No Longer the Fantasy of an Endless Supply: Water Value, Water Practice, and Changing Water Availability in Illawarra Households

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Abstract
Current discourse places water value within rigid, established boundaries characterised by simplification and categorisation. This research seeks to move beyond established categories that limit the understandings of value. The thesis draws on the histories and experiences of the Australian environment to expose new ways to think about values and practices associated with water. Focusing on the outdoor area of the home, networks of water storage and distribution are explored to capture the complex, diverse, and changing values connected to water. In this thesis, the phrase ‘water availability’ is used to describe different ways in which ‘availability’ of water varies. These ways include variable rainfall, drought, regulatory factors such as water restrictions, and sociocultural factors such as community pressure and expectation. In the context of climate change, it is becoming likely that the availability of water is going to change in Australia. In some places it will decrease, in some it will increase. In the Illawarra region of New South Wales, it is not entirely clear. As such research into how individuals and households cope with differing water availability may reveal something about how individuals and households might cope in the context of climate change.

This research focuses on the values and practices associated with water in the outdoor areas of the home, and the relations between value, practice, and changing water availability, among Illawarra households. Through a mixed-method approach – including semi-structured interviews, water diaries, and diary-interviews - this thesis seeks to address an overarching aim, to investigate how outdoor household water is valued, in the context of changing water availability. To explore the values of water and the contexts in which they occur, a further two aims are explored. These aims are: (1) how are water values expressed through everyday outdoor water practices? and (2) how do everyday water practices and values relate to water availability?

Values have been transformed by the relationship people hold with the outdoor area of their home, particularly the garden. The everyday patterns and practices created by different water availability have created a personal sense of responsibility, and shaped participants’ interactions with water. Previous experience of water scarcity and history with the harshness of the Australian environment correlates with a practical consciousness of water saving today. As a result of the personal history with water availability and the active engagement with water today, water practices have been ingrained in the everyday water habits of households. Different water availability – particularly drought – reminds households of the importance of the outdoor area and fosters a new perspective on how water is valued. A cultural change in how water is used is underway and there appears to be a willingness and eagerness by households to attune their outdoor practices to the realities of living in the driest inhabited continent on Earth.

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No Longer the Fantasy of an Endless Supply: Water Value, Water Practice, and Changing Water Availability in Illawarra Households

Jonathon Cook

This thesis is submitted in part fulfilment of the requirements for the award of the Honours Degree of Bachelor of Science in the School of Earth & Environmental Sciences, University of Wollongong 2013.
The information in this thesis is entirely the result of investigations conducted by the author, unless otherwise acknowledged, and has not been submitted in part, or otherwise, for any other degree or qualification.

Signed

Dated 16/10/2013

Jonathon Cook  PREFACE
Why This Project?

Putting into words the reasoning behind this project is difficult. The thought conjures up a history of my life like the chapters of a biography. I didn’t know it at the time but growing up in Port Macquarie on the NSW mid-North Coast was the beginning of my passion and interest in climate change and sustainability. Geography quickly became the subject of choice at high school and the knowledge of environmental complexity, population movement and mapping techniques overtook somewhat, what I believed to be, worthless information; information I thought to be irrelevant in my education. The curriculum of geography in my final years of high school was strongly influenced by the concerns at that time; predominantly globalisation, global warming and population rise. This sphere of influence moulded my current awareness of the environment and gave meaning to the changing geographic world.

It was no surprise that geography became my most successful subject. However, I was not convinced it was my future. I began university studying biology and continued it through until the end of my third session. I made the move to human geography not because I wasn’t enjoying biology but I knew geography could provide the cultural, social and anthropological disciplines to fill a deepening void of disillusioned prospects. The fog of indecision was clearing but it would shadow me for my entire undergraduate experience.

After graduating in human geography and having an equivalent major in physical geography I still wanted more. It was a desire for change and the challenge of something new, something different that led me to my honours year. The first person I approached was Dr Leah Gibbs with the idea of climate change as the context for my year of research. Through a collaboration of Leah’s previous research/experience and my passion towards climate change and sustainability research, the idea of how water is valued in Illawarra households was devised. Ignorant of the time constraints of the research, the scope of the project was continually changing until the value of water was settled on outdoor water practices within the context of different water availability.
The fog that clouded many of my decisions and future prospects is now dissipating and the road to the end of my honours year and beyond is clearing. I hope this research and any of my future endeavours contribute in the field of human geography: a discipline I see as important as any other, but far too often it is underestimated in the field of science.
ABSTRACT

Current discourse places water value within rigid, established boundaries characterised by simplification and categorisation. This research seeks to move beyond established categories that limit the understandings of value. The thesis draws on the histories and experiences of the Australian environment to expose new ways to think about values and practices associated with water. Focusing on the outdoor area of the home, networks of water storage and distribution are explored to capture the complex, diverse, and changing values connected to water. In this thesis, the phrase ‘water availability’ is used to describe different ways in which ‘availability’ of water varies. These ways include variable rainfall, drought, regulatory factors such as water restrictions, and sociocultural factors such as community pressure and expectation. In the context of climate change, it is becoming likely that the availability of water is going to change in Australia. In some places it will decrease, in some it will increase. In the Illawarra region of New South Wales, it is not entirely clear. As such research into how individuals and households cope with differing water availability may reveal something about how individuals and households might cope in the context of climate change.

This research focuses on the values and practices associated with water in the outdoor areas of the home, and the relations between value, practice, and changing water availability, among Illawarra households. Through a mixed-method approach – including semi-structured interviews, water diaries, and diary-interviews - this thesis seeks to address an overarching aim, to investigate how outdoor household water is valued, in the context of changing water availability. To explore the values of water and the contexts in which they occur, a further two aims are explored. These aims are: (1) how are water values expressed through everyday outdoor water practices? and (2) how do everyday water practices and values relate to water availability?

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households. Different water availability – particularly drought – reminds households of the importance of the outdoor area and fosters a new perspective on how water is valued. A cultural change in how water is used is underway and there appears to be a willingness and eagerness by households to attune their outdoor practices to the realities of living in the driest inhabited continent on Earth.
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Firstly and foremost I would like to sincerely thank my supervisor Leah Gibbs. From the first time I came to you some twelve months ago – slightly lost and confused – you have provided much needed support and guidance. Thank you so much for all your help and dedication over the past nine months. Just think, you’ll never have to answer my questions regarding word count ever again.

To the other staff within Earth & Environmental Sciences, I thank you for the additional help throughout the year. Thank you very much Elyse Stanes. You not only helped me with the technology component of the project, but you also opened my eyes to the idea of water availability. Without that assistance my project may have taken a completely different avenue.

Big thanks to the other Honours students. It was always nice catching up. It reminded me that I wasn’t the only one going through this experience, particularly when things started to get tough in those final weeks.

Enormous thanks to all twenty-two Illawarra residents who agreed to participate in this research. Needless to say this wouldn’t have happened without you. Your cooperation, flexibility and wealth of knowledge has been invaluable. I hope to do justice with the views, opinions and experiences you have provided regarding water.

Last but not least my family. Despite constantly having at least one member overseas, your support was crucial for getting me through these gruelling nine months. To my sisters - Cathryn and Nicole - my apologies for never initiating any contact during this time (you should be used to it by now), but thank you for making the effort. It was always nice to know you were thinking of me. To my dearest mother, I cherish your love and support, even when delivered via an incoherent text message. Finally, my father. Thank you so much for all the work you did for me this year. I must have been a very frustrating child at times and I admire your patience. The hours you spent going over my work has been priceless to this end result. Thank you.
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Chapter One

Introduction

1.1 Introduction

With the exception of air, water is the most omnipresent and vitally important element of the environment (Strang, 2005), and because of this it lends itself to an analysis of the relationship between the human experience and the construction of meanings and values. Strang (2005. pg. 97) reminds us that ‘there is probably more poetry, more literature and more art describing the form of water than any other aspect of the environment’ highlighting the emotional sensations water conjures when people come into contact with it. For these
reasons, water must be used in a sustainable manner. Central to the concept of sustainability is the realisation that water is finite – limitations exist on its ability to meet the needs of present and future generations. The human experience with water is as diverse as the contexts in which the interaction occurs (Strang, 2005). The themes encoded in water provide ‘important undercurrents of commonality’ (Strang, 2005. pg. 115) where water is a matter of life and death, basis of our identity, and a symbol of power and agency. These commonalities are located in the characteristics of water itself – including fluidity, transmutability and aesthetics – and the shared physiological and cognitive processes that form human experiences. By acknowledging the qualities of water and the environments it occupies, water is inescapably the most vital resource to humans’ continued existence.

In a space where water networks are rendered visible, the outdoor area of the home is both an arena and agent for water practices (Head and Muir, 2007). The outdoor area serves as a way of thinking about nature and culture and how they influence one another. Philosophically, Francis and Hester (1990. pg. 2) viewed the garden as a balancing act between ‘human control on one hand and wild nature on the other’. As an arena and an agent, the outdoor area of the home is loved and cherished. The passion engendered in this domain, and the everyday, habitual engagement between human and non-human nature provides significant potential for a cultural shift of household water use.

Changing water availability has placed water at the forefront of public consciousness. When large parts of Australia were suffering from water scarcity and failing water systems, a key motif for Australians was the need to adopt a ‘cultural change’ in relation to water (Strang, 2005; Allon and Sofoulis, 2006; Gardiner, 2008; Sofoulis, 2011). Understanding the convergence of cultural meaning, social practice and technology is imperative in recognising outdoor water use patterns and attuning the practices and attitudes to the realities of living in the driest inhabited continent on earth (England, 2009). Allon and Sofoulis (2006) criticise dominant discourses and frameworks of demand management as inadequate as they overlook the values and patterns of everyday water practices rendered meaningful and ignore ‘where consumption habits are collectively acted out, maintained and subject to change’ (pg. 46).

As we understand it, culture is a combination of ‘values, practices and interactions, involving both human and non-human forms, sociotechnical systems and technologies’ (Allon and Sofoulis, 2006. pg. 54). In order to achieve a cultural shift in the way water is used in
Australia for a sustainable water future, Allon and Sofoulis’ (2006) research - ‘Everyday Water’ - concluded with the need for better and ongoing understanding of the values and cultural meanings influencing domestic water consumption.

This study contributes to a growing body of literature on the commonalities and differences on the culture of water (Gibbs, 2006; Jackson, 2006; Head and Muir, 2007) and the values and meanings that embody that culture (Allon and Sofoulis, 2006). Drawing from the idea of ‘Big Water’ provided by Sofoulis (2005) in which Australia’s water systems embody the fantasy of endless water supply and Strang’s (2004) analysis of the unreceptive nature of domestic users to conserve water, this research argues that the outdoor area of the home is both an agent and site for changing water values and practices.

1.2 Problem

The theoretical framing of this research draws on moves within human geography and elsewhere to move beyond water and society as separate entities. This study provides a conceptualisation of the complex, diverse and entangled meanings of relationships between humans and water, and the processes that pervade water practices. Drawing on cultural and social geography, environmental conservation and resource studies, and behavioural studies, this research attempts to ‘de-fog’ (Sofoulis, 2005. pg. 448) the cultural domain in discourses of water values by integrating a sociotechnical perspective. This perspective defines society by the human and nonhuman elements embedded in everyday life to inform researchers about how practices and values function.

This study focuses on water availability, a concept that aims to encapsulate a range of different ways in which ‘availability’ of water varies, such as those experienced within the Illawarra over the past decade. Extending from the physical realm of water availability that deals with factors including drought (Willis et al., 2013) and variable rainfall (Gibbs 2006 & 2010; Gill, 2011) to sociocultural determinants including scarcity (Kaika, 2003; Hansen, 2009; Mukheibir, 2010), water restrictions (Harman et al., 2008; Sherval and Askew, 2012; Sherval and Greenwood, 2012) and policy (Hansen, 2009; Askew and Sherval, 2012), this study intends to inform thinking about values associated with water. By applying the notion
of water availability to a study of outdoor areas of the home, this study seeks to explore values as diverse, interconnected, complex and susceptible to change (Gibbs, 2006).

The severity of recent droughts and water restrictions is attracting increasing attention in the field of human geography. Much of this interest surrounds attitudes (Syme et al., 1983; Cary, 2008; Pearce et al., 2012), water consumption practices (Gregory and Di-Leo, 2003; Head and Muir, 2007; Sofoulis and Williams, 2008) and water management (Taylor, 2007; Muller, 2007; England, 2009; Parker, 2013) associated with changing water provisions in Australia. Through the lens of contemporary outdoor areas of the home, this study will contribute to a repositioning of water values within the suburban context, and enmesh humans within, rather than outside, nonhuman elements of nature. Through an evaluation of both outdoor household practices and how the availability of water varies, this repositioning will be discussed in terms of the interconnections between human and non-human elements. The dominant discourses and frameworks for thinking about water values overlook the complex and ‘messy terrains’ (Alloran and Sofoulis, 2006, pg. 46) where values and practices are rendered meaningful. The outdoor area of the home is one place in which the ‘messy terrains’ are acted out and involve multifaceted, interconnected, complex and entangled relationships that form particular places.

1.2.1 Practices

A focus on practice provides important points of intersection with previous research. Given the imperative of water conservation for household sustainability and climate change mitigation, it is crucial to understand what factors are influencing practices. An awareness of these factors will inform water managers and policy makers how to best encourage water conservation practices (Dolnicar et al., 2012). Despite the imperative of developing water conservation practices among households, relatively limited research has focused on this area to date (Hurlimann et al., 2009) and therefore little is known about Australians’ actual water conservation practices. Providing baseline data about households in the Illawarra, this study seeks to address the gap by contributing knowledge about Australian practices towards water conservation in the outside area of the home.

This research also aims to investigate the relationship between attitudes and practices. It has been well established by previous authors that while it is ultimately practices and behaviour that matters, attitudes are known to influence intentions and practices (Cary, 2008; Randolph
while past research has focused on the attitude-practice relations with water (Head and Muir, 2007; Hurlimann et al., 2009; Gilbertson et al., 2011), in this study this relationship is placed within a domain of values. It has become known that values do not necessarily translate into actual practice; referred to as the ‘value-action gap’ (Blake, 1999). A number of studies have found that despite a high value placed on water, actual water conservation practice remains weak (Gregory and Di Leo, 2003; Dolnicar and Hurlimann, 2010). Through a mixed method approach, this study aims to gauge a greater understanding of the value of water held by research participants and whether this translates into consistent or contradictory water practices.

1.2 Values

There is no single value for water; rather water attracts an ensemble of meanings dominated by historical and geographical circumstances and cultural, practical and social contexts (Jackson, 2006). The values associated with water are diverse, changing and complex (Gibbs, 2006). The lack of consensus in the definition of ‘value’ implies the need for further examination into its concepts and discourses that shapes meaning. In contemporary environmental management, ‘valuation’ is the concept most often used to express the value of goods and services to provide scientific measurements and observations (Farber et al., 2002). By reducing invaluable and complex ecosystems through commoditisation a monetary value is placed on nature. This study avoids the road of simplification and categorisation of value that presumes a degree of homogeneity in water.

This research draws on the knowledge and experience of the Australian environment to provide a way of thinking about water and value that challenges the narrow, dominant, contemporary approaches to valuing water. Drawing from a human geographic and social science approach of multiple knowledge of Australian water, this research seeks to move beyond the generic analysis of valuing water to a study of a particular place characterised by particular conditions. In reference to the values of water this research will particularly be referring to the work of Gibbs (2006; 2009; 2010) and Sofoulis (2005; 2011; 2013) who have informed this research about the interconnected nature of values. The values people place on water cross ‘traditional’ (Gibbs, 2006, pg. 77) categories of value and the work by Gibbs and Sofoulis has provided a greater nuanced understanding of these values. They remind us that
the values of water are not formed within rigid, established boundaries, but they move away from the hegemonic approaches. These ideas are strongly represented in water availability and household water practices as values may change according to the ways water is delivered, how much is presented, and the restrictions employed on its usage.

1.2.3 Water Availability

In this thesis ‘water availability’ describes a range of different ways in which the ‘availability’ of water changes. These encapsulate physical factors such as: variable rainfall and drought; regulatory factors such as water restrictions; and social and cultural factors such as pressures and expectations that neighbours exert on one another. In the context of climate change, it is becoming likely that the availability of water is going to change in different parts of Australia – in some places it will decrease, in some it will increase (CSIRO, 2007; Orlove and Caton, 2010; Gibson et al., 2011; Gill, 2011; IPCC, 2013). In the Illawarra, it is not entirely clear. According to the Department of Environment and Climate Change (2008) the Illawarra region is expected to experience increased rainfall during summer and drier winters and springs, however the degree of change is still uncertain. It strikes us then, that researching about how individuals and households cope with differing water availability may reveal something about how individuals and households may cope in the context of climate change.

The availability of water influences patterns of human interaction with water and shapes lifestyle and livelihood (Hurlimann et al., 2009). The impacts of water availability, particularly drought, have been evident across Australia’s landscapes and its communities. Through the histories and stories associated with drought, it has become synonymous with rural hardship and impacts on regional and rural economies. However, in recent times another image has emerged. The effects of drought have extended to the outdoor areas of urban and rural homes where restrictions have been imposed in an unprecedented number of locations (Chong and White, 2007).

The changing rainfall patterns and lower stream flows at the beginning of this century led a focus on conservation measures and management initiatives. These predominantly targeted outdoor water practices in the form of water restrictions (Tapsuwan et al., 2007). The concern raised in this study is that as water availability poses uncertainties in water supply, outdoor
water use continues to incorporate a significant portion of domestic water demand. This study examines the impacts of rationing methods, such as water restrictions, to gauge how practices have changed during these periods of demand and whether there is a correlation between the prohibition of outdoor water use and water values.

1.3 Aims and Objectives

This study explores the sociocultural and environmental context in which water is valued and used in the outdoor area of Illawarra households. This coastal region of south-eastern Australia is characterised by rainfall variability (Gill, 2011). This variability has been no more evident than in the past decade as the Illawarra experienced a climatic transition from severe drought and water scarcity to the onset of high rainfall and water abundance (OECD, 2010; Mukheibir, 2010; Akter and Bennett, 2011; Risbey, 2011). The unique topography and rainfall variability of the Illawarra has created an ideal location to investigate the value of water and the subsequent practices, attitudes and conceptualisations of those values in the context of rainfall variability, and changing water availability. This research encompasses the suburbs of the coastal fringe of the Illawarra from Austinmer to Shellharbour. Covering a range of social demographics, the makeup of the Illawarra enriches the research to allow an exploration of demographic differences that are said to drive environment decision-making (Hines et al., 1987; Barr et al., 2005).

The overarching aim of this thesis is to investigate how outdoor household water is valued, in the context of changing water availability. In answering this question, this work seeks to contribute to a body of research that explores how water is meaningfully positioned within the sociocultural environment of a region. Understanding this value is integral to the development and implementation of strategies to reduce outdoor household water consumption.

In addressing this overarching aim it must be acknowledged that these values are enveloped within a range of cultural and environmental contexts. To explore these contexts, this research will seek to answer two specific aims:

1. How are water values expressed through everyday outdoor water practices?
2. How do everyday water practices and values relate to water availability?

By evaluating the importance of particular water practices, this thesis seeks to determine whether practices are consistent with water values and how practices have changed over time. With rainfall variability experienced in the Illawarra, the second aim attempts to explore whether the practices, attitudes and values of water have been influenced by changing water availability. It is hoped that this work will contribute to the progress of water conservation measures and development of strategies towards a cultural shift in water intensive household practices.

1.4 Thesis Structure

The analysis of this thesis commences in Chapter Two, the literature review. As the section that lays a platform for the growth and development of this research, this chapter contextualises the value of water within a broader body of academic literature on household water practices. Different water availability are introduced in Chapter Two to express how they relate to the discourses of water practices and values.

Chapter Three outlines the methodological design introduced to address the aims and objectives of the research. The mixed method approach is discussed to introduce the three qualitative techniques; the semi-structured interview, the water diary and the diary-interview. Why these techniques were chosen, their relevance within the research and their effectiveness for meeting the aims of the research are discussed.

Chapter Four is the first of two analysis chapters. The value of water is explored through a historical and contemporary context. Emerging from the overarching aim of the research, everyday outdoor water practices are discussed within this context. Evidence based arguments are presented to address the complex nature of outdoor water practices, water value, and water history more broadly.

Chapter Five introduces the overarching context of the research in ‘Water Availability’. Cross cutting themes emerged from the qualitative methods – including drought, water restrictions and climate change and their meanings and values in regards to water availability.
are discussed. This chapter draws out these meanings and evaluates how different water availability affects how water is valued and how it impacts patterns of water practices in the wider sociocultural environment.

Lastly, Chapter Six concludes the thesis by discussing how the aims and objectives have been addressed, and summarising the findings from the qualitative analysis. Suggestions for further research are outlined to strengthen the understanding of the sociocultural and environmental influences on household outdoor water values. This is followed by the competing interests and competition for water in Australia and implications for further policy development.
Chapter Two

2.1 Introduction

This chapter seeks to provide a synthesis of a body of literature relating to water, introducing relevant theoretical perspectives that aim to contextualise water within the household. By drawing from a multidisciplinary approach, particularly social sciences and humanities disciplines, this chapter brings to light the different approaches to valuing water and the contexts in which they occur. This chapter is divided into three sections. The first section,
entitled ‘Water Values’, explores how value is defined and conceptualised, and the intricacies of valuing water. The second section is entitled ‘Water Practices’ and draws together threads of literature by presenting concepts of outdoor water use crucial to this thesis. This section delves into traditional water consumption in Australia while analysing modern values and practices associated with household water use. Within the context of climate change and future water variability, the final section of the literature review, ‘Water Availability’, examines three areas of water availability: drought, water restrictions, and climate change.

2.2 Water Values

2.2.1 Defining Value

The value of water is slowly becoming a broad and theoretically diverse topic among researchers. New ground is forming to address the issues of ‘value’ and according to Farber et al., (2002) this period of development is underway through decision-making by individuals and communities. In the context of increasing environmental and ecological awareness, the definition of the term ‘value’ draws on philosophical and economic traditions (Gibbs, 2006; 2010). Graeber (2001) views the value of water as situated within patterns of groups or individuals in a larger society of which these individuals are apart. According to Howitt (2001) and Gibbs (2006) the term is used within a broad dictum of ecological sustainability, social justice, economic equity and cultural diversity.

Looking at specific examples of value and practice within arid and semi-arid central Australia, Gibbs (2006) looks to conceptualise the value of water outside the dominant discursive structure of reductionism, anthropocentrism and cultural specificity. Rather than separating and simplifying value, Gibbs proposes a new framework for valuing water through the variability of social, cultural and ontological aspects to capture an understanding of thinking about water and the relationships between the human and non-human world. Gibbs (2010) describes the current dominant approach to water valuation as defined through scientific observation and measurement of goods and services. This approach provides the foundation of her argument that current attitudes to water valuation are based on Eurocentric knowledge. This paper provides a multidisciplinary approach to decentre current thinking of
water values and highlight the trend of separation and categorisation in environmental valuation.

A vast range of studies has acknowledged the gross simplification of water as a monetary value (Raucher, 2005; Jorgensen et al., 2009; OECD, 2011). Ioris (2011) presents a strong criticism to current literature that presents a reductionist interpretation of monetary value of water. The value of water must be understood as a confluence of human and non-human interaction (Gibbs, 2006). Ioris (2011) describes water as simultaneously capturing material, discursive and symbolic power that manifests in specific relationships. This power is valued according certain socionatural relations and derived from interactions within specific geographical and historic conditions (Ioris, 2011). This strand of thought understands water values as ‘enduring outcomes of past experiences that precipitate, and are stored, in the discourse, morality, and imagination of human societies’ (Ioris, 2011, pg. 874). That is to say, water encapsulated knowledge (Allison, 2002; Gregory and Di Leo, 2003; Sofoulis, 2013), socio-economic differences (Wutich, 2009; Laves and Choy, 2010; Sinclair et al., 2012), material pleasures, such as gardens, water features etc. (Higgs and Coghlan, 2001; Head and Muir, 2007; Gardiner, 2008), and satisfied and unsatisfied aspirations (Shove, 2010).

Ioris (2011) introduces the concept of ‘water value positionality’ as a way of introducing meaning and connectedness into the valuations of water that have become clouded by misinterpretation and misunderstanding within society. That is to say, water values are formed by ‘positions of values’ (pg. 885) that endure and change according to spatial and temporal variability and the interconnected values that are withheld in those positions. These interconnected values have been extensively studied by social researchers as they attempt to de-categorise (Sofoulis, 2005) and redefine (Jackson, 2006; Ioris, 2011; Sofoulis, 2011) the value of water.

The understanding and ability to care for what is valuable is determined by the extent to which something is meaningfully positioned within the cultural and spatial domain of our lived experiences (Thyer et al., 2009; Orr et al., 2011; Moy, 2012). Despite a plethora of academic research attempting to capture the innate complexity of water value, disciplinary boundaries continue to prevent a conceptual understanding of how water is valued and understood within society. The increasing need to create appreciation of the value of water demonstrates a changing paradigm in water research: one in which the meanings, practices
and values of water are no longer generated by economic-derived models or by a monetary value (Raucher, 2005; Ioris, 2011; Sofoulis, 2011), but understood through an interconnected system of social, cultural and environmental discourse (Gibbs, 2006).

2.2.2 Diversity, Change and Complexity of Valuing Water

The values associated with water are intricate, diverse, place specific and most of all changing. Rather than defining values of water into specific categories, Gibbs (2006; 2010) highlights the variability of water to articulate and improve the understanding of water values. She proposes the use of variability as a framework for valuing water to embrace ‘diversity, change and complexity, and emphasis[e] the complex interconnections between water, humans and the non-human world’ (Gibbs, 2006. pg. 79). Valuing variability can involve different approaches that ultimately foster a more complete and complex understanding of the value of water. Along with defining values within a generic category, values have so often been described static and simple. However a great deal of literature has emphasised the importance of acknowledging values as changing (Ioris, 2011), diverse (Ciancanelli, 2010; Larson et al., 2010) and complex (Jackson, 2006; Gibbs, 2010), and valuing variability is another means of narrowing the gap between the nature-culture divide (Gibbs, 2006).

Past research has ignored the dynamic representations of value. Gibbs (2010) encapsulates the importance of these concepts within environmental valuation. There has been a tendency to oversimplify the diversity of values by representing them in a number of different environmental discourses and failing to recognise the diverse meanings, views and understandings that underlie values (Gibbs, 2010). According to Howitt and Suchet-Pearson (2006), oversimplifying the interpretation of diversity can further marginalise particular people and values, similar to the effect of categorising values. The diversity of water is represented by its range of uses and what those uses have been influenced by.

Within the developing prominence of management and policy making research, change is frequently overlooked (Gibbs, 2010). In literature, reviews of environmental management, such as adaptive management (O’Hara, 2007; Mukheibir, 2010; Office of Water, 2010; National Water Commission, 2012; IPCC, 2013), have implicitly represented change but have so often associated value as static or unevolved. In contrast to water management, Sofoulis (2005) describes a sociotechnical perspective on water behaviour and attitudes at the
individual level. While water management literature may see values as fixed, Sofoulis’s (2005) sociotechnical perspective on water behaviour and attitudes at the individual level paints a different picture. Her research in western Sydney aimed to ‘de-fog’ the dominant cultural domain of current water consumption discourse to acknowledge that societies’ values of water are defined through human and non-human elements. Sofoulis questions ideas of change within an individual’s behaviour and practice to water, stating that practices are not necessarily a direct product of values; rather values can change as a result of practice.

The interconnected categories of water avoid the marginalisation and simplification of values. Jackson (2006) discusses how through resource management cultural values are separated from economic, environmental and social values. Such ideas of simplification, compartmentalisation and categorisation have complicated the understanding of valuing water and management processes associated with water by dividing the process involved and ignoring interconnected relationships and influences. Sofoulis (2011) reports on the changing urban water industry and identifies a number of areas for further research into valuing water. Sofoulis states the importance of gaining clarity on what counts as ‘value’. Values of water warrant an enhanced understanding of the diverse attachments to water, emotional and symbolic, so that the water sector can grasp the cultural logistics that underlie individual behaviours, practices and attitudes (Sofoulis, 2011). The value of water is forever changing, diverse and complex. As social, cultural and historic dimensions of water are acted upon, research will continually add to these systems and frameworks developed by academics such as Gibbs and Sofoulis to evaluate the effectiveness of current water regimes and infrastructure at the household level.

2.2.3 Compartmentalising Value

From economics and engineering to human geography, the past decade has seen literature on the monetary value of water (Jorgensen et al., 2009; David, 2010; OECD, 2011); methodologies on valuing water (Buenfil, 2001; Ashbolt and Maheepala, 2008); decentring dominant thinking (Gardiner, 2008; Gibbs, 2010; Moy, 2012); and exploring the perceptions of different groups on water value (Goemans, 2006; Buxton et al., 2012). Despite the broad interpretation of literature on the value of water, the general perceptions of valuation within environmental management show a predisposition to separate and categorise values in order to manage usage.
There is increasing interest by researchers to find sustainable solutions to the urbanisation and economic development of water and many are seeking the ‘triple-bottom-line’ method to account for their rationale (Raucher, 2005; Gibbs 2006, 2010; Griggs, 2011; Sofoulis, 2011; 2013). The ‘triple-bottom-line’ management framework accounts for the economic, environmental and social sustainability actions, in contrast to the financial and operating costs alone (Griggs, 2011). Griggs (2011) explains the concepts and the individual sustainable needs for the ‘triple-bottom-line’ framework. Griggs advocates for the implementation of the concept and the important roles it can play in the urban water system. However, not all researchers are for the ‘triple-bottom-line’ approach. In contrast to Griggs, Gibbs’s (2006; 2010) experience of the Lake Eyre Basin forces her to doubt the use of the three ‘categories’ and other dominant socionatural guidelines. The categorisation of these values limits their understanding, and fitting these realities into generic categories marginalises the interconnections and reduces the idea of value through ‘separation and simplification’ (Gibbs, 2006, pg. 75). The separation of values conforms to western science thinking of categorisation and, as Byrne et al., (2003) state, this compartmentalisation of values may only provide an ‘ideal of equity’. The broad acceptance of the ‘triple-bottom-line’ framework provides a problematic mismatch between the technical and scientific expertise of water managers, such as engineers and economists, and the environmental and social science experts on water usage and allocation (Sofoulis, 2013). This problem is evident within the context of climate change where water scarcity is evident and water availability is unpredictable.

2.3 Water Practices

Cultural understandings of water provide important contributions to the imperative global issues of sustainability. This is particularly so when analysis is merged with the interrelationships of everyday household practices and broader sociotechnical perspectives of storage and distribution (Head and Muir, 2007). The themes associated with water embody an array of meaning; including ‘life and death, as a generative and regenerative force, as the basis of identity, and as a symbol of power and agency’ (Head and Muir, 2007, pg. 4). Through a review of the literature, this section describes the areas of water practice that have been studied in the past. While some studies have conducted literature reviews regarding
water practices (Po et al., 2003; Po and Nancarrow, 2004; Dolnicar and Saunders, 2006; Hurlimann et al., 2009), most are limited by focusing predominantly on issues of water recycling rather than water availability and values.

2.3.1 Value and Practice

Whether households are water efficient or water profligate, the conceptualisation and measurement of water values tend to be ambiguous and inconsistent. This comes partly as a result of the multidisciplinary nature of research on how society’s values influence practices. Values can influence a range of human actions by determining social (OECD, 2002; Harman et al., 2008; Sofoulis, 2011), cultural (Allon and Sofoulis, 2006; Head and Muir, 2007; Gibbs, 2009) and environmental (Dovers, 2000; Gregory and Di-Leo, 2003; Gibbs, 2010; Gibson et al., 2011) desirability. Values establish personal priorities and initiate moral norms for people to behave in a particular way (Larson et al., 2010). Larsen and Harlan (2006) expressed the obligations of households to represent their outdoor area, particularly visible front yards, as symbolic expressions of themselves and thereby conveying what is valued and expected. Larsen et al., (2010; and Harlan, 2006) describe how practices may vary between the front and backyards based on the desire of the household to present themselves in observable, social settings.

The correlation between values and practices has not always been as clear as some studies have anticipated. For many, a significant gap has presented itself between the attitudes one holds and the practices one exhibits (Syme et al., 1983; Randolph and Troy, 2008; Cary, 2011; Gilbertson et al., 2011; Willis et al., 2011; Garcia et al., 2013). Blake (1999) refers to this gap as the ‘value-action gap’. Sofoulis and Williams (2008) suggest that through a sociotechnical perspective, it is not the values and attitudes that will shape water practices, rather the practices that will shape attitude. For Sofoulis and Williams (2008), cultural change can be accelerated by building or extending networks of ‘watersavers’ (pg. 55), which would require embodying behaviours to create cognitive shift. However, previous research highlights that contemporary household practices (Head and Muir, 2007; Ioris, 2011), attitudes (Dolnicar and Hurlimann, 2010; Gilbertson et al., 2011; Dolnicar et al., 2012) and technologies (Sofoulis, 2005; Gardiner, 2008; Millcock and Nauges, 2010) are products encompassing cultural values that dictate functioning and management of a household. While bodily repetition may create behavioural change, it is essentially the overarching value
system that determines understanding and awareness. Water practices are contextualised within this cultural value system and reinforced through the physical enactment that may include watering the garden, cleaning the pavements or filling the pool.

2.3.2 History and Wasteful Water Practices

An historical analysis by Davison (2008) argues that Australia’s current patterns of water use are not the result of need, rather historical circumstances. The garden has been seen as symbol of post-war suburban living (Beatley and Manning, 1997) and as a means to frame and express cultural psychology (Thomson et al., 2006). People began to move out of the cities during the 1940s and 1950s and had more money and time to spend in the outdoor area of the home, their own piece of nature. Davison’s (2008) analysis of the history of the Australian garden implies that the deeply ingrained aesthetic and the status of the household garden is nearly ubiquitous throughout Australia, regardless of water availability. However, Mullins (1981a; 1981b) demonstrates the importance of domestic water consumption in maintaining a standard of living enjoyed by Australians. Although Mullins did not explore this connection thoroughly, it is evident that high water consumption is important in sustaining the household culture. Other researchers have explored the issue of intense water usage within Australia. For example, Askew and McGuirk (2004) focussed on social distinction and conformity as a means to explain high water usage in household gardens. While Head at al. (2005) and Head and Muir (2006) demonstrated the importance of maintaining the garden as a place where people engage in nature, other writers have acknowledged socio-demographic factors (Hurlimann et al., 2009; Willis et al., 2011; Garcia et al., 2013) that may potentially influence the propensity to maintain gardens and therefore water use.

Australia has endured wasteful water practices for some time. Outdoor garden watering can contribute to as much as 30-50% of domestic water use (Pigram, 2007), and Dovers (2008) contends that these wasteful water practices exist because they have been actively encouraged by the Australian government. As (Randolph, 2007) found, the problem with inappropriate watering practices is the lack of education concerning water needs of plants and alternative practices in the outdoor area of the home. Randolph (2007) found that not only were homeowners generally unaware of the water use requirements of their garden, but also the amount of water they were applying. The interaction of homeowners with their outdoor area
of their home tends to be mediated by some form of technology. As the role of technology in outdoor water practices continues to grow, so does the literature to explore this interaction.

2.3.3 Water and Technology

Technology plays a significant role in how we, individually or as a collective, interact with nature. Jelsma (2003) describes how we are entrenched within a ‘sociotechnical landscape’; that is, we move around within this environment where society and technology are strongly embedded with one another. This embeddedness between technology and society is crucial for achieving sustainable water practices. If sustainable practices are to be accomplished within Australia the social and cultural aspects of water use need to be aligned with technical aspects such as design and purpose (Shove, 2003). Davison (2001, pg. xi) describes a view to move beyond the ‘deeply familiar pre-occupation with efficiency’ imposed by dominant discourses towards what Jelsma (2003. pg. 103) describes as a ‘re-moralisation of our sociotechnical landscape’. This approach considers efficient water practices as normative instead of requiring extra effort, and moves away from the traditional division of water practice and technology.

Davison’s (2008) historical analysis of Australia’s domestic water patterns explores the involvement of technology and correlated increase in consumption. He uses the installation of the hot-water system as an example of a technological innovation that has had a marked influence on the cultural evolution of watering practices in Australian domestic life. For children raised in the 1950s and onwards in Australia, the idea of plentiful, ever-present supply of water arriving to our taps when desired in the domestic sphere has become a formative part of our sociocultural relationship with water. Through the technological and institutional infrastructures for water delivery, Sofoulis (2005) characterised the water delivery in urban Australia as ‘Big Water’; a system that embodies a historic fantasy of endless supply and ‘the dream of making the desert green’ (pg. 48). The cultural norm of an ‘endless supply’ (Sofoulis, 2005; Allon and Sofoulis, 2006; Gardiner, 2008) of water was an integral part of the ‘Australian way of life’ (Allon, 1994. pg. 45 cited in Allon and Sofoulis, 2006). However, many social theorists (Shove, 2003; Davison, 2008; Sofoulis and Williams, 2008) have argued the need for consumers to be examined in the context of the sociotechnical environment in which they operate, rather than as autonomous agents with free-choice of the level of water usage. These arguments have a strong voice in sociocultural discourses of
water, but as Davison (2008) points out, while technological innovations have increased water consumption in daily practices, a social and cultural change in the way water is valued is also required.

Similar in the way Jelsma (2003) examines the variables that could change water behaviour, Sofoulis and Williams (2008) highlight the influence of ‘cultural innovation’ in redistributing the roles and responsibilities between water users, authorities and technologies, as it is within these water actors where we are ‘co-evolving’ (Shove, 2003). For Sofoulis and Williams, if people’s practices are embedded in this cultural process and the technologies conform to the household culture, then this should be the point of focus to change the practices of households in reducing water consumption. According to Strang (2004) and Kaika (2005), the expectation of water as a naturally abundant good is the result of the discursive disconnect between the networks of technology and supply and the household. They also place this perception on the combination of privatising supply, technology that provides misconceptions of endless supply and increasingly individualised socialisation. Strang (2004) describes this socialisation process where behaviours are embedded as creating a condition where, ‘domestic users are...impervious to efforts to conserve water’ (pg. 208). However, as a place where water networks are rendered visible and are engaged on a daily basis, the outdoor area of the Australian home provides an ‘arena and agent’ (Head and Muir, 2007. pg. 7) for changing water practices and values.

2.3.4 Water Conservation

Water conservation is viewed within literature as pro-environmental behaviour (Clarke and Finley, 2007). A vast amount of research has sought to gain an understanding of the reasoning behind household efficient practices and attitudes and the factors involved in an individual’s decision to conserve water (Moy, 2012; Gibson et al., 2013). Past research has investigated how psychological factors have influenced water practices, including attitudes, awareness and knowledge, concern for the environment, habits, and values, to mention but a few (Gregory and Di-Leo, 2003). Understanding the roles of water value and attitudes are important as we attempt to better understand the factors that guide individual choice regarding environmentally-responsible behaviour (Axelrod and Lehman, 1993 cited in Clark and Finley, 2007).
A significant body of research exists on factors that influence positive attitudes towards water conservation. However, as previously mentioned, attitudes do not necessarily translate into actual behaviour. Gregory and Di-Leo’s (2003) behavioural study found attitudes towards water conservation were poor predictors of water conservation behaviour (Clark and Finley, 2007; Randolph and Troy, 2008; Dolnicar and Hurlimann, 2010; Gilbertson et al., 2011; Dolnicar et al., 2012). As Ungar (1994 cited in Randolph and Troy, 2008) contends, the environment is not an ideal domain where attitudes can predict behaviour. Sofoulis (2005) and Shove (2003) go beyond these limitations to identify that consumption is the result of sociotechnical considerations which may change slowly and unevenly. Residents may not be able to change their behaviour quickly because of the ‘rigidities or path dependencies’ (Randolph and Troy, 2008. pg. 442) created by the different availability of water to the household. An awareness and practice of water conservation involves understanding of innovation, impacts and ingenuity of water saving practices as well as the desire to continually develop and reduce consumption activities (Nancarrow and Syme, 1989; Nancarrow et al., 1996; Nancarrow et al., 2002). In contrast, Middlestadt et al., (2001) explore the relationship between knowledge and water conservation and found those who hold a strong knowledge and understanding of water conservation regularly performed water saving practices.

2.4 Water Availability

Growing demands are being placed on water resources through increased industrial water use, urban populations and expanding irrigation. Water resources have been placed under immense pressure over the past fifteen years as a result of persistent drought. Furthermore, recent floods nationwide have re-ignited the debate regarding water resource allocation and the need for further investment in water infrastructure (Chiew et al., 2011). However, projected climatic models suggest that overall Australia will be faced with a drier climate as a result of climate change. The increasing demand on water resources coupled with changes in availability, timing and reliability of rainfall presents considerable challenges for management and governance. These issues have attracted significant attention by researchers who attempt to place current water availability in the context of future variability, uncertainty and climate change. Here, these studies are reviewed within three areas of water availability: drought, water restrictions and climate change.
2.4.1 Drought

In southeast Australia, the most recent drought that spanned over a decade placed immense pressure on water resources. According to Chiew et al., (2011, pg. 608), the most important outcome of the drought was the realisation that current water management approaches are ‘inadequate to deal with the high variability in water availability’. Predictions for future water availability and demand are vital for informed policy and management decisions and several studies have examined this area, particularly in the context of climate change (Hansen, 2009; Shove, 2010; Askew and Sherval, 2012; National Water Commission, 2012). Karoly et al., (2003) investigated the impact of global warming on Australia’s drought conditions. They concluded that although the ‘2002’ (pg. 14) drought was associated with natural variability of the climate system the high temperatures matched climate model simulations of increased greenhouse gases in the atmosphere. The evidence suggests it would be difficult, if not impossible, to separate climate change signals from the water availability experienced in Australia over the past fifteen years.

Work by Sherval and Askew (Sherval and Greenwood, 2012; Sherval and Askew, 2012; Askew and Sherval, 2012) on the impacts of drought in Australia – particularly Australian rural communities – has contributed significantly to further discussion surrounding the impact of droughts and the myriad challenges faced by individuals and communities at the forefront of drought. Sherval and Askew’s research has highlighted the urgency of a change in the mindset and language in drought to position it in Australia as a normal component of climate variability. Qualitative research by these authors on rural communities has recognised that local experiences are paramount to developing government responses (Sherval and Greenwood, 2012), future adaptation strategies (Sherval and Askew, 2012), and strategic policy frameworks that support farmers and communities (Askew and Sherval, 2012). Through examining current responses to drought (Sherval and Askew, 2012), the understandings of different stakeholders (Sherval and Greenwood, 2012), and the policies and programs that target specific drought-affected areas (Askew and Sherval, 2012), this research has argued for continual re-examination of government approaches and drought management.

The perception of drought is explored by Woundenberg et al., (2008), whose qualitative research looked to gauge the sociological impacts of drought on crop and livestock producers.
An interesting observation found in the study was that when questioned on their experiences with drought, farmers recalled their memories from the viewpoint of their childhood growing up on a farm. Taylor et al., (1988 cited in Woundenberg, 2008) found similar results. When questioned on their history with drought, farmers tended to recall the most recent and severe drought while growing up. Furthermore, Woundenberg et al., (2008) highlighted the connection between members of a community affected by drought in south-central Nebraska. Although drought was affecting the economy of a community, it also appeared to bring that community closer together. ‘What happens to the farmer happens to everybody else’ (Woundenberg et al., 2008, pg. 100) was voiced by a farmer when questioned on the impacts on the community, highlighting how a drought has the ability to draw community members together in the fight against a mutual hazard. Sherval and Greenwood (2012, pg. 255) speaks of how drought has been perceived within Australian research as something to be ‘conquered’ (Wilhite, 2003), ‘an enemy to be vanquished’ (Ward and Smith, 1996), and as a ‘ravager’ (Sherval and Greenwood, 2012, pg. 255). It is no surprise that given this status, the most recent drought to hit Australia raised calls to re-examine the fight against drought and ‘drought proof’ (Sherval and Greenwood, 2012) the region’s most vulnerable.

2.4.2 Water Restrictions

The impacts of climate variability, particularly drought, have been evident across much of Australia’s landscape, histories, communities, and stories (Chong and White, 2007). Although drought is synonymous with rural living, it also paints another picture. In urban cities and towns, drought has extended to the outdoor area of the home where water restrictions have been imposed to combat ‘discretionary’ (National Water Commission, 2007) water use. The implementation of water restrictions is not a recent phenomenon. Keating (1992 cited in Chong and White, 2007) recalls water use restrictions in the form of hosepipe bans were introduced in Melbourne as far back as the early 1860s as a drought response measure. Water restrictions have since been introduced Australia wide.

While a considerable body of literature exploring the economic impacts of drought is present, far less attention has been paid to the social impacts. Syme and Nancarrow are among a small number of researchers who have delved into these impacts of drought in Australia. Syme et al., (2004) have looked into the impact of water restrictions on the mental health of individuals who perceive the garden to be an important component of their lifestyle and who
have positive attitudes to gardening. They found that the impact of water restrictions, particularly if those restrictions are prolonged, can lead to a reduced quality of life (Nancarrow et al., 2002; Syme et al., 2004). Similarly, Harmen et al., (2008) found, in relation to the social impacts of water restrictions to the Ballarat community, that outside of economic issues, there was a concern regarding the health and well-being of residents. In particular, the availability, quality and taste of the town water were major concerns expressed by respondents. Nancarrow and Syme (2005) found individuals are becoming concerned in terms of their social and environmental values. Water shortages may cause a re-evaluation of values placed on water resources and the security of future water availability. Concerns for the actual or potential loss of cultural sites or natural assets as a result of drought were also expressed (Porter et al., 2005).

Water restrictions have primarily been implemented to target domestic water use in the outdoor area of the home. While a substantial amount of literature exists that examines the impact of water restrictions on outdoor practices (Head and Muir, 2007; Gilbertson et al., 2011), the attitudes of Australian residents is beginning to be of interest to researchers (Cary, 2008; Randolph and Troy, 2008; Dolnicar and Hurlimann, 2010; Millcock and Nauges, 2010). While compliance with water restrictions does not necessarily arise from pro-environmental attitudes (Clark and Finley, 2007; Gilbertson et al., 2011; Dolnicar et al., 2012), studies have shown that despite a deterioration in gardens, people with positive attitudes towards the environment become more accepting of restrictions (Pearce et al., 2012). Pearce et al., (2012) found in their research into the rural-urban attitude divide in South Australia that while people living in rural and urban areas found the restrictions necessary, residents believed there needed to be greater consideration regarding a number of factors. These included location specific, social situations and the lived experiences of those who the restrictions target; ‘for it is only where there is the motivation towards compliance that water conserving behaviours are likely to follow’ (Pearce et al., 2012, pg. 413). In contrast, when respondents believed the water shortage was not yet dire, Nancarrow et al., (2002) found that despite pro-environmental attitudes and a belief in the importance of water conservation, this was not reflected in water wise practices.

Roseth’s (2006) study on Sydney dwellers discovered that water shortages were not a top agenda in relation to other social and environment issues, even during severe water shortage and restrictions. There has also been a large body of work conducted by water authorities and
government organisations that have attempted to provide greater insight into water conservation and attitudes (Melbourne Water, 2005; CSIRO, 2002; Western Australia Department of Water, 2009; Office of Water, 2010; Water Research Foundation, 2010). An example of this work has been Nancarrow and Syme (1989) and Nancarrow et al., (2002) that gauged the community attitudes to water restrictions in Perth. They found that the implementation of acceptable water restriction policies since 1988 had become significantly more important to residents, despite always being considered important.

2.4.3 Climate Change

Extensive literature exists that explores the impacts of climate change on water supply and demand around the world. These studies have examined implications outside of Australia (Clark and Finley, 2007; Grafton et al., 2011; Garcia et al., 2013) and the significance of this relationship in Australia (Western Australia Department of Water, 2009; National Water Commission, 2011; Risbey, 2011). Although current planning methods treat weather as a fixed, stationary but uncertain process (Mukheibir, 2010), increasing research proves something to the contrary. Milly et al., (2008) and Franks and Kuczera (2002) recognise that the assumption of the climate as static or stationary is no longer valid under climate change or natural availability. According to researchers, increased climate variability is predicted to impact water resources and add pressure to the availability of future water supply in Australia. For some, these climate change impacts are already taking place and transforming Australia’s water security (Mukheibir, 2010).

Ethnographic research by Gibson et al., (2011a; 2011b) on household practices in the Illawarra revealed discussions of sustainability and consumption in the context of climate change. As the home is positioned as a ‘refuge or haven’ (Gibson et al., 2011a), it poses a high potential as a site of climate change mitigation via changes to practices. However, the images, consequences and responses of climate change do not necessarily resonate with Illawarra residents (Waitt et al., 2010 cited in Gibson et al., 2011a). Gibson et al., (2011b) highlight how the media can influence the perceptions of Illawarra residents. The binaries that characterise the climate change debate – sceptics versus ‘believers’ – do not exist in preference for a ‘contradictory mash of competing discourses’ (Gibson et al., 2011b).

Social science research is beginning to flourish within the complex interplay between attitudes, practice and communication of climate change, with dedicated water researchers
emerging. Whitmarsh and Lorenzoni (2010) describe these fields as young compared with the more established natural science fields of climate change. However, research is emerging at the nexus of climate change and water regarding technology (CSIRO, 2002; Millcock and Nauges, 2010), media (Syme et al., 2000; England, 2009), public health (Hurlimann, 2006; Curtis and Oven, 2012) and communication (Cooper et al., 2011). When combined, these related areas of research highlight the role of individuals and institutions in water use in the context of climate change. Clark and Finley’s (2007) study in Bulgaria concluded that the more an individual is aware and informed about climate change and global warming, the more likely they are to implement water conservation practices in and around the home. Similarly, Roseth’s (2006) study on community views regarding water shortages and drought identified climate change as the second largest factor, that participants believed contributed to water shortages, second only to other users’ wasteful water practices.

Within the research community, the efforts placed by researchers to better understand the relationship between climate change and the water industry is significant. As this trend continues, observed changes in urban water supply and demand under climatic projections will complement existing research to reinforce the need for change in the way water is consumed and valued in the outdoor areas of the home.
Chapter Three

Methodology

3.1 Introduction

In the context of climate change and different water availability in Australia the value of water and household water practices has become a multi-faceted area of research. Previous research has shown that it would be difficult to comprehensively analyse how individuals and households value and use water with a single method approach (Baxter and Eyles, 1997; Philip, 1998; Seale, 1999). Therefore, it is ideal to incorporate a mixed-method approach to
capture the innate complexities and richness of context-dependent positioning of multiple influences. The results of the qualitative methodology approach can then be synthesised into a single analytical understanding. The design of the methodological framework of this study aims to guide the data gathering process, interpretation, and understanding of the principles and structures of qualitative research. Importantly, this guide allows the researcher to see himself/herself as a subject of the research, to understand the significance of the analytical views of the ‘outsider’, and view the world of individuals as they themselves see it (Baxter and Eyles, 1997. pg. 505-506).

This chapter provides an overview of the aims and approaches of each the three qualitative methods used to gather data for this research: semi-structured interviews, water diaries, and diary-interviews. The first part of this chapter is an overview of the ethical considerations relevant to this research. This is followed by a discussion of how my subjectivity has influenced the interpretation of results, and the impact it may have upon participants. The final part of this chapter will describe the qualitative components in greater depth. This will include how these methods seek to minimise erroneous findings and how they will inform the aims of this research.

3.2 Ethics

According to Miles and Huberman (1994 cited in Tracy, 2010), ‘Naiveté itself is unethical’ (pg. 288). As qualitative researchers we must consider what is right and what is wrong in our actions, our responsibilities and our obligations to those whose lives we are studying, to our sponsors or supervisors and to ourselves (Montello and Sutton, 2006). Ethics is not just a means but it is part of a universal end goal that results in qualitative quality (Tracy, 2013). It is an unavoidable force in our research and our everyday life, not only on what we intend to do, but ethics also implicates us through unconscious means.

The importance of the ethical procedure has been emphasised by a number of geographers. Cloke et al., (2000) describe a historical lack of importance towards ethical consideration. Clear interconnections are essential between ethical issues and the subjects for whom the qualitative research has been directed (Cloke et al., 2000). The conduct of considerate, insightful and ethical research depends significantly on how the unique relationships between
the researcher and his/her participants are dealt with at a particular time and place (Hay, 2005). As a consequence of this relationship ethics is an integral part of the research procedure. Here, ethics is addressed through formal ethical guidelines associated with the University of Wollongong (UOW) and critical reflexivity detailing ethical considerations at a personal level.

All research at UOW is required to submit a formal ethical approval application to the Human Research Ethics Committee (HREC). The guidelines identify the reasoning for the research, those involved or potentially involved and what would be asked of the participants. It provides a first step for the researcher to consider the social context of the research and their responsibilities and obligations to those involved. The HREC focuses on the responsibility of the researcher to his/her research subject and sets appropriate guidelines for them to follow. The ethics guideline is primarily concerned with addressing matters of privacy and confidentiality, informed consent and harm.

3.2 Informed Consent

The criterion for a participant’s involvement in a research method is more than a simple ‘yes, I’d be happy to’. The principle means of providing informed consent allows prospective research participants detailed information of what the research is about, the issues that are to be explored and what is expected of them (Bryman, 2001). It is this information that will allow an individual to provide an informed decision about whether or not they wish to partake in the research. A ‘Participant Information Sheet’ (PIS) is designed for this purpose. As can be seen from Appendix A, a PIS details the aims and objectives of the project and outlines participant involvement. A PIS was mailed to prospective participants a week before the intended commencement of the interviews to allow time for familiarisation with the project and to ask any questions.

3.2.2 Confidentiality

The nature of qualitative research often involves invasive measures into the private lives of others. Bryman (2001) describes the right of privacy as a tenet that many of us hold dear, and transgressions of that right in the name of the research are not regarded as acceptable. The primary concern is the confidentiality of those private details, ensuring they are not accessible to the public (Tracy, 2010). A ‘Consent Form’ [Appendix B] was provided to the participants
prior to the interview process that addressed the issues of confidentiality. The consent form reiterates the purpose of the project and what will be required of the participant. In regards to confidentiality, participants were given three options: for their name to be present in the study, to be directly quoted using a pseudonym or for the information that was gathered to remain confidential. Before the commencement of research on 14 May 2013, approval from the HREC was received; ethics number: HE13/156 [Appendix C].

3.2.3 Harm

The mandatory ethical procedure enjoins researchers to anticipate and guard against any consequences that could be harmful. The ethics procedure plays an important role as a ‘gatekeeper’ (Winchester, 1996. pg. 117) to advocate for social researchers to minimise potential harm to participants and their relationship with the environment (Hay, 2005). This is again an issue of confidentiality addressed through the formal ethics process. Records and identities of individuals should be maintained according to their preference on the consent forms and care taken when findings are published (Bryman, 2001). The nature of the qualitative methods – with interviews and water diaries conducted in participants’ own home– limited the potential for harm or harmful situations as a result of that process.

3.3 Positionality

In the field of social science and human geography the researcher is seen as an instrument in his/her research. They process different biographies, personal histories and lived experiences. These subjectivities influence their research and it isn’t until an understanding of the role of the researcher is exercised that it is complete (England, 1994). Baxter and Eyles (1996) write of the importance of qualitative researchers to actively reflect on their methods and how they relate to their subjects. They must acknowledge the researcher as a ‘positioned subject’ (pg. 505) consciously deliberating about ‘what we do, how we interpret and how we relate to subjects’ (pg. 505). Evaluating my position within this project has allowed me to become aware of my own values, beliefs and opinions towards household water practices and water availability, and the potential impact this may have on the analysis and interpretation of the data. Despite the inherent difficulties, it has been crucial for my opinions and thoughts to
remain my own around participants, ensure a neutral method procedure and structure, and conduct data analysis without bias.

My position as a researcher at UOW in the School of Earth & Environmental Sciences is likely to have some influence on the responses of the participants. For example, participants may withhold knowledge or divulge information assumed to be what the researcher wants to hear. For these reasons, neutrality during the interview and diary process was essential with questions presented in a manner that would not intimidate nor influence the response of the participants. These essential steps have contributed to development of a rigorous and reliable methodology and provide a framework for the results to be analysed, interpreted and presented. This has been a continual journey and as I concentrate on how my personal interests and positionality impacts on the research process, I begin to emerge ‘not as an individual creative scholar, a knowing subject who discovers, but more as a material body through whom a narrative structure unfolds’ (Bruner, 1986. pg. 150). Box 3.1 discusses this journey of positionality in this research.
3.4 Mixed-Method Approach

The use of more than one qualitative research method has been advocated for some time. Baxter and Eyles (1997) claim that a mixed methods approach provides an opportunity to investigate consistencies and new insights that one approach may deliver to another.
Individually no method promises perfect results nor are they immune to shortcomings or disadvantages. Combining more than one method of gathering data has helped minimise the generation of erroneous findings (Philip, 1998). Furthermore, Philip (1998) states that during the course of a research project, the combination of methods may allow for a wide range of issues to be addressed that may not otherwise occur if a single method is employed.

The linkage between concepts and indicators of different methods is known as triangulation. According to Seale (1999) triangulation evokes an analogy towards navigation or surveying. Discovering one’s position on a map through an intersection of two landmarks rather than one, a more definite position is identified. To couple the powers of a multi-method approach and illuminate the lives of the participants and the contexts in which they are embedded, a three-method approach was adopted for this research project: semi-structured interview, water diaries and a diary-interview.

3.5 Recruitment

The strategies used to recruit participants were a reflection of the project aims and objectives. Participants were required to meet two specific selection criteria: they needed to have a ‘standard’ backyard, typical of Australian homes, and have interactions with that external component of the home. There were two techniques used for the recruitment stage: the use of participants in the Australian Centre for Cultural Environment Research (AUSCCER) Household Survey of 2009, and snowballing.

The AUSCCER Household Survey is a research project headed by Gordon Waitt of the University of Wollongong (UOW). Using cultural research, the aim of Waitt’s project is to build adaptive capacity for climate change mitigation and adaptation. In 2009 the survey ‘Tough Times? Green Times?’ was sent out to near 12,000 homes with 1,465 surveys returned. Of the returned surveys a number of individuals indicated that they would be happy to be contacted in the future. Despite a number of these respondents having already been contacted through previous research at UOW, a list was made available of those who might be willing to participate in this research. Through the list of contacts eighteen participants agreed to the interview and water diary stages of the study. The initial contact was made over the phone. An introduction to the researcher, the aims of the research, what was required
from the participant and the length of time of participation were discussed during the phone call. For those who agreed to participate in the research, a follow up phone call was made the following day to organise the time and place for the interviews.

Snowballing is a term used to describe the recruitment of a contact that can help recruit another participant. It is important to be aware of the potential problems of this technique. To avoid recruiting participants from a narrow like-minded circle, multiple initial contact points around an organisation or group should be made. Targeting relatively disparate individuals can also help address ethical considerations, such as confidentiality, as one participant may ask about another. Through the success of the AUSCCER survey recruitment process, the snowballing technique was only required for four individuals. As with the survey recruitment process, participants were contacted over the phone.

A concern for a researcher is whether the participants represent an overall socio-demographic of the study region. In accordance with Australian Bureau of Statistics (ABS, 2011) data, there are a number of sample characteristics that need to be addressed. Firstly, there was a lack of voice in the younger age brackets. A number of factors account for this number. Many people in this age group have day time jobs and families and stated they did not have the time to participate in this study. A current trend among younger generations is that they tend to live in apartments and townhouses that do not have a garden or occupy only a small area not suitable for this project. The most pleasing aspect of the recruitment process was the diversity in middle aged residents and older. This provided an array of different watering practices, historical significances and values as participants expressed a strong diversity in lifestyle factors. Appendix D provides some details about the participants; including age, occupation, and how long they have lived in the Illawarra and their current residence.

### 3.6 Semi-Structured Interviews

Interviewing is used to gain insight into individuals’ experiences and meanings that are attributed to their understandings of the world (Shurmer-Smith, 2002). Interviewing has allowed a change in research from extensive to intensive. For this research, interviewing lends itself to create the kind of explanations required to fulfil an emphasis on ‘explaining processes, changing conditions, organisation, circumstances and the construction, negotiation
and reconstruction of meanings of identities’ (Cloke et al., 2000. pg. 150). The interview process allows individuals to express opinions and provides a platform for their voice to be heard. This voice is then subject to interpretation for a more nuanced understanding of how water is valued in the Illawarra.

Semi-structured interviews create a flexible yet directed style of conversation. This method allows a face-to-face opportunity for verbal communication between the researcher and the participant (Dunn, 2005) and enables the researcher to understand how meanings differ among people. This is the platform that differentiates the interview method from questionnaires or surveys. As Hay (2005) explains, interviews can counter claims of public opinion by providing a set of beliefs, events or experiences in participants’ own words. The semi-structured interview can also provide a medium for the researcher’s own preconceived opinions and tentative conclusions to be ‘checked, verified and scrutinised’ (Hay, 2005. pg. 81), disclosing misunderstandings on the researcher’s part. By giving an individual a voice and a platform for experiences, practices and opinions to be recalled and recorded, participants gain empowerment (Valentine, 1997).

The interview was guided by a set of predetermined questions and guides that defined an inventory of issues [Appendix E]. During the progression of the interview stages, additional and complementary issues were raised by interviewees, which formed integral findings to the study. That is to say, the interview structure was not set on a rigid, unmovable set of guides. Rather, the open-ended, discursive nature of semi-structured interviews gave space for refinement and allowed modifications to occur. To further develop this process, several practice interviews were conducted with family and friends. This provided an opportunity to practice drawing on themes via in-situ questioning and offer feedback regarding my language, demeanour and rapport.

Previous literature (Winchester, 1996; Flowerdew and Martin, 2005; Dicicco-Bloom and Crabtree, 2006) and audio recording protocols recommended interviews be conducted inside the participant’s home or within a private room at UOW. Conducting the interview within the participant’s home ensures a familiar and comfortable environment that assists in developing rapport between the interviewer and interviewee. Flowerdew and Martin (2005) raised the issue of conducting an interview at a university where it may convey a formal setting producing a stilted interview. Overall, two interviews were conducted at UOW. Through the
development of a strong rapport and ensuring a relaxed environment, the location did not appear to hinder the interviewees’ responses. Developing this rapport was an essential component of the qualitative process. A rapport creates trust and respect between interviewer and interviewee and has allowed this research to establish connections that has resulted in participants allowing the researcher to delve into their private lives.

Throughout the qualitative process, ‘mechanical phases’ (Hay, 2005. pg. 95) were required to collect, transform and organise the data. The predominant technology used in this research was an audio recorder. Audio recordings allow for a natural conversation style as the interviewer is required to be more attentive and conduct critical listening rather than being preoccupied with note-taking. However, if the interviewee is shy, timid or nervous an audio recorder may also inhibit their response or they may become less forthcoming with information. During the interview stage of this study, the audio recorder was positioned partially out of view to avoid the potential downfalls of this technique. As part of the formal ethics procedure, participants were provided the option for the interview not to be recorded by these methods. However, all participants were happy for the recording procedure to be carried out.

3.7 Water Diaries

Developing methodologies to explore the intimate moments of participant’s lives has been a research challenge across many disciplines. Understanding the complex practices and experiences of populations within the private sphere can pose ethical and practical dilemmas for the researcher (Allon and Sofoulis, 2006; Wutich, 2009; Beal and Stewart, 2011). As a result, social researchers developed the use of solicited diaries within their methodology as a self-reporting tool to document the events of daily life (Bolger et al., 2003) or as a fixed medium for the participants to reflect on their ongoing observations and experiences (Harvey, 2011).

Diaries capture life as it is being lived, time structures their creation, and they allow for the layering of texts and the description of objects within a chronological framework (Sheble and Wildemuth, 2009). Diaries have provided the field of human geography with an influential set of methods to study particular human phenomena relating to valuing water. Solicited
diaries, by definition, are distinct in nature from personal or private diaries. They have been designed by the researcher to address specific aims and objectives and are therefore written by the author with full knowledge of its external consumption (Meth, 2003).

Like a fly on the wall, water diary entries capture ordinary events and observations that might be neglected in other qualitative methods. Research diaries are an effective tool to study a particular phenomenon that may otherwise be inaccessible to researchers (Sheble and Wildemuth, 2009). The semi-structured format of the diary, as highlighted by Elliot (1997), has an array of benefits. The participants are given more control on selection and omission of content. Participants are then in an independent position to present a water-related experience, behaviour or attitude outside of the researcher’s perspectives.

Sheble and Wildemuth (2009, pg. 1) state that ‘diaries range from highly structured logs to unstructured narratives’. The water diary used in this project falls somewhere in between. The semi-structured style of the water diary was designed to address the issues and concerns raised within previous limitations of literature and the aims of the project. The daily diary entry template [Appendix F] was organised such that the morning, lunch and evening time periods were categorised as time-intervals. Despite past research incorporating smaller time frames for daily entry (Beal and Stewart, 2011), the infrequent use of outdoor water guided the decision to include longer time frames. Attempting to keep the entry as unstructured as possible, the diary includes a short description of the requirements set out by the researcher. For each day a space is included for daily thoughts and self-evaluation. This space is particularly important as it allows for nuanced narratives to emerge and themes to develop.

Knowing the diary may become onerous for some participants and diary entry may collectively lapse over too long of a period (Sheble and Wildemuth, 2009), the water diary was kept for duration of two weeks. Similar to the semi-structured interview, a pre-test was conducted for the water diary with family and friends. Again, this provided much needed feedback as to the structure of the template and the effectiveness of the instructions. This pre-test also provided participants with an example of a single day diary entry and Figure 2.1 is page one of the example provided to participants. Appendix G provides both pages of the water diary example.
Figure 3.1: Page one of a completed example of the water diary.

A vital requirement of the diary, and an aspect that differentiates it from the interview method, is the time lapse between water-related practices and recording of those practices. Participants were given the option of documenting their daily entry on paper or on the
computer through a USB, to make the process as accessible to individual participants as possible. This process is a strength of the water diary as it captures and reports on the events and experiences in their natural, spontaneous context. This is achieved by capturing information at or close to the time of occurrence (Bolger et al., 2003). The time between an event occurring and the recording of that event is crucial to data analysis. The gap in recording can affect the reflexivity and selection of what participants’ record.

A level of participant commitment and dedication is required to avoid recording errors through under-reporting, content selection bias and behaviour modifications (Sheble and Wildemuth, 2009). Within the research of outdoor water use, these limitations did not appear to have a substantial impact on the data-gathering process. The diary-interview method enabled an evaluation of the water diaries and provided an insight into how these limitations impacted daily entry.

3.8 The Diary-Interview Method

Described by Zimmerman and Wielder (1977), the diary-interview method is one of the most widely followed diary research designs. As a means to provide a rich description of the research or as a way to provide triangulation, this qualitative method is often used in conjunction with other research methods. The diary-interview provides an opportunity for questions to be asked and answered and allows the recorded events to be explored in greater depth. It may also allow for the participant to clarify experiences that were written or unwritten and draw on events outside of the diary period for comparison (Harvey, 2011). Exploring the events recorded can be a liberating experience for participants. It can be used as a departure point to delve deeper into topics in the diary that were presented as well as those that were not.

The diary-interview method is unique in that the preparation of the interview is based on the same material: ‘the participant writes the diary and the researcher reads the diary’ (Sheble and Wildemuth, 2009, pg. 5). For all participants in this study, the post-diary interview was conducted within a week of the diary completion. This provided the researcher with time to analyse individual diaries and organise an interview guide based on that specific diary. To ensure a relaxed and familiar environment, these interviews were conducted in the same
location as the previous interview. The semi-structured format was again utilised in this method to ensure the participant was familiar with the conversational style and structure. Appendix H shows some general questions that were asked to all participants during this process.

### 3.9 Data Analysis

Researchers immerse themselves into interviews, diaries, reading and re-reading as a strategy to understand the qualitative ‘chaos’ of their data. It is through this immersion that new perspectives, connection, understandings, and theories emerge (Liamputtong and Ezzy, 2005). Liamputtong and Ezzy (2005) describe qualitative research as ‘calculated chaos’ (pg. 258), two central and potentially conflicting processes. The chaotic nature of qualitative data analysis has often been criticised for its exploratory and unclear aims. However, the path to the specific nature of a problem is not always clear. In contrast, qualitative research is also calculated. There are established methods that dictate procedures and techniques to analyse qualitative data (Bryman, 2001). These traditional methods include narrative analysis, diary analysis, and coding. These techniques have been established to produce effective means for the analysis of the results.

#### 3.9.1 Narrative Analysis

The research challenge presented here is to determine what elements of the data are important and how to record and interpret these elements. There is no single defined narrative method, but rather an array of ways in which the researcher can connect with the narrative properties of their data (Elliot, 2005). Gubrium and Holstein (1994 cited in Wiles et al., 2013) state that narratives make the usually unforeseen personal experiences visible and embodies their social contexts. By examining what people have to say about their personal experiences, narrative analysis provides insights into the spatial and social processes and events of an individual (Wiles et al., 2005). Researchers have emphasised the ambiguity of narratives, highlighting how narratives are multi-dimensional and by examining these dimensions a richer understanding of the events and experiences are presented.

Narrative analysis was turned to as a way to connect with everyday, situated experiences of individuals and families within the outdoor area of their home. Narratives provide valuable
insight into the experiences and meanings of geographic-related and social-related issues. Narrative analysis allows us to move away from the ambiguities of talk where contextual analysis and interpretation can occur. In the context of valuing water and water practices, narratives have provided a rich textured approach to the analysis of interviews and water diaries while enabling the researcher to become more attentive to the study participants.

3.9.2 Diary analysis

The techniques of acquiring diary data compared to the more conventional and systematic types of data collection have been subject to discussion (Bolger et al., 2002). The widespread use of diary methods has forced diary analysis to expand its theories and approaches to help researchers capture the experiences of everyday life that fill and occupy our conscious attention (Belcher, 1932; Bolger et al., 2002). The diary analysis aims to answer questions involving a person’s experiences, how other people differ in these experiences, processes underlining change, and the differences in these processes. For the sample size of this project’s water diary, simplification was the approach taken and ‘open coding’ used. Coding for the water-diary was similar to the interview data where common themes were manually identified and categorised accordingly.

3.9.3 Coding

Once the data has been collected and transcribed it is important that the qualitative material is coded. Coding is an integral process to the researcher as it aids in reducing, organising, analysing and theory-building of the data. It facilitates an organisational structure of familiarity by constructing and maintaining the data along lines of commonality and relation (Cope cited in Hay, 2005). There are a number of options when it comes to coding, both manual and by utilising software, with the majority of techniques best suited to large sample sizes. For the purpose of this research ‘open coding’, in conjunction with the theoretical principles of other coding systems, was used. While a number of the analysis techniques are similar, it is felt that with the sample size and the themes that are predicted to be present, ‘open coding’ captures the innate complexities of the text and clarifies salient thematic concepts (Crang, 2005). Open coding disciplines the researcher to be thorough and precise as the material is sorted word by word, line by line. As ideas and themes emerge they are noted alongside the text with no further thought or finalisation at that time. This process ensures the
The researcher gets as close to the material as possible and the concepts and categories can then be organised (Grbich, 2007).

The coding process is a monotonous task and although the manual practise is undertaken after the data collection, coding is a constant and unconscious process throughout our everyday lives. Cope (cited in Hay, 2005, pg. 232) reminds us that ‘being in the world requires us to categorise, sort, prioritise, and interpret social data in all of our interactions’. The process of coding qualitative data is merely a formulisation of the processes in our lives in order to extract subtle trends and create structures as a way to elucidate the interpretations to others (Cope cited in Hay, 2005).

3.10 Limitations and Conclusion

Throughout the data gathering process a number of limitations arose. Timing was the most significant limiting factor for the interviews, water diaries and the recruitment process. For some participants, the water diary period fell during a time of rainfall and was therefore a factor that needed to be taken into consideration during analysis and possibly discussed during the diary-interview. The interviews were conducted during a time of limited rainfall and participants often reflected on their most recent practices. The recruitment process involving AUSSCER’s household survey (2009) tended to attract an older demographic. Availability of this group was mainly due to retirement and no longer having children within the household. This was again another factor that needed to be considered during the qualitative analysis.

Despite these limitations, the research methods were effective in answering the research questions. Through the use of semi-structured interviews, water diaries and dairy-interviews I was allowed into the backyards of Illawarra residents and received first-hand information on water values and practices. What follows is an interpretation and discussion of the empirical data over two chapters. Chapter Four explores how water values are expressed through everyday practices of Illawarra residents; and Chapter Five focuses on how everyday values and practices are related to water availability.
Chapter Four

Water Values and Practices

4.1 Introduction

This is the first of two discussion chapters, which both seek to address the over-arching aim of this thesis: to investigate, in the context of water availability, how water is valued in outdoor area of the home. As previously discussed, water practices provide important intersections with previous research. Drawing from a human geographic and social science approach, this chapter moves beyond the generic categories of value that presumes a degree of homogeneity. This research has sought to explore how water values are interconnected

Source: Jonathon Cook, 2013
(Gibbs, 2006) and move away from the hegemonic approach. By evaluating particular water practices, this chapter seeks to determine how these water practices have changed over time and whether these practices are consistent with water values.

There is no single value for water. Rather, it attracts a collection of meanings dominated by historical and geographical circumstances. In this chapter a broad view of values and practices is first addressed. This consists of how water is constructed, the networks of supply, and a brief discussion of water drainage and storage system. This is followed by a discussion on the history of water use and value. This section seeks to explore the importance of past experiences and cultural meanings in becoming embedded in everyday water practices and how they operate in the outdoor area of the home. The final section addresses the water saving techniques used by Illawarra residents. Although spoken about within the previous two sections, a more nuanced understanding of these techniques is required. Drawing from the previous work on water practices, the final section conceptualises different water sources and adaptive practices. Three techniques that play a vital role in transforming the habits and practices are discussed: rainwater tanks, recycled water and native plants.

4.2 Water Practices and outside Water Networks

Water is positioned within a culturally specific set of consumption practices connected to spaces of the outdoor area of the home, the garden and suburban living. Recent fluctuations in water availability have propelled water to the forefront of conscious decision making within households. It has introduced new motifs of change in attitudes of profligacy and practice to attune our water habits to the realities of living on one of the driest continents on Earth (Head and Muir, 2007). Everyday water consumption has become entangled within these availabilities and the habitual enjoyment of practices and experiences that water provides (Allon and Sofoulis, 2006). Cultural geographies of water value have sought to understand the diverse and complex meanings of water and its multifaceted role in knowledge and practice. In the outdoor area of the home, water is simultaneously valued as a site of recreation and leisure, the display of identity, a means to reinscribe cultural practice and environmental knowledge (Gibbs, 2010). Setting water availability and environmental aspects associated with water aside for a moment, this part of the analysis delves into people’s actual water practices to underscore the importance of every day, unspectacular and
discrete dimensions of daily water use that have become ‘routine, habitual and, therefore, inconspicuous practices of consumption’ (Allon and Sofoulis, 2006. pg. 47).

The past decade has seen a dramatic increase in the discussion of water discourse and practice (Sofoulis, 2005, 2011; Allon and Sofoulis, 2006; Gibbs, 2006, 2009, 2010; Head and Muir, 2006, 2007). As a result of drought and the imposition of water restrictions, participants’ response to the water shortages indicated a comprehensive understanding of the social and ecological systems that are at play. The qualitative analysis revealed a unique language towards water practices in the outdoor area of the home: the behaviours of birds, plants, and soil; climatic patterns; time management of habits and routines; the networks of water delivery; and ideas of ingenuity and technology. These practices are tied closely as a dimension of everyday life, past experiences, and the knowledge and understanding of the processes of different scales of water management.

Participants constructed water as a ‘precious’ and ‘finite’ resource that has been continually mismanaged by state and federal governments. When canvassed on their attitude towards water in the Illawarra, the participant group took several avenues as to who is responsible for water conservation. Some made observations on ‘big water’ (Sofoulis, 2005) issues such as infrastructure, dams and water recycling, while issues such as drought, water restrictions and water quality were also discussed. While these discussion demonstrated concerns for water, they also produced a disconnection between the problems associated with water and the participants household water use. A sense of personal responsibility was raised by other participants, who explicitly linked their practices in the outdoor area of the home with the major water issues. These findings are similar to Head and Muir (2007) that found the attitudes of participants to the environment were split between those who spoke of ‘big’ water issues that rested on government responsibility and those who linked current issues to household consumption and practice. Lydia – a high school teacher from Austinmer - spoke of latter. She believes due to the ‘narrow margin of years’ in which the drought hit, households showed a willingness to cooperate because ‘people are willing to change and be responsible in the way that they live’:

“I think it’s something that we constantly need to be aware of but also modify how practices about being responsible and so forth” (Lydia - Austinmer)
“I think people respond very quickly and I do think people respond quite positively to being responsible and if the continent becomes a lot drier then I’m sure people will respond to that because they have indicated that many times over. I think we just change the best you can change” (Lydia - Austinmer)

The construction of water drainage and storage systems is a refinement of ‘big water’, spoken by Head and Muir (2007), to suit household practices and is an activity that provided some participants with a sense of responsibility. The resourcefulness and practicality of constructing a water system is directed towards a valuable purpose, as a mode of engineering various pipes to direct rainwater into different areas of the garden. A prime example of this was Peter, a retired equipment developer and maintenance engineer from Towradgi and a self-confessed garden enthusiast. Peter’s background as a maintenance engineer and his involvement with volunteer environmental development projects provided him with the expertise to build his own in-ground water tank and gravity fed watering system (as seen in the chapter picture as Peter stands beneath his home-made gravity fed system). Figure 4.1 shows Peter’s backyard and the shed where he built a 20,000 litre underground rainwater tank, gravity fed watering system and the solar panel on the roof that provides the energy to transport the water from the rainwater tank to the gravity fed system. Peter spoke with intense passion about his home projects and the prospects for future innovation and acknowledged ‘I’ve never been busier than since I retired. Building this, building that’:

“My previous life experience I worked at the steel works as an engineer. Water was a problem in that we had to control the flow of water leaving the plant for environmental reasons like pollution and that was probably one of my main tasks was improving the environmental type things in the plant” (Frank – Oak Flats)

“This [garden] will all be drip irrigated one day, the pipes are in there. At the moment this comes off a water tank and I’ve got a pump and under the shed is a 15,000 litre roof water tank. All the equipment is there, I’ve just got to finish it...and you’ll see a solar panel on the roof there, that’s going to drive a pump that will drive water from the in-ground tank to the head tank and that will drip feed all through my gardens” (Peter - Towradgi)
Whether it is the construction of drainage or storage systems, installation of rainwater tanks or introducing native plants the theme of ‘desire’ (Head and Muir, 2007. pg. 10) was often introduced. This resembled what many researchers have discovered: a changing culture of water in Australian backyards (Allon and Sofoulis, 2006; Head and Muir, 2007; Gardiner, 2008; Sofoulis and Williams, 2008). Desire was a recurring and strong theme in the qualitative analysis, but less cohesive in its articulation, which encapsulated the wants, needs and dreams surrounding water. When desire was spoken of by the participants, it involved aspirations of installing a water tank and other water saving devices, a desire for water features or the introduction of water saving plants. Other emotive experiences in the outdoor area of the home were feelings of ‘happiness’ and ‘pleasure’ generally associated with watering the garden and the tranquil effects as you connect with the environment through the watering practices. Ann – a social worker and teacher who lives in the foothills of Austinmer - spoke about her interest in installing a water tank after most of the preparation had already been completed, but as the drought eased and water restrictions were lowered some years ago, the idea of a water tank was placed on the backburner. Bruce – a retired auctioneer from Oak Flats – expressed similar interest in his water diary:
“Again funny enough we have things set up, it was difficult to put one on the block we’re on and a few years ago when there was more drought we got ready to put one in and got outdoor power for a pump and then it just didn’t happen for a range of reasons so no we don’t have one...it’s all ready to go but we just haven’t done it because it started to rain I think a few years ago. So when it became less of an issue drought wise when I think the restrictions on water came off” (Ann - Austinmer)

“Good rain, showery type. Makes me think about getting a rainwater tank when I see water running down the gutter” (Bruce – Oak Flats)

In contrasting circumstances, Frank – a retired fisherman from Oak Flats - who currently has a storage capacity for 20,000 litres of rainwater still desires more capacity:

“I wish I had more storage. They have cut my water bill down by over 30% and that’s the whole ideal because water, electricity and gas, well mainly electricity and gas are being privatised and water will be next. I don’t fancy paying some shareholders profits when I can get water from the sky for nothing. I can’t generate gas for nothing or produce electricity for nothing but I can catch water for nothing” (Frank – Oak Flats)

From Kaika’s (2005) reading of the household environment, the networks that supply water are invisible or ignored by the domestic consumer until a problem arises. However, the resourcefulness and ingenuity of participants such as Frank and Peter, and the desires raised by Ann highlight that in outdoor areas people expressed a detailed knowledge of these networks and their workings in and around their home. A crucial reason why people contain explicit knowledge of the networks is that ‘they are active agents within them’ (Head and Muir, 2007. pg. 13). Participants described practices that were both creative and banal to conserve and reuse water in both the water diaries and interviews. Figure 4.2 are two examples of these practices. The image on the left is of John’s reuse of washing machine water, and the right is of Peter’s self-designed automatic drip irrigation to his overhanging plants. These practices were informal, irregular and unstructured in nature and each participant contained their own unique technique of water gathering.

“I reuse water from the washing machine. I’ve got a pipe that connects from the machine to the rest of the yard, and I pump it out...I pump it into a wheelie bin and I cipher it with a hose and let it slowly go into the gardens” (John – Oak Flats)
“We use to have a big wine drum out the back and the rain would fill that with water and I would get the bucket and fill it and water the plants” (Merium - Shellharbour)

“We have some pots around the place that gather a bit of water occasionally but mostly as soon as it starts to rain a lot of the pot plants that are hanging around the barbeque area and any indoor pots I tend to put outside in the rain so that means they are watered more naturally by the rainfall rather than to having to water them separately” (Lydia - Austinmer)

For John – a retired gardening enthusiast and local to the Oak Flats area for his entire life – a daily ritual is using the water from the washing machine on his and his wife’s garden beds. For Merium – a Shellharbour resident for almost sixty years – and Lydia, they speak of the opportunity to gather water during times of rainfall. Furthermore, Lydia spoke of the benefit of her proximity to the beach within her water diary and the use of seaweed as mulch in her garden:
“The rainwater was mixed with seaweed that I had collected from the beach. The seaweed leaches minerals etc. into the water and is a great conditioner for the soil and plants” (Lydia – Austinmer)

These practices are highly ephemeral and diverse in nature, but like Allon and Sofoulis (2006) these practices are seen to play a significant role in transforming people’s water habits and practices. Recognising there is a need to change the way water is used and valued was the most commonly shared perspective towards environmental commitment across all participants. Consistent with Kurz et al., (2005) findings in Perth where water is constructed as a finite and precious resource that must be conserved, participants continue to place a high value on water, which is reflected by their water practices and the implementation of water saving techniques. The practices that have been described create new values and meanings that are influenced by broader social processes (Gibbs, 2010) and exist as a site of recreation, pleasure and desire, and resourcefulness and creativity.

4.3 Water Values and Past Lived Experience

The exclusion from and access to water is manifested in particular socio-ecological interactions that produce different ways of valuing water. These interactions include specific historical and geographical conditions. As Ioris (2011. pg. 874) noted, values are ultimately the lasting outcomes of past experiences that precipitate in the ‘discourse, morality, and imagination of human societies’. An understanding of the cultural domain and the complex experiences with water is crucial for developing effective management strategies and adopting sustainable urban lifestyles. This section seeks to explore the importance of cultural meanings and past experiences, both of which are embedded in everyday practices and function as interactions in the outdoor area of the home.

Consciousness of water saving practices is not a recent occurrence in people’s lives. The connection to rural or agricultural childhood on the land and normality of water scarcity was a common element within the qualitative data. By relating to specific experiences in their lives, several participants often reminisced on the harshness of the Australian environment and its impact on everyday water practices. Kerry – a mother of two and now retired living on the edge of Lake Illawarra in Mount Warrigal - spoke vividly about her experience as a child growing up with the rainwater tank as her family’s only source of water. That availability of
water reinforced a perspective of valuing water that has remained with her throughout her life and one she has passed down to her daughters.

“We were born in the times when there was only tank water, no town water at all, so when you had a tank on you had to wait for the rain and so you learnt to be very conservative, your washing up water went out to the plants and all that sort of stuff. So that’s how I grew up and I tried to teach Nicole and Jenny [Kerry’s daughters] not to waste the water but the grandkids just don’t understand because they have never come up or grown up with it, it’s always been available. I suppose that’s why we don’t waste it...water was precious and ever drop counted especially when there were droughts and if your tank was low you couldn’t waste water. You went down to the sea to have a wash instead of having a basin wash” (Kerry Mount Warrigal)

“You would see the rain coming across the water and it would stop before it got to you and mum would be there ready to run with the dishes. We would have all the dishes out to catch the water because we were running low” (Kerry – Mount Warrigal)

In contrast to the circumstances in which Kerry was raised, Larry – a train driver from Shellharbour and father of three - recalled the accessibility and liberal attitude to water use when he was growing up. Compared to Kerry’s childhood of the 1940s and 50s, Larry grew up during the 1970s when water was abundant and its availability was never an issue. The attitude and perception of water was dramatically different. ‘No one gave a bugger about how much they used back then’ (Larry - Shellharbour) was the perception voiced by a number of participants while reflecting on water use during the 1960s and 1970s, particularly from those who lived in coastal towns and communities. Larry often compared the situation he grew up in with his own three children; expressing a similar lack of care and appreciation:

“When you were a kid you didn’t even think about that, you just went to the tap and you didn’t think about where it came from, it was just there, ‘someone pays for this, what’s this all about?’ It’s a different attitude [now] and it’s good that they’re trying to change that attitude about water and how vital it is...I think everyone looked at it as a free commodity...I was born in the 60s and water back then was basically a toy. We never had computer games so we would have a lot more water fights and hose fights and the rest of it but now people are a bit more aware of the lack of water during those lean times” (Larry - Shellharbour)

Past experience with water scarcity often correlated with water saving practices, such as the introduction of rainwater tanks. The exposure to different water availability provides people with the ‘imaginative capacity’ (Allon and Sofoulis, 2006. pg. 51) to adopt a different
approach to the way water is used in the outdoor area of the home. Among participants who have exhibited water saving behaviours, a portion was raised during times of drought and water scarcity when availability to town water mains was non-existent. A personal history of dependence on water availability, such as Kerry, revealed a direct correlation with water conscious practices and attitudes and a greater involvement with the outdoor household water networks. Head and Muir (2007) have discussed this involvement with reference to backyard gardens, arguing that when residents make connections with outdoor water networks, networks become partially visible and may influence the conceptualisation of outdoor water practice. For those raised during severe drought and dependent on alternative water supplies, the involvement with these outdoor water networks were essential in fulfilling everyday household needs. This was the case for Frank. With a strong recollection and experience of water availability growing up and as a professional fisherman throughout most of his life, Frank’s intricate involvement with his household water networks is a reflection of past experiences. Over the past 15 years Frank has introduced 20,000 litres of rainwater tank capacity [Figure 4.3] for indoor and outdoor use and redesigned his front and backyard to suit the dry and harsh conditions previously experienced in the Oak Flats area. The practices Frank adopted highlights water as a scarce and reusable resource suitable for the continual fulfilment of outdoor water practices.

“When I grew up, I grew up on tank water for about 15 years of my early life and I know what it’s like to be short of water for every day to day life and the irony is that we only lived 2km out of town and when I came to school here [in Oak Flats] and eventually work here I turned on a tap and water was endless but because I lived 2km out of town and there was no town water there my parents had to buy water just to exist. When my mother put her brand new automatic washing machine on and it used 170 gallons of water my old man would freak so we were aware that water is valuable, a necessity, you just can’t live without it...the younger generations who didn’t experience tank water, their attitude to the use of water is different. They’re a lot more careless, a lot more blasé about water. When you live on tanks it’s not easy come easy go. You cross your fingers for when it does come it lasts until the next lot...water has always been crucial, been important for life...To me water has always had a constant value to me personally because it’s a necessity of life it has a constant value and that’s a high value” (Frank – Oak Flats)
Gardiner’s (2008) research into the use of tank water and its perceived value argues that for many, the value of tank water will fall if main water supply is freely available. For Frank and others who were raised and have lived a significant period of their life on alternative water supplies, the luxury and cultural norm of readily available water was and continues to be highly valued and vigilanty managed in the outdoor area of the household. For this group, the water saving practices, which formed as a result of those past experiences, have been ingrained in their daily water routines despite their present connection to water mains. This suggests that the connections between present and past experiences – mediated by family networks, childhood memories, and travel experiences – are important resources in understanding why water is valued in different ways. Margret G – a retired primary school teacher now residing in Shellharbour - was a prime example of this connection. Having grown up in England, Margaret moved to Australia in 1969 and bought a small farm near Dapto. “When we first bought the property it was non-drought of course, we had a stream running through and a big dam so you could use that if you were going to grow things”. As the drought worsened, Margaret and her family had to adapt to the conditions and developed water practices and attitudes that remain to this date.
“Where I came from we lived in the middle of a town and we had town water, it was always on tap, things we didn’t have when we first came here. You didn’t think about water as such, you had rainfall all the time where I lived in England so it was never short” (Margaret G - Shellharbour)

“It was a big learning curve in Dubbo and it did rub off when we came home because then we had like nine years of drought. It sort of rubbed off so you became more careful with water” (Margaret G - Shellharbour)

Similarly, Margaret T – also a retired school teacher - grew up during the 1930s and 40s in rural NSW. These circumstances have been ingrained in her everyday water practices. Having moved to Balgownie, Margaret devotes a lot of time to her roses and flowers that surround her villa. She reminisces about the times of water scarcity while growing up as a child and the impact that has had on her until this day:

“I’ve always been conscious of water. I can remember years and years ago when there were just tanks and you had to go get all your water from a tank and the little insects that came out of the tap when they used to get low...I can remember water shortages when we were only allowed to put water in the bath but I can’t remember what that was for though...I use to go on holidays on a farm. It stems from the same thing. I cannot throw out food or anything like that it’s been instilled in me to not waste food or water I dare say” (Margaret T - Balgownie)

Participants often reminisced about a time when water was in abundance and could be purchased for near to no cost. The price of water imposed no limitations, and guilt-free pleasures could be had by the family with no consideration to conservation. When the most recent drought hit and water restrictions were introduced, people were forced to change their water practices. By the latter half of the 20th century, urban water was both abundant and cheap in Australia. Urban consumers took for granted the availability of water and perceived its cleanliness and low cost as a right (Sibly, 2006). Frank, Larry and Peter all spoke of the 1960s and 70s as a time when water was viewed as an abundant resource with an unlimited supply, at little or no cost:

“There was plenty of water per head of population and the prices were ridiculously cheap. Water was never an issue 50 years ago” (Frank – Oak Flats)

“I think everyone looked at it as a free commodity. We get charged a fair bit more for it now but back then there might still have been water rates but they were nothing
substantial as there are today. No one gave a bugger about how much they used back then” (Larry - Shellharbour)

“30 years ago we didn’t worry about water, it wasn’t a problem. In the old days you could use as much water as you liked, it wasn’t a problem. I don’t think we paid for it. They had meters but I don’t think they came around and read them” (Peter - Towradgi)

Worldwide, water pricing is the predominant economic incentive instrument to not only charge for domestic water but also discourage wasteful practices (Hung and Chie, 2013). An increase in water price has been seen as an effective method in reducing household consumption and is believed to lead to household water efficiencies (Willis et al., 2013; Randolph and Troy, 2008). However, there is debate about the implementation and value of regulation approaches to water conservation (Willis et al., 2013).

4.4 Water Saving Practices

When exploring outdoor water practices and attitudes, participants described water as an undervalued yet vital resource that has been historically mismanaged and abused. Illawarra residents are active agents in the management of water and acknowledge that these past processes cannot continue. The conceptualisation of different water sources and concepts of creating change surfaced as key themes to outdoor water conservation practices. Strategies for water saving were both banal and creative. The irregular, unstructured and informal nature of these techniques between participants made these practices difficult to formally document (Head and Muir, 2007). However, it is these diverse techniques that play a crucial role in transforming habits and practices within the domain of the outdoor household setting (Allon and Sofoulis, 2006). In this section, water saving techniques are discussed with particular attention to: the installation of rainwater tanks; practices of recycling water, particularly washing machine water; and native plants in gardens

4.4.1 Rainwater Tanks

The past fifteen years has seen an unprecedented rate of domestic rainwater tank installations across many Australian cities in response to drought, subsequent water restrictions and development regulations and subsidies (Gardiner, 2008). Tanks have been depicted as a
means to challenge ‘big water’ (Sofoulis, 2005) systems and elevate the interactions with water to a ‘practical consciousness that can stimulate lasting changes in the way that water is consumed’ (Gardiner, 2008. pg. 100). Through exploring the reasoning behind the installation of rainwater tanks in households, and how it has influenced pre-existing attitudes and practices, two broad groups of participants are distinguished based on current outdoor practices: water intensive rainwater tank owners, and environmentally motivated rainwater tank owners. Rainwater tank owners are not a homogenous group but are distinct from one another through diverse attitudes and behaviours. It is these groups of behaviours and attitudes that are important here [Figure 4.4 show one of two water tanks on Cary’s property. This particular water tank was purchased eight years ago, as a result of the drought and to continue water practices during times of water restrictions].
One group of participants who own rainwater tanks, tend to demonstrate a culture of intensive water use. The results highlight a frequent engagement with leisure based water use that required large amounts of water. Gardening, lawn maintenance, refilling of the pool, and outdoor cleaning were seen as everyday water practices and almost essential to their households’ culture. The ownership of a rainwater tank within the Illawarra area allows the continuation of an outdoor water culture that may otherwise be constrained during periods of drought and water restrictions. These results concur with Moy (2012) whose research on the
water savings achieved by rainwater tanks in the Illawarra found a continual engagement with high water use activities by rainwater tank owners. In this research project, the autonomous control over outdoor water use became a recurring theme. For participants like Peter, rainwater tank ownership allowed an unrestricted use of water behaviours deemed acceptable prior to the introduction of water restrictions. Peter has a home within one hundred metres of coastline. Peter’s large garden and pool sits on a sand dune that requires above average water consumption. Since retiring Peter has built a large underground rainwater tank and sophisticated gravity fed system that allows him to maintain his water use practices within the context of the conditions he experiences on his property.

“I built the water tank because its concrete, its underground down there so once I got into that thought I really cut loose with watering the garden” (Peter - Towradgi)

More than just a volume of water, rainwater tanks continually consolidate a distinction between water mains and water obtained from the tank. The independence from the mains supply generated by rainwater tanks is a vital element of their appeal. Gardiner (2008) similarly found that pool owners, gardening enthusiasts and the environmentally motivated were attracted to rainwater tanks because of their distinction to the water mains. The value of the water harnessed by rainwater tanks was understood in terms of its independence to centralised water management decisions. This was the predominant reasoning for Lydia and her family who introduced a second tank during the water restrictions in early 2000. It allowed a freedom of water usage unattainable while on town water mains alone.

“When we got the water tanks it freed us up in the way that we weren’t worried about using water to water the garden otherwise you feel a bit guilty using the town water. If you have your own tank that means you can water as you need to water until they empty of course which usually takes a good watering to empty the tanks” (Lydia - Austinmer)

In contrast to water intensive rainwater tank owners, environmentally motivated rainwater tank owners emerged as a behavioural group that reinforced an ethical and moral consciousness towards water conservation. Through a variety of behaviours, including water recycling, using less water and indoor connections, environmentally conscious solutions were a part of a life view emphasising ‘controlled personal consumption’ (Gardiner, 2008. pg. 110). Moy (2012) also distinguished a group of tank owners that were dedicated to an ethics of water-saving and were environmentally conscious. Moy (2012) found that tank owners
were governed by a sense of duty to the community and the environment. Those practices were evident in the cases of Katherine and Jose. Katherine – who resides on the cliffs edge of Austinmer – and Jose – a Mangerton father of one who moved to Australia in 1986 from Brazil and born in Portugal – expressed a dedication to lowering their consumption and curb any past activity deemed wasteful:

“We try to be very green and there were water restrictions and because I’m a gardener we feel that we should use tank water when we can” (Katherine- Austinmer)

“The water tank has been in for 3 years and there were some water restrictions on but it was not for the water restrictions it was because we wanted to save and conserve water” (Jose - Mangerton)

Rainwater tanks owners do not fall into a specific category based on ownership. They exist within a set of defined water practices that exhibit a consciousness towards water saving or the maintenance of the outdoor area. That is not to say the water intensive group are not environmentally conscious, but the reasoning for their purchase of a rainwater tank was firstly to maintain their everyday water practices during times of different water availability. Consistent with the findings of Moy (2012), a contradiction between the attitudes and practices was frequently evident among the participants. Intentions to save water were often contradicted by participants partaking in regular high-volume water activities. As mentioned above, rainwater tank owners do not fall into neatly defined groups. The displays of contradictory practices highlight the complexities of outdoor water consumption.

4.4.2 Recycled Water

The most recent drought led to the imposition of stern restrictions to outdoor household use (National Water Commission, 2012). While the conditions and restrictions of the drought have abated, the potential for future dry conditions and water restrictions due to climate change - coupled with new pricing policies, sustainable housing designs and a trend towards integrated water management - are likely to create a change in the current perception and use of grey water by households. The opposition towards water recycling has tended to focus on the ‘yuck’ factor (Nancarrow et al., 2009; Leviston et al., 2006; Russell and Hampton, 2006): a response by individuals to the reuse of water derived from unsanitary practices in the home. It should be cautioned to assume that this view is a barrier to water reuse development and public acceptance. The following quotes by Chris - a father of two and resident of Corrimal –
James – a landscape constructionist from Austinmer - and Merium highlight the misconception of the ‘yuck’ factor. It appears within certain limits people are willing to tolerate water that is construed as ‘yuck’ or ‘dirty’ in nature:

“I really think showers and washing the clothes are the two biggest users of water. The water just goes down the drain so we need to recycle the water, even if you employ a grey tank so you can reuse the water. Not the sewerage but the water you use when you have a shower to be reused for the toilets” (Chris - Corrimal)

“We’re going to put in a reticulated water service where we can actually get bodies of water moving and aerate the gardens and whatever comes out of the toilets, like a biosystem that will treat the water like a little mini treatment plant in our home so that’s all from recycled water so we won’t rely on water mains as much as possible” (James - Austinmer)

“When we’re in a drought I reused the bath water for the pot plants and I collect the rainwater on the veranda in buckets and that goes around my pots on the veranda. I went to Queensland and a friend put a hose in her washing machine because they lived on a farm and they used all that water and I thought that was a good idea...but I don’t do that now, but I have done it. If we had a drought and we had water restrictions again I would do it” (Merium - Shellharbour)

The interaction with washing machine water, particularly during times of water scarcity, was a continual theme in the qualitative analysis. Washing machine water provides an area of water recycling where a formulised framework and structure may enhance techniques and provide greater public awareness and acceptance for water recycling. The reluctance participants to adopt this technique is based on the perception the water may be toxic to plants, or the ‘yuck’ factor as previously mentioned. Through adequate education and appropriate guidelines washing machine water reuse would gain greater acceptance and penetrate into outdoor water behaviours. John spoke extensively and enthusiastically about his history with using the washing machine water for his gardens and the progress and technical advancements he has made to make recycled water available to his front and backyard. For ten years John has been using the washing machine water on his garden. John has developed an articulated watering system that continues to this day. ‘…once you learn to do certain things, you keep doing it’. This practice has become a habit, an ‘everyday’ routine for John since the introduction of the water restrictions twelve years ago. This is well illustrated in Figure 4.5 as John demonstrates his reuse of washing machine water. When
John connects the pipe shown in the photo to a connection in the washing machine, water is gravity fed down to his front yard.

“I do reuse water from the washing machine. I’ve got a pipe that connects from the machine to the rest of the yard, and I pump it out. It’s a fair amount really because sometimes I pump it into a wheelie bin and I cipher it with a hose and let it slowly go into the gardens. So that means all the water from the washing goes onto the grass, or the lawns or the gardens. I do it all the time, everyday” (John – Oak Flats)

“It just seemed like such a waste letting it go down the drain when you can use it. It’s not saving much, it doesn’t decrease the bills so I don’t know why but the water is still being used. But then again I suppose if I put that water down the drain and then went out and hosed the garden with the hose it would be a lot more” (John – Oak Flats)

Figure 4.6: John showing how it is down with reusing his washing machine water.

The perceptions and acceptance of water reuse by the public are recognised by water authorities and researchers as the crucial ingredients for the success for any reuse project (Po et al., 2003). Participants in the qualitative analysis of this research voiced a clear willingness to go against social norms and, if they haven’t already, adopt recycling measures, particularly
for use in their gardens. Their enthusiasm contradicts common ideas about water recycling in Australian households and communities (Russell and Hampton, 2006; Nancarrow et al., 2009) and exceeds political leaders’ and water authorities’ willingness to act. Most encouragingly, it positioned the household as a subject of creativity and eagerness in providing a cultural shift in water towards water reuse and recycling. Ann expresses her strong support for change in the way we think about water recycling within the networks between the inside area of the home and the outside:

“A tank is one option but it’s somehow about our plumbing and how things are. Recycling water should be incorporated into the housing design and should be set up so washing water can be brought out to the garden and you probably wouldn’t even need a tank. It should be standard sort of practices and I don’t know why it isn’t” (Ann - Austinmer)

Ann questions why the use of recycled water is not common in Australian homes and one crucial reason is education. Through education about water, particularly alternative water sources such as recycled water, the negative connotations associated with those water forms could be replaced by strong public acceptance. In the past, larger scale water developments, such as desalination plants and recycling programs, have triggered negative reactions and community resistance (Tapsuwan et al., 2007). It is one thing to understand the attitudes and practices of individuals but it is quite another to change their ideas and perceptions. However, these ideas are not fixed or static. They are susceptible to change and education aims to address the issues of water scarcity and potentially influence public perception regarding issues such as water recycling.

4.4.3 Native Plants

The introduction of native plants into the garden environment is a technique used by most participants with a suitable sized outdoor area. Native plants are seen as a very sustainable choice when it comes to water conservation because of their drought tolerance and pest and disease resistance. There is also a cultural aesthetic to native plants. In urban areas they reflect a sense of place and provide an opportunity to educate on local bioregions. They also have the benefit of supporting other plant and animal life and urban remnants (Koester, 2013). However, for participants native plants provided a sense of freedom and assurance regarding water frequency once the native plants were established. As a landscapist, James provided an insight into the trends and direction of his industry stating a new paradigm has
emerged towards water conscious garden design with the introduction of drought resistant plants and installation of rainwater tanks:

“The industry themselves are leaning towards drought resistant plants and a lot of people are asking for low maintenance and drought resistant plants so they don’t have to worry about it but they are only drought resistant or drought tolerant when they are established and growing in their own environment and until then, I hate to say it, they are going to waste a lot of water. You have to waste before you can get the benefits. Once you establish it and get that there then the savings will be down the track” (James- Austinmer)

James discussed how people have begun to introduce local natives into their gardens as a means to counteract the droughts and subsequent water restrictions. At a time when water was in abundance and water conservation was unheard of, ‘fancy plants’ or flowering plants that require considerable water were the norm. However, as James pointed out, the water restrictions hit hard and forced many to rethink their outdoor water practices:

“Planting and what we do in the backyards whether it's planting or how we use water, especially in restrictions, it’s very important that we adopt different techniques or different ways of using water” (James- Austinmer)

4.5 Conclusion

By evaluating the qualitative material, water values have been articulated through lived experiences across time and location. As the idea of valuing water outside monetary values becomes accepted and applied within a range of resource management arenas, resource managers are acknowledging that different human perspectives are influenced by past experiences. The values that people place on water emerge not only from how they use water but also their diverse backgrounds, histories and livelihoods (Gibbs, 2010). The participants in study expressed a diverse background which included some who have lived in the Illawarra all of their lives, others have moved to the Illawarra for work or family from rural NSW and interstate, and overseas. The values of water emerge from diverse lived experiences and past experiences. These are embedded in water practices and attitudes and expressed in their own individual household culture.
The bucket in the shower, the hose in the washing machine; tolerance and perspectives towards ‘dirty’ water in households is changing and the habits and practices developed during periods of water restrictions remain part of daily routines. This engagement with water is where part of its value is understood as it cycles within and between nature and the household. The relationship between the outdoor and indoor area of the home acts as a network for water values to be played out through practices of capture, storage and distribution, and allow for ‘everyday, habitual nature of human engagements with the nonhuman world’ to occur (Head and Muir, 2007. pg. 25).
Chapter Five

Water Availability

5.1 Introduction

Drawing on the knowledge and experience of Illawarra residents, water availability is a key cross-cutting theme that emerged from concepts of change and the conceptualisation of different water values. Extending from the work of Gibbs (2006; 2010) on water variability, this analysis seeks to explore how different water availability – such as drought and rainfall, and regulatory factors such as water restrictions – influence outdoor water practices and how
individuals value water, including practices discussed in the previous chapter. In this research, water availability encapsulates a range of physical factors that influence the ways in which the ‘availability’ of water changes. By reconnecting the physical and social-cultural divide of water availability, this chapter aims to recognise the ‘diverse, changing and complex’ (Gibbs, 2010. pg. 370) interconnections between water values and the ways in which nature and culture are embodied. Specifically, this chapter seeks a gauge an understanding of how everyday water practices and values relate to water availability.

In this chapter, the concept of water availability is first addressed. This consists of discussions of how changing availability have influenced outdoor practices, characteristics of water and climatic variability (Gibbs, 2006; 2010). The impact of the ‘2002’ drought (Karoly et al., 2003. pg. 14) then follows. This consists of a brief overview of past experiences, attitudes and perceptions. In the next section, water restrictions are discussed to gauge the relationship between water use and values and the water practices involved in this relationship. In the context of climate change, it is becoming likely that Australia will experience changes in the availability of water. In the Illawarra this correlation is not entirely clear. The chapter concludes with a discussion of climate change and its impacts on Illawarra residents and outdoor household water.

5.2 Stories of Abundance and Scarcity

Water availability contains both spatial and temporal elements. These variables give rise to patterns of both human and non-human life and within the Illawarra they influence residents’ interaction with water, ‘water places and country, and shape lifestyle and livelihood’ (Gibbs, 2006. pg. 81). An analysis of the qualitative material revealed the extent to which water availability has impacted the relationship between the outdoor and the household. Frank - a resident of Oak Flats his entire life - continues a strong connection with water and the outdoor area of his home since his retirement as a fisherman. He spoke about his experiences of coming home and using copious amounts of water outside to cook his prawns. As a result of the unpredictability of water availability and an increase in the price of water, Frank has installed over 20,000 Litres of water capacity over five rainwater tanks. When asked the reasons behind installing the water tanks, he spoke candidly about the increasing water price and stubbornness to use town water, but particularly as a result of the Illawarra climate:
“This is the land of extremes and it’s either stinking hot and dry or its pissing down rain and flooding. Whatever might be honky dory this week, this month, this year can be totally different this time next year so basically it’s forward thinking and preparation, it’s all you can do” (Frank – Oak Flats)

For Frank the unpredictability of water availability to the Illawarra forced him to look into alternative water sources such as rainwater tanks. As a result of this unpredictability, Gibbs (2006) found residents of the Lake Eyre Basin value water for utilitarian and non-utilitarian purposes. Similarly, Illawarra residents speak with passion and curiosity about the non-utilitarian aspects of water including water places, the different forms of water, lasting and ephemeral water and their relationship with its availability. When water was spoken of by people who live in the Illawarra, it invoked ideas of intimacy, compassion and concern that are often qualities overlooked by the generic meanings of water in dominant discourses. This understanding of water fosters ‘attachments to specific waters and water places’ (Gibbs, 2010, pg. 367) that are defined by the forms and patterns of water availability. This idea is expressed by Ron, a former police officer who has lived in the coastal town of Vincentia on the NSW south coast, and now resides in Port Kembla:

“I used to enjoy standing in my garden of a daytime when it was a sunny day and hosing, even though I knew you shouldn’t hose when the weather is hot because it has an adverse effect on plants but I enjoyed the freedom because everything looked so nice and shiny and cooling” (Ron – Port Kembla)
Figure 5.1 shows Ron’s front yard where watering the plants added a therapeutic quality to water practices where the act of watering and the aesthetically pleasing result of a ‘shiny’ garden provide a connection to water outside utilitarian values. Similarly, Ann – a social worker and teacher from Austinnner - found standing in the garden with a hose and “a glass of wine” rather appealing. The specific water and water availability that Ann spoke of tied to family, stories and memories. She spoke of a memory of her father as a ‘legendary hoser’ and her mother as a ‘gardener’, and being with them during times of drought and water restrictions, and the impact they have had on her current outdoor water practices. These past experiences emphasise how water availability has changed over time and how these changes impact on outdoor water practices.

“My father was a legendary hoser; he would just be out with the hose...one of the visions I have of him is with a hose in hand. My mother was a bit more aware of [water] because she grew up in country Victory where there would have been drought and restrictions but a colder climate so growing different kind of plants I guess. My father was not one to be sensitive to the environment so that’s how I’ve grown up, a bit of a combination there although I’m not quite the hoser my father was but I can
see the therapeutic qualities of standing with the hose with a glass of wine” (Ann - Austinmer)

Water availability influences practices and behaviours in the outdoor areas of the home. Residents of the narrow coastal plain of the Illawarra region have, over the past five to ten years, experienced drought and abundant rainfall. The variability in patterns and flows of rainfall to the region directly influences gardening, water collection and overall outdoor water use. Understood in these interactions with water is the knowledge that water is ephemeral to the Illawarra. As discussed by Stewart – a Keiraville resident, teacher and father of three who came to Australia from England in 1982 – the impermanence of water by the processes of drought and water restrictions have shaped a new understanding or influenced an existing consciousness of water conservation and outdoor watering practices.

“[The drought] has made me change things and look at things environmentally different and I think that’s the benefit of it that it makes you change the way you do things” (Stewart - Keiraville)

Analysing how water availability impacts water value engages with the ‘untidy’ (Gibbs, 2010. pg. 368) or ‘messy’ (Castree, 2004. pg. 137) uniqueness of the Illawarra. Water is frequently described by Illawarra residents as ‘valuable’ and ‘clean’ but as a result of prolonged drought and subsequent water restrictions the language used to describe water invokes greater emotion and passion. Rather than being described according to a ‘utility value’ (Gibbs, 2006. pg. 368), participants have described rainfall according to the varieties of forms and the temporal nature in which it is received in the Illawarra. When asked ‘What value do you place on water?’ Stewart realised the complexity of the question:

“It’s a difficult question to ask because do you put a monetary value, do you put it on environmental value? I would say that at the moment it’s environmental. You have to try and make everybody aware that water is so precious” (Stewart - Keiraville)

The word ‘precious’ is of significance here. Water is not simply defined by its monetary value but the response here suggests a greater significance and personal sense of responsibility. Similarly, Merium – a retired business director from Shellharbour - speaks about her experience of going without rain for extended period which reiterates the value of water to her while reflecting on her history with water use and the water restrictions:
“I used to hose the gutters thirty years ago because water was abundant then, it didn’t matter and then they started talking about the dams running low. Things have changed and water is precious. Once we had a day when we couldn’t use our water for some reason, there was something about the water being infected with something...Then we had the restrictions and they were telling us that the dams aren’t filling and there’s no rain and you have to watch your water and I thought you really do realise that water is so precious” (Merium - Shellharbour)

Merium speaks of a short period of time when clean water became unavailable to her home in Shellharbour. It was during this period that her daily routines and practices were impeded and the realisation set in of how ‘precious’ and dependent we are on the continual availability of water. The patterns created by water availability influences and shape people’s interaction with water and their lifestyle and livelihood. These patterns are particularly apparent in outdoor water practices where water management programs such as water restrictions are targeted.

5.3 Drought

In early to mid-2000s many parts of Australia experienced one of the worst droughts on record, which placed severe stress on the Australian economy, environment, rural industries and communities (Neal and Moran, 2009). The immense pressure placed on the water resources led to the perception that this may be part of a broader change in the climate. Recently, a number of studies have suggested that the prolonged drought was the result of climate change and the dry conditions experienced in south-eastern Australia are likely to become more common as a drier future is expected (Mukheibir, 2010; Chiew et al., 2011; Askew and Sherval, 2012). The issue of climate change and drought was a contentious topic for some participants. Regardless of whether drought is part of a natural cycle or of changing climate, it has produced a cultural change within Australian communities relating to water attitudes and practices (Head and Muir, 2007; Cary, 2008; Dolnicar and Hurlimann, 2010). The impacts of drought, particularly the introduction of water restrictions, provided recurring themes in this research and have reinforced the values and practices spoken of in Chapter Four.

The perception of the water crisis and the influence it had on participants is a strong narrative in the qualitative research. Similar to Bruvold (1979) and Lam (2006), droughts were
perceived by Illawarra participants as a major influence in their conservation of water and a significant incentive to introduce water saving practices and devices. An examination of attitudes and practices towards drought revealed a cultural change in the way water was valued and used in the outdoor area of the home. Lydia – a school teacher and resident of Austinmer in the northern suburbs of the Illawarra - spoke of this cultural change based on her personal experience of her neighbourhood and community:

“I think people respond very quickly and I do think people respond quite positively to being responsible and if climate change happens and the continent becomes a lot drier then I’m sure people will respond to that because they have indicated that many times over. I think we just change the best you can change. The type of plants you plant, the mulch you use and the water you use” (Lydia - Austinmer)

"I think the drought has changed most people’s ideas and thinking. That started to get people thinking about other ways of using water and to be more careful in regards to how water was kept in the garden because people would often put on the sprinkler and leave it for hours...it’s quite interesting how practices are quite different according to how much you value water as an important resource” (Lydia - Austinmer)
Lydia recalls how the drought forced a change in people’s ‘ideas and thinking’ towards a more conservative water practices. Figure 5.2 shows Lydia’s backyard which highlights this cultural change. Walking around you notice two rainwater tanks, the use of seaweed to leach nutrients into the water in her wheelbarrow, a bag of water crystals that Lydia adds to nearly planted plants, and a bag of sugarcane mulch. All these practices are now habits formed as a result of the drought and expressed throughout the two week water diary. A study conducted by Randolph and Troy (2008) examining attitudes of Sydney residents towards water restrictions discovered similar results as the majority of participants (75%) changed their water practices in light of water restrictions. Similar to findings by Dingle (2008), there was conformity among the participants in acceptance of water restrictions during times of a water crisis, such as drought. Although this change occurred during periods of drought, the practices undertaken during this time continued well after the drought and water restrictions ended. As the availability of water changed from prolong drought to abundant rainfall in the Illawarra, the practices of residents were placed in environmentally and socially changing circumstances. The perception of participants about other water users is that once the drought ended, old habits and practices would resurface. This was not the case. For Ann, Lydia,
Nicole – a mother of two from Oak Flats - and many others, the years of water scarcity and restrictions in outdoor areas of the home formed routine habits and behaviours that transitioned through drought and water restrictions to current periods of abundant water supply.

“When the restrictions were really bad we just wouldn’t wash the car and that’s a habit that’s just stayed... I guess I tend to err on the side of not using water because those restrictions were so significant for so long I guess. You just got out of the habit of using water outside” (Ann - Austinmer)

“I think when we had the droughts there was a lot of publicity about water usage and the water restrictions were in pace then I felt that it was important then to collect rain water and I think a lot of people have changed their usage of water since the drought” (Lydia - Austinmer)

“I think the fact that we had that big drought and we had the water restrictions, I think it did make you have better water saving techniques and practices so I guess when you have them there they just continue” (Nicole – Oak Flats)

The drought was often a reminder of past experiences or present circumstances of friends and family, particularly those living in rural areas in Australia. During times of drought, the historical and social factors of experiences towards water had substantially influenced conservation practices as participants often reminisced of past times and family and friends. The most recent drought has placed water at the forefront of public consciousness as the behaviours, attitudes and values of water are re-evaluated and the cultural change to water begins to take form. This research supports the argument made by Head and Muir (2007) that there is a need to change the attitudes and attune household practices to the realism of the driest inhabited continent on earth.

5.4 Water Restrictions: Bringing Drought into the Home

I don’t think [the water restrictions] were bad. I think they were severe and necessary (Cary – Austinmer)

The impacts of extreme water variability, particularly drought, have been evident across the landscapes, histories and stories of Australian communities (Chong and White, 2007). Drought has become synonymous with pressures on rural livelihoods and environmental
impacts on regional and national economies. These impacts have extended into urban backyards where water restrictions have been imposed throughout an unprecedented number of Australian towns and cities. Water restrictions have primarily been implemented as a means to reduce ‘discretionary’ (Cooper et al., 2011. pg. 1) domestic outdoor water use on gardens, vehicles, swimming pools and outdoor cleaning. During periods of reduced supply, the outside area of the home has been seen as a valid target by water authorities to reduce water consumption. In the Australia these restrictions have been enforced at a level not previously experienced by its residents (Cooper et al., 2011; Gilbertson et al., 2011).

Water restrictions emphasise the need for restraint during times of water scarcity. This restraint in water consumption is part of a broader set of consumptive practices within the house, the garden and the community (Allon and Sofoulis, 2006). Participants discussed how some water practices are entrenched in the habitual pleasures of the watering experience. However, the rules and regulations of water restrictions scrutinises the ‘inconspicuous practices of consumption’ (Allon and Sofoulis, 2006. pg. 47) that may invoke feelings of pleasure and relaxation. Water consumption is placed under layers of practical consciousness and resurfaces when disturbed by impacts such as water restrictions. The water restrictions appear to have reduced external water consumption but at a cost to past habitual water practices. For Kerry – who resides on the fringe of Lake Illawarra at Mount Warrigal - the memory of different water availability extended to her daughter and grandchildren. In the water diary, Kerry recalls the circumstances her granddaughter – as a ‘baby of drought’ – grew up in and how pivotal this moment was in her granddaughter’s childhood:

“Reminds me of when my granddaughter was born in drought. She was nearly three before she felt rain on her and it frightened her. The first time she got wet she cried and did not like it at all. She does not like to have a shower, and she is ten years old” (Kerry- Mount Warrigal)

The propensity of households to change outdoor water usage depends not only on their attitudes, but also the institutional context within which they live and how the cultural change is accepted and encouraged. Despite the ‘browning of backyards’ (Allon and Sofoulis, 2006) and temptations to use water outside of the allocated time slots, participants – similar to Dingle (2008) - revealed positive attitudes to the implementation of water restrictions. On face value, participants are willing to accept mandatory water restrictions and for some permanent restrictions should be applied. Despite experiencing different water availability of
the past few years, as the period of prolonged drought slowly shifted into abundant rainfall, some participants believe water restrictions should remain in place during times of rainfall and heightened dam levels. Among those participants the assumption is that once water restrictions are turned off people will resort back to their original watering behaviours in which water is overused and undervalued.

“I don’t even know why they changed the restrictions. They should have just left them there and should not be changed because people will abuse it, or as soon Warragamba overflows everyone starts partying and turns the hose on just to do their undies” (James- Austinmer)

I think they should be at some permanency. I wouldn’t have an issue with it. What’s been really interesting is that when these water restrictions have been in people have actually made changes and are using less water so those restrictions have actually had an impact. Whether that would be the case long term we whether it would lose its gloss I don’t know” (Judy - Balgownie)

The relationship between individuals – such as Judy, a recently retired high school teacher from Balgownie - and their gardens provides a network for an active engagement in water storage and distribution. The introduction of water restrictions may be seen as an instrument that impedes this relationship as it impacts on the everyday habits and routines that maintain this connection. However, as discussed by James – a landscape constructionist from Austinmer – and Judy the water restrictions reveal a deeper connection between individuals and their gardens than previously thought. Although criticised by some human geographers (Allon, 2004 cited in Allon and Sofoulis, 2006; Allon and Sofoulis, 2006; Pearce et al., 2012), the ‘one-size-fits-all’ (Allon, 2004 cited in Allon and Sofoulis, 2006) approach to water restrictions has fostered a radical sociotechnical change in households daily outdoor water practices. It has introduced new perspectives on how water is valued, developed new ways of household living, and redefined the relationship between the individual and the garden, as discussed by Ron:

“Ohinally I used to enjoy just hosing the garden on sunny days because it felt good to be out there and the plants glistened but once they introduced the water restrictions and I started to comply with the rules I realised that with the shortage of water I shouldn’t continue hosing for the fun of it so I hosed when it was needed but I also checked for the weather forecast so even though I was often disappointed that it was going to rain in the next few days than I wouldn’t hose the garden at all” (Ron – Port Kembla)
“Since the water restrictions were brought in I have a high value on water now...it was because of the water restrictions and how much water was in the dams at the time and it also made me realise that I couldn’t just use water to stand outside and use it for no other purpose then to enjoy and having the garden shiny” (Ron – Port Kembla)

For Ron, watering was about the enjoyment of standing outside and the visual impact his watering practices would create. Ron became aware these water practices could no longer continue in light of water restrictions introduced in the early 2000s. Prolonged water restrictions have frequently been cited by researches as an instrument introduced by water authorities to encourage greater awareness of water use and to promote environmentally conscious behaviours at the household level (Harman et al., 2008; Cooper et al., 2011). The behavioural constraints held over Illawarra residents as a result of the drought have had a major influence on water usage behaviour since the mandatory restrictions ended. The majority of participants reported that during water restrictions they adhered to the rules and regulations. Although some did admit to watering their garden outside allocated time, Stewart and Merium described it as an exception to everyday practice:

“The restrictions said that you couldn’t water the garden, you couldn’t wash the concrete and you tend try and accept it but everybody breaks it. Yeah I did water when the restrictions were on” (Stewart - Keiraville)

“I have snuck the hose when there have been water restrictions, I’ll be honest, everyone does because you don’t want them to die but I have left the lawn and the lawn dies” (Merium - Shellharbour)

Participants’ expressed a feeling of guilt when discussing these practices during the interviews. In the water diaries, Judy spoke of feeling guilt-free after back washing the pool filter due to days of rainfall [Figure 5.3]. However days later she was ‘furious’ with herself after placing the filter on the wrong setting:

“Heavy rainfall for the past 24 hours means that I didn’t feel guilty or concerned when I backwashed the pool filter...Unfortunately, because I forgot (am furious with myself) I left the filter on ‘RINSE’ which meant that the pump continued to empty the pool” (Judy – Balgownie)
This highlights a state of cultural change described by Allon and Sofoulis (2006) in the way water is used, most substantially as a result of water restrictions. The water restrictions undoubtedly imposed limitations on the freedom of Illawarra residents and how and when they would be allowed to water. For some, a culture of high water use was evident in the qualitative analysis as continuous engagement with water based leisure activities was crucial to their households’ culture. This imposition prompted alternative water sources and a change in practice as households were forced to curb their outdoor water practices. For Lydia and Frank the purchase of water saving devices, particularly water tanks, were installed as a means to continue previously enjoyed activities, such as gardening and outdoor cleaning, without the guilt of breaking the rules and regulations of the water restrictions.

“I think when we had the droughts there was a lot of publicity about water usage and the water restrictions were in place then I felt that it was important then to collect rain water and I think a lot of people have changed their usage of water since the drought’ (Lydia - Austinmer)
“I think when we had the droughts there was a lot of publicity about water usage and the water restrictions were in pace then I felt that it was important then to collect rain water and I think a lot of people have changed their usage of water since the drought” (Lydia - Austinmer)

“That was partly because of the drought and the water availability in dams was going down and it was quite obvious that the price of water was going to go up... basically all I can say is that the whole purpose is for me to use as much free, out of the sky water, I can get” (Frank – Oak Flats)

In conjunction with the findings of Head and Muir (2007), the qualitative analysis revealed that the water restrictions were the predominant influence on water tank installation. A cultural shift has occurred as a result of the water restrictions as regions, like the Illawarra, move away from the normative processes of wasteful water use associated with the latter half of the 20th century. A shift in normative behaviours, brought about by water restrictions, may have a lasting influence upon rainwater tank installation, tank water usage and ultimately how that water will be valued by the household.

Although the water restrictions appeared to place water saving back on most peoples agendas and reinforced a conservative perspective to outdoor water practices, the burden of the restrictions were shouldered by all users, socially and financially. Participants identified these burdens to include the economic cost to the household of installation of rainwater tanks and grey water systems; retrofitting outdoor taps and pipes; replacing dead and dying plants and lawn; and other water saving practices relating to pools, cleaning and salt spray. Some of the costs imposed on households as a result of the water restrictions, particularly rainwater tanks, are now seen as crucial elements of backyards. For the most part, these water saving devices where implemented to counteract the impacts of the restrictions and allow autonomous control over household water practices. For Katherine and her husband, cleaning practices are essential due to her waterfront position [Figure 5.4]. At the beginning of the drought Alison installed a rainwater tank under her back veranda. Rainwater tanks are now seen as one of the most influential strategies in moulding contemporary community attitudes and behaviours towards pro-environmental water practices.

“I guess having to pay for things yourself makes you value things more so I guess that’s part of it. I think the fact that we had that big drought and we had the water restrictions, I think it did make you have better water saving techniques and practices so I guess when you have them there they just continue” (Nicole – Oak Flats)
“There wouldn’t have been an exact time I think it just seeps into your consciousness that yes we have to get a tank and how can we address this. Maybe it was the first restrictions, I thought there were restrictions around 8 years ago during the drought so I think since that time, certainly in our house, we wouldn’t do things like hose the driveway, have a sprinkler on” (Katherine- Austinmer)

“I guess we are conscious of water restrictions and things they have asked you to do like the proper nozzles on your hoses and we certainly purchase those based on those recommendations and they are sensible things to I guess” (Nicole – Oak Flats)

Figure 5.4: The view from Katherine’s backyard

Sofoulis’s (2005, pg. 456) criticism of water restrictions is that it creates an image of households as ‘thoughtless water-wasters, incapable of making choices’. An alternative focus of analysis is the effect restrictions have on the water practices of individuals. The water restrictions discussed in this study appear to have positively impacted outdoor water practices during and after the restrictions by altering watering practices and reducing consumption. How individuals value water changes between and within different water regimes and the circumstances in which households are placed. Although water restrictions have been
implemented on a short term basis by state governments, their ramifications are long term. Participants have expressed how their water practices and attitudes have changed well after the restrictions ended in the Illawarra and why these practices are maintained despite experiencing high rainfall over recent years.

5.5 Climate Change

Climate change is not a recent phenomenon, nor is it a future condition; anthropogenic climate change began well over a century ago (Weber, 2010). A modern scientific understanding of nature has allowed us to quantify our past and present impacts on climate. Many of these impacts will occur through water and the Intergovernmental Panel on Climate Change (2013) has stated that freshwater resources are vulnerable to the climatic observations and projections of climate change. Patterns and distribution of domestic, industrial and agricultural water use in Australia are already vulnerable to existing natural climate variability, they are likely to be particularly sensitive to climate change. The impacts of climate change are no longer potential threats but are now an inevitable reality with severe consequences for water resources in Australia (Sadoff and Muller, 2009). However, despite this reality, scepticism on the issue of climate change still remains and these perceptions are crucial in identifying environmental problems and possible solutions.

Climate change represents a stressor on water resource systems already under stress due to previous drought and mismanagement, and increasing demand. Climate change predictions place Australia’s water – in terms of economy and prosperity – in a vulnerable position. A spectrum of different impacts are associated with climate change and according to participants, water availability appears to be the most worrying. With drought, flooding, and water restrictions likely to become more prolonged and severe, participants are highly concerned about the prospects climate change may enforce on Illawarra households. However, it is not just a crisis of water availability that is worrying the public but also a cultural and sociotechnical crisis. Climate change places stress on all points of domestic water use. Consequently, households are shouldered the moral, financial and practical responsibility to save water during times of water restriction and drought. Stewart speaks about this moral responsibility as he explains the conflicting dilemma between saving water and keeping his plants alive:
“You look at the sun and you wonder how long is it going to last. You think the same way about water, how long will it last and the little seed in the back of the mind tells you that you need water for this plant to survive but I also need to conserve the water to know that its more than just me in the world” (Stewart - Keiraville)

Climate change is a complex phenomenon, with multiple interdependent social and environmental impacts, multiple areas of scientific research that are in some cases contested or incomplete, and multiple indeterminate or unknown future impacts (Pidgeon, 2012). The majority of participants accepted the claims that anthropogenic climate change was an occurring phenomenon and the consequences require immediate and comprehensive responses. However for a small number of participants, climate change remains a temporally and spatially distant issue and undercurrents of doubt were noticeable and influential as they spoke about the impact climate change has on their lives. Consequently, some people do not view climate change as having a direct impact on them, nor do they perceive it as being relevant. The willful denial that their actions as individuals will cause future personal losses or the view that the impacts of climate change are not apparent in everyday life has contributed to the thinking of some participants. These reasons, among others, have contributed to the difficulty for the public to conceptualise climate change and relate it to their daily water practices. The perceptions of this minority are fuelled by personal experience and observations and perhaps an unwillingness to change their present way of living. Hulme (2009) proposes that this stance on climate change is caused by the complexity and scope of the issue. As it is not a well-defined problem with a well-defined solution, gaps in knowledge and future projections of climate change present evidence to support scepticism and uncertainty. Kerry and James are a part of this minority and express their doubt over the anthropogenic impact and the conflicting science:

“I don’t really believe in the o-zone thingy because if you go back in history there are natural cycles and that causes a lot of it today and it’s a worry that so much of the ice is melting but I think that was going to happen whether you had toxins in the air or not” (Kerry – Mount Warrigal)

“I don’t think it’s proven. The science isn’t there or its actually conflicting science. There is changing climate but I don’t think to the detriment of how much is human induced, they can’t even provide all the facts. A lot of it is hearsay, other people’s opinions and what they think and how we should live” (James- Austinmer)
In contrast, Judy and Chris speak with frustration about the argument over climate change. Their opinions spoke for the majority of the participants that believe anthropogenic climate change is a real and occurring event:

“If you don’t think it’s real you’re a nong. That’s my honest opinion. It’s frightening. I’ve read that people knew about it thirty years ago. I think it’s so crucial and important that to me it’s the single biggest issue facing me, the country, the planet” (Judy - Balgownie)

“There’s no argument about it anymore. Is there? The argument is not about climate change now it’s just about how to deal with it, that’s what we should be having the argument about. It’s ridiculous to think that all the scientists in the world, 99.9% of them, one guy puts out a paper about how sceptical he is about it and all these people say it’s not true” (Chris - Corrimal)

In concurrence with past research (Randolph and Troy, 2008; Gibson et al., 2011), the research finds that acceptance of climate change - has had little effect on the water practices of individuals, households and communities. The qualitative analysis suggests that it is other factors that contribute to water saving behaviours. Factors including water restrictions, drought severity and water pricing, as discussed above, were felt to have a greater impact on water usage. Although climate literacy is a desired asset, a recurring narrative in the climate change and behaviour analysis shows little indication of climate change as the predominant factor for water conservation. That is not to say that climate change was not present within participants environmental and ethical consciousness, but it appeared among other factors that may have been at the forefront of decision-making. Across a socio-economic continuum, the changing culture of household water patterns is not predominantly driven by concerns of climate change, rather the costs and changing household social circumstances. Climate change is in the mix but is not at the forefront of decision making.

5.6 Conclusion

Throughout the qualitative analysis, Illawarra residents demonstrated an appreciation for the patterns created by water and engaged in the diverse, complex and changing meanings, values and practices associated with water availability. The impact of drought and water restrictions has been crucial to the understanding and influence of meanings, values and practices in the Illawarra region.
Rather than thinking the causes, effects and future outlook of climate change will result in behavioural changes to outdoor household water use; it inconveniently appears to be far more complex. The implicated decisions and responses of participants to previous droughts and water restrictions are informed by a range of factors; only one of which may be climate change. Practices and attitudes are the result of complex interactions between individuals, households, communities and institutions within physical and social environments (Gregory and Di-Leo, 2003). This analysis has highlighted the mismatch between an understanding and concern for water and water-related practices. Attitudes are shown to not always reflect a change in water practices. However, the majority of participants, whether a consequence of climate change or not, have transformed their water practices as a result of impeded restrictions, prolonged droughts and climate change.
Chapter Six

Conclusion

This chapter revisits the aims of the thesis, reflects upon the methodological approach, and summarises the key findings of the research project. To close, implications for policy and areas for further research are discussed.

The overarching aim of this thesis is to investigate how outdoor household water is valued, in the context of changing water availability. In addressing this overarching aim it must be
acknowledged that these values are enveloped within a range of cultural and environmental contexts. To explore these contexts, this research will seek to answer two specific aims:

1. How are water values expressed through everyday outdoor water practices?
2. How do everyday water practices and values relate to water availability?

By evaluating the importance of particular water practices, Chapter Four seeks to determine whether practices are consistent with water values and how practices have changed over time. With rainfall variability experienced in the Illawarra, the second aim is addressed in Chapter Five, which attempts to explore whether the practices, attitudes and values of water have been influenced by changing water availability. It is hoped that this work will contribute to the progress of water conservation measures and development of strategies towards a cultural shift in water intensive household practices.

In answering these questions, this thesis seeks to contribute to a body of research that explores how water is meaningfully positioned within the sociocultural environment of the Illawarra. These aims have been addressed through the literature that seeks to re-define the value of water, evaluate water practices in Australian backyards, and explore different water availability including the impact of past experiences on today’s water culture.

The mixed-method approach adopted in this thesis – involving semi-structured interview, water diaries and diary-interviews – has allowed triangulation of results highlighting consistencies and new insights while minimising errors. The semi-structured interview provided insights into the experiences, values and meanings that participants attribute to water, and how these meanings differ from person to person. The semi-structured interviews allowed a set of beliefs, events and experiences to be voiced by the participants.

The water diaries capture life as it is being lived. The diaries were used as a self-reporting tool and a medium for participants to reflect on everyday experiences. The challenge here was to create a diary structure that was neither confusing nor onerous. The original aim of the water diary was to provide greater detail of everyday water practices. However, the purpose of the water diary changed during the project. The water diaries became a reference point to evaluate consistencies and trends in water practices that were noted in the diary and in the interview process. By using the diaries in this manner, consistent or contradictory practices...
were discovered, and ordinary events and observations that were neglected in the interview process were captured. The diary-interview provided the final point for the triangulation of the mixed-method approach. This approach allowed a departure point from the events recorded in the diaries to be explored in greater depth and provided an opportunity for participant-specific questions based on the water diary and semi-structured interview. The combined methods provided in-depth, nuanced narratives on how water is valued and used in the outdoor area of the home. Although the water diary was used in a manner it was not originally set out to achieve, it became very useful to this thesis.

Chapter Four has sought to address both the overarching aim of this thesis – to investigate how outdoor household water is valued, in the context of changing water availability – and the additional aim: how are water values expressed through everyday outdoor water practices?

Regarding attitudes to and values associated with water in the Illawarra, the research revealed two distinct groups. One group made observations on ‘big water’ (Sofoulis, 2009) issues – a system that embodies a historical fantasy of endless supply – and a second group expressed a sense of personal responsibility for water. Some participants explicitly linked their outdoor water practices to major, large-scale water issues, and for these, the construction of water drainage and storage systems were an extension of their ideas about responsibility. Resourcefulness and practicality directed the actions of some participants and accentuated the sense of responsibility they felt. For others the theme of ‘desire’ was frequently introduced to articulate wants, needs and dreams surrounding water. Desire encapsulated aspirations of installing a water tank or water saving devices and plants. Extending from the idea of desire, a number of emotional responses and experiences were raised. Participants spoke of the ‘happiness’ and pleasure gained from connecting with the garden through the watering practice. These practices are entrenched in the habitual pleasure of watering the garden, and renders the networks, deemed by some as invisible (Kaika, 2005), visible through active engagement with the outdoor area. Participants recalled water practices that were banal and creative, resourceful and imaginative. These practices - influenced by broader social processes - have transformed the ways water is valued. The relationship between people and the outdoor area of the home allows the values, everyday practices and engagement with the outdoor area to be played out.
Consciousness of water saving is not a recent phenomenon in people’s lives. Participants connected with past experiences of their childhood, the normality of water scarcity and the harshness of the Australian environment. A personal history of dependence on water availability correlated with current water conscious practices and attitudes, and a greater involvement with outdoor water networks. For those individuals who have lived a significant period of their life during times of water scarcity they continue to place a high value on water as a result of past experiences. The water saving practices formed as a result of those experiences, have been ingrained in everyday water habits. This connection between present and past experiences is an important evaluation in understanding the different ways in which water is valued today. In contrast, another generation of participants spoke of a different history of water practice – profligate water use during the late 1960s and 70s. It was during this time that the outdoor area became a household’s ‘own piece of nature’ and participants recalled the ‘liberal’ use of water at that time. The values people place on water have been articulated through lived experiences. Backgrounds and histories are diverse and the values that result become embedded in contemporary water practices and attitudes.

Different water sources and strategies for water saving were revealed as cross cutting themes; these included rainwater tanks, water recycling, and the introduction of native plants. Two groups of rainwater tank owners emerged. For one group rainwater tanks facilitated sustained participation in intensive water practices and engagement with leisure based activities; while the other group – environmentally motivated tank owners – were governed by a sense of duty to the environment that reinforced an ethical and moral consciousness towards water conservation. While these groups demonstrate a set of defined water practices, this is not to say that intensive water users are not environmentally conscious. This study revealed the attitudes and practices discussed in the semi-structured interviews were often contradicted by regular high-volume water activities, as noted in the water diaries. The value of rainwater tank water is understood by most participants, across both groups, in terms of its independence from mains water.

Participants exhibited not only an interest in recycled water but degrees of participation in alternative water practices. In contrast to other research that suggests that people are unwilling to recycle water in their own homes (Russell and Hampton, 2006; Nancarrow et al., 2009), in this research participants showed an eagerness and enthusiasm for the potential of water recycling and reuse in their home. This perception and willingness to go against social
norms extended to the frequent use of washing machine water on gardens. The motivation that participants expressed is not restricted to minor reuse strategies. They extend to diversion and treatment processes that would utilise indoor water reuse, such as reusing water collected in the shower for use in toilets and for outdoor purposes. Although some of these strategies require council approval, participants are showing they are strongly supportive of a cultural shift in water reuse and recycling. The final section of water saving techniques is the introduction of native plants. Used by most participants, introducing native plants to the outside area of the home is seen as a method of drought-resisting by creating a sense of freedom and assurance in water consumption. A cultural shift is again evident as participants move away from flowering plants that require greater amounts of water to native and drought-resistant plants.

Chapter Five again explores the overarching aim of the thesis, and seeks to address the second of two further aims: how do everyday water practices and values relate to water availability?

This research revealed ways in which water availability has influenced current water practices in the outdoor area of the home. When participants of the Illawarra spoke of water it often invoked ideas of intimacy, compassion and concern. These perceptions of water are qualities that tend to be overlooked by dominant discourses of valuing water. The water practices are often more about the act of watering than the result. Many participants spoke of the therapeutic qualities and aesthetically pleasing results that watering can achieve. This understanding of water fosters attachments to specific waters (Gibbs, 2010). Water is frequently described as valuable, finite, clean and precious. The value of water is not simply defined in terms of its monetary value, but the research has revealed a greater significance and personal sense of responsibility at play. The patterns created by changing water availability influences and shapes participants’ interaction with water.

The most recent drought to hit Australia placed water at the forefront of household consciousness. This study revealed that the drought produced a cultural change relating to water practices and attitudes in Australian communities. The research showed that water restrictions reduced water consumption, but at a cost to habitual water practices. For some these practices were stopped, while for others it meant an alternative water source was needed to continue those practices. As water restrictions imposed limitations on the freedom
of water use, participants turned to rainwater tanks to continue a household culture of high water use. On face value, water restrictions are an instrument that often impedes outdoor water practices, but this research reveals something to the contrary. Participants revealed an important connection to their outdoor area and an active relationship between themselves and their garden. The restrictions emphasised this significance to participants and fostered a new outlook on how water is valued, redefined the relationship between the individual and the garden and developed new watering practices. This research on drought and water restrictions has again emphasised the cultural shift away from normative processes of wasteful water use.

In this thesis, the phrase ‘water availability’ describes a range of different ways in which ‘availability’ of water has changed in Australia, and specifically in the Illawarra. In the context of climate change, it is becoming likely that the availability of water is going to change in Australia. The perception of climate change is crucial for developing possible solutions and identifying environmental problems at the community level. For the majority of participants, anthropogenic climate is a real, occurring process that requires immediate attention. Others expressed scepticism about anthropogenic climate change, arguing that the science remains uncertain and that the issue is temporally and spatially distant. The research findings on climate change showed little indication that climate change was the predominant influence on water conservation in Illawarra households. Across the socio-economic continuum, climate change appears to be positioned behind other factors – such as financial and changing household social circumstances – that have influenced a cultural change in household water practices. The relationship between the cultural change and climate change appear to be far more complex than previously thought.

6.1 Implications for Policy

The ‘mono-dimensional’ (Allon and Sofoulis, 2010) or ‘environmentally centred’ (Sofoulis, 2005) approaches to influencing water use that attempts to change the culture of water use by informing people of the value of water – as if they are ignorant of it – is unlikely to succeed on its own. The evidence of the willingness to change water use in the Illawarra presented in this thesis suggests that developing a better understanding of the social and cultural norms and identities of Illawarra residents may provide greater potential for change. This includes ensuring the connections between households and the outdoor area – particularly the garden –
are maintained. An understanding of everyday water practices and the socio-cultural domain of water is vital for the development and introduction of water-related policy.

Government and water authorities have developed a range of policies and regulatory methods for dealing with divergent interpretations of water value. The impacts of water restrictions appear to be long term, despite being implemented only on a short term basis, as everyday practices are maintained well after the restrictions have ended. Implementing residential water restrictions as permanent cultural fixtures is an option available to water authorities and should be considered to maintain adequate water consumption. At this stage, the ‘one-size-fits-all’ (Sofoulis, 2005) restrictions appear not to be enough in fostering radical degrees of socio-technical change for all household. Residents appear to be blamed for living in a time during which the systems and technologies deliver the illusion of endless water supply and they are then shouldered the moral, financial and practical responsibility to save water. This is despite governments and water authorities assuming the responsibility for over a century in the name of modernity and growth. This research suggests that permanent water restrictions would influence those households whose practices are not maintained at times of different water availability. By influencing a suburban cultural change in appropriate water use, permanent water restrictions would disrupt the acceptability of intensive water use at any time.

Water pricing has been seen as an effective instrument in reducing the consumption and lead to household water efficiencies Australia-wide (Willies, et al., 2013). Water pricing is used as the predominant economic incentive tool to not only charge for domestic water but also discourage wasteful water practices. Based largely on an economists view, the efficiency of pricing was a theme raised by many participants. Raising the price of water and moving full cost to the consumer appears to be an effective conservation mechanism, as participants described price to be one of the foremost motivators to reduce consumption. This instrument redirects the reliance on monitoring regulatory factors such as water restrictions, or behavioural change campaigns that requires constant reviewing. However, the social value of water is at play here as water pricing impacts households that demonstrate an active engagement with the outdoor area. Water pricing as a method to reduce profligate water use should be assessed in this context as pricing will have social implications; it is not a simple solution.
6.2 Future Research

Understanding outdoor water practices, in the context of changing water availability, is an area that has to date received limited research attention. This study has revealed a number of sociocultural research areas that warrant further attention, including: longitudinal and generational studies, attitudes to water restrictions post augmentation projects and the invisibility of networks.

A longitudinal study has not been possible within the time-frame of this research project. Future research could investigate the values of water at times of different water availability, and the water practices associated with those circumstances. That is to say, research would be conducted during times of drought or water restrictions, and then again post drought. This would provide a more nuanced understanding of the attitudes and practices at specific times, rather than attempting to recall those years later.

For future considerations of policy development, a generational study would also be of benefit. This research has revealed that it was predominantly older generations that exhibited water saving practices as a result of past experiences. A generational comparison of attitudes and practices may provide future alternative policy directions for water authorities and governments. Both longitudinal and generational studies would gain insight into the process of household practices and attitudinal change and access the effectiveness of current or past measure to increase public acceptance.

Augmentation projects, such as desalination plants, are becoming increasingly prominent around Australia. This area demands further attention. It would be beneficial to explore community opinion on the role of water restrictions once these centralised projects are in place and in use. This would not only add to the current debate regarding water restrictions, but also the factors that facilitate a change in attitudes and practices.

The concept of visible and invisible networks was an interesting theme that emerged in this study. Now that there appears to be a cultural change in how water is used in the outdoor areas of the home, further research on the networks of water that connect the outdoor and indoor areas is warranted. Linking ideas of cleanliness, water reuse and water recycling, and the networks that supply these relationships would be of interest. This area of research is
particularly relevant at a time when people are becoming more enthused and motivated by the practice of water networks to supply the outdoor area of the home. Extending from the idea of Kaika (2005) these networks tend to be invisible because of the dirtiness or the ‘yuck’ factor that particular water holds. However, as these types of water become more accepted – as they appear to be in this research - further work is required to assess not only the attitudinal and behavioural changes, but where they can be improved and how they may become more accepted.
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Jonathon Cook


*Jonathon Cook*


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*Jonathon Cook*


**APPENDIX A: PARTICIPANT INFORMATION SHEET**

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**Participant Information Sheet**

‘Outdoor water values: daily practice and changing water regimes in the Illawarra’

Jonathon Cook

This is an invitation to participate in a research project.

**Purpose of the research**

The project is concerned with how people value water through their practices and behaviour in the context of changing water regimes in Illawarra. It aims to investigate:

1. how residents value outdoor water through their daily watering practices; and
2. In the context of different regimes of water availability, to investigate how practices, perceptions and values change within households.

The research is funded by a University of Illawarra, School of Earth & Environmental Science honours grant.

**Your involvement**

If you are willing to be involved in this research I will conduct an interview with you that is likely to last between 30 and 60 minutes, depending on how much time you have available. If you agree, I will record the interview. The only people who will access the recording and transcript are myself and my supervisor Leah Gibbs. In addition to the interview I would like you to keep a water diary for a four week period. The purpose of the water diary is for you to record your water usage in the outdoor areas of your home and describe your reasoning for practices and any changing ideas on those practices.

You may choose to be identified in my research by name, or by an ID code.

If you agree to be involved, you may withdraw from the project at any time, and you will not be negatively affected in any way.

**Expected outcomes**

Findings from this study will be used in my honours thesis that may become published in a scholarly journal article.

---

Jonathon Cook
This research will shape a larger project on participation in water values, and I hope the results will contribute to development of more comprehensive analysis of outdoor water use.

Questions or complaints

If you have any questions of concerns, you may ask me at any time before, during or after the interview. If you have any concerns or complaints about the way the research is conducted, you should contact the University of Wollongong Ethics Officer on 02 4221 4457.

Thank you very much for considering being involved in my research.
Consent Form for Research Participants

‘Outdoor Water Values: daily practice and changing water regimes in the Illawarra’
Jonathon Cook

I have discussed this research project with Jonathon Cook, and have been given information about the project. I understand that Jonathon is conducting this research as part of his work at the University of Wollongong.

I have been advised of what is involved in participating in this project, including how much time will be required, and I have had an opportunity to ask questions about the research and my participation.

I understand that my participation is voluntary, and I am free to withdraw from the research at any time. If I choose to do so I will not be negatively affected in any way.

If I have any questions about the research, I can contact Jonathon by phone or email. If I have any concerns or complaints I can contact the Ethics Officer in the Research Services Office, University of Wollongong, on 02 4221 4457.

By signing below I am indicating my consent to:

• participate in an interview, likely to last between 30 and 60 minutes; and
• have the interview recorded, so it can be transcribed.
• participate in the water diary over a four week period
I understand that the information collected during the interview and the water diary may be used for an honours thesis and possibly published as a scholarly journal article, and I consent for it to be used in that manner.

In this research project I wish to be identified by:

- [ ] First name;
- [ ] Pseudonym;
- [ ] Not to be identified.

Name: __________________________________________

Signed: ___________________________ Date: ___________________________
In reply please quote: HE13/156

20 May 2013

Mr Jonathon Cook
Unit 7/8A Market Place
WOLLONGONG NSW 2500
jc975@uowmail.edu.au

Dear Mr Cook

Thank you for your response dated 1 May 2013 to the HREC review of the application detailed below. I am pleased to advise that the application has been approved subject to the following information being provided:

Ethics Number: HE13/156
Project Title: Outdoor water values: daily practice and changing water regimes in Wollongong
Researchers: Mr Jonathon Cook, Dr Leah Gibbs
Approval Date: 7 May 2013
Expiry Date: 6 May 2014

The University of Wollongong/Illawarra Shoalhaven Local Health District Social Sciences HREC is constituted and functions in accordance with the NHMRC National Statement on Ethical Conduct in Human Research. The HREC has reviewed the research proposal for compliance with the National Statement and approval of this project is conditional upon your continuing compliance with this document.

A condition of approval by the HREC is the submission of a progress report annually and a final report on completion of your project. The progress report template is available at http://www.uow.edu.au/research/rso/ethics/UOW009385.html. This report must be completed, signed by the appropriate Head of School, and returned to the Research Services Office prior to the expiry date.

As evidence of continuing compliance, the Human Research Ethics Committee also requires that researchers immediately report:

- proposed changes to the protocol including changes to investigators involved
- serious or unexpected adverse effects on participants
- unforeseen events that might affect continued ethical acceptability of the project.

Please note that approvals are granted for a twelve month period. Further extension will be considered on receipt of a progress report prior to expiry date.
If you have any queries regarding the HREC review process, please contact the Ethics Unit on phone 4221 3386 or email rse-ethics@uow.edu.au.

Yours sincerely

A/Professor Garry Hoban
Chair, Social Sciences
Human Research Ethics Committee
<table>
<thead>
<tr>
<th>Name</th>
<th>Place of Residence</th>
<th>Age</th>
<th>Current or Past Occupation</th>
<th>Years in the Illawarra</th>
<th>Years in Current Residence</th>
<th>Other Information</th>
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<td>36</td>
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<td>Cary</td>
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<td>Ann Cameron</td>
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<td>51</td>
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<td>Grahame Crow</td>
<td>Figtree</td>
<td>36</td>
<td>Electrical Engineer</td>
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<td>Merjim Dohbel</td>
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<td>61</td>
<td>Retired; Director of home business</td>
<td>58</td>
<td>38</td>
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<td>Jose Flor</td>
<td>Mangerton</td>
<td>49</td>
<td>Handyman</td>
<td>20</td>
<td>5</td>
<td>Moved to Australia from Brazil in 1986; Born in Portugal</td>
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<td>35</td>
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<td>Retired; School teacher</td>
<td>45</td>
<td>16</td>
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<td>Chris Perusco</td>
<td>Corrimal</td>
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<td>Owns a windows refurbishment business</td>
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<td>Kerry Simpson</td>
<td>Mount Warrigal</td>
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<td>Retired</td>
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<td>36</td>
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<td>Peter Sorensen</td>
<td>Towradgi</td>
<td>72</td>
<td>Equipment developer/engineer</td>
<td>53</td>
<td>13</td>
<td>Born in Papua New Guinea - moved to Australia as a child</td>
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<td>James</td>
<td>Austinner</td>
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<td>Landscape construction</td>
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<td>John Stafford</td>
<td>Oak Flats</td>
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<td>Retired; Supervisor at Illawarra steelworks</td>
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<td>8</td>
<td>Born in Oak Flats</td>
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<td>Margaret Thomas</td>
<td>Balgownie</td>
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<td>Retired; School teacher</td>
<td>80</td>
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<td>Born in the Illawarra</td>
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<td>Port Kembla</td>
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<td>Also resided in Vincentia, NSW south coast</td>
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<td>Stewart Williams</td>
<td>Keiraville</td>
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<td>School teacher</td>
<td>28</td>
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</tbody>
</table>

* Names disclosed
Interview questions

‘Outdoor Water Values: daily practice and changing water regimes in the Illawarra’

Jonathon Cook

The interviews to be conducted as part of this research will be semi-structured. The questions below indicate the themes that will be covered in the interviews.

Your water practices

- Can you start by telling me a little bit about how you use water in the outside areas of your home?
- Can you tell me why those water use practices that you’ve described are important to you?

Outdoor water

- What parts of the outdoor area are most important for you and for water use in your household?

Water practices and behaviours

- What water practices are most important to you? And why?
- What water practices require the most water in your outdoor area of your home?
- Do you employ any water saving techniques to the outdoor areas of your home?

Different water availability

As you no doubt know, water availability changes at different times. For example, when there is very high rainfall or drier times, water restrictions or prolonged drought.

- Have different water regimes affected the way you use water in the outdoor area of your home? If so, how? And why?
• Can you tell me about any specific times when different water availability changed your water use practices?
• Can you see yourself changing your water practices (again) in the future?

Climate change

Scientists are saying that climate change is likely to have a range of implications for water in different parts of the world. In south eastern Australia it is quite complex

• Do you think that climate change is having any effects on your everyday life, and on how you use water in the outdoor areas of your home? If so, how? And why?
• Do you think climate change is likely to affect your life and water use in future? If so, what sorts of changes do you think it might have?
• Do you think climate change should have any effect on water and water policy issues in Australia?

Your role in valuing water

• Have you noticed any changes in the importance of water to you?
• Has this affected your water use practices in any way?

Finally

• Is there anything else that you would like to tell me about?
• Do you have any questions for me?

End this interview with these things:

• Explain what will happen from here.
• Ask or confirm if they are willing to do the Water Diary.
• Make sure that they know how to contact you and me if they have any questions or concerns.
APPENDIX F: WATER DIARY TEMPLATE

Daily Water Diary

Name: _________________________
Date: ____/___/ 2013

The aim of the water diary is to provide an account of your daily water usage on the external area of the home

Instructions;
- Please take note of individual water use and practices you undertook in the backyard or outside areas of your home. These might include: watering the garden, washing the car, cleaning, maintaining the swimming pool, playing with children etc.

<table>
<thead>
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<th>Morning</th>
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</table>

<table>
<thead>
<tr>
<th>Through the day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
Evening

**Daily thoughts:**
- This section is allocated to your overall thoughts on today’s water practices. Please take note of anything that seems important to you.
- Please also comment on how the individual water practices and experiences may change at different times, such as during water restrictions, periods of drought, or periods of heavy rainfall.
Daily Water Diary

Name: ________________________________
Date: 18/6/2013

The aim of the water diary is to provide an account of your daily water usage on the external area of the home.

Instructions:
- Please take note of individual water use and practices you undertook in the backyard or outside areas of your home. These might include: watering the garden, washing the car, cleaning, maintaining the swimming pool, playing with children etc.

Morning

- Fixed sprinkler used on garden prior to 10 am using timer attached to top restricting water use to 15-20 minutes.
- Hand washed car on lawn using bucket with detergent. Rinsing water off car with hose with trigger nozzle attached to conserve water.

Through the day

- Watered internal and external pot plants with watering can.
Evening

5pm - 6pm - Using fixed sprinkler on garden in 15-20 minute bursts. Water timer attached to top to conserve water.

Daily thoughts:
- This section is allocated to your overall thoughts on today’s water practices. Please take note of anything that seems important to you.
- Please also comment on how the individual water practices and experiences may change at different times, such as during water restrictions, periods of drought, or periods of heavy rainfall.

- Although weather is cooler, watering garden is still necessary due to low amount of rainfall this month. Soil is drying out.
- Water conservation tools used - top timer, trigger nozzle, watering cans, washing car on lawn so that water is retained in soil.
- Watering of garden permitted on odd number watering day.
APPENDIX H: DIARY-INTERVIEW QUESTIONS

Diary Interview Question Structure

Water Diary;
- What did you think about the structure of the water diary?
- What were the positives and negatives aspects associated with completing the water diary?
- Did the diary remind you of any practice or values relating to water that were not mentioned in the interview or diary process?
- Do you have any other comments or observations about the diary?

Water Value;
- How has the most recent drought affected the way you value water in the outside area of your home?
- Have your previous life experiences affected the way you value water in the outside area of your home?
  - If you think back to when you were growing up …was the way you used water different then? Did you think differently about water then? Do you think you valued water differently?
  - Why do you think your water use and the values you place on water are different now?
- Do you value water more now than in the past? Why?
- How do you think your ideas about water use and the values of water have been formed? What sorts of things have changed your ideas over time?