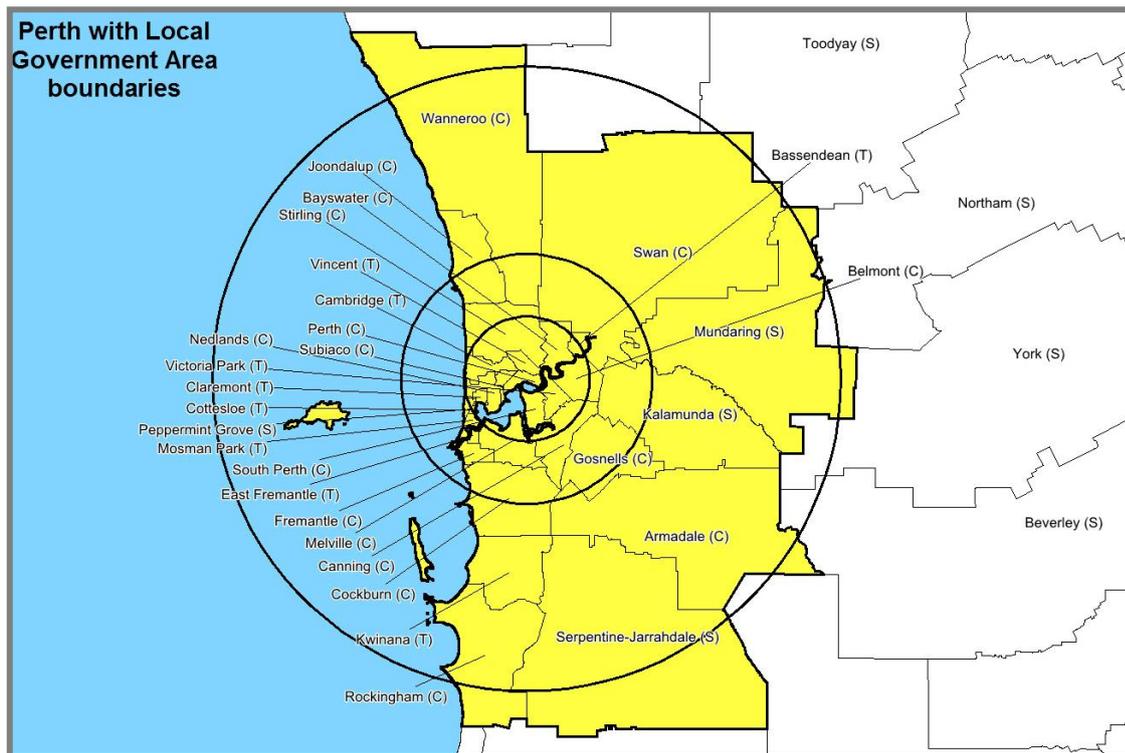
Population	1,900,000
Average income	$59,579
Mean Age	36.3
Average Max temperature (°C)	24.7
Average Min temperature (°C)	12.8
Annual rainfall (mm)	586
Above ground water storage volume (ML)	698,300
% of storage capacity	26.3% (183,415ML)
Annual surface water consumption(ML)	169,742
Annual groundwater consumption (ML)	486,741
Annual urban consumption (eg. Desalination) (ML)	327,184

(compiled from BOM 2014; ABS 2014c, n.p; BOM 2013)

Appendix 4: Suburb Water Consumption Averages for Melbourne and Perth Case Studies

Melbourne Case Study

Read End Fiscal Year	2014			2015			2016		
	Billed Usage kL	Cust Count	Avg kL/Year	Billed Usage kL	Cust Count	Avg kL/Year	Billed Usage kL	Cust Count	Avg kL/Year
Locality Name									
Broadmeadows	750,629	4,146	181	737,038	4,185	177	760,150	4,211	181
Coburg	2,044,711	14,000	146	2,030,755	14,134	144	2,096,551	14,246	147
Camberwell	1,575,349	8,711	181	1,558,166	8,864	176	1,663,703	8,984	182

Perth Case Study

Read End Fiscal Year	2014			2015			2016		
	Billed Usage kL	Cust Count	Avg kL/Year	Billed Usage kL	Cust Count	Avg kL/Year	Billed Usage kL	Cust Count	Avg kL/Year
Locality Name									
Armadale	1,270,482	6,035	211	1,272,327	6,108	209	1,235,117	6,172	201
Ballajura	1,826,440	6,538	280	1,746,547	6,542	267	1,773,186	6,543	272
Cottesloe	1,190,319	4,123	289	1,234,992	4,137	299	1,259,987	4,149	304

Appendix 5: Index of Suburb Clusters of Low, Moderate and High Social Advantage

SEIFA Index for low SES suburb clusters	Index of Social Advatage		Index of Social		Index of Economic		Index of Education		Population	LGA
Perth Suburb Cluster	Score	Decile	Score	Decile	Score	Decile	Score	Decile		
Armadale	878	1	889	1	911	2	859	1	12865	Armadale CC
Brookdale	902	2	909	2	996	3	852	1	2478	Armadale CC
Camillo	921	2	938	2	973	3	860	1	4562	Armadale CC
Melbourne Suburb CLuster	Score	Decile	Score	Decile	Score	Decile	Score	Decile		
Broadmeadows	797	1	772	1	856	1	852	1	10576	Hume CC
Camblefield	827	1	812	1	907	1	870	1	5465	Hume CC
Coolaroo	816	1	805	1	897	1	846	1	3259	Hume CC

SEIFA Index for Mid-High SES suburb clusters	Index of Social Advantage and Disadvantage		Index of Social Disadvantage		Index of Economic Resources		Index of Education and Occupation		Population	LGA
Perth Suburb Cluster	Score	Decile	Score	Decile	Score	Decile	Score	Decile		
Ballajura	1015	6	1012	6	1062	8	954	4	18934	Swan CC
Malaga	1057	8	1052	8	1078	9	1022	7	19934	Swan CC
Mirabookah	1008	6	1012	6	1043	7	958	4	1790	Stirling CC
Melbourne Suburb Cluster	Score	Decile	Score	Decile	Score	Decile	Score	Decile		
Coburg	1013	6	1006	5	974	3	1069	9	20311	Moreland CC
Pascoe Vale	1004	6	1011	6	978	4	1033	8	21073	Moreland CC
Brunswick	1047	8	1036	7	944	2	1134	10	22768	Moreland CC

SEIFA Index for High SES suburb clusters	Index of Social Advantage and Disadvatage		Index of Social Disadvatage		Index of Economic Resources		Index of Education and Occupation		Population	LGA
Perth Suburb Cluster	Score	Decile	Score	Decile	Score	Decile	Score	Decile		
Cottesloe	1144	10	1119	10	1078	9	1195	10	7393	Cottlesloe CC
Peppermint Grove	1155	10	1126	10	1108	10	1196	10	1523	Peppermint grove SC
Mount Claremont	1121	10	1090	10	1083	9	1176	10	4368	Mount Claremont CC
Melbourne Suburb Cluster	Score	Decile	Score	Decile	Score	Decile	Score	Decile		
Camberwell	1130	10	1112	10	1083	9	1164	10	200004	Boroondara CC
Glen Iris	1122	10	1109	10	1067	8	1162	10	24953	Boroondara CC
Deepdene	1118	10	1096	10	1072	8	1165	10	2370	Boroondara CC

(Compiled from ABS 2014b, n.p)

Appendix 6: Case Study Participant Profiles

Perth

Case Study	Name	Gender	Age	Nationality	Education	Occupation	Household Income	Marital Status	Household Structure	Time lived in the community	Residential Status	And do you live in a:
Cottesloe	Harley	Male	29	Australian	Post-Graduate Degree	Banking Finance	$150,000 or more	Single	Single no kids (3 others)	15years	Rented	House/villa with very large garden (garden 500+ square metres)
Cottesloe	Jennifer	Female	56	Australian	Post-Graduate Degree	Construction	$80,000- $100,000	Married	Retirees (1 other)	28	Owned	House/villa with very large garden (garden 500+ square metres)
Cottesloe	Brian	Male	75	Australian	TAFE/Technical Certificate	Pension/ retired	$20,000- $40,000	Married	Retirees (1 other)	37years	Owned	House/villa with small garden (garden less than 11-50 square metres)
Cottesloe	Collette	Female	66	Australian	Bachelor Degree	Retired	$40,000- $60,000	Married	Retirees (1 other)	30 years	Owned	House/villa with small garden (garden less than 11-50 square metres)
Cottesloe	Timothy	Male	38	Australian	Year 10	Consulting	$150,000 or more	Single	Single no kids	10 years	Owned	House/villa with large garden (garden 200-500 square metres)
Cottesloe	Ruby	Female	61	Australian	Year 12	Traffic Warden	$150,000 or more	Married	Mature Family (3 others)	15years	Owned	House/villa with very large garden (garden 500+ square metres)
Cottesloe	Nelson	Male	47	Australian	Bachelor Degree	General Manager	$150,000 or more	Married	Mature Family (3 others)	19 Years	Mortgage	House/villa with very large garden (garden 500+ square metres)
Cottesloe	Georgia	Female	48	Australian	Year 12	Teacher	$150,000 or more	Married	Mature Family (4 others)	2 years	Owned	House/villa with medium garden (garden 51-200 square metres)
Cottesloe	Jessica	Female	24	Australian	Bachelor Degree	student	$150,000 or more	Married	Couple no kids (1 other)	7yrs	Rented	House/villa with large garden (garden 200-500 square metres)
Cottesloe	Grace	Female	60	Australian	TAFE/Technical Certificate	Real estate Agent	$80,000- $100,000	Single	Empty Nester (1 other)	30years	N/A	House/villa with very large garden (garden 500+ square metres)
Ballajura	Rachel	Female	68	Australian	Year 10	Retired	$20,000-$40,000	Married	Retirees (1 other)	23 YEARS	Owned	House/villa with medium garden (garden 51-200 square metres)
Ballajura	Patrick	Male	73	Australian/ Asian	Diploma	Retired	$20,000- $40,000	Divorced/Separated	Retirees	26 yrs	Mortgage	House/villa with medium garden (garden 51-200 square metres)
Ballajura	Alee	Female	31	Australian	TAFE/Technical Certificate	Office Clerk	$100, 000-$150,000	Defacto/Living together	Young Family (2 others)	3 years	Mortgage	House/villa with medium garden (garden 51-200 square metres)
Ballajura	Lachlan	Male	46	Australian	Year 11	Road and Rail Transport Driver	$80,000- $100,000	Married	Empty Nester (1 other)	10 years	Mortgage	House/villa with medium garden (garden 51-200 square metres)
Ballajura	James	Male	26	British	Trade/apprenticeship	Labourer	$100, 000- $150,000	Defacto/Living together	Couple no kids (4 others)	1 year	Owned	House/villa with large garden (garden 200-500 square metres)
Ballajura	Jacob	Male	59	Australian	Diploma	Cartographer	$100, 000- $150,000	Married	Mature Family (3 others)	21 years	Mortgage	House/villa with large garden (garden 200-500 square metres)
Ballajura	Natasha	Female	48	New Zealander	Year 12	Unemployed	$60,000- $80,000	Married	Empty Nester (1 other)	14 years	Mortgage	House/villa with very large garden (garden 500+ square metres)
Ballajura	Susan	Female	62	Australian	Year 10	Office Manager	$100, 000- $150,000	Married	Empty Nester (1 other)	33 years	Owned	House/villa with large garden (garden 200-500 square metres)
Ballajura	Hayley	Female	55	Australian	TAFE/Technical Certificate	Office Clerk	$60,000- $80,000	Single	Single no kids	27 years	Owned	House/villa with large garden (garden 200-500 square metres)
Ballajura	Max	Male	57	Australian	Trade/apprenticeship	Road and Rail Transport Driver	$60,00- $80,000	Married	Couple no kids (3 others)	25	Owned	House/villa with very large garden (garden 500+ square metres)
Armadale	Edward	Male	71	Australian	Diploma	Retired	$80,000- $100,000	Married	Retirees (1 other)	15 years	Owned	House/villa with large garden (garden 200-500 square metres)
Armadale	Kate	Female	46	Australian	Bachelor Degree	Unemployed	$60,000- $80,000	Married	Mature Family (3 others)	14	Mortgage	House/villa with very large garden (garden 500+ square metres)
Armadale	Josie	Female	38	Australian/ Italian	Bachelor Degree	Child youth counsellor	$40,000-$60,000	Single	Young Family (2 others)	7 years	Mortgage	House/villa with small garden (garden less than 11-50 square metres)
Armadale	John	Male	62	Australian	Post-Graduate Degree	School Teacher	$100, 000- $150,000	Married	Mature Family (3 others)	17 years	Mortgage	House/villa with medium garden (garden 51-200 square metres)
Armadale	Karla	Female	66	Australian	TAFE/Technical Certificate	Nurse	$20,000 - $40,000	Divorced/Separated	Mature Family (2 Others)	20 years	Mortgage	House/villa with large garden (garden 200-500 square metres)
Armadale	Ali	Female	28	Filipino	Diploma	Financial adviser	$100, 000- $150,000	Defacto/Living together	Young Family (2 others)	Since childhood	Rented	House/villa with very small garden (garden less than 10 square metres)
Armadale	Damian	Male	55	Australian	TAFE/Technical Certificate	Transport Coodinator	$60,000 - $80,000	Single	Single no kids	15	Mortgage	House/villa with medium garden (garden 51-200 square metres)
Armadale	Nicola	Female	37	Australian	Year 12	Home Duties	$40,000- $60,000	Married	Young Family (2 others)	2 years	Mortgage	House/villa with very small garden (garden less than 10 square metres)
Armadale	Dale	Male	48	Australian	Trade/apprenticeship	Unemployed	Less than $20,000	Divorced/Separated	Single no kids	most of my life	Outright	House/villa with very large garden (garden 500+ square metres)
Armadale	Samantha	Female	49	Australian	Post-Graduate Degree	School Teacher	$100, 000 - $150,000	Divorced/Separated	Young Family (3 others)	2 years	Mortgage	House/villa with very large garden (garden 500+ square metres)

Melbourne

Case Study	Name	Gender	Age	Nationality	Education	Occupation	Household Income	Marital Status	Household Structure	Time lived in the community	Residential Status	And do you live in a:
Camberwell	Fraser	Male	28	Australian	Post Graduate degree	I.T Adminstration	$60,000- $80,000	Single	Hosuemates (2 Others)	18 Months	Rented	House/Villa with veery small garden
Camberwell	Lucinda	Female	53	Australian	Post-gradute degree	Scientist	$150,000 or more	Married	Family (3 Others)	14 Years	Mortgage	House/Ville with Medium Garden
Camberwell	Simon	Male	24	Australian	Bachelore degree	Student Advisor Deakin University	$60,000- $80,000	Single	Housemates (3 Others)	2.5 Years	Rented	Apartment/Flat
Camberwell	Bel	Female	30	Taiwanese	Post Graduate Degree	Adviser to minster for finance	$40,000-$60,000	Single	Housemates (3 Others)	2 Months	Rented	House/Villa with small garden
Camberwell	Anna	Female	60	Australian	Post Graduate degree	Manager Consultant	$100,000- $150,000	Married	Family (1 Other)	10 Years	Owned	House/Villa with small garden
Camberwell	Emily	Female	25	Australian	Post Graduate degree	Consultant	$40,000- $60,000	Single	partner (one Other)	5 months	Rented	Apartment/Flat
Camberwell	Lexi	Female	51	Australian	Bachelore degree	Student	$150,000 or more	Married	Family (2 Others)	7 years	Mortgage	House/Villa with a large garden
Camberwell	Sarah	Female	26	Australian	Post Graduate degree	Unemployed/Student	$150,000 or more	Single	Family (4 Others)	26 Year	Owned	House/Ville with very large garden
Camberwell	Alex	Male	43	Australian	Tafe/Technical certificate	Student	$20,000- $40,000	Single	Alone	18 Months	Rented	Apartment/Flat
Camberwell	Mathew	Male	47	Australian	Tafe/Technical certificate	Program Officer	$80,000-$100,000	Married	Family (3 others)	3 Years	Mortgage	House/Villa with medium garden
Camberwell	Pip	Female	57	Australian	Post Graduate degree	Garden Designer	$150,000 or more	Married	Family (2 Others)	19 years	Owned	House/Villa with a very large garden
Coburg	Julie	Female	63	England	Post-draduate degree	Quality Improvement Consultant	$20,000-40,000		Alone	30 Years	Owned	house/villa with medium garden
Coburg	Peter	Male	39	Australian	Bachelore degree	Nurse	$100,000- $150,000	Married	Family (3 Others)	6 Years	Rented	house/villa with medium garden
Coburg	Maggie	Female	29	Australian	Year 12	Student	less than $20,000	Single	Housemates (4 Others)	3 Years	Rented	Hoouse/Villa with medium garden
Coburg	Helen	Female	40	Australian	Bachelore degree	Academic/Consultant	$100,000- $150,000	Married	Family (3 Others)	18 mohts	Mortgage	House/Villa with a large garden
Coburg	Riley	Female	31	Australian	Bachelore degree	Student/ Teaching Assistant	$20,000- $40,000	Single	Family (2 Others)	3 Years	Rented	House/Villa with Medium Garden
Coburg	Jack	Male	78	Polish	Year 7-9	Plumber	Don't know ($645.25/ fortnight)	Married	Family (2 Others)	65 Years	Owned	Houese/ Villa with Medium Garden
Coburg	Jay	Female	37	Australian	Bachelore degree	Research Asistant	$80,000-$100,000	Single	Alone	3.5 Years	Mortgage	Apartment/Flat
Coburg	Henry	Male	65	Australian	Bachelore degree	Retired/ Computer technician	Don't know/Can't Say.	Married	Family (1 Other)	35 Years	Outright	House/Villa with a small garden
Coburg	Nicholas	Male	33	Aus/UK	Post Graduate degree	teacher	$100,000- $150,000	Married	Family (2 Others)	5 Years	Mortgage	Hoouse/Villawith large garden
Coburg	Valda	Female	66	Aus	Bachelore degree	Teacher/Retired	$20,000-40,000	Single	Family (1 Other)	6Years	Owned	HouseVilla with a medium garden
Broadmeadows	Louise	Male	33	Chinese	Diploma	Software developer	$80,000- $ 100,000	Married	Family (3 others)	4 Years	Mortage	House/villa with large garden
Broadmeadows	Tran	Male	67	Lebanon	Post Graduate degree	Interpretive/translator	$20,000- $40,000	Married	Family (2 Others)	26 Years	Owned	House/Ville with medium garden
Broadmeadows	Krystal	Female	20	Lebanese/Asutralian	Bachelore degree	Student	Less than $20,000	Single	Family (6 Others)	20 Years	Owned	House/ Villa with medium garden
Broadmeadows	Alice	Female	29	Kuwaiti/ Non-Kuwaiti	Tafe/Technical certificate	Stay at home mother	$80,000- $100,000	Married	Family (3 Others)	4 YEars	Mortgage	house/villa with medium garden
Broadmeadows	Rebecca	Female	58	Australian	Bachelore degree	Teacher	$20,000- $40,000	Married	Family (one other)	10 Years	Owened	house/villa with Small garden
Broadmeadows	Lauren	Female	45	Australian	Year 11	Unemployed	Less than $20,000	Single	Family (2 others)	12 Years	Rented	house/villa with medium garden
Broadmeadows	Dorian	Male	48	Australian/Lebanese	Diploma	Small business owner	$40,000- $60,000	Single	Family (5 Others)	30 years	Owned	house/villa with medium garden
Broadmeadows	William	Male	55	Australian	Bachelore degree	Real Eastate agent	$40,000- $60,000	Married	Family (3 Others)	18 Years	Owned	house/villa with medium garden
Broadmeadows	Sophie	Female	66	Australian	Year 12	Retired/ teacher	Less than $20,000	Married	Family (1 Other)	36 years	Owned	house/villa with Small garden
Broadmeadows	Thomas	Male	27	Australian	Tafe/Technical certificate	Mechanic	$20,000- $40,000	Single	Family (4 Others)	27 Years	Owned	House/villa with large garden

Appendix 7: Stakeholders and Community Informants Engaged in this Research

Stakeholders/ Expertise	Number of Participants	
	Melbourne	**Perth**
State Government		
Waste Water Managers	4	2
Stormwater Managers	4	3
Water Supply Managers	4	3
Water Retailers	2	2
Community Engagement (Environment)	3	2
Housing and Planning		1
Local Government (advantaged community)		
Environment/ Sustainability Officer	1	1
Community Liaison and Engagement	1	1
Town Planning		
Engineering		
Local Government (moderate community)		
Environment/ Sustainability Officer	2	1
Community Liaison and Engagement		1
Town Planning		1
Engineering		
Local Government (disadvantaged community)		
Environment officer/ Sustainability	2	3
Community Liaison and Engagement	1	1
Town Planning		1
Engineering		1
Community groups, NGO's, Other		
Academics	1	1
Organisational Capacity Building for Sustainability	1	1

Appendix 8: Semi-structured Interview Plan

Variables	Socially disadvantaged group	Socially advantaged (moderate) group	Socially advantaged (high) group
Preliminary/lead in Q's (Approx 20 minutes)	**How long have you lived in this neighbourhood/ community?** **When did you move here/ how did you come to be here?** **Cues**: Historical/Cultural background (capital) of interviewee. **Do you like living here?** **Are there aspects you like** **Are there aspects you dislike?** **Cues:** Community connectedness/ engagement (Social Capital), Material and economic resource availability (capital).		
Household water use practices (Approx 20 minutes)	**How long have you lived at your current house?** **Do you like living there?** **What aspects do you like?** **Are there aspects you dislike?** **Cues**: Material and economic resource availability, social and symbolic capital **Can you tell me about the ways you use water in your house?** **Cues: Bathroom, Laundry, Kitchen, other Materials** (objects, infrastructure, tools and hardware's). **Meanings** (attitudes and values, emotion and motivational knowledge or the social and symbolic significance). **Competencies** (know-how, background knowledge and understanding). **Have you always used water in these ways? (Materials, Meanings, and Competencies)?** **What things have influenced the way you use water in your home? (background, drought, resources)** **Cues**: Social, Cultural/Symbolic, Material/Economic capital (e.g. Environmental conservation/sustainability values, financial privilege/ restraint, education and water literacy, historical/cultural contexts etc.)		

Backyard/outdoor water use practices (Approx 20 Minutes)	Do you have a backyard or front yard, or are there outdoor spaces where you regularly spend time? **Can you describe them/it to me?** **What do you use these spaces for, what do you do in them?** **Cues**: Material and economic resource availability, social and symbolic capital **Can you tell me about the ways you use water in these spaces?** **Cues:** Gardens, Swimming Pool, Car Washing, other **Materials** (Objects, infrastructure, tools and hardware's). **Meanings** (Attitudes and values, emotion and motivational knowledge or the social and symbolic significance). **Competencies** (know-how, background knowledge and understanding). **How did you come to use water in these ways? (Materials, Meanings, and Competencies)?** **Cues**: Social, Cultural/symbolic, Material/Economic capital (eg. Environmental conservation/sustainability values, financial privilege/ restraint, education and water literacy, health and amenity etc.).
Community water use practices (Approx 20 Minutes)	I am interested to know more about your neighbourhood and the community you live in. Do you spend much time with others in your community? **What are some of the things you do?** **How do you perceive your water use compared to your neighbours or other community members?** **Is it different/ similar; in what ways?** **Cues:** Community Connectedness and social capital, cultural and symbolic capital (eg. Water literacy, social cohesion and education, etc.). **Can you think of other ways water is used in your neighbourhood and community?** **Are their things done to save water in your neighbourhood and community? What are they?** **Are there things community or volunteer groups are doing?** **Are there things your local/state government are doing? What do you think about these?** **Cues:** Water Literacy, community engagement, effectiveness of institutional arrangements. **In closing is there anything you would like to mention?**

Appendix 9: Participant Survey and Screener Document

Name	
Email/Phone contact	

Age	**Gender** ○ Male ○ Female ○ Other

Nationality/Country of Origin   **/**

What is your occupation?

What is your total annual household income before tax or anything else is taken out?
○ **Less than $20,000**
○ **$20,000 to less than $40,000**   ○ $80,000 to less than $100,000
○ **$40,000 to less than $60,000**
○ **$60,000 to less than $80,000**   ○ $100, 000 to less than $150,000

What is your highest level of education (circle)
○ **Never attended school**   ○ Trade/apprenticeship
○ **Primary school**
○ **Year 7 to Year 9**   ○ TAFE/Technical Certificate
○ **Year 10**
○ **Year 11**
○ **Year 12**   ○ Diploma

How long have you lived at your current address?	**Is the dwelling** ○ **Owned outright** ○ **Owned with a mortgage** ○ **Being rented,** ○ **Being occupied rent free** ○ **Other** _____

How many people do you live with?	**Who are they?** ○ Family ○ Housemates ○ Other _____

Do you live in a:
        ○ Apartment/Flat
        ○ House/villa without garden
        ○ House/villa with very small garden (garden less than 10 square metres)
        ○ House/villa with small garden (garden less than 11-50 square metres)
        ○ House/villa with medium garden (garden 51-200 square metres)
        ○ House/villa with large garden (garden 200-500 square metres)
        ○ House/villa with very large garden (garden 500+ square metres)

How long have you lived in this community?

Appendix 10: Explanatory Statement provided to Participants

EXPLANATORY STATEMENT FOR COMMUNITY RESIDENTS

Project: Social Inequality and Water Sensitive Cities

Project Number:

You are invited to take part in this study being conducted as part of the PhD research of Mr Paul Satur. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

What does the research involve?

This study will seek to investigate the way different communities use, save and interact with water in Australian cities. To do so we will try to understand how varying factors such as social networks, education and cultural backgrounds, and economic and material resources influence and shape water use practices in peoples households and communities. By participating you will be given the opportunity to voice your opinions, views and values in regard to the current and future planning and management of water resources. It will also assist in developing new water use and water saving programs, infrastructures and technologies that more effectively and fairly meet the needs of varying communities, while ensuring the sustainability of our water resources for future years.

For this study, a number of suburb localities have been selected and yours is one of them. Selected residents of these suburbs will be interviewed for this research. Your participation will consist of a 60-90 minute interview in which you will be asked about your water use and water saving practices around your home, garden and community.

Consenting to participate in the project and withdrawing from the research

The Interview will be audio recorded and later transcribed for data analysis and use. Prior to the commencement of the interview you will be required to give written consent (see attached consent form), and given the option of whether you agree to the interview being audio recorded or not. If you do not agree, an alternative method of data collection can be arranged.

Possible risks to participants

Given the nature of this study there is very little risk involved. However, for any reason, participants can choose not to answer any questions asked, to suspend or end their participation in the project and withdraw their interview material. Following the interview period (ending 1st December 2015), interviewees will be de-identified and withdrawal of material will not be possible.

Confidentiality

Any information obtained in connection with this project and that can identify you will remain confidential. By signing the Consent Form, the results obtained may later be developed in a publication. In such circumstances, information will be provided in such a way that you cannot be directly identified. Any quotes from individual participants used in reports/papers will be reported using a pseudonym. Your social circumstances and cultural backgrounds and histories may be described, and as a result prove potentially identifiable; however personal details will be excluded from the report.

Audio data and paper consent forms obtained will be stored at Monash University in a locked filing cabinet, accessible only to the researchers of the study. Transcribed data will be stored electronically on a password protected computer accessible only to the researchers of the study. The data storage period is a minimum of 6 years after the final publication using the data collected. After this time the data will be destroyed by a reliable disposal unit or shredding.

Results

Individual results are confidential and will not be available to participants. Data summary reports, any publications and copies of the final thesis can however be sent to any respondent who expresses an interest in seeing the results of the study by contacting either member of the research team (see below for details). Hard copies will be held at the Monash University Library and available from there upon request.

Complaints

Should you have any concerns or complaints about the conduct of the project, you are welcome to contact the Executive Officer, Monash University Human Research Ethics Committee (MUHREC):

Executive Officer

Monash University Human Research Ethics Committee (MUHREC)

Room 111, Building 3e

Research Office

Monash University VIC 3800

Tel: ███████████   Email: ████████████████   Fax: ██████████

If you require more information about the project or should you request a summary of the results, please contact the researchers on the details below.

Thank you for your time, your input into this research is highly appreciated.

Associate Professor Jo Lindsay
School of Social Sciences
Phone: ██████████
email: ████████████████

Paul Satur
School of Social Sciences
Phone : ██████████
email: ████████████████