

**Blind Belief in a Commodified Natural Resource:  
A Grounded Theory**

Submitted By Rebecca Pearce to the University of Exeter  
As a thesis for the degree of  
Doctor of Philosophy in Geography  
In September 2013

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## **Abstract**

This research examines the application of a Classic Glaserian Grounded Theory methodology to the phenomenon of drought when viewed from the perspective of household water users in southern England. The resulting conceptual work calls into question the effectiveness of water-wise messaging and current Government policies on water management, by highlighting the double assurances afforded to the public through their own observations of the natural cycling of water resources between atmosphere and land, and the continuous operation of the regulated water industry, that together sustain blind belief in the ongoing availability of potable water resources. To establish a clear separation between the development of substantive theory and mixed method studies that claim to take a grounded theory approach that are generally more popular within the discipline of Human Geography, the theory is presented alongside two pieces of work; a collection of modern drought histories and a questionnaire. Developed as part of the necessary process of cycling alternate projects to enable a theory to emerge from the data whilst the researcher is distracted from forcing her own ideas onto it, both these pieces can be viewed separately or as supportive companions to the theory. Additionally, in acknowledging the difficulty in presenting a Classic Grounded Theory in the traditional discussional form, for the benefit of the reader the theory is preceded by an autoethnography, which incorporates descriptive elements taken from field notes and the author's personal water diary. These works draw data from subjects in three counties in England (Norfolk, Kent, and Devon), following the northwest – southeast rainfall gradient. Supplementary material for the drought histories is drawn from local and national archives and recorded oral histories. The primary emphasis of this work is placed on assessing the merits of each of the methods deployed in addressing environmental social science issues in the context of climate change, which hitherto have been focused on perception questionnaires and the development of popular cultural typologies.

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## Accompanying Work

Pearce, R., Dessai, S., Barr, S., (2013) Re-Framing Environmental Social Science Research for Sustainable Water Management in a Changing Climate, *Water Resources Management*, Vol 27, Issue 4, pp 959 – 979

This paper was written during the ESRC-Funded PhD Studentship and is substantially my own work. I acknowledge the support and guidance of my supervisors, Suraje Dessai and Stewart Barr who I have named as co-authors and in particular, the unnamed reviewers whose comments and guidance were instrumental in the final shaping of the paper.

The final publication is available at Springer via [http://dx.doi.org/ 10.1007%2Fs11269-012-0184-0](http://dx.doi.org/10.1007%2Fs11269-012-0184-0)

## Definitions and Abbreviations

B'stapse	Barnstaple
CC Water	Community Council for Water
CGT	Classic Grounded Theory
Defra	Department for Environment, Food and Rural Affairs
ENSO	El Niño Southern Oscillation
ESRC	Economic and Social Research Council
EST	Energy Savings Trust
GT	Grounded Theory
HM Government	Her Majesty's Government
IPCC	International Panel on Climate Change
LWEC	Living with Environmental Change
NAO	North Atlantic Oscillation
NASA	National Aeronautics and Space Administration
OFWAT	Water Services Regulation Authority
R.T.W	Royal Tunbridge Wells
UK	United Kingdom
UKCIP	United Kingdom Climate Impact Programme

## Introduction

Drought is a “*normal, recurring, feature of climate*” (Wilhite, 2000, p8)<sup>1</sup>; a temporary interruption to the hydrological cycle in a specific geographical location that has distinct phases: meteorological, hydrological and agricultural. The Socio-economic impacts of these different phases and resulting public behaviours have been aptly described by Wilhite (2011),<sup>2</sup> as a style of crisis management, which he refers to as the hydro-illogical cycle. In recent years, future climate predictions have indicated that the UK will experience an increase in the frequency and severity of drought episodes. The impacts of these episodes are expected to be more keenly felt in the south east of England, where demand for water is high, annual rainfall is low, and groundwater reserves are vulnerable.

This Economic and Social Research Council and Environment Agency funded Case Studentship research project was initiated to investigate public perceptions of drought and climate change and the impact of these perceptions on water use behaviours. The unexpected occurrence of a severe drought during the research period provided a unique opportunity to observe and assess actual water use behaviours in times of water scarcity, and to collate details of public opinions of drought and its association with climate change, with the prospect of bringing new insight into the use of water demand management for both adaption and mitigation purposes. Alongside the potential practical application of this research in the sphere of water management a specific aim of the researcher’s was to critically assess the usefulness of various data collection methods, and the benefits of less traditional mixed method studies comprising novel approaches, in environmental social science.

This thesis begins by reviewing literature that positions key environmental, governmental and socio-economic aspects of drought, in relation to the hydrological cycle, naturally occurring fluctuations in climate, and additional

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<sup>1</sup> Wilhite, D.A., (2000), Drought as a Natural Hazard, Concepts and Definitions, in Wilhite, D.A., (ed), *Drought, Volume 1. A Global Assessment*, Routledge, London

<sup>2</sup> Wilhite, D.A., (2011) Breaking the Hydro-Illogical Cycle: Progress or Status Quo for Drought Management in the United States, *European Water*, Vol 34 pp 5 - 18

factors impacting on these processes that are caused by global warming and consequential climate change. The scene is then set for an exploration of the impacts of all of these elements on the global water commons, which all humans are reliant upon. These impacts are examined from a commercial perspective that is unique in English water catchments, due to potable water management and distribution being in the private commercial sector, though regulated by Government to ensure fair and equitable access to clean water for all, at a fair and affordable price.

In highlighting the growth of disaster literature in the mid-2000s, that contributed to both concern and skepticism over climate change, chapter one explores recipes for sustainable development promoted by the UK Government and the European Commission, and contrasts these recipes against attempts to manage water sustainably by meeting a target to eliminate water stress in the England by 2030 despite increasing population pressures. The self-reinforcing nature of reactions to drought, where water companies invest in infrastructure to increase water availability, which in turn creates feelings of security that drive demand for water upwards; positions this research directly on the dividing line between humans as actors in a global water commons and humans as customers of water utility companies. The research questions are included in this first chapter as an indicator of the environmental and social complexities that were the catalyst for the development of the original research proposal.

In chapter two, a hidden ecological debt situation, caused by excessive personal water use and embedded water in products and foodstuffs, is used to examine the under-valuation of water as a commodified natural resource and the blame game that is regularly played between water companies and their customers. The nature of this blame game that encourages belief in strengthening infrastructure to protect water supplies in the future but at the same time implies that customers should learn to limit their usage to respect the needs of others and the environment, presents a dichotomy that remains unaddressed. The argument that this dichotomy might be corrected through capping mechanisms or prohibitive pricing strategies, rather than appeals to altruism is discussed, and the effectiveness of so-called 'water wise' campaigns, where volumetric or financial limits are not included in water saving

strategies, is questioned in terms of the consequences for behaviour change efforts in a predominantly growth-based society.

In making a case for the introduction of alternative approaches to water demand management, methods that may be applied to identify motivating factors in positive environmental behaviour, and past research projects that have highlighted inconsistencies between attitudes and actions, are discussed at length. Some plausible explanations for these inconsistencies, whose roots are located in psychology, are presented. The popular use of behaviour change initiatives that are based on informing and educating, that in the case of water are expected to result in a gradual move by the public towards becoming a predominantly water-saving culture, is examined alongside social marketing approaches to manipulating environmental behaviours that intertwine practices, appliances, and commodities. The deployment of 'nudging' tactics, where the predominant choice architects are, in the main, natural phenomena that cannot be controlled by humans, prompts questions over whether drought itself can be used as a trigger to develop long-lasting water saving habits. Whether this will be more productive than resorting to warnings of looming climate change is discussed in relation to the growing number of studies designed to measure public perceptions of climate against their willingness to act to mitigate the problem by adapting to shortages of natural resources.

The complexity of this area of research is systematically broken down in chapter three, with the presentation of three research questions and a series of complementary projects, designed to both create the space for a Classic Grounded Theory to emerge and to serve as a methodological comparison tool where data is presented in traditionally descriptive ways to highlight the differences between conceptual theoretical writing and basic analysis of qualitative data. These approaches are used to separately examine the measurement of timing and spatial aspects of drought, climate perceptions, and water practices, that are each necessary to demonstrate a comprehensive understanding of the various public attitudes to water saving in the context of drought and climate change. With a stated intention of uncovering the varying strata of 'publics' in drought situations through analysis of media commentaries on historic drought events and collected personal memories of drought

experiences, a series of research projects are proposed to incorporate data collection through questionnaires, focus groups, interviews, and practical home visits. These are intended to be cycled concurrently, to unearth public perceptions of drought and climate change and expose details of the micro components of water practices undertaken in English households and the physical and habitual factors that influence these micro-components when water saving appeals are made.

In addition to this work an overarching Classic Grounded Theory methodology is introduced, with the intention of probing beyond self-reported behaviours and phantom consumers, into the individual 'lifeworlds' of water users. Rather than forcing the opinions of the researcher and earlier theorists onto the data as it is collated, this approach is presented as a method by which to discover useful theoretical insights from observations. The necessarily opportunistic nature of data collection for theory generation and the benefits of an unexpected drought episode that developed during the fieldwork phase of the research are discussed.

In chapter four, the complex meteorological, hydrological, and social histories, of three distinct drought episodes in England are presented; the long hot summer drought of 1976, the 2004-2006 drought in the south east of England, and the 2010 – 2012 drought, which gradually spread across England from east to west, during the data collection phase of the research. The importance of perceptions of fairness emerges as the inherently unfair and patchy practice of imposing restrictions on water use in specific geographical locations is described through a collection of oral histories and local newspaper reports. Numerous exceptions to the rules are apparently negotiated, to the annoyance of others and the media, that seek to blame water companies for mismanagement and profiteering. Discrepancies between locally collected weather data and national data are notable, alongside the fact that though unintentional, water restrictions tend to be implemented on the day a drought breaks, and this angers the public further.

The results of surveys completed by householders in three separate geographical locations spanning the rainfall gradient from east to west, are

discussed in chapter five. The collection of baseline data relating to personal water habits, water-saving activities, public opinions on the causes of drought and the cost of water, is primarily used to introduce a closer inspection of the researcher's personal water habits and the micro-components of water use behaviours observed during a home water use study. Samples from this study are presented as part of an autoethnography in chapter six. The detailed descriptions of home water use behaviours are used to underpin the Grounded Theory discovered through this work, which is detailed in chapter seven. In this theory, blind belief in the inevitability of rainfall events, forms the backdrop to a series of strategic moves by individuals to protect their right to access water resources, regardless of the weather. This thesis concludes with a review of the research questions and the key findings, which point towards a necessary alteration to the perspective from which the hydro-illogical cycle is viewed.

## **Acknowledgements**

This thesis could not have been completed without funding and support from the Economic and Social Research Council and the Environment Agency, and the unending patience of my supervisors; Suraje Dessai, Stewart Barr, Stephen Hinchliffe, and Julian Wright. Whilst the hours of solitary confinement and abstaining from discussion to protect my developing theory from an unsatisfactory premature ending have been difficult to cope with, it must be said that leaving a postgraduate student largely to her own devices is a risky strategy for supervisors to take and I am grateful for their trust and support, and for not showing the anxiety I must have caused. The University of Exeter, with the superb resources it provides for postgraduate research also deserves high praise, as without access to the wealth of academic material available through the library service, and the complementary training sessions, I would have not known where to begin with this research.

People are at the heart of this project. At every stage I could not have progressed without their willingness to participate, their frankness and openness in discussion, and their enthusiasm for peering into toilet cisterns, timing showers, and locating dishwasher manuals. Some have shared so many insights with me that we have become friends. Others continue to send in

rainfall data from their back gardens, water meter readings, and newspaper articles. When there is money to invest in a new bathroom, I am often the first person to be notified. I may, as a result, never lose the mantle of “*the water lady*”.

I would particularly like to thank all the willing oral historians who were prepared to share their reminiscences of past drought events with me. My husband Jason must also be mentioned as he has patiently designed, fitted, and plumbed new water appliances to my exacting specifications, in order for us to reduce our daily household water use to roughly half the national average consumption.

The worldwide network of Classic Grounded Theorists I have been able to tap into via the Grounded Theory Institute seminars I have attended has been an invaluable source of insight and methods for keeping within the boundaries of discovering theory from data. I particularly want to thank Barney Glaser, Judith Holton, Hans Thulesius and Anna Sandgren for some stimulating and thought provoking discussions in Oxford and Malmo.

The complex structure of a regulated water industry requires many people with opposing views to work together to secure water supplies for the benefit of people and the environment. Although they do not want to be named, I would like to thank numerous staff in water companies, the offices of regulators, and charitable organisations, for their time and thought provoking interviews. I hope they are not too disappointed to find out that they tend to view drought situations from entirely the wrong perspective.

Lastly, I would like to mention the weather; the thing that the English like to talk about the most. The stunning unpredictability of events in the past three years has kept me guessing along with everyone else, as to what might happen next. My choice of a rather opportunistic and organic method to follow has been a perfect fit under these conditions and I hope that in reading of my experiences, others will be encouraged to follow with even more elaborate recipes for environmental social research.

## Chapter One

# Climate, Sustainability, and the Water Cycle

## 1.1 Introduction

In this first chapter, the author's primary objective is to review literature relating to the impact of global warming on fresh water resources and human society. Section one explores basic elements of the interconnected phenomena of hydrological cycle and climate change, and their known and anticipated impacts on local weather patterns that dictate the availability of water. In section two, these phenomena provide a backdrop to the twin threads of disaster driven by overconsumption and sustainable lifestyles and consumption patterns that are intertwined in popular discourses yet often overshadowed by climate skepticism. These themes are drawn together in the context of current forecasts and policy stances that highlight the fragility of water resources and the competing demands on commodified water supplies that various agencies seek to protect and regulate. In sections three and four, the author's intention to explore the relationship between the privatised English water industry and individual water users is raised. The often contradictory structures of water management and regulation, and the impact of socially produced water scarcity under increasing occurrences of drought are debated, with both meteorological and socio-economic stages of drought being described. This brings forth questions over the ability of water users to sense the early stages of drought and adapt accordingly in time to avert disaster. Past drought episodes and future drought predictions, and the subject of perceived fairness in relation to the distribution of increasingly scarce resources, are exposed to scrutiny. Sections five through seven reveal a notable bias towards demand management in the water sector and the onset of a blame culture between customer and private providers of water services which is illustrated through examples of past water company failures during drought episodes. In sections eight and nine, some notable examples of extreme weather events in England, highlight the difficulty in utilising extreme events as indicators of climate change. The inaccuracies in collectively held perceptions and memories of past weather events and climate are scrutinised and the unreliable nature of public opinion based on these recollections is questioned. The complexity of utilising public

discourses and assumed memories to influence positive alterations in water habits to conserve resources is presented and the prevalence of appeals for water-saving actions by individuals is viewed through the lenses of three publics: ecological citizens, consumer citizens, and global water commoners. An increasing interest in educating these publics with the intention of altering demand is highlighted and the importance of broadening research into the practices of every-day life and the impact of external influences such as beliefs, habits, personal values, and available infrastructure on behaviours is raised.

## 1.2 The Hydrological Cycle and Climate Variability

*“What then is life? In the vast diversity of living species, we can pick out some characteristics shared by all. From the smallest bacterium to the tallest tree, from the flea to the whale, all living creatures are built around water.”*

(Kandel 2003, p40)

An essential component of life on Earth, water cycles between atmosphere, ocean, land, and ice, over periods ranging from days to thousands of years. In a cycle driven by radiation, land cools as water evaporates, transferring latent heat energy to the atmosphere, which is later released as water molecules condense into cloud formations on contact with cooler air (Houghton, 2004). The constant cycling of water comprises a complex intermingling of processes; plants transpire, rivers run, oceans circulate and glaciers melt. Water from all of these sources evaporates at varying rates and returns in the form of precipitation (rain, sleet, hail and snow) to replenish the soils, rivers, lakes, oceans and glaciers, from whence it came, yet not uniformly. Whilst it is a comforting thought that what goes up eventually must come down again, the process of evaporation and precipitation is not balanced in quantity and intensity across the globe and both drought and flood events are common. The constant input of energy from the sun combined with an atmospheric blanket of water vapour and other gasses such as carbon dioxide, methane, nitrous oxide, and ozone, maintains day and night temperatures on Earth, at levels where most of the 1.4 billion cubic kilometers of water (Shiklomanov 1999 cited in United Nations Environment Programme, 2002) is liquid and not frozen and

therefore highly mobile. More importantly, water, whether held in cloud formation, ice, ocean, river, soil moisture, or locked into deep underground aquifers, is part of the changing climate theatre and plays a key role in determining the impact of increasing global temperatures due to escalating quantities of greenhouse gases in the atmosphere from anthropogenic activity.

Historically, climatologists have defined the variation in climate from equatorial regions to the poles in distinct climate zones. Located in the mid latitudes where warm moist air from the sub tropics meets cold, dry air from the high latitudes, the UK falls inside the temperate zone characterised by unsettled, ever-changing weather that is neither too hot, nor too cold, yet is considered often to be wet (Met Office 2012 a). These typically changeable characteristics underline the importance of understanding the hydrological (water) cycle, which is vital if we are to distinguish the potential alterations to climate caused by global warming and the impact this might have on day-to-day weather variations. While water vapour directly contributes to the greenhouse effect, the reflective qualities of clouds and ice have an overall cooling effect. Meanwhile, precipitation controls the salinity and therefore density of water in the oceans. The movement of more or less dense water drives ocean currents and the impact of this circulation on surface water temperature is an important factor in fluctuating weather phenomenon. Additionally it is established knowledge that for the past 10,000 years at least, a “*see-saw of atmospheric pressure variations*” (Kandel, 2003, p113) east-west across the Pacific Ocean - El Niño Southern Oscillation (ENSO) - and north-south across the Atlantic Ocean - North Atlantic Oscillation (NAO) - has, through corresponding fluctuations in sea surface temperatures, contributed to oscillating warm and cool periods globally. This results in variations in weather patterns in Western Europe ranging between warm, wet winters and relatively cool, wet summers driven by the prevailing westerly winds; and clear skies, much colder drier winters, and hotter summers, caused by periodic blocking by the Azores High (Kandel, 2003). These fluctuations in the weather are not necessarily indicative of long-term changes in climate. However, it is generally agreed that climate change is altering the odds of experiencing extreme hydrological events such as drought and flood. In the case of drought, according to Kallis (2008, p94):

*“Global warming should increase ocean and land evaporation. In principle, evaporation increases precipitation, but higher temperatures reduce soil moisture. The direction of precipitation and moisture changes will vary regionally and seasonally given climate feedbacks. Regions where precipitation will decrease and temperature will increase should experience more droughts. Droughts are not just about decreases in means, but also about variability. Global warming is expected to exacerbate extreme hydrological variability as the water-holding capacity of the atmosphere and evaporation increase, accelerating the hydrological cycle.”*

### 1.3 Climate Change Predictions – Drought, Flood and the UK Water Resource

Generally as the Earth continues to warm, a greater number of heat waves like that experienced in Europe in 2003 are expected to affect the UK. The United Kingdom Climate Impact Projections 2009 assessment predicts that under a medium emissions scenario the temperature increase of a summer's day in southeast England to be above 2 degrees and below 9 degrees Celsius. The central estimate is 5.5 degrees by the 2080s. By 2050 dramatic changes in climate are expected with average daily summer maximum temperature increases between 3.5 and 4.5 degrees (compared to 1971 - 2000 average), making a typical summer like 1998 (the hottest on record to date). All areas of the UK are anticipated to have increased winter rainfall and decreased summer rainfall. According to Houghton (2004), *“any increase in temperature in a variable climate will mean an increase in drought and flood”* (Houghton 2004 p161). The UK Climate Change Risk Assessment (Defra 2012 a) anticipates that a key consequence of climate change in the UK will be a substantial reduction in deployable output of water. Put simply, it is increasingly likely there will be times in winter when there is a surplus of water and times in summer when there is not enough. In the UK, the first area to notice the impact of this is expected to be the densely populated areas of southern England (Rance et al, 2012). There is increasing concern that if measures are not taken now to adapt to this future situation, potentially dangerous water supply failures may be common by 2035 (Charlton & Arnell, 2011).

This research takes as given that global warming is gradually increasing in intensity and that this is at least in part caused by human activity. Whilst climate skepticism tends to receive equal billing to scientific countenance of climate change phenomena in the media, the weight of scientific evidence for human induced climate change and the gravity climate scientists, economists, and policy makers, apportion to this subject provides a compelling and in some cases alarming argument for the human population on Earth, to act in unison on many levels, to curb greenhouse gas emissions substantially. Indeed so stringently that life as we know it is expected to change beyond all recognition. Popular literature on this subject (see for example; Pearce 2006, Monbiot 2006, Gore 2006, McIntosh 2008) tends towards alarmism and describes in detail the causes and potentially catastrophic effects of escalating greenhouse gas emissions, yet with a cautious uncertainty Pearce suggests:

*“After many generations of experiencing global climatic stability human society seems in imminent danger of returning to a world of crazy jumps. We really have no idea what it will be like or how we will cope. There is still a chance the jumps won’t materialise and instead the world will warm gradually, even benignly. But the chances are against it”*

(Pearce, 2006, p346)

Monbiot (2006) is gloomy about the outcome of political inaction to reduce greenhouse gas emissions by 90% by 2030 (what he considers is required) but optimistic that there are solutions available that will allow human society to carry on living in a warming world. For both Pearce and Monbiot, issue and chapter separate the predicted outcomes of climate change, and the longed-for changes scientists, technologists, and society, could make to address the problem. The separations help to define the problem in detail but also serve to scale a global issue down to distinct features allowing skeptics to fill the gaps with criticism. Hence in the past five years a plethora of conflicting media reports have pointed to discrete phenomena to confirm or deny climate change. For example Hartson’s (2009) *“The Most Costly Scientific Blunder in History?”* points to thriving polar bear populations and increasing polar ice (in parts) as an indicator that the science is wrong. And Swain’s (2007) *“You Have Been Warmed”*, forecasts a scorched Earth blighted by drought and endorses the notion of global warming as a potentially catastrophic phenomena that requires

drastic action to avert disaster. As a consequence it is reasonable to expect the readers of such publications to be confused about the existence of climate change, its causes, and what they can do to mitigate the problem. According to Whitmarsh (2011) the proportion of members of the public who are skeptical regarding the realities of climate change is increasing. Additionally there is potential to confuse matters further by introducing adaptation strategies, which may, on the surface, appear to have very little to do with carbon emissions. In the case of drought for example, saving water is a logical treatment for the problem of water scarcity (which may be caused by climate change or may have happened regardless of climate change). The fact that treating and pumping less water will result in fewer carbon emissions is less obvious to the end user. Slightly more noticeable is the impact of heating less water in the home to save not only carbon emissions but money also. Bringing these twin aims (mitigation and adaptation) closer together requires a more holistic approach to succeed where a sensationalist media prevails. An increase in new media technologies in recent years provides myriad ways of accessing and contributing information about climate change but as a consequence, O'Neill and Boykoff (2011) point to individuals becoming "*inundated and overloaded with information*". The difficulty of finding useful and trustworthy sources of information may hinder our progress in understanding and acting positively.

Aubrey Meyer considers the world as a global commons where the application of "*precaution and equity*" (Meyer, 2000, p18) or equitable sharing of scarce resources and a slow retreat from traditional energy sources (contraction and convergence) is key to a sustainable future on Earth. Everyone is included. It's one global problem for a global population. No one can escape; skeptic or believer. However, unsurprisingly, current methods harnessed to cut emissions and alter lifestyles and preferences for energy and resource hungry exploits are in direct conflict with the growth and consumption targets so highly prized in both developed and developing nations. Although it is worth noting that Stern asserts: "*stabilisation of greenhouse-gas concentrations in the atmosphere is feasible and consistent with continued growth.*" (Stern et al, 2006, p xi). Since 1992, successive Earth summits have failed to garner binding agreements from all states on emission reduction targets that are believed to be sufficient to slow global warming to a pace that human society can adapt to (Garvey, 2008). As a

result Gaia theorist James Lovelock suggests we should enjoy life on our over populated and consequently under resourced planet while we can, and look to ways of adapting to the inevitable;

*“Keep in mind that it is hubris to think that we know how to save the Earth: our planet looks after itself. All that we can do is try to save ourselves.”*

(Lovelock, 2009, p15)”

McIntosh (2009) argues that hubris equals pride which leads to violence and then to ecocide. In his opinion, human’s selfish consumerist ways are killing the planet and themselves and he adds a spiritual dimension to the debate, appealing to the soul. These issues and the political and policy arguments on this great global dilemma will re-surface later in this review but for now the perception of climate change as an inevitable consequence of human activity from which this research was developed is presented by Lovelock. For saving ourselves is a complex business and holding out for a quick fix for climate change that the world can agree on, or a temporary natural cooling, appears at present futile. Far from an every man for himself ethic, or a spiritual one, Lovelock advocates an emphasis on sustainability;

*“Even if some natural event such as a series of large volcanic eruptions or a decrease of solar radiation relieves us, it still will have been better to spend our money and our efforts making our countries self-sufficient in food and energy and, if we are to become wholly urban, then in making cities that we are proud to live in.”*

(Lovelock, 2009, p38)

Agreements on limits to climate emissions such as those proposed at the Kyoto Earth Summit may amount to *“nearly 20 years of merely gesturing towards meaningful cuts”* (Garvey, 2008, p124) but the concept of sustainability has a longer and possibly more meaningful history. The Bruntland Report (United Nations World Commission on the Environment and Development, 1987) provided a clear and now well used definition of sustainable development that takes into account the needs of future generations and the importance of ensuring that our actions in life do not compromise the lives of those that have not yet been born. In 2005, the UK Government outlined its vision of sustainable development and *“a future without regrets”* (HM Government, 2005,

p96) in the UK Sustainable Development Strategy. This strategy clearly identifies *“increasing stress on resources and environmental systems - water, land, and air”* (ibid, p13) and directly identifies the cause of this stress as consumption and waste, advocating a move to living within environmental limits. The strategy highlights the importance of the polluter pays principle, where the costs of environmental and social problems are covered by those who cause them. With the Earth’s population rising it is conceivable to imagine an entirely urban population by mid-century. Food, energy, and drinking water, are likely to be scarce commodities. Just as Lovelock is content that our efforts should focus on sustainable urban life, Newman (2006) gives a convincing account of the positive role of high-density urban areas in reducing global environmental impact and promoting resource efficiency. He describes sustainable development as being an *“approach created as a new kind of development that would allow present and future generations to benefit economically, socially, and environmentally”* (Newman 2006, p286), describing sustainability within an urban context as that carefully held balance between a reduced ecological footprint and improved quality of life (p 286). Newman’s argument for packing vast numbers of people into relatively small geographical locations, to minimise resource use and maximise recycling rates is somewhat convincing, particularly on transport and the fact that this approach leaves vast areas of land untouched and available for food production and water attenuation. However, he is quick to point out that existing wealthy western cities are not sustainable as they sprawl over much larger areas with fewer citizens per square kilometer. In contrast, the Bruntland Report favours the development of small and intermediate urban centres rather than mega cities.

Clearly ideas of sustainable futures and concepts for climate change adaptation and mitigation are packed with contradictions. How is it possible to have growth without consumption or to keep cities small as the population rises? Likewise the predicted effect of climate change can appear equally contradictory. Why will both flood and drought, and high and low temperatures be features of global warming? Having already stated that in a warming climate the incidences of drought are set to increase and in the UK drought will have the greatest impact in the densely populated areas of southern England, it is important to explain the significance of sustainability in the context of water management. Whilst it is

difficult to consider precipitation as a commodity, in urban environments water is piped, treated, in a potable state, to homes and businesses at a price. Its origin, a distant reservoir, underground aquifer, or perhaps even a desalination plant, is likely to be many miles from the point of use. Between the point of origin and the point of use a natural environmental resource becomes a regulated commodity and the anticipated effects of climate change combined with lifestyle change and increasing population density create the prospect of water scarcity and damage to nature caused by over abstraction from water catchments, and pollution (European Commission, 2007a, Environment Agency, 2009). According to the Environment Agency:

*“Sustainable development requires the ongoing protection of the water environment so that we can continue to use water as a resource in the long term, In turn, the use of water must never allow the long term health of the environment to deteriorate or be put at unacceptable risk.”*

(Environment Agency, 1998, p7)

In other words, for sustainable development to become a successful survival strategy in a changing climate, urban populations will have to live within specific resource limits. This implies an important connection between user and water provider that is more than simply pipe work. Knowing what amounts to a fair share of water is important in a warming world. However, clear methods of testing water users understanding of fairness and their commitment to adapt to fluctuating availability of water have yet to be developed and applied uniformly by the water industry in England.

#### 1.4 The English Privatised Water Industry: Coping with Water Stress

This thesis will examine carefully the relationship between the water industry and individual household water users, who are their customers. Privatisation of the UK water and sewerage sector swiftly followed the 1989 Water Act (House of Lords Science and Technology Committee 2006), and the water sector is now regulated by three agencies; Environment Agency, Drinking Water Inspectorate, and Water Services Regulation Authority (OFWAT). The Water Act 2003 handed power to the Environment Agency to regulate water abstraction rates to ensure resource management is sustainable. OFWAT oversees water companies in balancing metering, pricing, water saving

initiatives and infrastructural development (OFWAT 2010 a). Their combined efforts seek to ensure the demands of the European Water Framework Directive (European Commission, 2003) are met in that companies are required to ensure sustainability of commodified water resources for the benefit of people, without harming wildlife dependent on water as a natural environmental resource (Environment Agency, 2003); another seemingly contradictory goal. In line with this, the 2011 Water White Paper asks for reduced abstraction from rivers to protect the environment whilst acknowledging a growing population with increasing demands for water. It seeks to achieve this through innovation in the water sector without increasing the cost of water to a prohibitive level (Defra 2011 a p8).

According to Taylor et al (2009), *“water stress is becoming a permanent feature of life in Britain and other developed societies.”* A country that is water stressed is defined as experiencing *“withdrawal exceeding twenty percent of renewable water supply”* (Houghton, 2004, p157). In England, the Environment Agency has sought to measure the severity of water stress across the water sector using a scoring system based on current and future demand for water, projected population growth, and effective rainfall based on 1971 - 2000 average. Naturally, just as population growth is not uniform across England, precipitation and water storage options are variable also. The Environment Agency system identifies areas of low, moderate, and serious water stress. Over half of water companies in England spanning the majority of the south eastern area of the country are now classified as seriously water stressed, with the exception of Veolia Water East (previously Tendring Hundred Water), which has a lower classification of moderate, due to successful efforts the company has made to reduce water demand by introducing metering to 70% of households and minimising leakage down to the lowest level in the UK water industry (Veolia Water, 2012). South Staffordshire, Severn Trent, and South West Water companies are all considered to be moderately water stressed and a further six companies, mainly in the north of England but also including Wessex and Bristol Water are considered as low water stress areas. A complete list of companies and their designations is shown in Table 1. These calculations highlight the mismatch between the perception of the UK as

generally wet and the availability of potable water for household and industrial use. The Environment Agency takes the view that:

*“In designating areas as water stressed, we have taken into account that water is a scarce resource across England. We believe that even in those areas designated as “low” water stress, there should be some activity to ensure that water is used more efficiently. Water companies and water users cannot disregard the environmental consequences of their abstractions and energy use.”*

(Environment Agency, undated, p2)

While warmer does not necessarily equate directly to drier, the prospect of drought manifesting more frequently makes research into its impact in England a comprehensible proposition. Particularly as balancing demand and supply through a combination of metering and pricing, infrastructural development, and customer awareness of water scarcity and water saving initiatives, has been the focus of drought planning in the water industry to date (OFWAT 2010). At the same time, reducing carbon emissions has also been placed on the industry’s agenda (Defra, 2008, OFWAT, 2008) and home energy saving initiatives now include advice to householders to reduce their use of hot water as a way of saving energy (Energy Savings Trust, 2012). Acknowledging the need to reduce demand and thereby contribute to climate change mitigation as well as adaptation strategies, the Government has set a target to reduce per capita water consumption from an average of 150 to 130 litres per day, by 2030 (Defra 2008). Additionally, amendments to UK building regulations in 2010 seek to ensure that newly built properties limit per capita consumption to a maximum of 125 litres per person, per day (However with per capita demand in existing homes higher than average (160 litres per person, per day), in the southeast of England (Riley and Openshaw, 2009), the importance of fostering a water saving culture cannot be ignored (European Commission 2007 b).

**Table 1.**

Water Stress Designations for England

Source: The Environment Agency (undated) & Ofwat (2012)

<b>Water Company Area</b>	<b>Classification</b>
Essex & Suffolk Water	Serious
Veolia Water South East (formerly Folkestone and Dover Water)	Serious
Southern Water	Serious
Thames Water	Serious
Veolia Water Central (formerly Three Valleys Water)	Serious
Portsmouth Water	Serious
Sutton and East Surrey Water	Serious
Cambridge Water	Serious
South East Water	Serious
Mid Kent Water	Serious
Semcorp Bournemouth Water, (formerly Bournemouth and West Hampshire Water)	Serious
Anglian Water	Serious
South Staffordshire Water	Moderate
South West Water	Moderate
Veolia Water East (formerly Tendring Hundred Water)	Moderate
Severn Trent Water	Moderate
United Utilities	Low
Bristol Water	Low
Northumbrian Water	Low
Yorkshire Water	Low
Cholderton and District Water	Low
Wessex Water	Low

### 1.5 Drought and Climate Change in England

The phases of drought have multiple definitions and Glantz (1977) has argued that there should be two components to each drought definition, one meteorological and the other sociological. In the absence of a universally agreed definition combining these two aspects, for the purpose of this research the combined phases of drought will be taken to mean a natural reduction in rainfall which is exacerbated by timing i.e. seasonal variations in temperature, high winds, low humidity, and seasonally fluctuating human demands on water supplies. Combining natural climate variability and environmental and anthropogenic factors, a drought has four distinct and often overlapping phases beginning with the meteorological phase that is considered to be a “*normal recurring feature of climate*” (Wilhite 2000 p8). The key characteristic of meteorological drought is a reduction in the intensity and frequency of precipitation. The length and severity of meteorological drought is dependent on factors such as air temperature, relative humidity, and wind speed. The associated impacts of a lengthening period without precipitation, extends to agricultural drought where a gradually increasing soil moisture deficit impacts on crops and vegetation. The hydrological drought phase follows as river flows decrease and ground water reserves diminish. The final phase in a drought cycle is socio-economic drought. In this phase the impact of reduced water supplies and crop yields, and restrictions on non-essential uses of water, force the public to adapt to rising food prices and alter their daily water-based regimen. The length of the socio-economic drought phase is dependent on both physical and environmental factors, as well as behavioural ones. How effectively water users can limit their demand in order to give rivers, aquifers and reservoirs time to replenish when the meteorological phase ends is key to speeding up or slowing down the recovery process. The time of year is also important. If a meteorological drought such as the most recent one in southern and eastern England lasts throughout the winter period, only breaking in late spring as air temperature is rising and day length increases radiation exposure and vegetative growth, the recovery period will be long and slow, as precipitation tends to be evenly balanced against evaporation from soils and open water sources and transpiration from plants. In other words, what comes down, goes straight back up without percolating down into groundwater reserves. (Wilhite 2000, Environment Agency 2012 *b*, Met Office, 2012 *a*). Heavy rains do not tend to improve the situation initially because the land is dry

and hard to penetrate and much of what falls runs straight into rivers and eventually out to sea. The efficiency and robustness of water company systems are also critical factors contributing to the length and severity of socio-economic drought (Environment Agency, 2012). Water users' actions in these periods are critical to the long-term viability of water supplies. Applying and relaxing water saving activities in time with the weather is less effective than taking a precautionary approach in case of a drought, and continuing to save water long after a hydrological drought has broken. However, water customers do not always know what to do, or when to do it.

Marsh et al (2007) have identified over thirty drought episodes in England and Wales between 1800 and 2000, including ten long droughts lasting over one year; the predominant characteristics of which were clusters of repeated dry winters. In the 20<sup>th</sup> Century the notable droughts impacted predominantly in England and Wales, particularly in eastern areas. Towards the end of the century, exceptionally high temperatures in summer characterized the droughts of 1990 – 1992 and 1995 – 97. More recently, a severe drought was triggered by an unusually dry and warm spring, summer and autumn in 2003 followed by low rainfall in the south east in 2004 which developed into a sustained period of drought conditions that lasted until early winter 2006/07 (Marsh, 2007). During the course of this research, the south and east of England suffered a 27 month period of drought between December 2009 and March 2012 which was also sustained by two exceptionally dry winters (Environment Agency, 2012). This drought coincided with a sustained La Nina period. La Nina being the cold counterpart to El Niño, which is caused by an enhanced pressure gradient between the eastern and western pacific which helps to develop extraordinarily strong trade winds (NASA, 2012, Met Office, 2012 *b*). However, a change in weather patterns over the past 30 years has shown winter rainfall in general to be 10% above the previous average and summer rainfall 10% below (Environment Agency, 2012).

UK climate projections continue to indicate that summers will be hotter and drier and winters wetter. It is too soon to say whether the two severe droughts in the past ten years that do not fit with the projected pattern of short summer droughts and wet winters, are indicators of another change in climate and

associated weather patterns, or are simply the product of a lengthy La Nina period. Using the medium emissions scenario A1B, the UK Climate Impact Projections predict that by 2080, relative to a 1961 - 1990 baseline, summer precipitation in the far south will have reduced by 40% and skies over southeast England will be clearer, with relative humidity decreasing by approximately 9% (UKCP09, July 2009). Sheffield and Wood (2008) use multi-model, multi-scenario IPCC AR4 simulations to project changes in drought occurrence due to acceleration of the hydrologic cycle and capacity of the atmosphere to hold moisture as temperature increases, showing an increase in four to six month drought periods in northern Europe. Research completed on behalf of Defra (shown in Table 2.) provides an overview of the potential impacts of climate change on drought in the UK. Arnell and Delaney (2006) also list several potential impacts on the water supply system from climate change including changes in the frequency of low flows and recharge, which may increase the number of flooding incidents and turbid flows causing saline intrusion at abstraction points. Water supply infrastructure may be weakened altering reservoir safety, and potable water quality may be affected because large fluctuations in the flow of water into treatment works will impede the smooth operation of facilities designed to bring raw water up to potable standards. Ultimately these potential impacts may mean demand for potable water at peak times cannot be met and the consequences for the water supply industry are notable and of considerable interest to the Environment Agency, which seeks to ensure natural aquatic resources are not harmed by over abstraction or pollution. At the same time OFWAT is keen to ensure continuity of supply to customers and to protect water customers from over pricing, which is a likely outcome associated with scarcity.

**Table 2.**

Expected Impact from successive drought phases, adapted from Wade *et al* (2006)

<b>Drought Phase</b>	<b>Changes</b>	<b>Impacts (do nothing)</b>
<b>Meteorological</b>	<p>Two-fold increase in dry summers</p> <p>Increase in frequency of 'short' droughts</p> <p>In southern England, short droughts would occur two and three times as frequently in the 2020s and 2050s compared to the 1961 – 2000 period</p> <p>Little change in frequency of consecutive dry winters</p> <p>Increased summer soil moisture deficits</p>	<p>More frequent activation of drought planning activity</p> <p>More frequent drought permit and/or order applications due to 'exceptional' shortages of summer rainfall</p>
<b>Agricultural</b>	<p>Increased summer soil moisture deficits</p>	<p>Increased demand for water for agricultural crops, particularly for potatoes and horticulture.</p> <p>Reduction in irrigation on low value crops</p> <p>Social and economic impacts on food production</p>
<b>Hydrological</b>	<p>More frequent low flow conditions in sensitive catchments with low base flows</p>	<p>Reductions in water availability for public water supply, irrigation and the environment</p> <p>Environmental impacts on water quality, fisheries and ecology</p>
<b>Drought Phase</b>	<b>Changes</b>	<b>Impacts (do nothing)</b>

Phase		
<b>Socio-economic</b>	Increase in peak demands for water Water shortages in vulnerable water resource zones with limited storage (groundwater and reservoirs)	Reductions in security of supply and/or water company levels of service Activation of drought planning activities as the 'norm' More frequent demand restrictions Social and Economic impacts

### 1.6 Water Company Management and Drought Plans

Defra's vision for the water industry in 2030 is a sustainable supply-demand balance across England with no seriously water stressed areas, with water companies actively encouraging demand management to protect customer and environmental needs (Defra 2008, p23). Section 62 of the Water Act 2003 (HM Government, 2003) requires water companies to produce water resources management plans, review them annually, and to revise them every five years. The Secretary of State can direct on issues to be considered as part of these plans. Water companies are also required to publish drought plans and manage supplies to cope with peaks in demand. The regional variability of water resource management strategies of different water companies are a reflection of the differences in rainfall patterns, storage capacity, geology, land use, and water demand in their geographical locations, which Johnson and Handmer (2002) have noted are consistent with a northwest to southeast gradient where in the northwest of England, precipitation rates are higher, demand for water is lower and groundwater storage capacity is low, compared with the southeast of England where precipitation is low, demand is extremely high due to density of population and groundwater storage capacity is high. Thus the ability of water companies to meet demand is less compromised than might be expected. The result is regional variation in the availability of water, the type of storage facilities and the demand on the available resource. Therefore it is reasonable to expect similar regional variations in management strategies to ensure domestic supply security.

Alongside a requirement to promote water saving, the Water Industry Act 1991 (HM Government, 1991 a) and subsequent amendments permit water companies to impose hosepipe bans. They may also apply for drought orders from the Secretary of State that allow a greater number of restrictions on non-essential uses of water, and drought permits from the Environment Agency that allow for increased water abstraction rates from existing and additional sources (Defra 2005). As a drought slowly manifests and careful management reduces the possibility of water rationing to a very late stage, the effects can initially go unnoticed by the public, who may understandably become resentful if asked to reduce their water use (Bakker, 2000). This is particularly evident when water companies remain in profit, and widespread leakage, where it is considered by water companies uneconomic to fix and replace pipes, is widely observed by water customers (Haughton, 1998, Bakker, 2000, BBC, 2006, Taylor et al, 2009). The 1995 drought hit hardest in West Yorkshire but as Bakker (2000) points out, this was due to a combination of poor management decisions by the then privatised water company, Yorkshire Water. In particular, Yorkshire Water's reluctance to tackle leakage problems which were much worse than estimated and increased demand from customers whose profligate use of water was influenced by a dislike for the company whose profits were increasing. A swift depletion of reservoir resources ensued and these were not naturally replenished due to a severe lack of spring and summer rainfall. Having implemented drought orders and hosepipe bans every year except for 1993 since privatization in 1989, it was not immediately obvious why the water company managers did not attempt to introduce more robust water supply policies that had already been suggested by the regulator, or to attempt to reduce leaks, which turned out to be equivalent to household demand. As a result, customers were not prepared to implement water-saving activities as they attributed the primary cause of the drought to bad management. This combination of factors meant that the water company came very close to a complete failure of supply to West Yorkshire.

During the 2004 to 2006 drought, hosepipe bans were implemented by seven English water companies and although two of these companies also applied for drought orders to further restrict non-essential water use, these orders were not

implemented. This was partly due to an unwillingness to implement more severe restrictions on their customers to avoid criticism. The details of restrictions and their duration are shown in Table 3. Responses to a Defra consultation in 2006 revealed a high level of cynicism of the use and interpretation of these powers, particularly on the subject of hosepipe bans for garden watering and car-washing, that did not extend to cover other activities such as patio cleaning and filling swimming pools (Waterwise, 2006, HM Government, 1991 *b*). This criticism was reviewed after the 2004 – 06 drought, and development of the Flood and Water Management Act 2010 (HM Government, 2010) provided a mechanism - the Water Use (Temporary Bans) Order 2010 - allowing water companies to temporarily ban specific activities with greater precision than that afforded by the Drought Directive 1991. The Drought Direction was also revised in 2011 (Defra, 2011 *b*) to tackle some of the anomalies that confused and annoyed the public and to provide clarity for commercial businesses, such as those in the horticultural sector and services where the action imposing restrictions would have a severe impact on their ability to continue to operate, or where limiting water use could compromise basic health and safety procedures. Whilst these clarifications are very helpful for those directly involved, they are still seized upon as contradictory or unfair measures by those who are not delegated special privileges for water use when restrictions are in place.

### 1.7 Fairness and the Demand-Supply Situation

The perception of fairness and equality regarding access to and use of water is an important factor that this thesis will return to time and again but at this juncture it is important to describe the tensions that exist between water supplier and water user during socio economic drought episodes.

#### **Table 3.**

2004 – 2006 Southeast England drought water restrictions by company

<b>Company</b>	<b>Restriction</b>	<b>Area affected</b>	<b>Effective from</b>	<b>Lifted on</b>
<b>Sutton and East Surrey Water</b>	Sprinkler ban	Company – wide	21 <sup>st</sup> March 2005	18 <sup>th</sup> January 2007
	Sprinkler and unattended hosepipe ban	Company – wide	22 <sup>nd</sup> April 2005	18 <sup>th</sup> January 2007
	Hosepipe and Sprinkler ban	Company-wide	1 <sup>st</sup> March 2006	18 <sup>th</sup> January 2007
	Non-essential use ban	Company-wide	27 <sup>th</sup> May 2006	15 <sup>th</sup> November 2006
<b>South East Water</b>	Hosepipe and sprinkler ban	Kent and Sussex	30 <sup>th</sup> July 2005	7 <sup>th</sup> February 2007
	Hosepipe and sprinkler ban	Company-wide	3 <sup>rd</sup> April 2006	7 <sup>th</sup> February 2007
<b>Mid Kent Water</b>	Hosepipe and sprinkler ban	Company-wide	8 <sup>th</sup> August 2005	28 <sup>th</sup> February 2007
	Non-essential use drought order granted	Not implemented	25 <sup>th</sup> May 2006	
<b>Thames Water</b>	Hosepipe and sprinkler ban	Company-wide	3 <sup>rd</sup> April 2006	18 <sup>th</sup> January 2007
<b>Company</b>	<b>Restriction</b>	<b>Area affected</b>	<b>Effective from</b>	<b>Lifted on</b>

<b>Southern Water</b>	Hosepipe and sprinkler ban	Sussex North	10 <sup>th</sup> June 2005	18 <sup>th</sup> January 2007
	Hosepipe and sprinkler ban	Sussex Coast	11 <sup>th</sup> July 2005	18 <sup>th</sup> January 2007
	Sprinkler and unattended hosepipe ban	Hastings, Kent Thanet & Kent Medway	11 <sup>th</sup> July 2005	18 <sup>th</sup> January 2007
	Hosepipe and sprinkler ban	Sussex Hastings, Kent Thanet, Kent Medway	30 <sup>th</sup> July 2005	18 <sup>th</sup> January 2007
	Hosepipe and sprinkler ban	Isle of Wight	15 <sup>th</sup> March 2006	25 <sup>th</sup> November 2006
	Non essential use drought order granted	Not implemented	25 <sup>th</sup> May 2006	
<b>Folkestone and Dover Water</b>	Hosepipe and sprinkler ban	Company-wide	3 <sup>rd</sup> April 2006	2 <sup>nd</sup> October 2006
<b>Three Valleys</b>	Hosepipe and sprinkler ban	Company-wide	3 <sup>rd</sup> April 2006	18 <sup>th</sup> January 2007

The Water White Paper published in December 2011 (Defra 2011 a) advocates fair distribution of natural water resources between water companies who have a duty to supply fresh potable water and sewerage services, on demand, to a rising population, and also to sustain wildlife environments that are increasingly

under threat of degradation. At the same time the paper advocates a dynamic water management sector that despite being based on inherently unpredictable resources is a low-risk option for investors. Finally it looks to water companies to incentivise 'water wise' behaviour (using less) and at the same time to meet shareholders' financial expectations with potentially reducing revenues, whilst maintaining low prices for customers. (Defra 2011 a, p8). These contradictory drivers highlight the difficulty in viewing water as both a natural resource and a universally available commodity.

In England, water companies have to date exploited their monopoly status by investing in infrastructure to secure supplies. The steady increase in single person households and water appliances and gadgets, drives demand for water (House of Lords Science and Technology Committee, 2006). In times of drought, a "*socially produced scarcity*" (Bakker, 2003, p28) brought about through increasing demand conflicting with the need to protect nature provides an opportunity for water companies to argue successfully for infrastructure investment. Improving infrastructure to increase water availability in turn leads to greater confidence in supplies and more water use. As Kallis (2010, p800) points out, water companies benefit from selling more water to their customers. Ultimately, it is best for water companies to ensure there is sufficient infrastructure to maintain confidence in supplies most of the time and only to introduce prohibitions of water use when a hydrological drought phase is evident (Kallis, 2008, p101).

### 1.8 Public Perceptions of Drought: Discourses and Preparedness

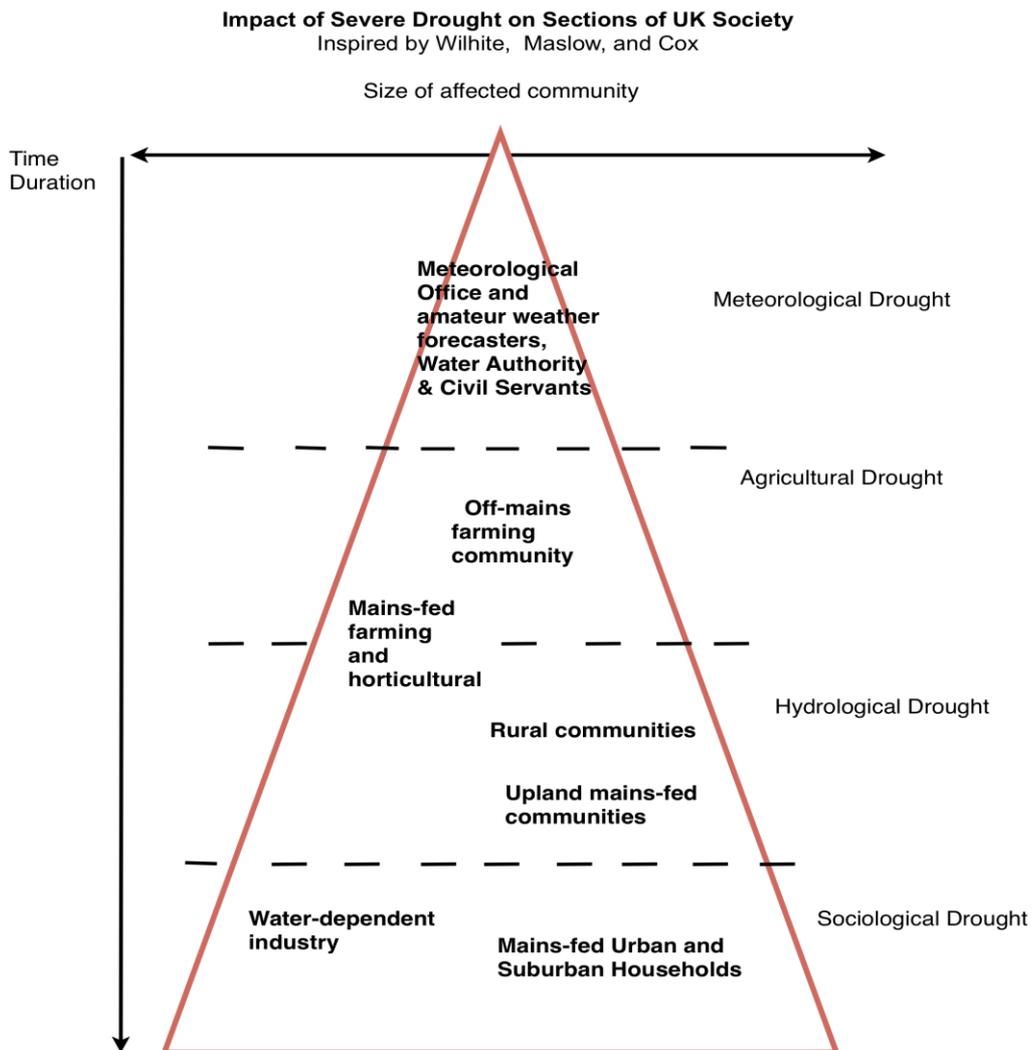
The socio-economic element of a drought tends to give rise to media discourses that imply confusion rather than understanding of weather and climate. Publishing details of how hosepipe bans are to be interpreted (for example Cochrane, 2012) has become a regular feature of the media approach to water restrictions. A common feature of recent drought has been the mismatch in timing between the dry and hot weather associated with drought and prohibitions of water use such as hosepipe bans, which are often implemented only marginally before the weather breaks and remain in place until enough rain has fallen to refill reservoirs and underground aquifers. Household water users

however, struggle to accept water rationing while it is raining. The recent drought affecting Yorkshire and North West England in 2010 was caused by a six-month period of abnormally low rainfall from January to June but the impact on water supplies did not become apparent until early July when the water provider, United Utilities, imposed a hosepipe ban. The ban lasted until August 19th, during which time it mostly rained (United Utilities 2010). Towards the end of the 2004 - 2006 drought in Southern England, commenting on the seemingly ill-timed water restrictions, Paul Seeley, Director of Mid Kent Water exclaimed in an interview *"This is the wettest drought in history"* (Watkins, 2006). Thames Water executives made a similar comment to this at the end of the 2012 drought (Wipple, 2012).

At the end of the long drought of 1975 - 76 the newly appointed Drought Minister, Denis Howell, was heavily criticised by the people of North Devon and a petition was launched calling for the head of the regional Water Authority to be sacked, as rain fell on streets where residents were forced to collect their water from standpipes (Anon, 1976). Despite the public reducing their water use by 45% (Gardiner, 1980), a combination of visitor pressure, limited water storage facilities, and a public that was so used to hose pipe bans in summer they did not fully appreciate the severity of the drought, prolonged the water restrictions for a considerable period after the meteorological drought had ended. These common features of public behaviour with regards to water use before, during, and after a drought; from apathy towards water conservation during wet weather, to complacency while water reserves are still plentiful, to panic and blame when shortages become apparent, has been described by Wilhite (1992) as the *"hydro-illogical cycle"*. Wade et al (2006) suggest there are a number of barriers and potential solutions to this problem. Confusion about where a drought begins and ends and its severity due to the slow accumulation of effects, timing, and the extent of populations, they say, can be limited through persistent and updated communications. Glantz (1977) however concludes that repeated communications to the public may not have the desired effect. In observing the Sahel as an example of an area that had experienced meteorological and agricultural drought over a sustained period, exacerbated by human and animal population pressures, he notes that the importance of water to different sections of a population can serve to diminish or increase the

importance and impact of a drought forecast, even if it is entirely accurate and given in advance. The progression of a drought through its phases and those affected in each phase are described pictorially in Diagram A below.

**Diagram A**



Inspired by Wilhite's (2000) diagram of the phases of drought, Maslow's (1968), hierarchy of need, and Cox's (1978) published diary of the 1976 drought, this diagram shows that the volume of actors that are affected increases over time and that some actors are involved and aware of the impact of drought much earlier than others. The diagram allows for the concept of a drought to be

viewed from more than one perspective and these shall be explored further in the next section.

### 1.9 Weather, Weather Memories, & Extreme Events

In 2009 the Met Office Hadley Centre issued a decadal forecast that *“at least half of the years after 2009 are expected to be warmer than the 1998 record”* (Met Office, 2009). Pearce (2006) points to 1998 as a critical year, not only the warmest in the twentieth century but one of *“exceptionally wild weather”* (Pearce 2006, p55), around the globe. An intense El Niño period brought flooding in the East African dry season and drought in the rainforests. Forest fires claimed vast areas of natural habitats, thousands of people suffered famine, and mudslides washed whole communities away in California (Ibid, 2006). According to the Intergovernmental Panel on Climate Change (IPCC), El Niño – Southern Oscillation events are consistent with extremes of the hydrological cycle (drought and flood) and these are increasing in frequency and intensity with global warming. The water cycle is intensifying and becoming less predictable (IPCC, 2007). Around one hundred and eleven thousand cubic kilometres of rain falls on land annually (Houghton, 2004, p155) but this does not fall evenly around the world. As the climate warms evaporation and precipitation increase alongside the likelihood of extreme weather events.

Logically, it is only possible to gauge whether the climate is changing by looking at past weather records. The denotative of climate is *“Average weather and its variability over a period of time, ranging from months to millions of years.”* The World Meteorological Organization standard is a 30-year average (Met Office, 2010). Climate change is described as *“a change in the climate’s mean and variability for an extended period of decades, or more”*. According to Simons (2008), Britain has the longest weather records in the world with temperature readings from as far back as 1659 and rainfall measurements for England and Wales dating back to 1766. Historically our weather record is full of surprises and unexpected extremes. In August 1843, a hailstorm swept across the Midlands and East Anglia leaving 23cm diameter hailstones 1.5 metres deep on the ground. In 1891 snowfall on Dartmoor in Devon was heavy enough to completely fill a 30-metre deep ravine. Two years later almost the whole of

Britain was gripped in a drought where rain did not fall at all from March to May in most parts. In 1944, a deluge of rain hit Holmfirth in the Pennines, swelling the river Holme to a point where it burst its banks, sending a 2.5 metre high torrent of water raging through the town, tearing up buildings, factories and homes. (Simons 2008). More recently, on August 16<sup>th</sup> 2004, in four hours, 200mm of rain fell around the village of Boscastle in Cornwall (Burt et al, 2005). The rainwater flowed into the river Valency and as a consequence, 2 billion litres of water rushed down the valley, flooding the villages and washing away bridges, buildings, trees, and cars (Met Office, 2004). The topography and dry July keeping the soil dry, contributed to the outcome (Golding, 2005). On October 30<sup>th</sup>, 2008, in just two hours, 30 centimetres of hailstones fell on the town of Ottery St Mary in Devon. Cars were trapped in 1.8 metre deep drifts that blocked drains and caused flooding when it subsequently began to rain. People were evacuated from their homes as the floodwater reached 1.5 metres deep and the river Otter burst its banks. (Graham et al, 2009). It is not a simple task therefore to discern whether the British climate is changing, when extreme weather events have been both recorded and repeated in the recent past.

Talking about the weather is a British obsession but according to Harley (2003) our memories play tricks on us when remembering hot summers, which we apparently assume are only ever in the distant past, even when records show that four of the twelve hot summers since 1900 were recorded in the past fifteen years (Harley 2010, Met Office 2010). Hot summers are by Harley's estimation those where the average temperature between June and August is above 16.5 degrees Celsius. Table 4. shows when the hottest summers since 1900 have occurred. The fact that meteorological drought can occur in any season, hot, warm, or cold, and socio-economic drought continues long after the meteorological drought has broken, makes this type of extreme hydrological event appear less so because of the length of time it takes to impact on human society in urban settings. Whether memories of drought can be similarly inaccurate as memories of hot summers, has rarely, if ever been researched in the UK.

**Table 4.**

Harley's Hottest Summers (June – August) in the last century, extended to include the period 2000 to 2009.

Year	Mean Summer Temperature (degrees Celsius)
1976	17.8
1995	17.4
2003	17.3
2006	17.2
1983	17.1
1947	17.0
1933	17.0
1911	17.0
1975	16.9
1997	16.6
1959	16.6
1955	16.5

#### 1.10 Publics and Drought

A common collectively held perception of drought in an affected urban community relates to water as a public good, a shared resource that is in scarce supply. This is in stark contrast to the mainly private and individually held perceptions of water as a resource when it is in plentiful supply. Researching drought therefore requires the researcher to be careful to distinguish between ‘the public’ in the media, which is an assumed collective voiced by journalists, and its members who are individual citizens, independent actors with personal motivations that may not always reflect the collective sentiment. In a drought, the media takes on the task of voicing its public’s opinion and public officials seek to advise this constructed entity. Water companies follow suit but at the same time are linked to members of the public that are their customers, who are in turn advised by consumer groups regarding their rights. Dewey (1927) asserted; *“The Public consists of all those who are affected by the indirect consequences of transactions to an extent that it is deemed that it is necessary to have those consequences systematically cared for.”* This *“Phantom Public”* (Lippmann, 1930) is therefore both water consumer and water conserver, with a moral obligation to limit its use of a scarce commodity that it is their right to access at an affordable price. Appealed to through the moralization of water

consumption this public of water customers/users is expected to do the right thing and at the same time to expect to be treated fairly by water suppliers. Yet Lippmann (1930), in his response to Dewey believed that it is an inescapable truth that the public is only concerned with allaying crises rather than doing justice or promoting good. This is possibly why attempts to educate water users generally become attempts to alter public opinion. It is important to note this because this research is concerned both with public opinion and the opinions of individual water users, as their concerns and perceptions of drought and climate change may be expressed differently, even though these publics are one and the same.

In the UK, persuading citizens that they have a moral obligation to use natural resources sparingly falls into the remit of the Department for Environment, Food, and Rural Affairs (Defra). Recently, Defra has begun to acknowledge that; *“Engaging and nurturing key individuals may be more effective in bringing about system-wide change than targeting the behaviour of all individuals.”* (Darnton *et al*, undated p6). Citing *“real world”* examples (Darnton, undated, p50), as opposed to stereotyped versions of the public, it is clear that there is some dissatisfaction that standard attempts to encourage new habits to combat environmental problems such as climate change, have not worked convincingly in the past and this will be explored further in chapter two. This is unsurprising as the majority of public water dialogue often leans towards consumer rights and affordability rather than ethical and environmental arguments. In the case of consumer groups such as the water industry funded Consumer Council for Water (CC Water), cost and service delivery win over nature. The organisation’s thoughts on the 2012 drought cover the protection of supplies for drinking, washing and cooking; the provision of clear explanations for water restrictions, reductions in leakage; and a commitment from water companies to *“do everything they can to ensure there are not more serious restrictions if there is another dry winter”* (CC Water, 2012), as if they might control the hydrological cycle itself. In contrast, Waterwise, an independent non-governmental organisation aims to promote water efficiency to protect the environment. Waterwise is part of a coalition of organisations called *Fairness on Tap*, which is attempting to ensure that 80 percent of English households have a water meter fitted to encourage efficient usage, and at the same time to ensure that water

company tariffs are affordable thus gaining “*a fair deal for water – for both customers and the environment.*” (Garner et al, 2011). Where water companies feature in this fair deal is not clear but the dual aspects of a general water dialogue are evident, as they are in the recent water white paper; *Water for Life* (Defra, 2011 a), which highlights the conflicts between meeting demand by abstracting ever more water from rivers and aquifers, whilst maintaining the environment for wildlife, and educating ‘the public’ to use less whilst ensuring it is affordable and available to everyone, and provided by a dynamic water sector that is attractive to investors, despite it not being in their interests to sell less water to their customers (Kallis, 2008).

Despite Defra’s acknowledgement of the importance of addressing the individual, much of this rhetoric addresses the public on the basis that changing consumption practices requires their educating as consumers, with predominantly information-led strategies that convey distinct ethical overtones. But as Clarke et al (2007, p232) argue, if we consider consumerism to be based on a culture of “*individualized, egotistical self-interest*”, then ethical campaigns such as those designed to encourage water saving for environmental benefit, are generally aimed to speak to the already informed, not to convert the uninformed, promoting a series of “*calculable acts*” (Clarke et al 2007 p236), such as saving water to save money, rather than speaking to citizen consumers with specific ethically motivated identities. As Slocum (2004) notes, this is mirrored in climate protection campaigns in the United States, where the individual is constituted as a citizen consumer by neoliberal discourse which normalises the value of saving money by using less energy and thereby reducing greenhouse gas emissions. Whilst consumer advocacy is not considered by Slocum as an appropriate medium through which to seek fair treatment for the consumer as well as the natural environment, she suggests that in some cases consumer politics can highlight previously overlooked situations and prompt governments to investigate and regulate (Slocum, 2004 p767). In the case of water, the use of an ethical argument for the protection of the environment will be considered carefully in this research because ethical campaigns are logical when a consumer is asked to buy a specific product with appropriate credentials, such as fair trade goods but it is harder to remain an ethical consumer in the context of water when a key aim is to consume less.

Away from public gaze, the individual water customer/user can view him or herself as a victim of high prices and/or poor service, or a morally just person who only consumes the minimum amount of a precious natural resource, and each identity may be used interchangeably for personal convenience.

In contrast to the idea of the consumer citizen, electing to use less water to conserve resources for people and for nature might be considered a characteristic of ecological citizenship (Dobson, 2003). The Environment Agency considers itself as a spokesperson for “*the environmental aspirations of water-bill payers*” (Environment Agency, 1998 p2) who in 1998 were shown through a poll of 200 organisations to place far higher emphasis on the need to protect aquatic environments for environmental reasons than to keep water prices low. Whether water customers feel the same way today would need to be tested. Recent research completed on behalf of OFWAT appears to reveal customer endorsement of paying more for water now to ensure that adequate investment is made in infrastructure to protect water resources for the future. (Creative Research Ltd, 2011). However, at this stage the author treats these revelations with a healthy amount of skepticism. A critique of the research methods used to garner this response can be found in Pearce et al, 2013, which was written during this research project and is reproduced in Appendix A. This paper describes in detail the inadequacies of qualitative data analysis commonly found in studies based on mixed methods, that either result in basic description and the segmentation of subjects into groups sharing specific observed characteristics, or attempt to verify the researcher’s findings by clumsily suggesting other works that identify similar behaviours and characteristics. Following Dobson’s prescription, in the context of water use, an ecological citizen at the most basic level would be aware of and prepared, to limit their ecological footprint; would not draw upon fossil water if it might affect future generations, would have a good understanding of the water cycle, climate, and how their actions in the UK may impact environments far from where they are based. And most importantly would only use the amount of water they need rather than as much water as they want to because it is there, regardless of whether they can afford to use more, or are going to financially benefit from doing so. Such citizens would always be alert to the development of a drought situation and ensure they did not take more than their fair share of

water, to avoid depriving other citizens and nature. In other words, a selfish person cannot be an ecological citizen and to go looking for citizens that do or do not bear these traits would be one way of researching this subject. However, it is worth considering whether any or all of these characteristics might be switched on and off at will by the bearer, and if highlighting the inadequacies and changeable natures of individuals is a worthwhile and useful activity from which implementable actions can be developed.

It is also important to consider whether any ecological citizen that exists will perceive the threat of impending water shortages. Having already mentioned Wilhite's interpretation of general behaviour during drought periods as the hydro-illogical cycle, where little is done until it is too late, it is important to understand how whole populations can become victims simply by not being aware of processes of change that develop very slowly. This, to a certain extent necessitates the observation of nothing whatsoever for a sustained period of time. Diamond (2005) applies the term "*creeping normalcy*" (Diamond, 2005, p 426) to the slow-building threat of environmental disaster. Using the inhabitants of Easter Island, who chopped down more and more trees until the forest could not be sustained, Diamond explains how changes in forest cover were probably undetectable from year to year and only the eldest members of society, looking back to childhood, would probably have noticed. At the time the islanders employed correct reasoning, placing their immediate needs in front of unanticipated future problems. Every time a tree was cut down it represented a small loss borne across the whole island population but a big gain to the individual. However, over time the cumulative losses created a life-threatening problem that could not be solved. It was a typical example of a commons tragedy bought about through group denial that could only be identified in retrospect.

*"Thus human societies and smaller groups may make disastrous decisions for a whole sequence of reasons: failure to anticipate a problem, failure to perceive it once it has arisen, failure to attempt to solve it after it has been perceived and failure to succeed in attempts to solve it!"*

(Diamond, 2005, p 438).

Erlich and Erlich (2013) have recently highlighted how human civilizations have evolved to combat obvious and immediate threats rather than to sense and act on slowly building background problems, and the necessary global behaviour change required to avoid global societal collapse caused by over use of natural resources. Fortunately, unlike the people of Easter Island, in the UK, the managers of privatised water companies and the Water Services Regulation Authority (OFWAT) already perceive the threat of climate change and its potential impact on water supplies. Commenting on water industry climate adaptation strategies, Defra outlines the potential threats:

*“This is a major concern for the majority of companies, that demand will outstrip, or put a strain on supply, derived from combination of warmer weather, increased demand, evapotranspiration, competition from other water users, and reduced availability of the resource (less rainfall). This risk is multiplied by the concern that climate change could affect silting of reservoirs in heavy rainfall, increased incidence of algal blooms on reservoirs in warm weather, and heavy rainfall contributing to more pollutants finding their way into aquifers.”*

(Defra, 2012 p 135)

At the same time Defra is critical of the industry focus on demand reduction rather than the government’s preferred “twin-track” approach of a mix of infrastructure development and demand management, calling for water company staff and their customers to be “*educated on the importance of adaptation*”, (Defra, 2012 p142) and for more research into the risk posed by extreme events such as multi-year droughts. Defra’s leaning towards demand-side management and a general belief in education for behaviour change has been criticised by academics as being largely unproductive. Van Vliet et al (2005) for example argue that household consumption of resources such as water and energy is part of the practices of every-day life and that too many barriers continue to exist around these practices that prevent the individual from adapting to changes in climate by simply using less. They point out that water and energy are not conventional commodities but the levers for specific services such as bathing and laundering which “*each have a trajectory and a dynamic of their own*” (Van Vliet et al, 2005, p19). Their argument rests on the importance of unpicking what is behind consumption and focusing on the individual services a resource is used for, rather than the quantity used, via the

bill, which they consider to be more productive than encouraging ecological citizenship by appealing to altruism. According to Van Vliet et al (2005) water users have a dual existence. Their practices are part of the home and at the same time part of a network of pipes and infrastructure that has opened up possibilities for the use of resources that have become part of everyday life. Despite a growing number of academics calling for research to take a fresh look at consumer behaviour from a practices perspective (Shove, 2002, Sofoulis, 2011, Spaargaren, 2011), environmental behaviour research remains centred in the area of climate change and human adaptation.

### 1.11 Introducing the Research Questions

In this chapter, in the context of drought, climate skepticism, water customer selfishness, and uncertainty over the future severity of climate change, have been identified as key behavioural elements that are incompatible with the concept of sustainability as a successful survival strategy. It is clear that individuals cannot alter the global hydrological cycle but that the collective actions of many can contribute either positively or negatively to water stress. The impact of these contributions will be subject to local variation depending on numerous technical, hydro-geological, environmental, behavioural, and economic factors, and above all, the weather. Changes in climate are difficult to detect in the short-term but the availability of potable water in England is privately managed and as such there is some scope to monitor its use and apply various methods to curb demand when drought conditions are prevalent. However, promoting efficiency and reduction of water use to customers as a method of developing environmental awareness and sustainable lifestyles is a well-intentioned strategy but not one that has been proven to be successful at this time. Utilising the threat of potentially disastrous climate change will not necessarily result in alterations to individual or collective practices without greater specificity and understanding of the complexity of the links between pipe work and infrastructure, the services water is used to perform, and the people that are intertwined in this network, which is wholly reliant on a single precious natural resource, water. For these reasons, it is important to view research in this arena from multiple perspectives rather than to concentrate on securing supplies from a demand management perspective. It is the mix of

concerns for strengthening public and industrial resilience to, and understanding of, extreme events that are expected to increase in frequency and severity due to the influence of climate change, that has resulted in a desire to find answers to the following research questions:

- How does the public perceive and conceptualise drought and climate change and is there a link between the two?
- Does experiencing drought lead to mitigative behaviour in terms of water consumption and energy use?
- What are the cognitive and institutional barriers to an effective public response to climate change?

These questions are in the minds of water regulators, water managers, and those responsible for safeguarding against the environmental and health consequences associated with severe drought situations. To answer them it is logical to think that one must be able to observe subjects during drought episodes and have the means to measure changes in water use habits, or to measure alterations in water consumption levels (up or down). There is also a substantial cognitive component to these questions, which requires a level of enquiry into the thoughts and opinions of individuals and groups and the motivation to act or not, to environmental threats, when they are perceived as having the potential to cause harm or disturbance to daily life. In chapter two, the current status of social environmental demand management research, which has been described as being situated at the *“cross-roads of personal characteristics and behavioural intentions”* (Hurlimann et al, 2009, p47) will be explored in an attempt to justify the proposed methodology for this research. The methodology in this case evolved through time alongside the weather, the reading, and an increasing realisation by the researcher that the research questions might not be adequately answered through the use of standard qualitative data collection and analysis techniques alone, and that the broadly accepted assumptions behind the research questions may confine the outcome of the research to a predictably useless set of behaviour types and scenarios that are impossible to reproduce in normal life. A subset of questions from the researcher’s perspective read:

- Which methods are best suited to the study of perceptions?

- Is it possible to measure links between perceptions of something that cannot be specifically measured or detected in real time (climate change)?
- Is a member of the public more likely to perceive and conceptualise a drought or simply to experience and react to the impact of a drought on their daily routine?
- When is the best time to measure the impact of drought through the experiences of subjects? Before, during, or after the event?
- What indicators can be used as measures of experiencing the impact of a drought?
- Which types of drought could be used to observe mitigative behaviours and are they measurable?
- What is an acceptable public response to climate change?
- If there is no current drought can all of the data required be collected from subjects in retrospect?

A substantial amount of hedging was required to allow for the possibility that a drought might occur, allowing data to be captured from direct experiences and actual measurements (rainfall, soil moisture, reservoir levels, domestic usage rates, etc.). However, the immediate drought-free situation required the research to concurrently allow for the potential collection of new drought data from observations of behaviours during a drought, should it arise, and at the same time to look retrospectively to past drought episodes within living memory, to allow data capture of recalled behaviours. A variety of data collection methods could be used; questionnaires, interviews, participant observation and so on but the analysis of these warranted guiding from a distinct methodological perspective, to uphold the researcher's requirement to complete a satisfyingly useful piece of research that would have relevance in past, present, and future drought situations and lead to implementable water management solutions. This methodology needed grounding in the real world and so the idea of completing a classic Grounded Theory evolved.

*“Classic Grounded Theory (GT) is simply a set of integrated conceptual hypotheses systematically generated to produce an inductive theory about a substantive area.”* (Glaser and Holton, 2004, p2) It is therefore not overly scientific in its development, not designed as a descriptive tool or a method by

which research can be verified or generalised and it is not confined to a specific place, people, or time. Classic GT transcends all these things to distill research observations down to the very essences of circumstances and problems and the myriad strategies deployed by subjects to adapt. In deploying such a methodology, the author would also go some way to reversing the trend of “*default remodeling of GT*” (Ibid 2004, p3) by researchers who fail to see that though using the same basic research tools, the classic GT methodology cannot be integrated into, and used to, legitimise a mixed method study. And as a refreshing alternative it would be possible to demonstrate how elements of a mixed method study can be contrasted against a classic GT to highlight both their differences and limitations.

## Chapter Two

### **Influencing Behaviour Change: Valuing Water**

## 2.1 Introduction

In chapter one, the importance of adapting to and mitigating climate change and the impact of carbon emissions on the water cycle were established. The impact of drought and resulting tensions between water user and water provider were described through the collective voice of a phantom public that water companies and various authorities converse with in the media and official documents. The expectation that water customers can be educated to limit their demand of water to preserve precious resources was alluded to, although the appropriateness of the use of labels such as consumer and ethical consumer were questioned. The general research questions triggered in the mind by the scenarios described in chapter one were introduced, and the use of classic GT as a methodology that could be utilised to probe for answers to the research questions and at the same time analyse the benefits of using GT in this area of research, in contrast to standard mixed method approaches, was suggested.

This chapter introduces the concept of valuing water as both commodity and natural resource. A notably lax public attitude to water conservation and the water embedded in separate products, processes and foods, emphasises the dichotomy of promoting water saving and economic growth concurrently. The past popularity of behaviour change research is reviewed in relation to the regulated practice of encouraging water customers to use less water. Currently water companies are required to meet a target of one litre of water saved, per billed household, per day, up to 2015 (Cave, 2009). This is one of the competing demands on the market-based water sector, that traditionally has relied on scarcity to highlight demand and thereby provide opportunities for debt-financed infrastructure investment (Water UK, 2009), which is profitably recovered from customers (OFWAT, 2010 *b*). There are various potentially limiting factors such as price, prohibition of supply, metering, and education resources, which are discussed, and popular paradigms in public behaviour and water use research, which are explored. Doubt is cast on the effectiveness of the methods currently deployed to encourage environmentally positive behaviour such as social marketing campaigns and “*nudging*” (Sunstein and

Thaler, 2008). This leads to a discussion that prompts questions about the future direction of behaviour change research and the limited impact of perception studies and qualitative work based on self-reported behaviours. In the final section the reader is encouraged to consider the history of water habits and to view current water habits as part of an ongoing evolutionary process that is as much dictated by personal circumstances and plumbing as by altruistic tendencies towards 'greener' behaviour patterns, which might be researched in greater depth using the classic GT method.

## 2.2 Recognising the Value of Water

*“It is vital to develop a value framework for water resources from an end-user and environmental ecosystems perspective, as well as encompassing the inextricable link between water and energy. Most of the UK population, do not know their domestic water usage or the extent of their much larger water footprint, which includes “virtual” water embedded in food, industrial products and other services that may originate from other countries.”*

(Water Research Innovation Partnership, 2011, p17)

This research comes at a time when the world is changing and facing the prospect of the complex problems associated with climate change, which include the increasing severity of future weather events, ocean acidification, Amazon forest dieback, glacier fluctuations, sea level rise, and species loss (Fussell, 2009). There is almost unanimous agreement that these problems are caused by humankind and that humankind has the means by which to ensure further damage is not caused by ever increasing emissions of greenhouse gases (King, 2004). However it has not yet been shown that humankind has the motivation to tackle these problems by limiting its consumption of energy and resources and thereby reducing waste. Sustainable development is a neat concept but in the developed world it also remains an elusive one. There is a growing body of evidence to show that predominant values in modern society often conflict with the need to reduce resource use to tackle climate change and that societies in developed countries are consuming resources at an

unsustainable rate, plunging the world into what is termed “*ecological debt*” (Simms et al, 2009, p5). The developed world’s ecological footprint remains greater than its biocapacity. Water scarcity affects 11% of the European Union population and 17% of its territory (European Commission, 2007 a). The UK’s overall domestic water footprint is far greater than the available water resource. Whilst each person uses roughly 150 litres of water per day for washing, cleaning, cooking, and drinking, the embedded water in total consumption of food and other products each day amounts to some 3,500 litres per person, with 62% of the UK’s total water footprint being imported from other countries in the form of food and fibre (Water Research Innovation Partnership 2011, pp 5-6).

Managing water resources within sustainable limits contributes both to mitigating future climate change and adapting to the changes in climate we anticipate. However, as the UK Government points out, “*Our attitude to water- where it comes from, what it costs and how we dispose of it – is too casual*” (Defra, 2011 a, p84). It is apparent that the UK population exists in a perpetually water scarce environment, whilst paying little or no attention to the problem, being more interested in the function water performs than the importance of water itself. Considered a basic utility, water has become an inconspicuous part of every-day life (Sofoulis, 2005). Yet, however insignificant water is to the individual, the combination of existing out-of-date infrastructure, standard approaches to water management, cultural influences, and customer preferences for high volume apparatus and activities, such as power showers, high-pressure hoses, and deep luxury baths; reveal that water scarcity is set to be a constant feature of every-day life (Medd & Shove, 2007). This has prompted a broadly critical commentary regarding public water use that raises the issue of both the intrinsic and monetary value of water:

*“Water scarcity has occurred due to water being undervalued as a resource. It is imperative that this attitude towards water changes and legislative, regulatory, engineering and pricing levers are utilised to drive behaviour change. Recognition of the true value of water and its symbiotic relationship with food, energy and the environment will raise the fundamental importance of water in the national psyche”* (Institute for Civil Engineers, 2012, p18).

### 2.3 Efficiency and Equity in the Water Commons

Generally it is assumed that water users pay scant regard to water itself, how it is used, how much of it is used, where it comes from, or if its use deprives others of a vital resource or causes environmental damage. From this perspective, if it is correct, water is of little or no value. Water users who are serviced by water companies, extract from a shared system however much they want, when they want, regardless of the weather. This results in England, in socially produced scarcity, (Bakker, 2003, p28), which technically water companies enable because it is not in their interests to encourage behaviour that ultimately decreases sales (Kallis, 2008). It is a classic example of a commons tragedy (Hardin, 1968). Despite water being a scarce, shared resource, individual users might be considered as not viewing their water withdrawals from the tap as exploitative withdrawals from a global water commons but instead as purchases of an abundant commodity from water companies whose profits are made from providing water on demand in increasing quantities, to suit evolving lifestyles that value the luxury and comfort of limitless water on tap (Barr, 2008, p7).

The English water industry is considered unique in that it is completely privatised and divided between small numbers of private monopolies (Bakker, 2001). These companies are regulated, in part, by the Office of Water Services (OFWAT) and have a duty placed on them to conserve water and encourage their customers to use water sparingly. Therefore, two public debates on the water industry routinely focus on company efficiency and leakage rates, and affordability for the customer. According to Bakker (2001), evolving from being considered a service industry, to a supply industry moving towards full cost recovery from the customer, and removing previous interventions that allowed for a leveling of charges across catchment boundaries, has meant it is impossible for all water users to pay the same rate for water. The cost of water varies depending on the constraints within which a water company is working. This leads to significant variations in basic water tariffs between regions. To

complicate matters there are two ways in which households can pay for water and sewerage services; either through an outdated rating system that uses basic property information as a proxy to determine the likely volumes used per household, and sets rates for annual fees accordingly; or metered charges for the actual volumes used. The former tending to be prohibitively expensive for individuals living alone in large houses and the latter sometimes proving too expensive for very large families existing on low incomes. The independent Walker Review (Walker, 2009) of charging for household water and sewerage refers often to the “*fairness principle*”, (Ibid, 2009, p12), ruling out all suggested methods of charging by household type or size, insisting that charging for the amount of water used by metering properties is the only ‘fair’ way and calling for 80% of households to be metered by 2020. It is assumed that targeted ‘social’ tariffs can be used to ensure the very poorest households can still afford to turn their taps on. Those who can afford to pay their water bills will inevitably cross-subsidise those who cannot.

#### 2.4 Managing Demand for Water

Despite the need for scarcity to drive demand in a market-based economy (Swingedouw, undated), UK water companies are obliged to promote water saving to their customers and as already mentioned in chapter one, mechanisms exist whereby customers’ use of water can be limited during drought periods, although the effectiveness of water company powers is limited to the curtailment of non-essential and mainly external uses of water. Powers to ration water use in the home without relying on customers to voluntarily curb their use by installing standpipes or implementing rotational cuts are obtainable in extreme circumstances but there is reluctance on behalf of water companies to introduce these measures and they have not been enforced in England since the 1976 drought. This research looks in detail at how householders coped in the past with water rationing in severe drought conditions, prior to privatization in 1989, and examines whether such measures are likely to be successfully implemented, post privatization. It also looks closely at the concept of the ‘water-wise customer’, who it is thought, through education, metering, and pricing, can prioritise water efficiency as a constant in their lives, as a contribution to the mitigation of future climate change, and for those who are on

metered supplies, as a method of saving money also. Household water saving is highlighted by Bakker (2001), as an area where low-income families may find themselves excluded, as many efficiency savings (though not all) can only be made after investment in improved technology. However, water-wise messaging (don't leave the tap running when cleaning you teeth, shower instead of a bath, and only flush if you must) and the promotion of efficient products such as low-flush WCs, aerating shower heads and taps, and A-rated dishwashers and washing machines, provide the back-bone of initiatives to curb water demand in England, with little or no regard to the feasibility of individual households to invest time and money in adaptations and new daily hygiene regimen. A recent example of water-wise messaging from the Bathroom Manufacturers Association can be found in Appendix B. This is broadly similar to that of the English water companies who publish lists of water saving actions in leaflets, on customers bills, and their corporate websites, and provide free or low cost water saving devices such as water butts, tap inserts, shower timers, and devices for displacing water from cisterns to reduce the volume used per flush, to customers who request them.

## 2.5 Education for Behaviour Change

Hoppner and Whitmarsh (2011, p47) argue that, *“implicit understandings of citizen engagement and agency, as communicated in governmental documents, are problematically shorthanded compared with the reality and complexity of human engagement”*, implying that the education to action doctrine may not work with complex issues such as climate change and water management. Agrawaal (1999) has argued that communities can be trusted to conserve natural resources providing they are not treated as a homogeneous group. Instead we are to look for shared resource characteristics that are useful for developing strategies. One educative message therefore may not fit all individuals and all scenarios. However, the prohibitively high cost of engineering solutions and the twin constraints of increasing demand and diminishing resource availability make leaning towards demand-side solutions to water management popular even with water companies (Gleick 1998, Johnson and Handmer, 2002).

Sharing both the cost and the risk of failure with the customer makes it easier to blame the customer for failure. At the same time it also makes it easier to convince the customer to pay more for a more robust infrastructure to avoid failure of supply and blame (Nevarez 1996). Whether this approach encourages water users to value water and use it appropriately is questionable. However, the predominant emphasis has shifted from an evenly balanced, 'twin-track' approach to engineering solutions and modest behaviour change, heavily towards placing the burden of responsibility on consumers (House of Lords Science and Technology Committee, 2006), who it is assumed can be persuaded to draw less from the water commons to ensure everyone has enough now, and that future generations have enough water also. The effectiveness of this linear approach to educating the public requires close scrutiny; particularly as a notable decrease in overall water demand is not evident despite water-wise messaging initiatives being deployed for some time. It may be that this approach does not work in the context of water and climate change. Or that the level of sophistication in methods of recording water use are not sufficient to garner an accurate picture of whose demand is rising, dropping, or staying the same. Selfishness may prevail as the messages are targeted at individual customers and do not create a sense of common purpose. Alternatively, some households may adopt water saving measures more readily than others. As Berk et al (1993) assert, although attitudes can affect demand, water is a market commodity and reviewed solely in this way, water scarcity is **not** a commons dilemma. Implying that the price of water should theoretically serve to limit demand by rising and falling to reflect scarceness or abundance but at the same time acknowledging that regulation of the water industry and thereby its pricing serves to limit the effectiveness of financial restraints on the public's attitude to water use. In short, the effectiveness of 'water wise' messaging without imposed limits or financial incentives is unclear. Therefore, research methods used to unearth the impact of environmental education and climate perception must be sufficiently robust to clearly identify the motivating factors in positive environmental behaviour.

## 2.6 Behaviour Change: Theoretical Underpinnings

The number of reviews in recent years, of behaviour change research and initiatives, and the theoretical basis for such studies, highlights the popularity of the notion that behaviour change is the key to sustainable development and specific changes in behaviour such as those advocated in 'water wise' messaging, can be implemented successfully through education. i.e. water users can be trained to adopt behaviours that benefit society, the environment, and themselves. Behaviour change theories are predominantly drawn from a combination of behavioural economics and psychology (Darnton, 2008, Jackson, 2005) and a small number of theoretical models dominate research in this area. Ajzen's Theory of Planned Behaviour (Ajzen, 1991) is often cited but the idea that behaviour can be mapped, based on personal attitudes, values, norms, habits and beliefs, and those personal attitudes can be altered through increasing the publicly held bank of knowledge of a certain topic, has not been shown to be universally effective in generating the behaviours that are aligned with sustainable development goals. The overarching theme of use less and waste less is hard to implement in a growth-based economy. In the case of water there is a notable gap between what water company customers say they are willing to do in relation to water saving and what they actually do. There is a similar discrepancy between expressed concern for climate change and willingness to make lifestyle changes that serve to mitigate the problem. Narrowing this gap between attitude and action is considered by policy makers to be their greatest challenge (Anable et al, 2006). Barr (2004, p232) examined "*the relationship between rhetoric and reality*" in measuring the difference between the public's expressed intentions to recycle and expressed recycling behaviour, to expose an obvious attitude-action discrepancy or value-action gap. As a signifier, this gap has served to highlight the public's stated reluctance to adjust and adopt new sustainable behaviours. Ajzen's (1991) Theory of Planned Behaviour describes how individuals and societies learn to favour behaviours that they believe have desirable outcomes. Therefore it is unlikely that the public will be keen to adopt behaviours that they consider to be less convenient, uncomfortable, and costly. Taking water saving as an example of a mitigative behavior, not leaving the tap running whilst brushing one's teeth, is a costless method of saving a precious resource. But a water customer may consider it less convenient and therefore less desirable, despite its obvious positive environmental impact. Perceived water rights may direct individual

behaviours that are in conflict with perceived obligations to save water (Lam, 1999).

Festinger's (1962) Theory of Cognitive Dissonance can and is, often used to explain why the public is able to express concern for environmental issues but display a lack of willingness to do anything about them. We can dismiss climate change as irrelevant because we do not understand it, or be consonant with its implications if we do. Cognitive dissonance arises when climate change or what we need to do to mitigate the problem, does not fit with our mental picture of reality. So for example, when the weather is cold, it may be difficult for us to believe in global warming. When it is raining it may be difficult to believe that water scarcity is an issue to be concerned about. It is possible to maintain consonance with climate change by altering another element of cognition. This possibly explains why both Stoll Kleemann et al (2000) and O'Connor et al (2002) identified publics that were able to express belief in climate change and willingness to support actions that serve to mitigate its causes but at the same time to allow considerations of the effect mitigation might have on their personal livelihoods to determine how committed they were to following through with action. The blame culture around debates on water use facilitates a range of dissonances that customers use, including hostility towards water companies who are considered not to be doing all they can to save water, which becomes an excuse for individuals not to bother to follow water-saving advice (Opinion Leader Research, 2006). Examples of this negative response include strong criticism of Thames Water during the 2004 – 2006 drought that Andrew Marsh of the Consumer Council for Water (BBC, 2006), described as *“a credibility gap between making large profits and asking customers to save water.”* Similarly, as mentioned in chapter one (section 1.6), during the West Yorkshire drought in 1995, according to Haughton (1998), *“the company [Yorkshire Water] allowed itself to be typecast as aggressive, manipulative and greedy.”* This gave customers a reason to reject appeals to curb their water use despite the obvious fragility of the supply system and the environmental impact.

A variety of Government and marketing organizations appear content to work around the value action gap by targeting sections of the public who they believe are more likely to be consonant with environmentally beneficial behaviour. The

likelihood of success has been determined through the development of market segmentation models based on a limited number of factors relating to public perceptions of climate change (based on questionnaire data) and carbon consumption rates of various socio- economic groups (Defra, 2008, Anable et al, 2006, Futerra, 2010, Hunter, 2009, World Business Council for Sustainable Development, 2008). These models set out a series of public stances or degrees of willingness to act that remain anchored to the knowledge deficit model that assumes increasing public awareness of environmental issues through education will drive positive behaviour change.

Defra has developed a framework for pro-environmental behaviour (Defra 2006), which divides the English population into seven segments based on their willingness and ability to act [to positively impact climate change], identifying three of these segments; Positive Greens, Waste Watchers, and Concerned Consumers, as being the most appropriate target audiences to work with to promote increasing pro-environmental behaviour. On behalf of the Department for Transport, Anable et al (2006) have developed a motoring market segmentation model, which attaches seven labels to motorists. The Energy Saving Trust (EST) has developed a ten-segment consumer-based marketing model by overlaying household energy use data over Experian's Mosaic Model of consumers, which is derived chiefly from census data. Four segments in the EST model are assumed to have a higher personal concern for energy saving, a greater interest in purchasing energy saving products for the home, and to be more likely to take an interest in renewable energy technology. These are their target audience and are labeled Environmentally Mature, Educated Advocates, Discerning Elders, and Comfortable Conservatives. Four other segments; Driving Dependency, Financially Burdened, Ethnic Tradition and Fixed Horizons are assumed to be less aware of the Energy Saving Trust and to have lower personal concern for environmental issues and therefore to be harder to influence, As a consequence, these segments are not a priority group for the EST. More recently, Futerra (2009) used a segmentation model to assess publics in terms of their interest or disinterest in adopting methods to reduce carbon emissions. Again, arguing that if these segments of the population can be identified, the identifier will already know whether they are predisposed to change and how best to work with them. The World Business Council on

Sustainable Development (2008) notes that there is currently no recognised or agreed definition of a sustainable consumer lifestyle. It utilizes a seven-segment model devised by UK climate Group and Sky Lippincott and notes that the new taxonomy intended in green marketing models, is an attempt to “*understand the new green/ethical, sustainable consumer*” (ibid 2008). Organisations utilising these models are encouraged to identify and work only with population segments that will provide early “*quick wins*” (Anable 2006), but it is difficult to see how success can be guaranteed through targeted work with these segments without taking into account other factors such as infrastructure, technology, and norms of behaviour. It is the presentation of this *a priori* knowledge derived from limited observations of statistical data and self-reported preferences, that should be of great concern to researchers in this field, as the lack of grounding in relation to actual behaviours seriously erodes the the credibility of works that begin by attempting to place members of publics into these segments for their own purposes. The resulting taxonomy simply subdivides publics into different value groups or behaviour types, which invariably overlap each other and cause confusion and a level of complexity that is not required, offering little or no insight into the cognitive state of the publics under scrutiny and possibly better reflecting the opinions of the observers than the observed. Table 5. below places five of the popular segmentation models already mentioned next to Futerra’s descriptive groups. This indicated the number of segments considered suitable to work with for ‘quick-wins’ (shaded yellow) and the proportion of unapproachable types. There are no reliable figures attached to these segments. One cannot tell which segments represent the largest portion of the population.

**Table 5. Five Popular Segmentation Models Plotted Against Futerra’s Descriptive Behaviour Groupings**

<b>Futerra Descriptive Groups</b> (Futerra, 2009)	<b>Futerra</b> (Futerra, 2009)	<b>Experian’s Mosaic Green Aware Segments</b> (Experian, 2008)	<b>UK Climate Group / Sky Lippincott</b> (World Business Council on Sustainable Development, 2008)	<b>Anabel’s Seven Travel Segments</b> (Anable 2006)	<b>Defra Pro-environmental Behaviour Model</b> (Defra, 2008)
Radical environmentalists	Angry Antis				
Fighting for change. Committed Activists	Climate Fighters	Eco Evangelists	Campaigners, (engaged, responsible, worried)	Car Skeptics	Positive Greens
See marketing and revenue generating prospects in “green” products and alternative technologies	Carbon Opportunists	Convinced consumers		Aspiring Environmentalists	
I’m not acting unless you do (point to others to do something before they do any more)	Carbon Protectionists	Too busy to change		Malcontented motorists (most likely to change)	Cautious Participants
Aware of climate change but inactive. Could be persuaded to become cynics or activists. Very strongly influenced by the media	Home Firsts	Doing their best	Followers - (unsure, image conscious) & Optimists - (Interested, fashionable)	Car Complacent, (not aware of potential to change)	Stalled Starters

<b>Futerra descriptive groups</b>	<b>Futerra</b>	<b>Experian's Mosaic Green Aware Segments</b>	<b>UK Climate Group / Sky Lippincott</b>	<b>Anabel's Seven Travel Segments</b>	<b>Defra Pro-environmental Behaviour Model</b>
Warn against action in an economic downturn highlight personal cost of high energy and commodity prices	Economic Worriers	Constrained by Price			
Understand the concept but not ready to act yet	Carbon Realists	Green but doubtful		Reluctant Riders (Could be encouraged to do more)	Waste Watchers
Conspiracy Theorists – science is an excuse to curtail consumption	Climate Change Deniers	Skeptical Libertarians	Rejecters, (uninterested, individualistic, confident)		
Avoiders Argue for jobs over carbon cuts	Industry Avoiders	Wasteful and Unconvinced		Die-hard Drivers, (least likely to change)	
It's too late to do anything now	Climate Quitters	Why should I bother?	Unwilling, (unconcerned, inflexible)		Honestly Disengaged
*Futerra do not appear to identify an element of the public that would qualify as confused		Confused but well behaved	Confused (detached, uninformed, open)		

These rather crude attempts to label the individual with an assumed set of personal traits and thereby to control the direction and outcome of efforts to inform and educate are clearly rooted in Cultural Theory, even though the intention of the theorist is not to have their work substantially short-handed to a series of behaviours that relate to the nebulous concept of environmental benefit. Cultural categories are public matters according to Douglas (1966) structured by language in order to make sense of patterns that exist in communities – a way of classifying social behaviours that is naturally selective and leads to simplified views of the world. Justifying behaviours through the development of cultural understanding is one way of testing one's knowledge of water-related activities where they appear detrimental to society and nature, although this may result in the rejection of behaviours that are anomalous. Describing forms of human nature and linking them to behaviours would be another.

In deference to the long tradition of theorising about the nature of being and the meaning of culture in order to make sense of behaviours and the reasons behind them, it is important to explain that the sense of urgency generated through reading disaster literature such as that referenced in chapter one, and the unalleviated frustrations caused by the current piecemeal approach to tackling the problem of safeguarding and fair apportionment of water resources, requires swift action and more defined and accessible solutions to the immediate problem of socio-economically driven water scarcity. Taking a Cultural Theorists approach to describing lives lived through a simple segmentation model would do no more than break potential social characteristics into four elements of social solidarity (Thompson et al, 1990). Though cleverly extended by O'Riordan and Jordan (1999, p89) into five ways of life - Fatalist, Hierarchist, Individualist, Egalitarian and Hermit – these typologies are based on reactions and values held between groups. Dividing society in this way anticipates a Fatalist approach to climate change and water shortages as an inevitable fact of life in a warming world where nothing can or needs to be done to stop it. An individualist perspective however would be expectant of survival due to society's ability to seek out, find, and manage, new, clean, water sources. A hierarchical reaction to drought would involve

anticipating instructions on when or where and how to use water. Whereas egalitarians would be content to ration water resources evenly across society, anticipating sharing and foregoing access to protect those who are more vulnerable/need. Those with a hermit-like attitude would continue undetected, possibly dying of dehydration. These labels are drawn from long-standing efforts to set out models of society. They are helpful guides but too broad to work with to identify ways of effectively directing publics to prepare for drought and water scarcity events. Whilst they are bound up in the identification and assessment of risk to society, as has already been described in chapter one, the risks associated with drought are not easily detectable until it is too late. The threat remains invisible for too long and the threat when entangled in a dialogue about climate change is less tangible because of the unpredictability of climate and by association the weather. Cultural theory is therefore much more useful to the researcher in helping to make sense of their observations after the GT is completed, rather than for setting up experiments that will guide the researcher to find out what is happening at the level of the individual household, as presumably if one goes in search of the individual, the heirarchist and the fatalist, one will surely find them all but perhaps not learn anything new from the experience at this level. This statement is made not to dismiss the importance of Cultural Theory in this arena. The management of water and the behaviour of water customers are inherently political issues and much needs to be said about the politicisation of the risks and potential injustices attached to inappropriate management and use of water resources. However, setting the bar at the level of cultural theorisation assumes that we know all we need to about the processes and practices that lie beneath.

There has been a wealth of distinguished and relevant theoretical and philosophical writing that one can confidently draw upon to try and illustrate the sometimes observed and occasionally assumed myriad transactions between water user/customer and water provider and regulator. The comfort one can experience from delving into Plato's *Republic*, or David Hume's *A treatise of Human Nature*, or works by Marx, Weber and Simmel makes sense of the postmodern requirement to fit society into orderly classifications. This however, in the main, forces researchers to provide descriptive works that though

enjoyable to read and insightful, providing plausible scenarios purporting to explain or predict human behaviour, do so without ever thoroughly pinpointing the specific circumstances of individuals. To answer the research questions, observing individual behaviours is fundamental, as water-wise messaging appears to be driven by rhetoric that is underpinned by very limited and useless (because of its size) water data. There is also a stated desire to drive the majority of the population to the borders of society to join an environmentally risk averse sect, or to become egalitarians by understanding the great commons dilemma of water management. This reference to Douglas and Wildavsky's (1982) identification of three cultures, with notional geographic placements either centrally (Market and Hierarchy) or on borders (Sect), from where the different cultures can identify their ways of life in contrast with one another, maps cleverly onto the current situation with regard to water policy. If this research was purely to focus on the development and acceptance of water policy it would be perfectly acceptable here to delve deeper into the realms of risk perception and society. The cultural underpinnings of water use are of course of great interest and extremely important to understand but when reduced to an almost universally available commodity - potable water - which can be measured and controlled by water companies and by individuals at the end of the pipe work if they choose to, water availability in drought situations needs to be considered in terms of quantity, resource efficiency, and management, that are relevant at the household level, where tackling the risk of failure of supply is the responsibility of water companies. Cultural theory is highly significant with regards to perception of risk (Tansey & O'Riordan, 1999) but the author questions when cultural theory is of use in this situation? Tansey and O'Riordan promote the usefulness of Cultural Theory in debating and reinterpreting to further knowledge. However, when it is likely that the researcher will find that risk of drought is not commonly perceived, or at least not until the threat has passed, and when it is more likely that the researcher will observe inaction rather than action, the time appears to be right to look more closely at the underpinnings of existing notions of the water users than to further knowledge based on generalised models that may be grossly inaccurate. One must be methodologically individualist to drill down through the layers of discussion on risk and environmental behaviour change that have built up over

time, smothering gaps in our knowledge of what is actually happening with neat behavioural typologies. Taking a closer look at individual behaviours may alter the dialogue of risk in relation to drought and water resources. This will undoubtedly be of interest to cultural theorists. From a sustainability perspective, a commons approach to water management is required and it will be interesting to review any subtle adjustments that are made to re-frame risk politically and industrially, away from protecting the individual from a cultural theory perspective.

## 2.7 Making New Methods in Environmental Social Science Relevant

In presenting a conceptual framework for advancing theories of environmentally significant individual behaviour, Stern (2000) highlights a number of aspects of behavioural studies that help to define the requirements for this research. Firstly he draws the distinction between environmentally significant behaviour that is intentional i.e. the person acts in a way that he or she perceives will benefit the environment, although it may not; and behaviour (deliberate or automatic), which will have an impact on the environment which can be positive or negative, but nevertheless, a definite impact. Stern suggests that focusing on impact-orientated behaviours that can make a large difference to the environment is “*critical for making research useful*” (Ibid, p408), and water saving would appear to fit into this category. However, Stern also notes that it is necessary to understand people’s underlying motives and beliefs in order to facilitate behaviour changes for positive environmental benefits, pinpointing habit and household routine as important though rarely considered areas for research. Stern explains that differences between environmental intent and environmental impact make theories explaining environmentalism “*necessarily insufficient for understanding how to change environmentally important behaviours*” (Ibid, p415). He suggests that attitudinal factors, contextual forces, personal capabilities, and habit and routine are all important, and studies that look at only one of these variables may not contribute much to comprehensive understanding of environmentally significant behaviour that is required to change them. This has been highlighted by the Defra Centre of Expertise for Influencing Behaviour, which whilst reliant still on targeting seven behavioural

segments of English society acknowledges the importance of action on multiple levels, tailored to fit with specific circumstances, within the “*triangle of change*” (Reeves, undated) which encompasses Government, Business, and Communities. This lays to rest the idea that social marketing campaigns such as Defra’s heavily criticised Act on Co2 advertising campaign (see Image (I)), can work in the context of sustainable development. This campaign attempted to introduce fear of the future as a reason to act to curb personal carbon emissions but as Reeves (undated) remarks, “*fear can alienate and create a sense of hopelessness*”. In contrast, effective social marketing relies on marketing the correct incentives to an identified segment of the population; for example smoking cessation aids to people who want to give up smoking, or exercise plans for people who want to lose weight. Social marketing to target groups based on measures of ‘greenness’ is much harder as the climate and water demand problems are much more complex and require multiple iterations to catch everyone in a particular segment, because whilst their opinions and beliefs or actions may be similar to others, their personal habits that require adjustment and homes that may need adaptation can vary immensely. The woolly goals of tackling climate change may not be specific enough to market blanket solutions. The goal of reducing water demand may be less woolly, but the overall environmental message may be lost. More importantly, it is possible that solutions promoted may turn out to be counterproductive when the framing used is one of marketing money saving ideas to the consumer which may be adopted for personal rather than environmental benefit (Corner & Randall, 2011, p1008).

**Image I: If Our Climate Changes**

Reproduced with kind permission from Defra, Act on CO2 campaign



Recently, the UK government has expressed an interest in ‘nudging’ the population to make positive choices. The concept of Nudging, developed by Sunstein and Thaler (2008) promotes the idea that individuals can be subtly manipulated into making decisions that benefit their lives through careful management of “*choice architecture*” (p3). This is based on the principle of “*libertarian paternalism*” (p4) whereby the individual is free to exercise choice and the choice architect (perhaps a water company or government department) is free to lay before him/her a choice of pathways, knowing that the chooser is most likely to be nudged down the right path because it makes sense to do so. However, restrictions have no place in a nudging strategy as these remove freedom of choice. When combined with incentives, Sunstein and Thaler predict a high success rate. Whether this method can successfully be applied to water use remains to be seen. Outside of the scope of nudging, regulation can guarantee results and as domestic customers cannot choose between water suppliers, it is possible to increase the cost of water in an attempt to limit its use. It is also possible to limit availability of water. Nudges in the home are more difficult to implement unless introduced into the overall design of the building. When choosing new water apparatus customers may be nudged by placing all the water-saving appliances at the front of the store. (The recent voluntary introduction of a water efficiency labeling system by water appliance manufacturers will help customers to identify the most efficient designs.) In

reality of course, such a business exists to make a profit and is more likely to place the most profitable items at the front and these may not be the most water efficient. Whether a person can be nudged into taking five minutes in the shower rather than ten, when in their opinion a ten-minute shower has a positive impact on their life in terms of relaxation and cleanliness, is something to consider. What we will see in later chapters is that whilst some of the behaviours outlined by Sunstein and Thaler are evident in analysis of individual's behaviour during drought episodes, often, in the case of water management, it is not humans that are the designers of the choice architecture but natural phenomenon – the weather and the availability of natural reserves of water – that are the choice architects.

## 2.8 The Future for Behaviour Change Research

Whilst the Government continues to tinker with methods for behaviour change that will result in a society overlain by ubiquitous 'greenness', this remains a hope rather than a certainty. It is the job of both climate and social scientists to measure how far we have progressed/regressed. Measurements of greenhouse gases show us that we are far from green. Attempts by social scientists to measure the public's ability to live sustainably appear to be mainly in the area of perception of climate and willingness to change (Kempton 1991, Leiseriowitz 2005, Palutikof et al 2004, Sterman & Booth Sweeny 2008). Measures of actual consumption of water and the various habits or practices that use water are few in number. Although there have been some notable advances in this area of late, for example Richter and Stamminger's (2012) analysis of water consumption in the kitchen in four European countries has provided a detailed account of individual water habits at the kitchen sink. The habits observed varied considerably within and between different nations. This indicates that it is unwise to assume that each individual's water habits will be roughly the same as one's own. Richter and Stamminger chose to place cameras over kitchen sinks to monitor every time the tap was turned on and how the water was used. They do not indicate in their paper how subjects felt about this intrusion in their homes. It is the author's observation that the lack of studies of other water-based practices such as bathing or doing the laundry is partly due to the level to

which researchers are prepared to probe and the willingness of subjects to participate and reveal the details of their personal habits. Hand et al (2005) for example develop a series of plausible reasons for the increase in popularity and frequency of showering but this rather gives the impression that probing into real showering practices would be out of the question, so alternative methods of reasoning why habits evolve are satisfactory.

The growing literature on social practices is assumed to offer opportunities to move beyond self-reports in demand-side research that is now predicated on altering practices, changing habits, and controlling consumer choice. However, perception studies still persist despite most authors accepting that self-reports cannot be relied upon (Berk et al, 1993, Spaargaren, 2011, p2). To move society forward in this respect, avid readers of the disaster literature around climate change tend to think a disaster is required to make us change our behaviour for environmental benefit. Others anticipate our reaching a “*social tipping point*” (Davidson, 2011, p180) a critical mass of positive environmental behaviours that Hoppner and Whitmarsh (2011) believe we still haven’t reached yet. This might be why our attempts to understand the current inactivity has centred on behaviour change from the perspective that education will lead to action and to be satisfied with sentiment when we know that this is not necessarily followed by action. At the same time, according to Wolf (2011), not enough has been done to prevent people who already consider themselves to be ecological citizens, from not reaching their environmental goals. And their collective efforts of various environmental initiatives have minimal overall impact.

*“The passion and commitment of the individuals attempting to drive this change is evident, and within their own small spheres, they are indeed often making a genuine and long-lasting difference to the individuals their programmes reach. Despite all of this energy, passion and busyness, however, these behavioural shifts are not making their effect weighty enough to register on the radar of mainstream society and culture.”*  
(Davidson, 2011 p180)

In the case of water saving it is still a rather on-off affair, dictated by weather rather than climate. The idea that disasters can induce radical shifts in

behaviour may hold fast in the case of the UK water industry, which is slowly recovering from the most recent sustained drought period.

Taylor et al (2009 p 591) have suggested that water shortages can be *“embraced as a positive catalyst for long-term behaviour change and for social and political reform”*. But it is not as a tool for reform that water companies are engaged in initiatives to encourage water customers to use less. Kallis (2008 p 102) explains that *“water utilities have an incentive to maximise consumption rather than reduce demand”* and that water saving promotions are demand balancing tools that are useful when resources are scarce but conflict with normal business, when supplies are plentiful (and thereby cheap) and it is in a company’s interest to maximise consumption and revenues. Therefore water saving advice tends not to be targeted at particular customer segments but is generalised and promotes the sale of water saving technologies such as low flow showerheads and water butts. This is likely to be a product of the fact that water companies are monopolies. Without competition they do not need to know much about a customer base that is not able to choose to go elsewhere for water services. This may explain why water companies’ understanding of how water is used by their customers and in what quantities, appears to be outdated. Medd and Shove (2007) criticised the water industry’s reliance on the notion of the average consumer whose water use equates to 150 litres per day, and showed that seemingly ‘average’ households use varying quantities of water. They argued that individual choice based on careful assessment of cost and benefit is not how the public decides to use water but that water use is a *“consequence of accomplishing different types of practice”* (Ibid, p3) such as washing dishes or watering the garden. In other words, a decision to water the garden is based on the need to maintain turgid plants rather than an assessment of the cost of the water used. To unearth the complexity of these issues, Medd and Chappells (2008, p13) have called for further ‘thick’ description of the *“micro-components of water use”* and Berk et al (1993 p 235) conclude that the job of understanding exactly the combination of prohibitions and changes to personal habits in play when the public is asked to reduce water use has been *“virtually unaddressed”*. It is for these reasons that it is important to explore in depth the micro-components of water use in domestic settings in

this research. Some of this information could be unearthed and published by water companies through direct liaison with their customers. However, as has been mentioned previously, it is not in their interests to know too much about their individual customers and so the researcher who, for reasons of security and sensitivity cannot access individual customers and their usage data directly through water companies, is forced to develop more complex and less reliable methods of data capture. As a result, many resort to description and generalization, supported by cultural theory rather than attempting to collect raw data from individual households that may lead to new theories of environmentally significant behaviour that lead the movement towards sustainable water management.

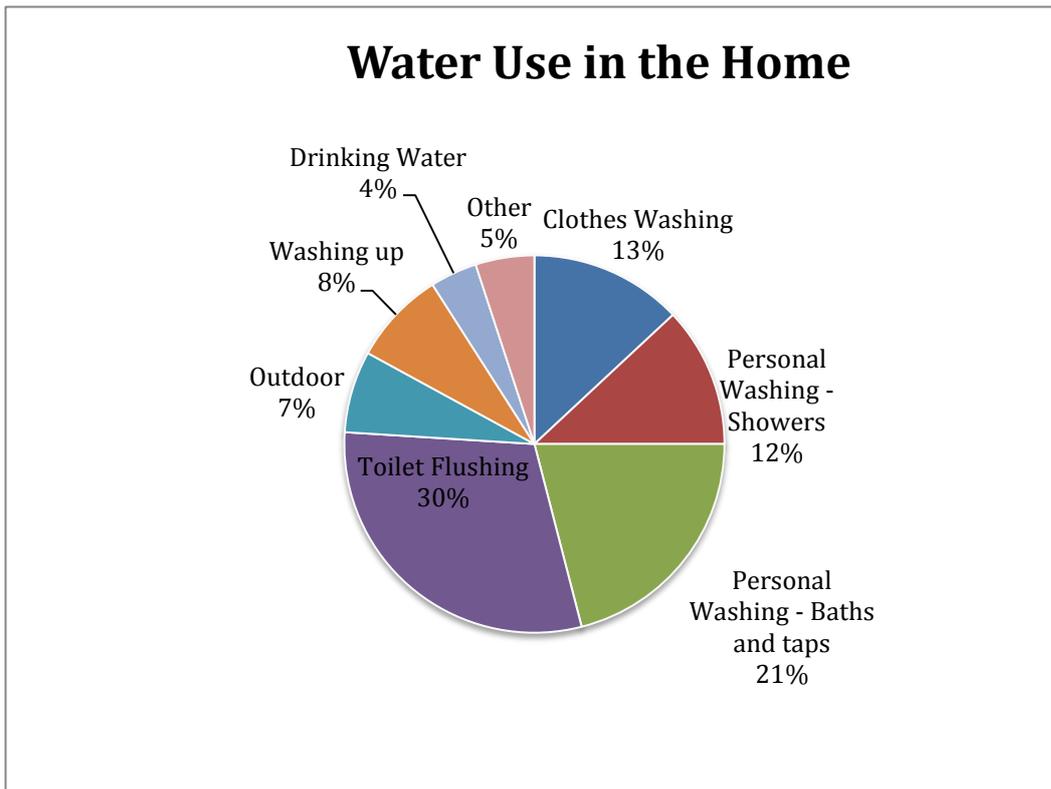
## 2.9 The Evolution of Water Practices

Historical research is very important for helping us to understand the origins of behaviour. Priscoli (1998) advocates the importance of history with regard to understanding the use of water resources. Trentmann and Taylor (2006) have provided insight into early water provision that has led us to the systems and structures that support our practices today. Taylor et al (2009) explain that the luxury of water literally 'on tap' within the home did not become prevalent for urban dwellers until after the Second World War, with rural homes not connected until the late 1950s and 60s. Prior to this it was only wealthy families that had water piped to indoor rooms and most working class people in urban areas had a tap in the yard and outside toilets. In England in the 1930s, average water consumption per head for the urban population was between 114 and 182 litres per day. In rural areas without access to piped water, consumption was much lower, between 23 and 90 litres per day (ibid, p586). This implies that the convenience of piped water to the home was pivotal in driving a substantial increase in water use. The English population was approximately 38 million in 1931 (Jeffries, 2005) and is approximately 53 million today (Office for National Statistics, 2012) and despite the introduction of washing machines, dish washers, power showers and pressure washers, the per capita water consumption of the UK population is approximately 150 – 160

litres per person per day; somewhat lower than one might expect. However, whether this level of consumption is sustainable or necessarily required, is at the heart of the current debate on future water management. The population of England and Wales is expected to rise by 9.6 million by 2030 and therefore total water demand is expected to rise, even if households reduce their water consumption (OFWAT, 2011) to 130 litres per person per day, as Defra would like. Diagram 2. shows the proportion of water used for various activities in the home today.

To understand how water habits are evolving now, practice theory is slowly gaining prominence in the area of water research. Spaargaren (2011) highlights two traditional paradigms, individual and systemic, within which lies water research that aims to contribute towards the development of behaviour change initiatives. The research and theoretical underpinnings already discussed in this chapter are mainly individualistic whereas the current dichotomy in demand management policy is that it is based both on the systemic and individual paradigms assuming that water users will eventually be forced to be green through a combination of strictly enforced regulations, prohibitive pricing, and systematically applied technological innovation, but at the same time preaching to the public's moral responsibility to "*do their bit*".

**Diagram B. Water Use in the Home** produced by the organisation Water Wise<sup>3</sup>



Whilst authors such as Reginez and Custead (2011) broadly advocate an approach to encouraging minimal resource use that incorporates strict prohibition and regulation through legislation, and would be comfortable with the systemic paradigm and critical of the inadequacy of the individualist paradigm, Spaargaren (2011) is equally critical of both paradigms; one allowing the individual to have too much choice, the other restricting the individual's opportunities to choose to adapt positively in their own way. Understanding practices within broader social systems, presents researchers with a half-way-house, where there is the possibility to develop bespoke solutions. Failing to take the time to understand the social systems and technological restraints that impact on the actions of individuals is considered by Spaargaren (2011, p2), to be "*socially naive*" but it is one thing to observe and understand consumption and another to develop mechanisms to alter consumption behaviour and this is

<sup>3</sup> Available at:

[http://www.waterwise.org.uk/reducing\\_water\\_wastage\\_in\\_the\\_uk/house\\_and\\_garden/save\\_water\\_at\\_home.html](http://www.waterwise.org.uk/reducing_water_wastage_in_the_uk/house_and_garden/save_water_at_home.html)

highlighted by Medd and Shove (2007). It may be that some studies try to achieve both without success. These typically resort to verification of popular theories followed by the development of various typologies that are ripe for adoption by advocates of segmentation models. Whitmarsh et al, (2011) advocate two-way delivery, mixing theoretical and practical for successful behaviour change initiatives but the existing behaviour of individuals is somewhat discounted, as those involved switch from theorising about what individuals do, to what individuals might do. Our stated mistrust in results of questionnaires and self-reporting in interviews leaves our theories up in the air and fairly useless in practical terms.

This is where Classic GT becomes attractive to the researcher who is intent on going beyond describing practices and identifying the baseline behaviours of individuals in the context of natural resource management. Doing GT necessitates direct exposure to the scenario in question and direct contact with subjects and an open-minded approach to all potential outcomes as they are not known or anticipated prior to the investigation. The purpose is to alleviate a problem and the problem motivating this GT is the noticeable lack of data from individual households.

Typically, Classic GT is used in the medical professions to get behind some of the most sensitive issues; theorists – usually nurses or doctors – have direct access to patients during treatment sessions or on wards and can observe and interact with all subjects in a medical setting many times over long periods. The results are stunning and above all useful. They provide clear explanations of how people react and interact in difficult situations either as care givers or receivers, or as concerned relatives. In the world of corporate management, classic GT is also a popular research method. Again researchers tend to be working in or with the subjects in question over long periods. The goal of GT is to conceptualise what is happening rather than simply to describe (Sandgren, 2010). As a result, people and their actions are neither classified, nor dropped into different segments. Instead they are revealed as an underlying pattern that can be mapped out through a series of sensitising concepts. The result is a

theory about how people alleviate or manage their concerns, in a particular setting.

Barney Glaser, who first developed the GT method with Anselm Strauss (Glaser and Strauss, 1967), has published a compendium of good examples of grounded theories (Glaser, 1993). The subjects covered include occupational mobility, adult learning, behaviours of heart attack survivors, parenting, prisoners' altered perceptions of time, deprivation of privacy, physical touching, and taxation. Each exposes a pattern of behaviours that can be used to make sense of similar situations. In *Cutting Back After a Heart Attack*, Patricia Dolan Mullen, takes a look at the stages of recovery after myocardial infarction (MI) and plots the things sufferers cut back on to limit their risk of suffering another MI, such as smoking, fatty food, and exposure to stressful situations. The main problem for those studied being described by Dolan Mullen as "*minimising losses*" i.e. making personal sacrifices such as giving up some of the things they like, to limit the likelihood that they will suffer another more devastating loss (potentially their own life). The main way of tackling the problem is through personal calculus – weighing up the benefits and disbenefits of different cutbacks. This may sound incredibly simple and it is. The pattern that MI sufferers follow is laid out in fewer than 20 easy-to-read pages. The endurance task of conducting 100 interviews and endlessly observing MI recoverers in various group settings makes a fleeting appearance and the main thrust of the writing is to spell out how things are for those in recovery. The pattern that emerges is powerful and recognisable. Once read, the reader instantly agrees that they would behave in the same way if struck down similarly. If they have known an MI sufferer they know this to have been the post MI way of dealing with recovery. This is the point of a classic GT – to clear away all the speculation and introduce a concept that works.

The hypothesis for this drought and climate related work is that it should be possible to deploy the classic GT method to identify latent patterns in home water use that are relevant in the context of drought and help to dislodge the current 'stuck' concept of education for behaviour change that is underpinned by perception studies of individuals grouped into ill-fitting segmentation models.

The desired output here being to provide an accessible written work of limited length that can be read and understood within and outside academia and used for positive benefit by communities of interest such as the water sector and others who are seeking to promote sustainable living.

Of course, a 20-page summary of a latent pattern in water use would not meet the requirements of a PhD thesis that should be lengthy and complex. Fortunately, there is an important aspect of the GT method that a keen researcher can use to generate a substantial body of work alongside producing the conceptual work. This is due to the primary aim of the GT methodology being not to force one's own ideas onto the data but to let the theory emerge from it. The only way to successfully achieve this is by actively engaging in other work, allowing sufficient time away from the data and creating a relaxed, wait-and-see attitude to the process in order to remain consonant with the fact that by filling one's day with alternate activities it is not possible to concentrate solely on the data all of the time. This work can follow a more traditional research route and be complementary to the theory and in this case it is anticipated that viewing drought and water resource management through other forms of data capture will result in a healthy comparison between several methods. This is undoubtedly the aspect of this work that the reader may find difficult to grasp. What is being suggested here is that the researcher will be keeping busy whilst waiting for the true answer to a problem that has taxed so many for so long, to simply pop out of the data at some stage. The skill in doing GT rests in one's ability to trust that this is indeed what will happen. Having other, more tangible work to address on a daily basis helps to keep mental images of the data suppressed sufficiently to let it be processed in the subconscious rather than the conscious mind. Confidence in the process is therefore a key criterion for doing GT. For some this would mean going beyond a structured set of limitations that no researcher is at liberty to do. For Barney Glaser this is "*academic freedom to the max*" (Glaser, 1998, p133). To generate new concepts from fresh data rather than transpose received concepts onto fresh data (old onto new) can be either liberating or terrifying.

## 2.10 Key processes in Grounded Theory

Having explained the basic motivation for doing GT it is important to set out the key processes involved. Principally it is important for the researcher not to know what the problem is before he or she starts to investigate. This is not difficult in the case of water use research because it is clear from the reading thus far that very little is known about actual water use in the home and perceptions of drought and water availability during drought situations. Remaining true to the process of discovering GT requires an open-minded approach and one must be prepared to identify and work on any problem that arises. It was entirely possible throughout this research that a GT would be written but it would not have anything to do with drought or water resources management and because of this, having other relevant work to do provides some insurance against being unable to answer the research questions.

There are some strict rules that must be followed at all times if one is going to be wholly faithful to Glaser's methodology. Going with the problem and not forcing the data are mandatory rules. Other rules the researcher wisely obeys are as follows: The researcher should not record interviews or discussions, talk about the emerging concepts categories and properties with others until the time is right, reduce the work to diagrams and flow charts, or read about the subject whilst doing the work. Providing one is working within these rules, one may exercise the licence to conceptualise responsibly. Adhering to the method requires dedication and rigorous testing checking and re-checking to ensure that one does not get swept up with the excitement of having the freedom to think and say whatever comes, into making misguided generalisations that are not evidenced in the data or worse still shift backwards to relying on description. The basic elements of the method are simple. One 'collects data' by observing and recording (by hand) whole scenes comprised of multiple incidents. The data is immediately coded line-by-line. The method of constant comparison whereby each piece of data is compared against new pieces as they are generated (incident by incident) serves to dictate the direction of the data collection (who, what, where, when and what questions to ask?) and so this cannot be predetermined. As observations spring to the mind of the researcher, these are

recorded in memos. Memoing leads to more general coding or the development of categories and their supporting properties (aspects of incidents that bear the same hallmarks). The nomenclature that is generated by this process is unique to the area of concern and verifies further observations of properties until the category is saturated. The point at which saturation is reached is the point at which the researcher acknowledges that no new incidents have been observed for some time. The saturation of categories over time serves to gradually delimit the data and the refinement of categories to a reliable grouping that reveals the latent pattern of behaviours that are repeated by actors in their efforts to resolve the basic problem (whatever that may be). The theoretical writing-up of this work therefore raises the results of the practical and time consuming task of finding out what people do, think, and say, to a conceptual piece that should have meaning for others, not just the researcher.

## 2.11 Summary

In this chapter the author has sought to define the current water research landscape, in respect of demand management and attempts to gauge and influence public intentions. By placing known water use and embedded water use within the frame of research, a new path of interest has emerged that is currently obscured by a general lack of studies of actual behaviours as opposed to stated behaviours. The separation of these types of research into individualist and systemic paradigms therefore does not satisfy the requirement to probe behaviour alongside environmental, social, and structural constraints and influences, that are beyond the reach of regulators, water company managers and researchers' questionnaires. Although historic evidence shows that circumstances, availability and convenience are more likely to dictate levels of water consumption than climate prediction and environmental education, this review finds most research in this subject area is limited to perception studies and the development of educative or persuasive methods such as social marketing. This creates opportunities for new studies and new methods that will contribute substantially to knowledge and theory in relation to lifestyles, climate change, and water resources.

The decision to conduct a classic GT study has been introduced as a methodology to carry this area of environmental behavioural research to a new, more useful, though conceptual level, through systematic application of the GT method, as a reaction against furthering the development of segmentation models and descriptive works that cannot be practically applied across society. However, the time, pacing, and distractions of other work required to complete a GT allow for an opportunity to complete other distinct research projects that can be used for comparison purposes. The integration of this work with GT is fully explained in the next chapter, which describes the methods of collecting and analysing related data across three separate areas of work.

## Chapter Three

### Methodology

#### 3.1 Introduction

In this chapter the methodology and scope of this research is set out in detail, beginning with the origins of the research questions. Classic Grounded Theory (GT) is presented as the overarching methodology of choice and there is an explanation as to why this particular research methodology is appropriate for environmental social research that seeks to capture evolving opinions and lifestyle changes, as they are adapted to accommodate meteorological phenomena. The importance of project cycling as a necessary aspect of GT development leads the reader to a detailed exploration of the research questions and the decisions behind the choice of empirical methods to be cycled as distinct projects as part of the necessary pacing of GT exploration. The trialing of focus group techniques is used as an example of the use of opportunism in GT. The impact of the weather on the fieldwork is also discussed and the population samples chosen for study are introduced. Section eight explores ethical considerations regarding working with small groups in domestic settings, and recording their water habits and opinions on water use. In the final section, the inherent problems in presenting conceptual works as part of a doctoral thesis, and the opportunity to present the GT methodology as an addition to the Geographer's portfolio of methods in environmental social science research, is highlighted.

*“If researchers could figure out just what the triggers are, policy-makers could design packages of incentives, information, signals, and prompts, with which to generate desired forms of behaviour change.”*

(Van Vliet et al, 2005 )

### 3.2 The Origin of the Research Questions

Chapters one and two reviewed literature relating to the key themes of this research: drought, climate change, water scarcity, sustainable development, and public behaviour research. The Living with Environmental Change partnership (LWEC) recently stated what it expected of those working for societal change with regard to water. Their list of demands included “*increased awareness of water cycles and systems and how future changes might affect lifestyle and business*”, and “*efficient operation of the human water cycle and minimized water footprints.*” (LWEC, 2012, p19). The periodic phenomena of drought, brings these expectations into sharp focus. The working title for this research was *Public Perceptions of Drought and Climate Change* and was inspired by the Economic and Social Research Council (ESRC) seminar series, *Mapping the Public Policy Landscape*, and in particular the 2008 seminar entitled *Behavioural Change and Water Efficiency*, which sought to define the role of social sciences in influencing the behaviour of individuals as water users. However, it is the author’s observation that it is difficult to move to the point of influencing behaviours without first acknowledging that new combinations of research methods are required to establish exactly the nature of current behaviours and how they are shaped by the myriad systems and technologies that individuals are exposed to.

The key social points raised in the ESRC seminar were that there are notable variations in personally perceived legitimate uses of water and varying emphases placed on the value of saving water. The seminar highlighted that the scope for changing water habits and modes of provision of water, alongside water saving technologies and factors impacting water consumption such as price, convenience, and perceived need, had not been researched sufficiently. However, six years have elapsed since the seminar and in that time, concerns over the impact of rapid climate change on water resources have resulted in the hasty development of a plethora of information sources that attempt to influence public behaviour in the context of domestic water consumption. Examples include the Energy Saving Trust’s online water and energy use calculator (Energy Saving Trust, 2012), which asks the question, *Is your energy bill*

*overflowing?* And takes users on a tour of a virtual house, via appliances and systems such as water heating and showering, to work out where savings could be made. In a similar vein, Southern Water's *Emily's House* (Southern Water, 2012) is a short film where water users are taken on a tour of an average house by little Emily who reminds them to turn off taps properly and offers other hints and tips on water saving. Defra also provides advice on domestic water saving on its website (Defra, 2012 c). Starting by explaining that an average UK household uses 100 cubic metres of water each year it explores some of the common alternative water management options that are cited when water is scarce, such as desalination plants and bulk transfers of water around the country via a national water grid. It suggests that every family can do their bit to save water, to avoid these costly and ill thought through measures. All these awareness-raising efforts appear to pay scant regard to the call from academia for more comprehensive research to underpin these initiatives. The subsequent successes and failures in this arena have provided an experimental backdrop against which the author has been able to test a variety of theoretical positions and methodological challenges; the increasing global interest in the behavioural aspects of water management having added to the number of environmental social studies of behaviour but not necessarily increased or indeed finely tuned the methods applied to this area of research (Pearce et al, 2012). This leaves the field open for an injection of new ideas and opinions that this thesis is intended to stimulate.

The aims of this research were stated in an application to the ESRC and the research questions were set prior to the author being allocated the work. It is important to note at this stage that although they were rigorously applied throughout, these questions were also subjected to close scrutiny by the author along with the results of the research completed. The aim of the research proposal was to bring together social, behavioural, technical and economic references, and view them in combination through the eyes of the public.

The brief proposed working with 'publics' in at least three sites in southern England. The selection of these sites would be based on "*contrasting areas that have recently suffered from drought and water restrictions (e.g. Southeast England), areas that have suffered from drought but with no recent restrictions*

(e.g. *East Anglia*), with areas that have experienced neither drought nor restrictions in recent times (e.g., *SW England*)” (Dessai, 2009, ESRC Case proposal, ES/G041040/1, 2009). At the time of writing the proposal it was not possible to predict that a severe drought would develop across southern England in the final year of the research, which would result in water restrictions being applied in parts of East Anglia for the first time in twenty years (Anglian Water, 2012).

A core aim of the research was to answer the research questions through identifying the public’s perceptions of the nature of drought and its link to climate change, their responsibility for drought, their willingness to reduce their water demand in times of scarcity, and their willingness to pay for solutions that might guarantee security of supply in the future. At the same time, the project was anticipated to locate both barriers and incentives - informational, social, and structural - to engaging with water conservation and climate change. Exploring individual experiences of drought was considered a key component of the work, and clearly, in order to devise the research questions, a basic hypothesis had already been shaped. Firstly it was hypothesised that it might be possible to detect a direct link between actions to mitigate climate change (reducing personal carbon output) and the use of water. This was dependent on viewing the public as an entity, capable of perceiving and conceptualising drought as a phenomenon caused by climate change, and that this would be observed through probing and questioning by the researcher. Secondly, it was presumed that there was a definable effective public response to climate change to measure the public’s behaviour against, although this response was not described in the proposal. Thirdly, implicit in the project brief was a widely held opinion that there are limits to climate adaptation and that these are formulated within a person, based on their knowledge, ethics, and perception of risk (Adger et al, 2009).

In light of the literature reviewed, the research questions appeared increasingly naïve in their simplicity, making the author concerned at times that she had been naïve in accepting the research brief. This is why reading a broad range of literature at the outset of a project is so important. It allows time for thought and

reflection and saves one from making mistakes at the research design phase. In this case, the literature identified a number of complexities in answering these set questions and the author is indebted to Professor Steve Hincliffe for directing her to look again carefully at some of these complexities. Principally, there are multiple publics and once this is acknowledged it is impossible to read “*the public*” as shorthand for humankind in all forms: groups or individuals; in various settings such as home and the work place; or as virtual entities in the media. Therefore, it is important to identify one’s choice of ‘public’ to research and develop strategies for identifying and studying these publics and appropriate methods of collecting and analysing the data.

Probing publics on the topic of climate change is not as straightforward as other less complex and controversial phenomena. Several authors; for example Leiserowitz, (2005), Kempton, (1991), and Hulme, (2009), have cast doubt on the ability of publics to identify and conceptualise climate change. To follow a commonly prescribed route already travelled by others, through perception questionnaires and verification of various theories, may not have brought forth any new observations and was not attractive to the author. The severity of a drought will dictate the likelihood of the introduction of prohibition of water use and thereby reductions in consumption. However, observing the action of publics using less water in a drought could not necessarily be assumed to be a direct response to climate change, even if an increase in the frequency of drought was shown to be due to global warming. Furthermore, if the development of sustainable lifestyles were indeed the most appropriate response to climate change as the literature suggests, any cognitive or institutional barriers detected in this research would only relate to one aspect of a multi-faceted concept and could not be assumed to apply to all other sustainable practices. In acknowledging these important factors, the author did not set out therefore to offer solutions that would secure positive behaviour change. It is up to policy-makers and practitioners to develop these. Instead, the author set out to establish a baseline. As such, the research was devised as a study of perceptions and actions of people who “*are practitioners who indirectly, through the performance of various practices, draw on resources*” (Røpke, 2009, p2490) in a changing climate. It was not an empirical study of practices

with the intent of identifying environmental impacts as an important factor as this was taken as given and the research brief indicated an interest in delving deeper into the social aspects of practices. As O'Brien (2011) has suggested, it was important to pay attention to subjectivity and how publicly held world-views were affected by environments and discrete understandings of climate change and related phenomena, to obtain "*deeper understandings of the human dimensions of environmental change*" (O'Brien, 2011, p547). Approached in this way, the author considered the research a perfect fit within the human geography discipline, which allows investigation and analysis of both physical and social dimensions of human development and the interplay between humankind and the natural world.

### 3.3 Choosing Classic Grounded Theory (CGT)

Works by Kellstedt et al (2008) Barr, (2004) O'Connor et al, (2002) and Stoll Kleeman et al (2001), revealed the gap between perceptions and willingness to act but were not designed in a way that would allow the researcher to go behind the scenes to provide a clear understanding of the lives and motivations of the perceivers. Berk et al (1993) asserted that understanding exactly the combination of prohibitions and changes to personal habits in play when the public is asked to reduce water use is "*virtually unaddressed*". Medd and Chappells (2008) called for further studies to go beyond self-reported water saving activities and Medd and Shove (2007) concluded that educating water users to establish water saving practices whilst emphasizing environmental concerns represented one of several promising strategies for research. However, there is clearly a problem in that researchers often try to leap to the latter educative model before having a complete understanding of the former position. This observation provided the author with a strong motivation to develop a strategy that allowed time to understand how individuals might combine the unknown [future climate] with the unchecked [water habits] and to understand the subtle adjustments subjects made to their perceived norms and actual behaviour in an environment familiar to them which would most likely be their homes.

According to Charmaz (2006), GT is a systematic method that requires the researcher to move back and forth between deeply probing beneath the surface of a situation and analysis of visual and audible observations and accompanying data and evidence. A wide variety of techniques may be used and Classic GT, the author's preferred method, is described as being neither qualitative nor quantitative but "*a general research methodology occupying its own distinct paradigm on the research landscape*" (Holton, 2010). Readers should note this emphasises the clear distinction between taking a Grounded Theory approach and doing Classic GT. GT having been adopted by many as a purely qualitative method (Goulding, 2002), which is very often described by researchers undertaking mixed method studies as a grounded theory approach, where the core component of a research project comprises extended interviews but the study does not result in a theory as such, and the interview results are used to verify existing theories and explain other observations. Ellis (1993) provides an excellent example of this in his study of information seeking patterns of researchers, which Ellis uses to develop models of information seeking activities and a set of recommendations for information retrieval system design, without developing an actual theory.

In contrast this research did indeed follow the method set out by Glaser and Strauss (1965, 1967) and further detailed by Glaser (1978, 1998, 2001, 2003) directly to develop a theory. The purpose here being not simply to take a new approach to the method of collecting qualitative data but to follow a carefully prescribed paradigm to provide an "*entirely fresh slant*" (Goulding, 2002, p42) to an area of growing interest. In this case to follow a strictly Glaserian method, as opposed to that advocated by Strauss and Corbin (1998) which involves strict coding matrices and results in a clearly documented difference between the two (Glaser, 1998).

### 3.4 The Importance of Project Cycling in Classic Grounded Theory

The original intention for this research was to use a mixed method approach requiring qualitative and quantitative data to be analysed and compared to existing theories. Choosing Classic GT did not replace this approach. Glaser

(1978) suggests that following a grounded theory method requires a level of concentration that cannot be maintained extensively and the best way to avoid fatigue and early theorization resulting in thin description is to cycle several projects at the same time. Therefore the research was split into three separate project strands in response to the three research questions. These project strands were expected to provide data suitable for analysis in a traditional verification study that might also be useful as secondary data in the process of developing the theory. Additionally there was an element of work that could not be planned in advance and this is where Classic GT stands out from other methods, in that grounded theorists consider that everything they encounter is data and the collection and analysis of this data prompts the researcher to look in new areas for more information and this cannot be planned. If it could be planned then the researcher would clearly be forcing their own ideas onto the data and this is something that must not be allowed to happen. Perfectly planned data collection is not true to the subject matter it simply reflects the opinions of the researcher. The anticipated caches of data: interview and focus group transcripts and notes, personal diaries, discourses, and ethnographic writing would be analysed and used to prompt introspection by participants and the researcher, leading to deeper analysis and further introspection, which would inevitably lead the researcher to look further, ask more questions, and find new subjects to work with, with the aim of reaching theoretical saturation and from this point, abstracting substantive theory. There is a more detailed account of the process of completing a GT in chapter seven of this thesis.

To identify a manageable suite of projects that could be cycled together the author chose to design set fieldwork tasks that would attempt to address the research questions systematically, whilst also contributing secondary data to the overarching grounded theory study. These projects could be viewed simply as components of a mixed method study and analysed as such but to the author these projects represented a means by which access to publics could be gained and opportunities to observe and probe subjects' practices and motivations. The following sections break down the research questions into their constituent parts and describe the processes through which decisions were made regarding the methods to combine and the publics to study.

### 3.5 Interpreting the Research Questions

- Question 1. How does the public perceive and conceptualise drought and climate change and is there a link between the two?

This breaks down into two questions; one about perceptions and the development of concepts and another regarding the way subjects link different concepts together. Perception is described in the Oxford English Dictionary as the *“intuitive recognition of a truth, aesthetic quality, etc.”* or *“an interpretation or impression based on one’s understanding of something”* and also, *“the ability of the mind to refer sensory information to an external object as its cause.”* For the purpose of this research climate change was considered to mean a long-term change in climate principally driven by increasing temperatures (global warming). Yet, on a global scale, a steady increase in global average temperature will not necessarily mean a steady increase in drought across the planet. Therefore there was scope to study these concepts through the eyes of publics as separate conditions. Drought and climate change were not automatically linked.

To attempt to reveal the intuitive thinking of others based on imperceptible long-term changes in climate and extreme localised weather conditions requires a high level of sensitivity. Neither drought nor climate change could be considered external ‘objects’ even though they are distinct and measurable phenomena over time. It is not possible to prove in all cases that drought when it occurs is an unfortunate consequence of long-term climate change. It is broadly assumed that a warmer global atmosphere will be a wetter one (Houghton, 2004) although increases in atmospheric water vapour will be caused by evaporation from oceans and land, and there are many different variations of drought – meteorological, agricultural, hydrological, socio-technical - and a plethora of human factors contributing to these such as over abstraction from aquifers and rivers, intensive farming techniques, and deforestation. This question appeared therefore to present few opportunities for the collection of meaningful quantitative data. Instead, exploring perceptions of climate change and drought with subjects was considered more likely to provide a wealth of qualitative data. However, timing was important as both climate change and drought manifest

slowly and are to a certain extent measured retrospectively. Asking subjects to reflect on past experiences of drought and climate change may garner quite different results to quick capture of experiences of these phenomena immediately as they reveal themselves as aspects of ongoing changing weather patterns. Whether it would be possible to collect data (both recollections and direct experiences in real time) from subjects would prove to be dependent on the weather as it unfolded during the life of the research. How the researcher would be able to discern between genuine responses from subjects and responses considered by subjects as appropriate (because these are not always the same thing) also required careful consideration.

Bord et al (1998) lament the “*enduring dilemma of social research*”, admitting that most respondents will express concern for global warming as it would be socially unacceptable not to, but this does not mean that they will accept to make drastic changes to their lifestyles to tackle the issue. In reality, global warming still ranks below other more tangible environmental concerns. Bord et al’s (1998) work highlights the difference between questionnaires that solicit responses from individuals regarding the perceived threat of the consequences of global warming, which tend to be answered with great concern, in contrast to similar questions that focus the respondent on the self. When shielded from the threat of global warming, respondents appear to downplay its negative impact, diminishing the requirement upon them to act. However, when asked to consider the impact of global warming on the self, respondents show much greater concern for future personal harm but are generally less willing to make changes to mitigate its effects. This might explain why Kellstedt et al (2008) observed that individuals feel less and less responsible for climate change the more aware of it they become.

At the outset of this research a drought had not been officially declared in England. Analysis of on-line Met Office monthly climate summaries (Met Office, 2012) shows that during the twelve months over which the research design process was developing (October 2009 – September 2010), there was below average rainfall across most of England for five months. However, there was above average rainfall for four months and water companies expressed no

concern over availability of supply, leading the author to concentrate on developing research methods that would rely on memories of drought in the past and understanding of the concept of climate change, without there being any notable discussion of the topic prompted by the experience of actual socio-economic drought. The author chose two publics to answer these questions: firstly, a media-based public located in the past and voiced by reporters and writers commenting on notable drought episodes in newspapers, journals, books, and audio-visual archives. And secondly, a public held in the memories of those who had experienced notable droughts, which were discovered through the collection of oral histories from willing volunteers. These caches of data were to be brought together in the form of localised drought histories, providing comprehensive overviews of two notable droughts in England, the great drought of 1976 and the more recent drought in southern England between 2004 and 2006. These histories are presented and compared in chapter four.

- Question 2. Does experiencing drought lead to mitigative behaviour in terms of water consumption and energy use?

Naturally it is helpful to answer this question during drought conditions. Without a drought one could turn to quantitative data provided by water and energy companies that relates to periods of drought. There is some evidence of water saving prompted by appeals and hosepipe bans instigated during drought periods. Water companies expect customers to reduce their water use by around 10% when a hosepipe ban is introduced. However it may be unwise to link aggregated water company data with an assumed public. Populations are not homogeneous and their constituent parts may harbour distinctly different water-based practices. One must question how one can categorise individuals into meaningful groups for analysis, what motivates them, and how one might access data that is more specific to the subjects under observation.

Argawal (1999) has argued that communities can be trusted to manage and conserve natural resources providing community is understood in the context of the differences between individual members, i.e. they are not homogeneous but they will share some characteristics that are useful for developing resource

conservation strategies. Mitigative behaviour in a drought may not always be measurable in respect of cubic litres of water or kilowatt-hours of energy saved for a whole population but data from individuals may provide great insight when combined with observations of practices and discussion regarding perceptions and concepts. Other researchers; Palutikof et al, (2004), Dessai & Simms, (2010), have used questionnaires to garner perceptions of climate change and self-reports of mitigative behaviour. However, exploring opportunities to mine a rich vein of qualitative data from individuals and groups that are prepared to voice their intuition during drought conditions or to comment on past drought experiences and their actions, as questions one and two demanded, was anticipated to be best achieved through methods such as extended interviews, participant observation, and focus groups which would be conducted in three locations representing the three geographical areas.

- Question 3. What are the cognitive and institutional barriers to an effective public response to climate change?

This question assumes that there is a known appropriate public response to climate change and that it is in some way connected to drought. Whilst highlighting a possible mismatch between the position we find humankind in today - facing climate change with very little agreement on what to do about it - it implies there are identifiable barriers in the public psyche and institutional governance that might be overcome. It is only possible to identify such barriers when the extent of an appropriate public response to climate change has been identified and this is a very broad topic beyond the scope of this research. Therefore, for clarity it must be noted that the author interpreted this question as a challenge to identify cognitive and institutional barriers (if any) within the context of drought and water management only. Open questioning and exposure to multiple scenarios is important in areas of work such as this, where the exact nature and extent of the desired public response is not specified. The author therefore sought to identify a means by which it would be possible to instigate a meaningful dialogue with subjects regarding aspects of drought and water management that would draw out specific details of existing public

responses to drought and their personal management of water resources in the home environment.

Buttimer (1976) asserted that phenomenological approaches to geography research could explore and describe the *“icebergs [behaviours], whose depths we can sense only vaguely”* (p287). She also suggested that, *“the notion of the lifeworld connotes essentially the pre-reflective, taken-for-granted dimensions of experience, the unquestioned meanings and routinised determinants of behaviour”* (p281). To answer the research questions it was important to establish links between public knowledge of drought and climate change, experiences of past drought and water scarcity, and water saving behaviours. Essentially, asking subjects to reflect on past experiences, current activities, and future scenarios. The broad base of literature reviewed, spanning climate science, drought, environmentalism, behavioural psychology, water management and water practices, did not lead to a clearly mapped path to developing fieldwork proposals although it did pinpoint a logical start point in the absence of an actual drought, in analyzing individual water practices in the home. A positivist approach to this was not considered appropriate. This mainly stemmed from the noted value-action gap (Stoll Kleeman et al, 2000, O’Connor et al, 2002 Barr, 2004, Jaimeson, 2006) and the absence of research seeking to bring together perception studies and field observations of everyday uses of water, with opportunities to ask participants to add meaning to these field observations by reflecting on their motivations for maintaining habitual water practices, leaving the researcher to attempt in part to solve *“the enduring problem within social science of how to explain the relationship between conscious human agency and social structures”* (O’Riordan & Jordan, 1999 p89).

Bunting and Guelke (1979) criticised behaviour and perception geography as focused on image, and cast doubt on the idea that people will honestly reveal the real thoughts behind their activities to researchers. They also warned against adopting extreme subjectivity – phenomenological analysis – on the grounds that, it is description of human activity as well as insight into the lifeworlds of subjects that are important elements to bring together for research

of this nature. Therefore, a mixed method approach, combining opportunities to collect useful observations of lifeworlds, the social and physical structures and events shaping these lifeworlds, and the motivations and perceptions of various publics whose lifeworlds are the subject of analysis, was considered most appropriate. In addition to this, identifying barriers in institutional governance would require probing the various governing bodies and water companies to carefully assess their position on climate change and policies and structures that may block (intentionally or unintentionally) the public's attempts to adapt. In the case of water management, research to date regarding scarcity has been polarised and directed by the bias towards end-user issues and the blame culture that exists (Pearce et al, 2013). The dominant idea here being that customers can be blamed for using too much water and forced to take action. This very cleverly deflects attention away from policy makers, regulators, and water suppliers, and rests the spotlight onto the phantom public, which in this case is the phantom consumer, comprised of averaged water consumption data, and water-saving attitude survey data, contextualised through climate perception questionnaires.

It is not possible to pick out the individual from large data sets. Millock and Nuages (2010), for example developed probit models to assess the probability of households adopting water-efficient equipment. Their research was based on a survey of 10,000 households and was interpreted as showing that households on water meters were more likely to invest in water-efficiency. Without visiting these households, there is no visible proof that this is actually the case. Self-reports of ownership of 'water efficient washing machines' or 'low-flush toilets', led to the assumption that respondents actually knew about these appliances and their interpretation of 'water efficient' was comparable to that that of the researchers. Using these types of data to substantiate assumed behaviours described in popular theoretical models or segments appeared to the author and thankfully some other commentators to be less credible than some alternative approaches.

Jackson (2005) has criticised the use of theoretical models to construct behaviour change initiatives and Darnton (2008) has argued that the use of

stages of change models such as the transtheoretical model (Velicer et al, 1998) would be more beneficial. The transtheoretical model identifies self-efficacy as a tipping point between behaviours when the subject considers a new behaviour to be more personally beneficial to themselves (Bandura, 1977). Sadly this model has not been used directly in studies to identify tipping points in water use behaviour, perhaps because it is just as likely to show subjects altering their habits to use more water than less. In research that attempts to measure progress towards sustainability there is inevitably an overemphasis on trying to pinpoint the exact opposite, to look for the positive rather than the negative. Of course it is just as helpful to pinpoint the moments when individuals move further away from sustainable living but this is presumably far less attractive to those who go in search of indicators that point to the public making steps closer towards where policy makers would like society to be.

Bearing this in mind, one might conclude that the general framing of sustainability or climate change around such research may not be helpful. To design good social environmental research it might be better to look at the basic elements whether social, economic, or environmental, without framing at all to begin with. To simply identify what is happening rather than attempt to predict what will happen if one alters a noted trend, might be much more useful. This does not mean that the context of the research should simply be hidden from the subjects but possibly from the researchers also (See Pearce et al, 2013 in Appendix A for a lengthy discussion on new methods of research). Owen et al (2009) withheld the topic of their research from water diarists and focus group attendees to ensure they gave honest answers but framed their analysis of the results within their own constructed definition of sustainable water use. Allon (2006) on the other hand, deliberately avoided environmental framing in her research based on water diaries, encouraging authors to write frankly about their thoughts, motivations, and choices around water use without directing their thoughts through the filter of environment or climate. Jensen (2008) critiqued Danish behaviour change initiatives and the limits imposed by the perspective from which subjects were observed, suggesting that linking observations of participants with their stated opinions on environmental topics and consumption data did not reveal the individual intentions behind specific consumption

choices, particularly as some choices were out of the control of the subject. In other words, fitting preconceived models to observed actions, may lead us to believe subjects are driven by motivations that do not actually exist. This is possibly why much topical and well-intentioned social research aimed at the development of behaviour change initiatives appears to leave a gaping hole where true motivations and behaviours of the individual lie. Perhaps because it is difficult to detect motivations simply by recording stated perceptions, and it is even more difficult to clearly identify existing behaviours from guided questionnaires that are reliant on self-reported actions and ownership of environmentally categorised apparatus.

Behaving positivistically and attempting to prove or disprove existing theories or hypotheses based on an assumption about a phantom public's behaviour was not the intention of this research. Nor was it the author's intention to monitor stages of change, for firstly it is really important to identify basic common behaviours and various lifeworlds. In the author's opinion, the reading confirmed there was a need for this and after careful consideration of epistemological principles of Phenomenology, Verstehen, and Social Interactionism (Bryman, 1984, Cloke et al, 2006, Williams and May, 2000, Schultz and Luckmann, 1973, Goulding, 2002, Charmaz, 2006), following the Classic GT method, faithful to that 'discovered' by Glaser and Strauss (1967) emerged as a suitable guiding framework for ongoing fieldwork, enabling the collection of 'rich' data with a great deal of depth. The sensitising concepts uncovered through reading were therefore not viewed as a theoretical framework but as "*points of departure*" (Charmaz, 2006, p17) from which the research began. More importantly, the author was freed from the constraints of a specific frame for the research, as Classic GT is not dependent on a set analytical framework. Successful theory generation is dependent on the researcher's ability to let go of any preconceived ideas and to follow the data, not caring which direction it takes but allowing a theory to emerge through systematic analysis of what is heard and observed, regardless of its fit with other theories. To this end, the author determined to use simple questionnaires to collect baseline data from subjects that would go some way to answering the second research question, and at the same time would provide an opportunity to recruit individuals to the GT study,

where the data collected would provide a platform for discussion that was sufficiently open in context to allow the conversation to be guided by the interests of the interviewee rather than the researcher. This is critical in Classic GT where the overriding principle is not to force data to fit pre-existing theories but to let the data speak for itself in the construction of fresh, new theoretical writing that is guided by the experiences of the researcher rather than a pre-set framework of assumptions such as those contained in the project brief, which were swiftly abandoned for this part of the research. These discussions would take place in focus groups and subjects' homes, should they be willing to participate.

### 3.6 Developing Focus Groups

In formulating the research strategy the author conducted a test focus group on July 10<sup>th</sup> 2010. The focus group took place in the public library in Barnstaple town centre. Barnstaple is a market town in North Devon. In 1976 the population of Barnstaple suffered severe water restrictions due to a severe drought. The author wanted to identify discussion topics that might encourage participants to discuss drought and/or climate change. Participants were recruited via messages placed on social media websites and also in person in the town centre. A £10 shopping voucher was offered in return for attendance. Three male and four female participants attended. Their ages ranged from 22 years to 67 years. Three of the participants had lived in the area long enough to remember the 1976 drought. So as not to drive the discussion, as facilitator, the author placed seven cards face down in the centre of the table. The participants were asked to turn the cards over one at a time, to discuss the topic on the card and move onto the next card when the topic had been exhausted. The topics are shown below:

- 1) Today's Weather - Describe the weather today, how it makes you feel.
- 2) Weather and Travel – Do you always check the weather forecast before going out and does the weather influence when you travel and how you travel?
- 3) Your Weather Wardrobe – What specific items of weather-related clothing i.e. rain mac, wellingtons, sun hat, do you have in your wardrobe and how often are

they used?

4) Weather and Home – How does the weather affect the things you do at home such as gardening and washing?

5) Forecasting and Visual Cues – Do you have a temperature gauge, a barometer, a piece of seaweed hanging by the door? Do you look out for different cloud formations? What visual cues do you use for making your own weather predictions?

6) Tomorrow's Weather – Have a go at predicting tomorrow's weather.

7) Weather and Climate – How do you think climate change is going to affect the weather? Is it already?

These questions were set based on the notion that talking about the weather may trigger a discussion regarding drought or climate change. Unfortunately this approach yielded very little discussion on these topics. Although the weather preceding the focus group had been warm and sunny for several days, just an hour before the meeting a cool sea fog had rolled in across the estuary and so the main point of discussion was based on the idea that the weather was generally "miserable", "wet", "cold", "grey", "cloudy". Participants expected future weather to be the same. There was a noticeable link between car ownership and indoor work and antipathy towards the weather in general. For six of the participants who had indoor jobs, and cars that they drove to work, it was possible for them to avoid the weather. Their attire and day-to-day activities were not affected by changes in the weather and therefore they neither dressed for the weather nor did they claim to have any interest in reading forecasts or making their own weather predictions. One participant who had recently retired from an outdoor job and enjoyed gardening paid more attention to the weather, had a larger range of weather specific clothing and paid attention to forecasts. Something that was noticeable about the group was that members appeared to find it difficult to openly discuss issues whilst being observed by a stranger and other participants they did not already know. Whether this had an impact on the outcome is difficult to say, however, the purpose of the exercise for the author was to assess her ability to run a focus group and set a strategy for drawing information from the group, which did yield a result but was not necessarily the best way of initiating discussion about climate or drought.

Where the flexibility of GT is important in this analysis of an event is revealed if one considers an occurrence during the focus group session that was out of the control of the researcher yet entirely relevant. The walls of the library meeting room were very thin and it was possible to hear with great clarity the discussions and deliberations between people entering and leaving the library. At one point, a group (assumed to be four people) stopped short of leaving the building on realising how cold and damp the sea fog was. On entering the library it had been a bright sunny day and although this group could not be visually observed, their discussion highlighted the fact that their attire was not suited to the change in the weather. Having discussed the “*typically predictable*” change they then lamented their choice of clothing. In contrast to the group inside the room, outside, an emphatic conversation ensued blaming the weather that was “*always bad*” for allowing them to expect sun and warmth and therefore not to bring raincoats or umbrellas. After a while, the group concluded that the fog would not lift, the summer would be a disaster in meteorological terms and they had better run to their cars, accept the inevitability of cold, damp, clothing that would ensue, and retire to their homes to contemplate switching the heating on. The unavoidable verbal intrusion was hastily noted down and saved for analysis as part of the GT. This is an example of opportunism that is important in such a study. It also indicated that looking at weather wardrobes might be a useful thing to do but it might be best done in the home and not during a focus group.

### 3.7 Choosing a Suitable Sample of the Population

As GT is not meant to be based on statistically significant samples it may be difficult to understand why identifying a sample population is mentioned in this thesis. The original brief outlined a broad geographic area to consider and the proposed cycling of projects allowed for some consideration of who, where and when to sample but also underlined the ability of the researcher to move outside of these defined data collection areas if the mantra of letting the data decide, directed her to do so.

As a consequence of the test focus group outcome, a decision was made to

recruit focus group members from established groups who already knew each other and were assumed to be more comfortable in each other's company. Focus groups would take the form of extended discussions about water use in the home. Climate and weather would not be specific topics suggested to these groups but any spontaneous discussion of climate or weather would be recorded. These groups would be located and recruited in a two-step process. Firstly community organisations in the three chosen areas (Kent, East Anglia and Devon) would be identified and contacted by e-mail. Lists of groups are generally held in regional libraries and it is possible to search online lists held by local authorities for potential contacts. The author had in mind a reciprocal offer that was expected to result in two outcomes; firstly the selection of willing groups who in return for charitable tasks completed by the author would be prepared to attend focus groups and field subjects for interviews, and secondly would give a reason for the author to spend time in the three geographical areas of study. This would provide an opportunity to become immersed in these areas and get to know their communities in a way that might not be possible through reading and self-guided orientation visits.

The author, having extensive experience in environmental and horticultural work with community groups, circulated a brief curriculum vita together with an invitation for groups to put forward ideas for small projects that could be completed within six weeks. In return groups were asked to field members for extended focus groups on water use, or to share past drought memories by agreeing to record oral histories of either the 1976 or 2004 – 2006 drought. After some lengthy exchanges of e-mails and telephone discussions, the author identified only one group to work with. This group was a local food group based in Royal Tunbridge Wells in Kent, dedicated to promoting the use of allotments and growing fruit and vegetables as part of a Transition Towns initiative. The tasks the group asked the author to complete included planting a promotional flowerbed in the centre of the town, and polling residents on their interest in setting up a system for swapping locally grown produce. In return ten members of the group agreed to attend two extended focus groups and other group members agreed to provide drought histories. The full details of this arrangement can be found in chapters four and five.

A second group was located in Plymouth, Devon. This was not located through a systematic search of the local authority lists but by pure chance. The formation of a new, small, residents association was brought to the attention of the author by an acquaintance. This group comprised a lively and diverse mix of households, varying considerably in size, age, gender balance, and ethnicity. When approached the group was receptive to the author's ideas which in this case were simply to read their water meters on a regular basis, to get a feel for their per household water consumption and to co-ordinate small individual and group discussions on the subject of water use. In this case the author offered nothing in return other than to share any interesting insights on water use with the group. More details of this group and how the work developed can be found in chapter seven. Contact with the North Devon section of the University of the Third Age had already resulted in an offer from the Secretary to recruit members, who were living in North Devon in 1976 and were able to recall the severe drought at that time, to offer their oral histories from that time in return for a talk on the topic once the research was complete. Despite not having a confirmed group in East Anglia to work with, the author felt confident that one could be found and that it would be best to begin the fieldwork. The outcome of this approach is explained further in chapter five.

### 3.8 Ethical Considerations

Prior to the commencement of the fieldwork the author sought ethical approval from the departmental ethics committee. Due to the subject matter, collecting data via questionnaires and running focus groups was considered a non-controversial activity. The author did not plan to collect sensitive personal data. Information would be provided to participants regarding the reason for the research, how data would be stored and used, and all participants maintained their right to anonymity. Attempting to unearth new data relating to the micro components of water use by visiting subjects in their homes presented both ethical and safety concerns. The author wanted adult participants to discuss their water habits in a familiar environment (their homes), with people who were part of their established network of friends in the neighbourhood in attendance where possible. Participants would also be invited to try various water-saving

'gadgets' such as shower timers, and report back on their impact on personal water use. Participants would not be interviewed alone for safety reasons and a key member of the residents association would act as a safety buddy, being informed of the date and location of meetings and start and finish times. The researcher would check in and out for safety reasons. Young people under the age of 18 would not be included in the study unless they were brought to a group meeting by a parent. Participants would receive a sign-up letter (see Appendix C), explaining the purpose of the research and would sign and return it to the researcher in advance. Participants would be allocated a code rather than be named in the written notes. Notes taken would be available for participants to review if they wished to. Whilst this strictly documented approach does not fit terribly well with the principles of GT, where following leads that emerge from the data would make it impossible to plan in advance, most traditional mixed method studies are completed within pre-agreed ethical parameters. As other GTs are often completed in hospitals where strict ethical guidelines are enforced regarding interactions with patients, it was presumed that a certain level of ethical restriction is manageable in a GT study, although Glaser does not offer any guidance on ethics in the key GT texts.

### 3.9 The Influence of Weather Conditions on the Research Development

The author's experience of applying Classic GT method will be described in detail in chapter seven, prior to the presentation of the resulting theory. For now it is important to consider the time over which the research took place and the evolution of the research programme in that time, for although it was not considered a positive event for the population of England, the researcher was blessed with the good fortune of finding towards the end of the planned fieldwork phase that severe drought conditions became widespread across southern and eastern England and this led to a rather opportunistic extension of the fieldwork which contributed a great deal to the development of the substantive theory. The fieldwork was planned to take place between October 2010 and September 2011. The first six months of 2010 were the driest in England for 100 years with total rainfall of 362.5mm compared with the long-term average of 511.7mm (Met Office, 2010). This was followed in 2011 by the

driest spring for 20 years with only 45% of long-term average rainfall in southern and eastern England (Met Office, 2011). The slow, creeping nature of drought observed by Wilhite (2005) was evident in this case with socio-economic drought being officially declared in the east Midlands and East Anglia on June 10<sup>th</sup> 2011. Despite the obviously dry weather the privatized water companies did not introduce any prohibitions or limits to water use and so the public were able to continue using water without restriction. A second dry winter followed in 2011/12 and the drought spread to London and the southeast and parts of the south west of England, where rainfall was between 60 and 75% of average volumes across the winter months. By February 20<sup>th</sup> 2012 the situation was serious enough for the Environment Minister, Caroline Spelman, to call a drought summit (Mason, 2012). The drought continued through March and hosepipe bans were introduced in seven water company areas by April 5<sup>th</sup> (BBC, 2012). This unexpected though beneficial (to the researcher) turn of events provided an opportunity to conduct a much broader analysis of a drought covering the chosen geographical areas for study, in real time. Although this extended the time taken to complete this thesis, it created opportunities to observe the behaviours of various publics in a severe drought situation, in addition to collecting secondary data and self-reports of behaviours in past droughts, the latter having been originally anticipated to be the only source of data available. A brief history of the 2010 – 2012 drought is included in chapter four, for comparison with the drought histories from 1976 and 2004 – 2006.

### 3.10 Avoiding Confusion

Having broadly outlined the activities proposed for this research and the opportunity to extend these activities to take advantage of the drought situation, it might not be immediately obvious how this work differs from that of any other mixed method study. The combination of techniques used for this research included theoretical sampling through participant observation in the form of extended interviews and focus groups, practical experiments, and analyses of extant data including rainfall records, personal diaries, newspaper reports, historic accounts of past droughts, and social media commentaries on drought and water management. These activities were part of a series of cycled

projects, which could be viewed as a mixed method study, or as a series of events contributing to a GT.

Doing grounded theory is a creative, and also quite secretive affair that begins without a prescribed framework or direction. Following an initially self-generated concept, everything the researcher encounters is treated as data rather than selected observations based on their fit with pre-existing theories. This approach to research made extending the period of data collection and analysis across the drought period feasible without having to re-start, or re-design the research methodology. It also meant that a substantial number of interviews were conducted outside of the main study groups as the researcher opportunistically turned every encounter with water users into a moment, no matter how brief, to collect data. This activity was not subject to a separate application to the ethics committee as it would have been impossible to predict the times, places and nature of these encounters. This is where the collection and classification of data for such a study becomes rather complicated and it is reassuring to the researcher that a clutch of cycled projects are available to fall back on, should the process of GT become overwhelming. In this case each event could be analysed and presented as a legitimate piece of work that would contribute towards the study of drought and climate change. The same work could also be utilised to create opportunities to collect data for the GT study. Chapter five contains a description of the delivery and collection of questionnaires in the three chosen locations. A substantial number of interviews that constituted data for the GT study were collected on the doorstep of homes whilst collecting completed questionnaires. The questionnaires incorporated a brief explanation of the research and respondents were able to sign the back page to consent to an interview at a later date. Having been told when the questionnaire was going to be collected, a surprising number of respondents waited for the researcher to call and ask to be interviewed on the spot. This unexpected situation presented a perfect moment for individuals to talk freely about their water habits. The good weather facilitated strolls around gardens and lengthy discussions, revealing a wealth of individual habits, rituals, and opinions. It is impossible to know when a GT will be completed. It may take months or years. This is an incredibly risky position for a student to accept but

in this case, the questionnaires could be analysed and presented as part of a mixed method study should no theory be forthcoming. If a theory were forthcoming it would be interesting to see how useful questionnaire results are in making sense of environmental behaviours in contrast to the presentation of a substantive theory.

### 3.11 Conclusion

On reflection, this appears to have been an overly ambitious amount of very time consuming research to undertake. It required traveling across England from west to east and spending several weeks in each chosen location. However, the mix of approaches would certainly yield a broad spectrum of primary and secondary data for the GT study, with each element also being of interest in its own right. The cross connections between each element of the work made compilation of the data extremely complex. The final choice of presentation being to provide description of the data as it might be expected in a mixed method study, to support the final presentation of a theory (should it emerge). The novelty in this process being mainly this approach to the research and writing-up as a series of linked issue-based projects that are identifiable in the final thesis rather than hidden amongst the theoretical writing as a series of codes indicating notes and memos that remain unpublished. Beyond this it would be possible to compare the relative usefulness of the selected project methods in comparison to the distinctly different GT methodology.

The importance of defining new methods of researching drought and water scarcity issues was expressed in Pearce et al (2013), (see Appendix B), which was written during this studentship as a direct call to environmental social researchers to facilitate a change in direction in environmental behaviour research. Whilst Grounded Theory was proposed in this paper as one new alternative for researchers to experiment with, there are inherent problems in delivering a final theory in the Classic Glaserian style, which demands a conceptual approach rather than one of description and verification. Stepping away from the security of observing behaviours and comparing them to other

behaviours already observed, and attempting to write a new, stand-alone theory on the subject, is, as has already been mentioned, a risky strategy. In doing this the author hoped not only to shine a new light on aspects of every-day life that are of great concern environmentally but at the same time to present a substantive theory that would stand the test of scrutiny from other grounded theorists and also lay open aspects of the normally hidden world of GT development, to geographers and environmental social scientist who would not normally consider its use. In addition to this, it was anticipated that any emerging theory would provide opportunities for the development of positive interventions to be used to improve relations between water companies and their customers, and have a direct impact on the way water is used in households, with an emphasis on reducing overall demand for water.

In the next chapter the results of work to recreate the socio-economic aspects of past drought episodes in southern England are presented in two historic accounts of the impact of the short summer drought in 1976 and the longer drought spanning 2004 – 2006. These are compared to the drought that occurred across the duration of this research project between 2010 and 2012.

## **Fair Weather and Fair Shares of Water: How Publics are divided in Drought Situations**

### 4.1 Introduction

This chapter is split into three sections and is designed to introduce readers to the three research locations and three severe droughts as they were experienced in those locations, separated both spatially and across a 36 year time period. Although in each location the public experiences of the meteorological, hydrological and socio-economic stages of drought were significantly different, there are some notable shared characteristics between the behaviours and opinions expressed by the three publics studied in each case – the public in the media, public bodies accountable in water crises, and water users; each forming part of the unique drought histories of 1976, 2004 – 2006 and 2010 – 2012.

Each of the detailed historical timelines presented combine materials from multiple sources. In part one, the great drought of 1976 is documented through detailed text analysis of archived local newspaper reports, personal diaries, and recorded oral histories from those who experienced it directly. The recording of oral histories was considered a more appropriate method for capturing reminiscences than structured or semi-structured interviews. This combination of factual reporting from the time and personal memories is corroborated through the only detailed diary account of the drought, published by Evelyn Cox (1978). In part two the long drought that had a severe impact across a narrow band of southern England between 2004 and 2006 is documented through text analysis of archived local and national newspaper reports, government and agency reports, and brief comments supplied by individuals who were living in the county of Kent at the time. This collection of experiences is contrasted against Philip Eden's (2008) critical account of the event. Part three is comprised of the author's collection of on-line newspaper reports, radio

commentaries, blog posts, and Government announcements, collected towards the end of the drought period 2010 – 2012 when the socio-economic impact came to prominence in England.

Carey (2012) has argued that a modern focus on the science of climate change has overshadowed the practice of doing historical climatology from a social and cultural perspective. This has resulted in there being few if any works that historicise recent cultural and socio-political events associated with climate. However, extreme and prolonged weather events in the recent past have prompted a resurgence of environmental historical writings that attempt to locate the roots of anthropogenic climate change (Morgan, 2013) and deliver a sense of understanding of how we might view the risk of future changes in climate.

#### 4.1.1 Motivation for the research

It is important to note that each of the histories presented below is a stand-alone item. A cycled project designed to distract the researcher and make doing GT bearable, and an insurance policy against failure to allow a theory to emerge from the GT study. Reviewed separately they provide a window through which one can observe small, localised water crises and learn something from what happened, in an attempt to ensure that these problems do not occur in the future. The oral histories recorded for this work, when reviewed as secondary data in a GT study, could be coded, analysed, and categorised, as part of the substantive work.

In chapter one the fact that meteorological droughts build slowly and are best described in retrospect through quantitative data such as soil-moisture deficits, rainfall data, and reservoir headroom calculations, was shown to be partly to blame for the hydro-illogical cycle of inaction followed by panic, followed by a blame game. In the early stages of this research a drought was developing although it was impossible to know that from the outset. It was therefore appropriate to look at ways to garner information about the behaviours of

different publics during drought situations by looking at past drought events. These histories following three distinct drought histories were collated in an attempt to make sense of historical sociological data linked to three distinct geographical locations in southern England, representing the three levels of drought or water shortage experience mapped out in the original ESRC proposal. The techniques used were guided by the available data for the locations, which in the main is held in local newspaper reports. The relevant water companies were not willing to allow access to any privately held drought reports from the period 2004 to 2012, although South West Water were happy to field a member of staff with strong memories of the part he played in managing resources throughout the 1976 drought.

Early reading revealed that North Devon was the area of England that suffered the most severe rationing of water in 1976. As this was an event that many people still remember, the idea of recording oral histories was developed as a means by which a picture of the socio-economic aspects of the drought could be brought to life. Whilst the recordings are not presented as part of this thesis, the full transcripts of conversations with those who agreed to share their memories of the drought became a substantial secondary resource for the grounded theory study, although this was not of primary concern at the time this project was designed. The unique aspects of the first historical account are the extracts of the reminiscences from people who experienced water rationing by standpipe, which are used to fill in the gaps in knowledge that are not provided for in local media reports. The availability of a complete account of the 1976 drought from published diaries is significant as it confirms the general level of accuracy in this type of data collection. On the whole, people's memories of what happened in a severe drought situation are shown to be quite accurate. Their opinions of what and who were responsible are quite revealing and their knowledge of how one might flout a water ban reveals a high degree of ingenuity.

The second drought history relates to the period between 2004 and 2006 and it was assumed that the information could be found using similar methods. Unfortunately, the memories of people living in the Southeast of England at that

time are not so clear on the drought. However, much was written in the local and national newspapers and a critique by Eden serves to expose the discrepancies between actual rainfall data and the level of media coverage and concern for the safety of water resources.

The third drought history is by no means a complete analysis of the media commentary or of people's experiences of water rationing. Working in real time, (which it was possible to do in this instance) provides enormous quantities of data, mainly from the media. The explosion of social media in recent years has led to an almost infinite digital commentary that requires specialist software to capture and analyse. Therefore this is an incomplete record designed as a comparison tool.

The histories presented below are a small contribution to our understanding of water management during recent drought periods from a socio-economic perspective. Whilst they may say something about the future risks associated with climate change, they do not point to the causes but to patterns in behaviours and dialogues in communities of distinct locations in England. These patterns are highlighted to assist water companies and environmental agencies in planning for the management of water resources during future drought episodes. The method by which these behaviours and patterns are revealed is through the rather mundane yet necessary process of compiling and presenting data from localised sources, sequentially, so that it may be possible to combat drought through preparedness (Wilhite, 2002) by anticipating that these behaviours and patterns may materialise again in the future, where similar circumstances prevail.

#### **4.2 The Great Drought of 1976**

In 1976, severe drought conditions led public Water Authorities in England to use the threat to households of the introduction of standpipes, to encourage water saving to conserve supplies and reduce household water use by 30%. Introducing the first Drought Act on August 6th, the Government promised there would be fair shares of water for all (Cox 1978, p92). However, the subsequent

handling of the drought in North Devon was perceived as distinctly unfair, by a local population that experienced its severity by varying degrees according to their geographical location, age, occupation, and specifically, the Water Authority's approach to the situation. In the end, the fair weather didn't always make up for the mayhem caused when mains water supplies began to run dry.

*“Certainly, if ever there was a crisis which had been solved by the time-honoured British tradition of muddling through the water crisis of 1976 was one.”*

Evelyn Cox (1978, p143).

#### 4.2.1 Building a Comprehensive Picture of an Historic Drought Event

This section is based on work completed over a twelve month period to build a comprehensive picture of the 1976 drought as it was experienced by people living in the North Devon towns of Barnstaple and Bideford and their surrounding villages, by collecting and recording personal oral histories and collating a comprehensive text analysis of local newspaper reports. This geographical location is of interest as it was the only area in England in 1976 where standpipes were actually commissioned for use on a large scale, in a bid to manage rapidly diminishing water supplies.

The work required to build a history of the 1976 drought in England began in the North Devon Library and Record Office in Barnstaple, where it was possible to view microfiche copies of the North Devon Journal Herald\*, which was the prominent weekly independent newspaper sold in North Devon in 1975 and 1976, a forerunner to the North Devon Journal which is still in circulation today. The author studied all 104 editions of the Journal published between January 1975 and December 1976, identifying all weather and water related articles, comments, and letters to the editor, and conducting a thorough text analysis of these items to develop a picture of the impact of the drought as it manifested. Having established a time-line of events that shaped the media public's perspective on the drought, additional layers of material were overlain on the

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\* For the avoidance of a repetitive and lengthy reference list, all items from editions of the North Devon Journal Herald and Kent Messenger are cited in the text by date of publication, feature headline, and reporters name where given.

basic 'history'. These layers were drawn from oral histories collected from people who were living and/or working in North Devon in the same period, who were able to recall vividly, the long, hot summer of 1976 and the proceeding dry period, which began in May 1975. During this time, according to Rodda and Marsh (2011), only 756mm of rain fell and temperatures over 32 degrees Celsius were recorded somewhere in England each day from 23<sup>rd</sup> of June to 8<sup>th</sup> July 1976. The oral history contributors, five women and seven men, were aged between sixteen and 45 years of age at the time of the drought. Their varying occupations and interests at that time are shown in Table 6.

Each oral history contributor brought their own perspective to the drought through memories of their actions and responsibilities at the time. Two of the twelve contributors were recruited via e-mail appeals to local community groups operating in and around Bideford and Barnstaple. Eight contributors were recruited via the North Devon branch of the University of the Third Age, and two were sought by name based on information the author collected from media reports from 1976 and insider knowledge from members of staff at the regional water company, South West Water Ltd. Their combined contribution to the development of this work was invaluable. Bringing to life an important environmental historical geography that, whilst comprehensively recorded in meteorological records, had been hitherto overlooked from a human perspective, is an important component of understanding drought and laying foundations for improved water resource management in future extreme conditions. An exception to this is the published account of events in 1976 by Evelyn Cox, a book that the author was unaware of until she stumbled upon a discussion on its contents during an Internet search of comments posted on news websites, on the prospects of the developing drought in 2011. Thankfully, it was possible to locate a copy and the detail it contained was used to verify comments from the oral history group, increasing the author's confidence in the validity of the accounts collected.

**Table 6.**

Oral Histories – Gender, Age Groups, and Occupation/Interests of Contributors

<b>Gender</b>	<b>Occupation / Interest in 1976</b>	<b>Age Range in 2010 (yrs)</b>
Male	Builder	40 - 50
Female	Nurse	60 - 70
Male	Physicist	70 - 80
Male	Salesman	60 - 70
Female	Teacher	60 - 70
Female	Councillor	70 - 80
Male	Farmer	70 - 80
Male	Water Engineer	50 - 60
Male	Chairman of Lions Club	60 - 70
Female	Housewife	70 - 80
Female	Student	50 - 60
Female	Waitress	50 - 60

Drought has no universally agreed definition and it slowly manifests over time; the speed of our acceptance of drought conditions being controlled by our ability to measure the effects of myriad combinations of precipitation, temperature, evaporative processes and soil conditions, and compare them to previous dry years. The appropriateness therefore of using this method to explore climate induced impacts and public behaviours is underlined by the fact that generally, it is only when a drought has passed that we can retrospectively measure and evaluate its duration, severity, and impact. In fact, only very recently, Rodda and Marsh (2011) published *The 1975-76 Drought, a contemporary and retrospective review: A comprehensive quantitative analysis of the drought*, confirming it as the reigning champion of dry years. 1976 is not only memorable because it was an Olympic year. According to Simons (2008) “*it still remains the hottest, driest, and sunniest summer in the annals of British climatology*”. The uniqueness of the situation and several other memorable aspects of this particular drought provide suitable anchor points for individuals to grasp. Slogans such as “*Save Water, Bath with a Friend*”, The “*Phew, what a Scorcher*” headline, the Ladybird Plague at Westward Ho! Potato famine, and

shortages of staples such as milk and eggs (Simons 2008), bring forth detailed recollections that have until now been undocumented.

To date, the greatest contribution to the very small archive of texts on the 1976 drought is that of Evelyn Cox who, from her detailed diary entries, described by Blythe (1978) as “*a Last-Days-of-Pompeii style and evidently well-kept journal*” provides a comprehensive account of the drought from her own experiences living on a small farm in rural Herefordshire. Her description of the hours spent pumping and carting water from various sources as her own private supplies from two shallow wells, a traditional dew pond, and a series of tanks fed by rain water, dried up, is remembered by Cox (1978, p11) as “*a fifteen month siege*”, beginning in October 1975 and not ceasing until December 1976. The details of how she and her husband managed their small beef cattle and show horse enterprise and cared for their new-born baby throughout this period, through careful grass management, and hard work and tenacity in seeking and obtaining water from farther and farther afield, not only provides great insight into the vital importance of clean, fresh, running water for survival but the divisions and misunderstandings between those with access to fresh, potable mains water, piped into their homes by the local Water Authority, and those reliant on private supplies that were rapidly drying up. And when supplies were dangerously low, the divisions between those whose mains supplies were rationed and those who continued to have moderately restricted access to what Cox (1978 unpaginated) described as “*the most underrated convenience in the 20th century*” throughout the worst drought in living memory.

Cox’s work is an extremely comprehensive and compelling account from a personal experience of what is still considered to be the worst drought on record but it is written from her perspective, and this research attempted to fill the gaps between various experiences and opinions of the drought by exploring the phenomenon from either side of the various dividing lines. The following combination of items located in editions of the North Devon Journal Herald (NDJH) from January to October 1976 and vignettes from eight oral accounts of personal experiences of the drought are an attempt to weave together a more detailed and accurate rendition of events as they unfolded, that has not been

revealed to date in news reports or academic assessments. North Devon was chosen as according to the *Drought Atlas of 1976* (Gardiner, 1980, p70) it was the area of England hardest hit by water rationing but when direct supplies to households were finally cut and replaced by standpipes in the street, the inconvenience of having to go outside with a bucket, for water, only lasted between fifteen and twenty days. It was nothing like the fifteen-month siege described by Cox but the plight of the 'townies', as Cox would have described them, grabbed the attention of Ministers and dominated media headlines in a way that the Herefordshire farmer neither sought, nor would have expected.

#### 4.2.2 The Creation of a New Authority for Water

Prior to 1976, the 1973 Water Act had placed responsibility for the provision of water and sewerage services on nine Water Authorities, to be overseen by the National Water Council. There were no specific references to drought in the Act which focused on charging for water, fisheries management, land drainage, and bulk supplies. It set out a national policy for water, not a policy for the absence of water, and placed a statutory duty on Water Authorities to provide safe drinking water within their areas. South West Water Authority had responsibility for North Devon, a popular tourist destination. In 1975 and 1976, the beautiful weather brought high numbers of visitors. According to Rodda and Marsh (2011), over a 16-month period from May 1975 to August 1976, Devon received less than 50% of average rainfall. London and the South East were less badly affected and the attraction of the seaside meant demand for water decreased in built-up industrial areas and increased in coastal holiday destinations. The combined impact of low rainfall, increased visitor numbers and evaporation from reservoirs meant that by August 1976, reservoirs in Devon had between 20 and 50 days supply left (Rodda and Marsh 2011 p24).

Ian (Chairman of local Lions Club) - *“North Devon; almost complete reliance on visitors who would book on a short notice period and come flooding down. It wasn't like Torquay where people would book ahead. Braunton: if you had good weather on a Thursday, you would get visitors on the Saturday. Good weather equaled crowds of visitors, which was*

*eventually one of the great difficulties about the water shortage. 1976 was very hot and in the areas of Barnstaple, Braunton, Saunton, and Croyde, there were thousands of extra visitors, swamping the restaurants and having a good time, to the delight of the local population who were living off the holiday trade.”*

In the summer recess from her last year in college Rachel went home to work on the family farm in Braunton. Alongside farming sheep and a few head of cattle, a large proportion of the farm income came from renting out family rooms and providing breakfast and an evening meal as part of the package. The farmhouse was reliant on a deep, private well that the family could not recall ever having run dry. However, noting the severity of the dry period, signs were placed in bathrooms asking guests to share shallow baths. By early August there were a staggering 24 people living in the farmhouse but few had been keen to observe the polite requests to save water and as a result, the inevitable happened.

Rachel (Student) - *“They weren’t terribly keen to help us with the situation. They just didn’t understand that water didn’t just come out of the tap that it came from a well. I remember the day the well ran dry. We all had to move out. I turned on the tap to do the washing up and I thought the pump wasn’t making the noises it should. All that came out was worms! We had to wait two weeks for the Water Authority to put up a standpipe two miles away at the end of the lane and I had to take the tractor and trailer out every day to fetch water. I was young and fit then and it presented an exciting challenge to me. But when I think of all those buckets of water all over the house. At the time I was more interested in who got the best sun tan!”*

According to Cox (1978), *“The drought was an experience which divided us into two nations - those whose lives were deeply, and at times dangerously disrupted, and those to whom the drought was at most an over publicized inconvenience.”* At the time the well on Rachel’s farm ran dry, Cox (1978 p112) wrote in her diary:

August - *“By now the British population was clearly divided between those with water and those without it. Those with water seemed blissfully unaware of the real implications of the drought.”*

#### 4.2.3 Early Warning Signs of the Drought

Naturally, it was long before August when the first warnings were sounded by the National Water Council and local Water Authorities. The drought had begun in May 1975 and there had been a hosepipe ban in North Devon from July to December 1975 but this was nothing unusual. On 29th January, a letter to the editor of the North Devon Journal Herald (NDJH) mentioned the exceptional lack of rainfall in the previous year and complained of the high cost of water rates despite restrictions. According to Faye Webber, who was a local Councillor representing Barnstaple at that time, prior to 1974 when it became part of the South West Water Authority, the North Devon Water Board was renowned for charging high levels of water rates to fund development of the Meldon reservoir. Local people were concerned that not all the water from this reservoir was serving the North Devon area but was instead being piped to the Plymouth area (although this wasn't actually the case).

*“As far as we were concerned it was our water and we begrudged paying for it and it being directed to somewhere else.”*

In fact, the area was served by eleven impounding reservoirs (shown in Table 7) which were not always capable of coping with seasonal population increases and according to Marcus Fox MP for Shipley, speaking in the House of Commons on March 12th 1980, there were only four summers between 1957 and 1979 when there were not hosepipe bans. It is likely therefore that the local community had become accustomed to temporary restrictions of outdoor water practices such as garden watering but that holidaying visitors were less likely to be interested in limiting their water use. In 1976, reports suggest that the local population may have become rather complacent.

Ian (Chairman of Local Lions Club) - *“There were two small reservoirs and early on there were the usual warnings that we had all experienced in previous years. The newspapers said the levels were dropping, down to 69% and nobody took a blind bit of notice because this was usual.*

*Prior to 1976, to my experience going back to 1969, there were always hosepipe bans.”*

**Table 7.** Impounding Reservoirs serving North Devon in 1976

<b>Reservoir</b>	<b>Volume (Megalitres)</b>	<b>Reservoir</b>	<b>Volume (Megalitres)</b>
Holywell	34	Melbury	242
Darracott	52	Tamar Lake	304
Challacombe	69	Upper Tamar Lake	1215
Jennetts	112	Wistlandpound	1550
Gammaton	145	Meldon	3090
Slade	226		

(Source: South West Water Ltd)

On February 12<sup>th</sup>, according to the NDJH, heavy rainfall caused both the rivers Taw and Torridge to burst their banks serving to allay fears of another dry year. Roger, who was farming just outside Barnstaple at the time, explained how he felt at this point:

*“We just didn’t expect to have two dry years in a row. We were caught out really.....”*

Soon afterwards, the NDJH returned to its recurrent theme of the fragility of water resources in the area noting that a special report on the lack of water resource and pressure from holiday developments in nearby Ilfracombe, was to be delivered to the Water Authority management team with the March 18th headline *‘Ilfracombe deprived of vital water’*. However, this was immediately overshadowed on March 22nd when a freak blizzard blocked Roads as six to eight feet of snow fell, dismissing any public concern over security of supply.

#### 4.2.4 Preparing for the Drought

It wasn't until April 1976 when the Water Authority finally decided to alert local people to the problem of the drought though at the time local reservoirs were actually full. The 15th April NDJH headline read '*Drought Danger Warning*' as water authorities announced that without serious rain communities would be rationed to five gallons (23 litres approx.) per head by the summer. A letter to the editor complained of a 200% rise in water rates in five years despite continued restrictions, implying that members of the public were somewhat cynical regarding the inability of the Water Authority to secure supplies throughout the year, despite their increasing income. On April 22nd the NDJH leader comment urged readers to curb their use of water before even hotter weather and more holidaymakers arrived. This implied that the weather was already warmer and drier than average for that time of year.

Gillian (Teacher) - *"I remember that water was being wasted while we were being asked to save. I remember being quite angry because we were always hearing of leaks from local reservoirs always feeling we are a neglected area. We weren't in the front, or in the face of politicians. With the leakage we knew about, the high rates, the invasion of visitors, there was enough there to make us angry."*

Martin, a water company insider, remembers the situation from the company's perspective. The post Water Act restructuring of water resource management in 1975 had brought together a set of managers who didn't in his opinion "gel" and a *"dysfunctional set of assets; localised, with no capacity to transport between them"*. He described how there was *"..no comprehensive drought management plan and each area was run by people who knew it from 1974. There was no plan to act as an Authority. Senior Managers had World War Two experience and command and control fed into drought management."* Martin had, as a junior at the Authority, volunteered to assist the newly formed Drought Management Committee. The committee met at the organisational headquarters in Exeter approximately 40 miles from Barnstaple. A 30ft long map of the South West was erected and Martin and a colleague were responsible for marking the map with every pipeline, waterworks and reservoir,

with tape and stickers, showing the percentage drawdown of water for each reservoir. *"It was like Dad's Army"*. This, he says, exposed both Plymouth and North Devon as problem areas.

#### 4.2.5 Hotting Up

By April 29th the NDJH headline read *'Exmoor Dry as a bone'* It was in fact according to the paper the driest April for 83 years with only 5.6mm of rain, one tenth the average; the previous year's rainfall for April having amounted to 69.7mm. Farmland was said to be *"hardened like concrete"*, there was not enough grass for livestock and the land was already *"too solid to plough"*. According to Cox (1978 p58) by this point, while local farmers were already suffering, the townies still had unlimited access to fresh, running, water but they were at least beginning to adopt some water saving practices. And in some cases they were anticipating the worst.

Gillian (Teacher) - *"My husband got a new water butt to collect rainwater. He likes emergencies and calamities and he is a bit of a Heath Robinson type and he devised a plan for our having one minute showers if we all lined up naked and took it in turns and was amazed when I and the children were not very keen!"*

Ian (Chairman of the Lions Club) - *"They [The Water Authority] then pleaded for us to reduce our use of water. In those days, the average person had about 32 gallons [145.47 litres] of water a day use, roughly, and they wanted to reduce it by half down to 16 [72.73 litres]. They said one good idea was to put bricks in WC cisterns. I did this because I was a building surveyor and I knew how to do this but not everyone did. And the public were a little concerned but generally speaking they were apathetic. 'Oh it will get sorted out'."*

Around about this time, Cox had begun to notice that some communities were already without water and having to rely on mobile supplies and standpipes:

*"Long before stand-pipes were introduced, with much publicity, into Devon, villagers in Herefordshire were drawing their water in buckets and*

*jugs from a local tank, as if they were Bedouin in the Middle East drawing their water from the nearest well.” (Cox, 1978, p92)*

However, a small number of the population in North Devon were already walking to standpipes to fetch water:

Andy (Salesman) - *“The first standpipes to go on were at Bishops Tawton, Mount Pleasant [outskirts of Barnstaple] I was in one of the first houses - about eight properties on a very unfortunate spur - the water pressure was so low, you would come home in the evening and see the guy downhill, just around the corner, watering his garden, and that meant you couldn’t get water out of the tap. And it was of course always at the weekends if you had visitors, with kids, and you had to say to everybody, now don’t flush the toilet.”*

The Water Authority solution was to provide a standpipe some distance away but driven by a sense that they were being mistreated Andy and his neighbours mounted a campaign to get the mains water piped to their houses.

*“We were put on, well in fact they put a standpipe up at the bottom of the hill and we had a sort of concerted effort with the neighbours to keep ringing the water board [to complain] as we were told every time you ring the water board you get a little dot. In the end they got quite annoyed with us. And I said well you gave us permission for the properties to be built at the top of Mount Pleasant. Eventually they did, it was quite funny, it was farcical because just above us, it’s no longer in use now, there’s one of those concrete reservoirs. It didn’t happen over night, it took time and I well remember the water board people coming one evening and saying ‘we’ve solved the problem for you, we’ve solved it’. You’re going to get your water from the other side of Barnstaple and we are going to switch it over at five o’clock or six o’clock or whatever it was. So we all sort of congregated. It was almost like Christmas lights going on and you could hear this gurgling in the pipes coming up the field. And that is about as far as it got, just a gurgle, because they didn’t have the head of water to get it up.”*

By May 11th the NDJH announced the ‘Save It’ campaign and a hosepipe ban. The low rainfall in April had apparently led to an “unofficial drought”. It would

appear that the population of North Devon carried on taking advantage of the good holiday trade and nothing was mentioned in the paper until July 1st when Bill Tanton, a local amateur weather forecaster, was quoted announcing that the *“Heat wave will go on until September”* the drought by then being considered to be of *“almost unprecedented proportions”*.

On July 16<sup>th</sup> the Government hastily introduced the Drought Bill, which received Royal Assent on August 6<sup>th</sup>. The attitude in North Devon was that it would eventually rain.

Mary (Housewife & Soroptomist) - *“Everybody knows the saying ‘come to sunny North Devon, rain six days out of seven!’ We just never believed it could get so hot or be so dry.”*

Meanwhile, Martin describes what the situation was really like:

*“There was just a thin sheet of water running across the bottoms of the reservoirs and it was folklore fed to the people by the newspapers that suggested that incompetent water managers were causing there to be water restrictions. The truth was that there was nothing left in the bunker to use. There were giant notices on the roads coming into the South West stating ‘You are entering a Drought Area’ these were very unpopular. Visitors weren’t going to cap their water use. They were going to have a good holiday. But there was a twenty-fold increase in demand for water between winter and summer and the system couldn’t cope.”*

Gillian (Teacher) - *“They were taking out the bath plugs in holiday residences and then the visitors were going out and buying plugs – human ingenuity.”*

By August 16<sup>th</sup> it was obvious that the situation was serious and standpipes were erected in Bideford though not commissioned. Ian remembers how, with the threat of serious rationing becoming apparent, people sought to stockpile water that they could get easily while the taps were still working and to sabotage the process where they could:

*“So one standpipe from memory served about 20 houses. It varied. One of the effects of all this is that builders’ merchants locally quickly sold out*

*of plastic dustbins. People were buying them and in a time when they were trying to get them to reduce [their water use], they were filling from the taps these bins! Now some people opened up the stopcocks in the road and poured rubble down so when South West Water Board came along, they didn't have time to pick all that out so they left that stopcock on."*

On August 24th the situation across the country was considered serious enough for the Government to appoint its first Drought Minister, Dennis Howell. By this time, with the ongoing positioning of standpipes in Barnstaple and Braunton and increasing dire warnings to cut water use or have water cut off, the people of North Devon found him hard to take seriously.

Roger (Farmer)– *"Well, the Drought Minister, he seemed a sort of likeable chap but a bit of a buffoon really."*

Gillian (Teacher) – *"Mr. Howell, he made wonderful statements like we should all shower together and this got onto all sorts of sketch shows because it was so funny."*

In early September, residents were starting to notice that not everyone had a standpipe. All business premises and thereby any apartments above them were not going to be switched off. Properties which were still served by lead pipes were also left out, likewise remote properties and small hamlets were highlighted by the lack of attention by the Water Authority.

Ian (Chairman of Local Lions Club) - *"Now if you lived on the perimeter, or in an isolated house they didn't even reach you. They didn't even bother. Two or three houses in a hamlet were not of great importance. In 1976 you escaped being cut off by another factor and that is if you had lead pipe work. From the mains in the road there were lots of houses with their connections in lead. The reason why lead pipes were allowed not to be disturbed was because if you switch it off and then switch it on a couple of weeks later, the effect of the lead is flushed through into the house and constant use without interruption doesn't give you the same risk."*

The Social Services department at the County Council was given the task of deciding who would be left on the mains due to their individual circumstances.

Faye (Local Councillor) – *“They had a cut off at the age of 74. If you were over 74 then you wouldn’t be turned off. But if you happened to be 73 and really ill, when a 74 person could perhaps be reasonably fit, it didn’t go down very well. Course then it was anybody with young babies, they were left on. So you know, social services decided the rules on who was going to be left on and who was going to be turned off.”*

The community was beginning to be divided by age, circumstance, location, and plumbing. It was unsurprising that the Water Authority became a target of frustration.

Ian (Chairman of Local Lions Club) – *“The water board brought their PR men in and in Braunton they hired the village hall and it was crowded. It was of no use. Generally speaking, the public were so angry, they threatened to lynch one of the PR men. Who was saying everything would be all right but everybody could see that it was going to be bad.”*

Martin (South West Water employee) – *“I was almost attacked at a public meeting in Plymouth [where standpipes had also been erected] ... North Devon was scary. We had failed. We didn’t go out and say sorry, we stayed in our bunker, and command and control notices in newspapers didn’t get people on side.”*

On September 15<sup>th</sup> the inevitable happened. The combined forces of the influx of holiday visitors, water hoarding and general apathy from a community that had historically paid a high price for water and was fed up with not having enough, led to the standpipes being commissioned in Barnstaple and Bideford.

Faye (Local Councillor) – *“We celebrated Barnstaple Fair on that day which is an ancient ceremony that we have every year and on that day, when we came home, the water was turned off, but not only was the water turned off but it started to teem with rain. Which really went more*

*against the grain!...We are all standing in the rain filling up our buckets! Which didn't go down very well."*

It was at this point that feelings that the process had been unfair and that it wasn't bringing the savings required, began to surface.

Faye (Local Councillor) - *"There was a feeling in the area that I wasn't cut off but I was. That created quite a lot of gossipy nastiness. There was a lot of backbiting. I think a lot of it was because they wasn't clear in advance, what they were going to do."*

*"Everybody wasn't turned off because where there were old pipes they weren't. What we got, where I live, we were paying higher rates than they were down the road, they weren't being turned off...And people saw we've got new pipes and those people down the street aren't off so there was a bit of ill feeling. But what people were doing is if they've got relatives somewhere else, they would go and have a bath there. So in a way, it wasn't really saving water was it?"*

Some households were determined to beat the standpipes:

Ian (Chairman of Local Lions Club) – *"Some, I know, from conversations after, would nip out at midnight and turn on the stopcock about 3mm so throughout the night there was a steady dripping into the roof tank, which would give you something like 25 gallons. Now it wasn't drinking water because it was going through the hot water system but 25 gallons of washing water."*

It rained every day from 20<sup>th</sup> to 30<sup>th</sup> September when Faye Webber was featured in the NDJH calling for the Drought Minister to return to *"witness public disquiet and near-riot caused by the chaotic imposition of standpipes"*. A petition calling for the head of the Water Authority, Mr. Slocombe, to be sacked was in circulation and had reached 7,000 signatures. On October 1<sup>st</sup> removal of the standpipes began and all the water people had stored was tipped away and they luxuriated in deep hot baths once again. By October 7<sup>th</sup> mains water was available in all homes. The paper reported that Melbury reservoir was still only at 44% capacity but Meldon was overflowing. In the letters pages, contributors

suggested installing water butts in readiness for future drought episodes and a Bishop advised on continuing to pray for more rain.

Martin (South West Water employee) – *“We needed constraint to continue for three months to allow systems to recover. Luckily, most visitors had gone away but appealing to customers was not much use.”*

#### 4.2.6 Interpretation

The Government was clearly unable to honour its promise of fair shares of water for all during the 1976 drought. Having the ability to maintain access to the convenience of running water in the home, for many was dictated by their age, location, plumbing, or willingness to cheat or resort to sabotage. Whether limited to strip washing with a bowl of water, taking one’s bar of soap to the ocean, sharing a bath, or visiting a friend still with mains supplies, bathing routines were disrupted and respect for the Water Authority eroded.

Although it is not possible to publish all the oral histories collected for this work in this format, contributors also mentioned a *“Dunkirk spirit”* (Ian) within the community and a willingness to help the less able to get water from standpipes but also elements of deception and greed when those in receipt of kind contributions were found to be hiding healthy supplies already, or claiming to own livestock in order to avoid the standpipes. Surveillance photographs from helicopters and model planes were used to identify leaking pipes but also showed a patchwork pattern of brown and green in urban areas highlighting that many still insisted on watering their lawns, long after the hosepipe ban came into force.

According to Cox (1978 p142) *“The Times in October argued that in some areas restrictions were imposed later than was sensible because the authorities did not want to have an outcry that water, having just been made more costly, had also been made immediately more scarce. The authorities wanted time for the memory of higher water rates to die away before they cut back supplies.”* However, in this case it is more likely that the South West Water Authority’s

inability to communicate effectively with the public was due to poor management and an inherent inability to develop good customer relationships. The fact that the whole population paid water rates that were not going to be reduced by saving water, also served to maintain a perception of water being something expensive that the Authority had a duty to deliver whatever the circumstances. The long lead into rationing led to hoarding of water in dustbins, old bathtubs and copper cylinders, and various carriers and buckets. This made the situation worse and in many cases the water was never needed and was poured down the drain as soon as the rain came.

On a positive note, although Dennis Howells, the Drought Minister, promised finance for reservoirs that was eventually not forthcoming, the drought helped to develop a strategy plan for the future which resulted in the expansion and development of three large reservoirs in the South West; Wimbleball which was completed in 1978, Colliford completed in 1986 and Roadford which was built in direct response to the drought and completed in 1989, overlaid with a new interconnecting pipe network meaning that by 1990 there was four times as much stored water in the South West Water area than in 1974. Today, only the three largest reservoirs; Wistlandpound, Meldon, and Upper Tamar Lake, are used by South West Water for supply in North Devon but significantly with a much improved transfer network. The company can now transfer water to these reservoirs from Roadford, and as a result there has not been a hosepipe ban in Devon for the past fourteen years.

## II

### **4.3 Drought in southeast England, 2004 – 2006**

*“A largely political drought characterised by extensive ‘spin’”* (Eden, 2008, p160)

Between 2004 and 2006 a severe drought achieved a national media presence similar to that of the great drought of 1976, although the drought itself covered a very small area of southern England. The ability of the 2004 - 2006 drought to

capture national attention has been attributed by Eden (2008) to the fact that most UK national newspapers are based in the area of southern England that was affected. Just as in 1976, this drought culminated in an exceedingly hot and dry June and July and was immediately followed by a sustained period of above average rainfall. Eden's critique of the over extensive reporting of the drought is based on his observation that in his opinion there was no severe socio-economic impact and that both the Met Office and Environment Agency were guilty of "*disgraceful manipulation of the rainfall statistics*" (Eden, 2008, p166) by emphasising a second consecutive three-month winter dry period in a way that was unjustified based on actual rainfall.

This section is based on an analysis of editions of the Kent Messenger<sup>4</sup> between January 2004 and September 2006, conducted by the author in the British Library's National Newspaper Archive in Colindale, London. Supplementary evidence was sourced through internet searches of online national newspaper archives and reports from the Environment Agency and OFWAT. Additionally, eleven focus group members were invited to share their opinions of how the drought was handled, with the author, during a lively discussion on January 27th, 2011.

#### 4.3.1 The Beginning: 2004

This drought history begins in January 2004. Analysis of editions of the Kent Messenger and the prominent news items covered in weekly editions during that time show that the main concerns of the media public in Kent were the availability of good schools, levels of local policing, traffic congestion, and a political desire to encourage blue chip companies to the area to boost the economy (January 1st, 2004, p6). The paper also voiced concerns over levels of housing development in the area. Unlike the North Devon Journal Herald in 1976, who called upon the services of their amateur forecaster on an ad hoc basis, the Kent Messenger incorporated weekly contributions from Mr Lester

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<sup>4</sup>For the avoidance of a repetitive and lengthy reference list, all items from editions of the North Devon Journal Herald and Kent Messenger are cited in the text by date of publication, feature headline, and reporters name where given.

Gosbee, a farmer from Frittenden. Mr Gosbee had a column of discussion and a weekly weather forecast in each and every edition. Mr Gosbee's Frittenden rainfall data and meticulous collation of temperature records and local weather observations has been used by the author to build a picture of the drought as it was experienced in the River Medway catchment in southeast England.

At the beginning of 2004, (January 1st, p22), Mr Gosbee reviewed the weather of the previous six months of 2003 and provided his forecast for the six months ahead. The title for this piece was *"Phew What a Real Scorcher we had but Wrap up Warm as Snowfall's on the Way."* The strap line read: *"A sizzling record summer and autumn means that water rationing could be looming again in 2004."* Gosbee highlighted the fact that record temperatures had been recorded in Kent in 2003 and that the period between June and September had been the sunniest and warmest since records began in 1959. Across Kent, June 2003 had been the warmest since 1976 and rainfall had been below normal. Between June 22nd and July 7th 2003 there had been 15 days with temperatures reaching 32 degrees Celsius and Gravesend in Kent had recorded a record temperature of 38 degrees Celsius on August 10th. There had been no rain at all in north Kent in September and rainfall in October had been 60% of average volumes. August to October 2003 had been the driest three months for 150 years. Gosbee predicted *"no severe winter"*, and *"not enough rain to satisfy water authorities so a real prospect of water rationing next summer"*. On page 44 of the same edition, an article with the title *"Eau Dear, now they want non-stop rain"* carried a picture of a completely dry reservoir (Bewl Water) and explained that the driest weather for more than a century had caused a drought which could lead to water restrictions unless there was average rainfall every two out of three days up to March. This was apparently all that would compensate for the prolonged dry spell, as reservoirs were at an all-time low and water abstraction from rivers was increasing. The largest water company serving the area, Southern Water, was reported to be asking for permission to take more water from the River Medway to fill Bewl Water, which was the largest reservoir in the area. This action would apparently relieve pressure on groundwater reserves, which in the Weald of Kent were already very low. This was important as Bewl Water was generally used to top

up Darwell Reservoir that served the Hastings area. The paper quoted Mark Goldthorpe, programme manager for South East Climate Change Partnership, who said; *“the fact that nine of the past eleven months this year has been below average rainfall is of concern to everyone.”* He went on to say; *“It indicates the shifting patterns we can expect to become the norm as a result of climate change. The projections for the region [south east England] is that it will receive up to 10% less rainfall throughout the year, with much drier and hotter summers.”* Goldthorpe pinpointed the problem ahead in a rather confusing way; *“Winters will be wetter on average than we are used to but there is an increasing risk of a relatively dry winter with dry summers either side.”* In other words, who could tell whether the people of Kent faced drought or flood? This article highlighted the fact that the local water companies; Thames, Southern, Mid Kent, and Folkestone and Dover Water were all appealing to customers to help conserve supplies. Their top tips for water conservation were to take a shower instead of a bath, wash cars using buckets rather than running hosepipes, only to use the washing machine when there was enough laundry for a full load, to put a device in the toilet cistern to reduce the volume of water available for flushing, and collect rainwater for use in the garden.

#### 4.3.2 Public Criticism, Skepticism, Confusion and Climate Change

In the January 9th edition (page 6) a letter to the editor from Andrew Barr headed *“Water Shortage, Are they Joking?”* criticised water companies who were considered to be blaming *“a few dry months for a possible water shortage next spring.”* The correspondent complained that there had been eleven inches of rain in November and December and that in the previous three years there had been an average of 40 inches of rain a year, which was eight inches higher than normal and one of the wettest periods in a century.

*“Now they tell us groundwater levels are low. The real reason? We are using much more water, building thousands of new homes in the area and we have not invested in water saving measures. Mid Kent water now tell us they are resurrecting the Broad Oak Reservoir but it won’t be ready until 2019. When we see springs and streams drying up that have always kept running in dry summers before, we’ll worry about the*

*environment and we'll not be conned by the excuses we have heard lately."*

Another unnamed correspondent wrote; *"I imagine water companies in North Africa and other dry parts of the world would find it extremely amusing if they were told we have a water shortage after 152 inches of rain in the last four years."*

In the same January 9th edition (page 42), a headline article read *"Be Eco Friendly in 2004"*. In this article the Environment Agency message to people in Kent was conveyed as an appeal for individuals to make resolutions to help the planet. The Agency anticipated water supply to be a continuing problem but at the same time asked people to sign up to a flood warning service. In the home supplement January Gardening Diary, by John Clowes, readers were asked to *"Learn the hot lessons of last year."* The UK was likened to the Kalahari Desert and readers were encouraged to prepare for regular drought by planting south-facing borders with drought tolerant plants, and mulching soil to keep in moisture. A week later (January 16th, page 3) the headline read; *"Water everywhere but we still need it to rain!"* by Angela Zigler. Mid-winter was turning out to be mild and wet. Flood warnings had been issued for rivers in the Weald, despite years of summer water restrictions. The rivers Beult, Teise and Lesser Teise, all tributaries of the River Medway were affected. However, it was also reported that Southern water announced that reservoirs were only 70% full which was 10% below average.

By January 23rd, the mild wet weather had turned to heavy snow. At the same time in the previous year East Malling had recorded record temperatures of 17.4 degrees but on 27th January the temperature was only four degrees. The snow lasted to the end of the month and Lester Gosbee eventually recorded four inches of rain for the month (page 43). By February 6th the air temperature had jumped from four degrees to 17 degrees and strong winds brought trees down in Sittingbourne town centre. Much of February and March was unusually mild and wet and the paper announced *"Fears of water shortages following last year's dry summer have been allayed following heavy rain over the past four*

*months*". Supplies had been pumped to reservoirs while the river levels remained high. Bewl, Lamberhurst, Darwell and Powdermill reservoirs were reported as full. A purely socio-economic drought threatened to emerge as workers at the Mid Kent Water Company voted to strike. The March 13th headline read "*Strike threat to water supplies*" with a strap line "*but rain means no shortage*". While temperatures continued to be above normal, regular rainfall kept discussion of drought out of the local media, which focused on climate change instead.

In the April 8th edition of the Messenger (page 8), recommendations were made following a seven-month study of the impact of climate change in southeast England. Securing enough water for a steadily growing population was of concern and it was suggested that water saving devices should be fitted in all homes and metering of properties should be standard for all new developments, with education and guidance for water conservation given to residents and businesses. On page 82, in an article titled "*Forget the heat wave, here comes the rain*", BBC weather forecaster Maddy Lee Preston announced bad news for the forthcoming summer, predicting Kent to expect two months of miserable down pours with June being the worst month. However, the ongoing fair weather in the last week of April heralded a "*barbeque Friday*" (April 23rd) and temperatures were expected to continue to rise together with the quantity of rainfall. By May 7th Lester Gosbee was announcing that the cumulative rainfall for England up to May had been 35% above normal and at Frittenden 57.4mm had fallen, which was 4% above average. Gosbee also pointed out that temperatures were 1.5 degrees above the long-term average.

#### 4.3.3 The Cost of Water takes Centre Stage

On May 14th (page 11) the focus of attention turned to the cost of water. The paper announced "*Water pain as bills are set to soar.*" Southern Water had been permitted by OFWAT to raise their prices and household water bills were expected to rise from an average of £247 to £358 per annum. The following week, (May 21st, page 29) in a discussion piece titled "*Don't tap us for more water cash*" Kent County Council and representative Members of Parliament

urged OFWAT to block the proposed Southern Water price rise. Their argument was based on the knowledge that Southern Water needed to raise prices to develop services to proposed new housing schemes but that in their opinion separate structural funds from central government should be available in such instances so that existing residents would not have to finance extensions to infrastructure. On the same page a separate article exclaimed: *“We’ve got plenty so Sussex can have some”*, announcing the development of a 29 km pipeline from Bewl Water reservoir to Hazards Green water supply works in Sussex, to serve properties in Hastings and Bexhill. The weather remained fine and warm with temperatures up to 25 degrees Celsius but the outlook was for it not to last. On June 4th (page 30) the headline article; *“Bewl water is all set to get bigger dam it!”* described how Southern Water was investigating ways of increasing water supplies by expanding the reservoir. A five-year research project into the feasibility of increasing the height of the reservoir, which at that time was capable of holding 31,000 million litres of water, would begin with extensive surveys. According to the article, water use in the area served by the reservoir had risen by 50% in 25 years and demand was predicted to rise by 150 million litres per day across Sussex, Kent, Hampshire and the Isle of Wight by 2030. Lester Gosbee’s weather summary showed that May rainfall had been 50% lower than average. The fine weather continued and higher temperatures were expected, although by June 18th, temperatures had dropped and the weather became more unsettled. The cooler, wetter conditions continued into July and it was not until the end of the month that temperatures began to rise again. By August 6th, (page 10) the elderly were being warned to prepare for a heat wave, the Department for Health having launched a heat wave plan.

#### 4.3.4 Record Breaking Temperatures and a Plague of Wasps

On August 12th (page 31) the headline article read *“Some Softening of Water Bills”*. The outcome of Southern Water’s request to raise prices had resulted in a compromise increase not quite to the level requested. Lester Gosbee’s weather section commented on the warm nights describing how towns such as Gravesend had recorded their warmest nights on record in the preceding week (22.8 degrees) but he predicted thundery, wet weather to prevail. By August

20th the tail end of Hurricane Charlie had sustained the unsettled weather, which was shaping up to be record-breaking for both rainfall and temperature. The rain did not however deter a growing plague of wasps. In the August 20th edition (page 39) an article titled "*Summer with sting in his tail*" explained how the preceding mild winter had fostered an increase in wasp numbers resulting in a rise in reports of wasp nests up from 217 in 2003 to 695 in 2004. By August 27th it was confirmed that August was indeed the wettest since records began with double average rainfall at 79 mm (eventually 88mm). On page 11 the paper announced: "*Wet Summer Ruins harvest*". Cereal crops were proving impossible to harvest.

Summer returned in September with sustained above average temperatures and very little rain. By the 24th Lester Gosbee revealed that there had been less than 12mm although the month as a whole did not break any records. Sunshine had been 26% above normal and the overall temperature was 1.3 degrees above normal. The rain returned in October with double the average amount being recorded by October 29th. Lester Gosbee noted that the cumulative total rainfall for the year to date was 'only' 15% above normal. On November 4th, 30mm rain fell in a few hours causing flooding. Eventually, October rainfall had been 20mm above average. November continued to be wet almost up to the 28th and this was followed by a long dry spell lasting until December 17th, when 21.5 mm of rain fell. Lester Gosbee had predicted a good chance of a white Christmas but his prediction was not fulfilled. In his end of year weather review he suggested that sunshine for 2004 had been 80% of normal, temperature had been 1.2 degrees Celsius above normal but that rainfall had only been 45% of normal, but it is hard to imagine that a 29-day dry spell in winter could alter the statistics so dramatically.

#### 4.3.5 2005, A Second Dry Year? Who is to blame?

As 2005 began the Environment Agency outlined its flood plans for the River Medway. On Jan 21st Lester Gosbee expressed concern that there had only been one inch of rain over the Weald of Kent that month. By the February 4th edition, he was clear that January had been the driest since the year 2000 with

only 35% of normal rainfall. February was similarly dry with only 35% of normal rainfall and again Gosbee highlighted the rainfall deficit announcing that Kent had only received 60% of average rainfall since the beginning of the year. However, by February 25th Gosbee was remarking on the heaviest snowfall since 1997. The snow continued to fall and the March 4th edition showed pictures on the front page of children playing in the snow in Maidstone. Inside the paper carried a four-page special edition of snow pictures. Kent had had the heaviest snow for ten years (page 3). Army land rovers had been called in to take staff to Maidstone Hospital. Roads had been closed, trains cancelled and schools closed (*White Wednesday*). In the March 11th edition an article titled "*Homes Expansion Debated*" (page 11), focused on plans for the development of 32,000 new homes each year, for next 20 years, which was due to be discussed. In the same edition, page 15 carried an article titled "*Environment a Top Priority for County*". At a conference at East Malling Research Station, delegates had discussed environmental threats including the possibility of water shortages in the summer. The article quoted Councillor Richard King stating that "...people are unaware of the consequences of their lifestyles". A letter titled "*Winter Scare is a Warning.*" in the March 25th edition (page 10), from Malcolm Hayes of Aylesford, called for a ban or freeze on new housing development until there was enough water. Hayes' main concern was that there were insufficient natural resources to sustain existing populations. On page 17 in an article titled: "*Kent Needs to Get Wet to Stop us all Drying up*" Adam Charlton reported that only half normal rainfall had been recorded between November 2004 and January 2005. His article continued with details of rising water consumption driven by population growth and lifestyle changes. Housing development was highlighted as a cause of two problems; increasing water consumption and less water soaking into the ground. Mid Kent Water urged customers to use water wisely. Another article on the same page titled "*Meters are Such Good Yardsticks*" highlighted the fact that 32% of domestic water customers in Kent were metered but that water use per capita, per day, was 15 litres above rest of England. This is quite misleading as figures produced by OFWAT show that there is great similarity of consumption rates across all water companies, with a small number of exceptions. What is notable though is the difference between metered and unmetered customer consumption, which

varies from between 5% and 21% less for metered customers by company (OFWAT 2007, p 14).

On April 1st, Lester Gosbee's weather outlook was "*sunny and bright*". The weather remained fine for much of April and temperatures were higher than normal and rainfall was 5% above normal too. By May 6th, Lester Gosbee was reporting that 50 mm of rain had fallen in April. He also predicted that the weather would cool and there was a strong likelihood of frosts at night. On May 20th Gosbee reported that there had been the highest number of frosts in May since 1935 but by May 27th temperatures had increased substantially and that day it was expected to be around 27 degrees Celsius. Gosbee's outlook for the week ahead included thundery showers and high temperatures. On May 27th Gravesend recorded a maximum temperature of 31.4 degrees Celsius but night temperatures remained low. According to Gosbee's comments in the June 3rd edition, Kent had received only 40% of normal rainfall in May.

#### 4.3.6 Hosepipe Bans Loom

On June 24th, Chris Hunter reported on page 24 "*Now Hosepipe Bans Become More Likely*". He pointed to the shortage of winter rainfall leading to an increased risk of summer drought, which he expected to have the greatest impact upon west Kent. Hunter quoted an organisation called Water Voice Southern, stating that water levels in Kent were under weekly review and that customers would be asked to curb excess water use. Hunter suggested that a combination of climate change and a growing population would result in water shortages, predicting that new reservoirs and desalination projects would be needed in the future. By July 1st Lester Gosbee confirmed that there had been 210 mm of rain since the beginning of the year and compared this figure to the drought year of 1996 when over the same period of time there was only 142mm of rain. Despite there being a considerable difference in volume his verdict was that water shortages would be a cause for concern. In the same edition on page 9, Allen Watkins reported under the title "*Reservoir Shock for Councillor*", that a proposal from Southern Water for a reservoir at Burnham had been spotted by a local councillor, "*buried in a report*". However Southern Water countered this

report by saying that they had no plans to build a new reservoir but they may expand Bewl Water and increase capacity of the nearby Eccles Lake, between 2015 and 2020.

It was not until July 8th that Emily Hall reported that Mid Kent Water would be “reluctantly” introducing a ban on the use of sprinklers and unattended hosepipes on July 11th, to make sure that “everyone has enough water for basic necessities like washing and cooking” (page 27). Hall highlighted the fact that householders would risk prosecution if they flouted the ban. Apparently, high demand for water but low levels in underground supplies, which had been consistently dropping since November 2004, had prompted the ban and 218,000 properties would be affected in Maidstone, Faversham, Whitstable, Canterbury and Ashford. The July weather remained hot and mainly dry and although the drought issue had still not reached the front page of the newspaper over UFO sightings and crop circles, page 31 of the July 22nd edition carried an article by the Political Editor, Paul Francis, titled “*Water: Kent is now on par with Jordan.*” A leading climate change expert was said to have issued a stark warning that water shortages would increase, as water scarcity in Kent was on a par with parts of the Middle East. Philip Sivell representing UKCIP was quoted as saying he had “...serious reservations whether there will be enough water to go round to meet the extra demand created by thousands of homes in places like Ashford.” Sivell had been speaking at an inquiry into water shortages in Kent, particularly Ashford. He said he did not blame the public but placed emphasis on the need for land developers, Water Authorities, Local Councils, and the Farming community to act quickly.

#### 4.3.7 The Public Call for Engineering to Solve the Water Problem

The public responded to this report in the July 29th edition (page 10) when Vic Denham of Larkfield wrote: “*Malta has no water and desalinates it all. We are surrounded by sea. It may cost but at least we won’t go thirsty.*” Meanwhile, on page 15, the paper announced that due to the exceptionally dry winter a hosepipe ban for South East Water customers would start on July 30th. 268,000 households would be affected and would not be permitted to use hosepipes and

sprinklers or to wash cars. On the weather page, Lester Gosbee wrote that some welcome rain had fallen in the previous week with some parts of Kent receiving 25mm with more rain expected. A week later on August 5th, reader Jim Rafe of Maidstone wrote (page 10) *"Water Shortages are not Unavoidable."* lamenting the loss of an idea to bring water via a pipeline from the North of England, contrasting this proposal with that of finding natural gas in the north sea, one pipeline to bring gas ashore having gone ahead. He asked *"...but what happened to the idea of bringing the most vital necessity of life into areas of need? Nobody making any fortunes?"* However, as it happened, Lester Gosbee wrote in his weather column in the same week, *"July turned out to be Kent's wettest month since October, putting a dent in my long range forecast. Outlook mostly fine and getting warmer"*. On August 12th he wrote; *"A summer to please all. We've had some cool days and some hot. Even a little rain for gardeners and farmers. Outlook changeable with some sunny spells."* The impact of the drought did however continue to affect the River Medway with Emily Hall reporting on August 19th (page 17) that toxic blue/green algae had built up in the river due to the low water levels and warm weather. The weather continued to be generally warm and wet, as one would expect under global warming, with Gosbee's comment in the same edition being *"A nice hot summer's week. Outlook warmer sunnier weather to come."* and on August 26th he wrote; *"Last Friday many parts of Kent had wettest day of the year. Outlook fine."* The less predictable, warm but showery weather continued into September and gave the public the impression that the summer had not been particularly good weather-wise but on September 9th Gosbee announced *"Some people say it has been a disappointing summer but the facts say not."* and went on to explain that May temperatures had reached their highest since 1983. June had had the warmest spell since 1976 and Wednesday 30th of August had been the hottest August day since 1949. The unusually warm weather continued right through September, which Gosbee reported on October 7th as being the 5th warmest on record.

#### 4.3.8 Warm Autumn Keeps Drought Concerns Afloat

The unusually warm weather maintained temperatures in the mid to high 20s Celsius well into October and this must have been on the minds of the Kent Messenger's editor because suddenly on October 14th Gosbee's weather feature was moved up to page two of the paper. This proved to be a sensible move as the record temperatures continued. On the same day the Environment Agency began a campaign to tackle flood apathy and an article by Eve Parish (page 9) suggested "*County is likely to flood again*". This article focused on the fact that residents in the catchment at risk of flooding were not preparing for it. The rain became more frequent with Gosbee reporting on November 11th that he had recorded 84mm of rain (15% above normal) at Frittenden in October, and that five months of similar rainfall was needed to replenish the reservoirs. This chimed with Alan Smith's report on page 29 titled "*It's a dry outlook for water*", which highlighted the ongoing water shortage due to low reservoir levels and "*severely depleted*" groundwater levels. According to Smith, Mid Kent Water was keeping the hosepipe ban in force. Bewl reservoir was only 38% full and rainfall for the county had only been 50% of average in September and 60% of average in October. This either implies that rainfall was variable across the catchment or Smith was using other data that does not match Gosbee's local records. It is difficult to tell because no comparable figures are available from the Environment Agency or Met office. The higher than average temperatures did not drop until the end of the second week in November with Gosbee commenting on the drop in the November 18th edition and forecasting sharp frosts. On December 2nd, the headline read "*On full alert to deal with freezing winter. Roads agency prepare and met office predicts severe winter.*" Gosbee suggested that Kent might end up with the coldest winter since 1978/79 but that the outlook was for milder weather and more rain. On December 9th he was able to report that the weather had been so wet that some parts of Kent had already exceeded the November rainfall total. The year ended in heavy snow, the December 30th front-page headline reading "*It's Snow Much Fun*". Having failed to get onto the front page, the drought was forgotten, as Kent became a "*wintry playground*".

#### 4.3.9 2006: Mid Winter but Reservoirs are still Low

On January 6th Lester Gosbee announced that 2005 had been the 10th warmest year on record and pointed out that eight of the warmest years had been recorded since 1980. The snow and frosts continued but overall precipitation was low. By February 3rd Gosbee was reporting that 2005 was also officially the driest year since 1973. Prospects for the ongoing drought were not good. In January, Kent had only received one-third of normal rainfall. Page 18 carried an article by Alan Smith with the title "*Drought Alert*". The article described how the River Medway would be used to refill reservoirs. A drought permit had been granted by the Environment Agency to Southern Water to refill Bewl reservoir, which was still only 35% full and at its lowest level since its construction in 1975. A public inquiry had heard from the company that the south of England was experiencing the worst drought in 100 years. The volume of water to be taken from the river would limit the flow rate down from 275million litres per day to 100 million litres per day. Conservationists complained that the permit did nothing to solve longer-term problems.

A week later (Feb 10th, page 10) reader, Mrs Denyer, wrote that washing vehicles wasted a lot of water and she wanted to know why owners of small commercial vehicles such as taxis and vans were allowed to use hosepipes to clean them rather than be forced to use a bucket. A week later again (February 17th), Gosbee announced that the preceding week had been the wettest, warmest, and windiest for the year and the heaviest rain had fallen since early December. Reader, Patricia Walford wrote (page 11) "*I put my wellies on and go out in the rain and wash my car and let the rain wash the soap off.*" Meanwhile in an article on page 37 titled "*Warning over new Homes as Water Crisis gets Worse*" Paul Francis reported that the Green Party was calling for freeze on house building, while the water shortages continued, and they wanted to encourage grey water recycling, rainwater harvesting and efficient appliances. The article suggested that recent studies underestimated the severity of the problem and further water stress would be the result if climate change accelerated. On February 24th, Gosbee explained that traditionally February was known as February Fill-Dyke, as snowmelt used to fill dykes in

that month. However, February had been the second driest month in the year but most of Kent had had greater than average rainfall that year. Bearing in mind that he was commenting only two months into the year, these observations mean very little but national newspaper commentary on the drought was building and reader Deborah Gregory of Allington wrote (page 11) *"We use washing up water for our cars"*. It is difficult to imagine a positive result from the use of greasy washing up water on a car and of course the letter had presumably been written just before the rain began but on Page 15 an article titled *"Water Water Everywhere"* described how the River Medway had burst its banks after torrential rain.

#### 4.3.10 Drought Orders Ahead but Gardens will still Bloom

By March 3rd the patchy nature of rainfall across Kent became evident. According to Gosbee, winter rainfall for Fretenden had been 127mm, which was, according to him, 30% below normal. But February rainfall had been 25% above normal. On page 21 the paper announced *"Blooms Promise During Drought."* South and East in Bloom organisers had said that the competition would go ahead in the summer despite the drought. They encouraged ground planting rather than raised planters and hanging baskets and said that Judges would be looking for water efficient schemes. On page 33 the headline was *"Water Fears Deepen"* Rob Bailey reported that car washes and other non-essential uses of water were likely to be banned as the south east's water crisis worsened. Both mid Kent and South East Water were apparently considering further restrictions after the driest fifteen-month period since 1933. Bailey pointed out that Folkestone and Dover water had recently been given permission to fit water meters compulsorily in every customer's home but added that this would be a short-term solution, not one that would stand the test of time. South East Water was also reported to be considering applying for a Drought Order which would mean that car washes, window washing and watering golf courses would be banned. Mid Kent Water would also consider applying for a Drought Order if the problem worsened.

On March 10th, a page two headline article ran; “*Swedish tanker plan to help relieve water crisis.*” Lee Winter and Alistair Irvine reported that “*international aid could help solve the water crisis*” Mid Kent Water were battling to come up with a solution to rising demand over the next 30 years and were apparently considering a long-term plan to tanker water from Sweden. An 18% rise in the population was expected by 2030, which meant it unlikely that existing supplies would be enough. The article quoted industry figures of 36 million litres of water per day used by domestic and business customers in the Maidstone area, with capacity for a further two million litres. Ideas being discussed would not be agreed until 2008 but included the Swedish tankers, raising the height of Bewl reservoir, investing in desalination plants, recycling waste water, and transporting water from other parts of the UK. Standpipes were not ruled out as a necessary drought measure. In January, Southern Water had been granted permission by the Environment Agency to extend its drought permit. As an immediate emergency measure, town centre floral displays would be scaled back and watered only three times per week, and water butts were to be installed in parks. This would result in a substantial reduction from the 320,000 litres of mains water usually expended by Maidstone Council on watering bedding plants and trees in spring and summer.

On March 17th, Gosbee wrote that there was no sign of Spring-like weather and only 12mm of rain had fallen so far in the month. Pages four and five carried a water shortages special report. Key points in the article were that Kent was facing its worst drought since 1976. Bewl water was only 56% full and local Member of Parliament, Sir John Stanley had asked a question in the House of Commons regarding what the Government was doing about it. According to Stanley, in a normal year mid Kent would expect 715 – 755 mm rain but between October 2004 and September 2005 only 485 – 610 mm had been recorded. Readers’ attention was focused on water companies. The article explained that a lot of water was “*going straight down the drain*” this was due to leaks from company pipes and from pipes on customer’s own premises that had not been fixed. A new water-saving campaign was due to be launched. Paul Seeley of Mid Kent Water appealed to customers not to waste a single drop. His

company and Southern Water were both seeking permission to implement a non-essential use ban on customers.

On March 24th, Gosbee commented on the past three weeks being much colder. Reader Malcolm Hayes wrote (page 10), that water companies were blaming customers for the shortages and not doing enough themselves to fix leaks. He also highlighted the potential impact of new developments and asked the Government to intervene and halt house building. Maidstone Councillor Paul Oldham agreed that residential development was a problem. On page 21 the *Beat the Drought Campaign* was launched and Farmers and Horticulturists apparently lent their support. This was the first time that the threat of the drought to crops had been alluded to.

#### 4.3.11 Growing Hotter and Wetter

Temperatures started to rise and on April 7th the paper ran another Drought Special with the Headline *"Allotment holders sweating on drought order court bid"*, Mid Kent water were apparently unable to give definitive answers as to whether allotmenters would be able to use water from standpipes. According to the article, if secured, the non-essential use ban would result in people not being permitted to fill swimming pools, ponds, or ornamental water gardens. The fine for non-compliance would be £1,000. Maidstone Allotment Management Committee member Angela Lakhera was quoted as saying *"we are hoping because we are growing food we will be able to continue to water our crops."* The Horticultural Trades Association meanwhile was calling for a review of hosepipe bans as it considered them unfair to industry. A Hosepipe ban they claimed meant a householder could fill his swimming pool but a nurseryman could not water plants. On page 11, reader Diane Warren of Maidstone said she was shocked to hear that she may be banned from watering her allotment. On April 14th Lester Gosbee predicted Easter to be mild. On page 6 the headline article titled *"Drought order for and against"* focused on Defra inspectors hearing the cases for and against drought orders. Both Mid Kent Water and Southern Water were arguing that two extremely dry consecutive winters were the cause of the drought and average rainfall in recent

months was only 78% of average, with Bewl water at only 70% capacity despite replenishment from the River Medway. Other contributors complained that Cricket Squares were at risk if a ban was agreed and window cleaners were likely to lose their jobs. On page 17 the paper highlighted a new website under the title *"Water Saving Tips on Tap"*. Water company bosses appealed to gardeners not to flout the hosepipe ban and urged them to go to a website [www.beatthedrought.com](http://www.beatthedrought.com) for ideas. On April 21st the paper heralded the outcome of Defra's deliberations with the headline *"It's decision day soon over water use restrictions. Announcement expected next week says Alistair Irvine."* Although the readership was never going to be treated to a discussion on the outcome, which would not actually be made public until May 26th. Meanwhile, the rain had begun to fall.

On April 28th on page 16 under the title *"From Sea to Tap and Back Again,"* a Southern Water spokesperson described how not all water that was used, treated, and released to rivers could then be used again. Evaporation and take-up by plants had to be considered. The fact that 70% of water used came from underground sources was also in the spotlight and readers were asked to continue to make savings. On page 17 a headline *"Welcome rain but it won't ease crisis"* also pinpointed the fact that local reservoirs only provided 30% of water demanded by customers and the recent rainfall would not improve things. The next aquifer re-charging season would not begin until October. The article rambled over various points including the fact that Mid Kent Water was being *"forced"* to spend £60 million on repairing leaks in the next five years, and berated the company for leaving a water main leaking for days in Maidstone town centre. It was noted that the federation of small businesses had asked the then Secretary of State, Margaret Beckett not to put small firms such as window cleaners and car wash operators out of business by imposing water restrictions. Meanwhile, residents were urged to *"switch on to water hogs"* (a plastic bag device, otherwise known as a Hippo, that is placed in the toilet cistern to displace water and reduce the amount used for flushing), and to *"get into the spirit of working together to save water"*.

On May 5th, Lester Gosbee announced that it had been the first April since 1986 not to see temperatures exceeding 20 degrees Celsius. An article on page six revealed; *“Water use survey shows underestimation”*. The results of a survey of 1,868 people conducted by a popular DIY store prior to launching a new range of water-saving products had revealed that average daily water use per person was 160 litres but that 50% of people completing the survey estimated their use at 60 litres per day. Mid Kent water had sent letters to all customers reminding them to use water wisely and South East Water had been flooded with requests for plastic Hippos. Temperatures began to rise and on May 12th Gosbee reported that May 4th had been the warmest day of the year to date. However, although the temperature was rising, by May 19th, showers had become more widespread. The page four headline read; *“Despite all that rain, we still face standpipe threat”*. Meanwhile, the Environment Agency issued a new drought warning. A report had shown severe problems with water availability despite near average rainfall between February and April. The Agency warned that if May to September rainfall was less than 80% of normal, reservoir levels would drop quickly and restrictions would be enforced. There was apparently still a risk of severe restrictions such as standpipes and rotational cuts. Groundwater levels were the lowest on record and rainfall in the past 18 months had been much lower than in 1975 – 76. But the rain kept on falling.

On May 26th the paper announced that the Drought Orders had been granted but would not be implemented immediately. As it happens, these orders were never implemented (OFWAT 2012). Ten days of heavy rain prior to Defra’s decision to grant the orders led to a hesitation amongst the water companies who held back at the last minute, thanking customers for their water saving efforts and stating that they would be monitoring the situation carefully. The Environment Agency suggested that they would like to see the restrictions used and one water company, Sutton and East Surrey Water, did secure and implement a non-essential use ban (which was not lifted until November 15th). This was reported widely in the national media (BBC, 2006). The Messenger provided tips to gardeners, suggesting they soak plants at night, and leave established plants to cope without watering. The Fire Brigade asked the public

to be vigilant and not to discard cigarettes, to pick up litter, and extinguish bonfires properly. Avoiding fires would naturally avoid heavy losses of water. A Mid Kent Water spokesperson was quoted as stating that standpipes in the streets would be an unlikely outcome. Public swimming pools stayed open and householders were asked to fix leaks and take showers. The weather showed it's appreciation for the public's concern by ensuring that Lester Gosbee was able to record 114mm of rainfall making May the wettest May since 1983.

June continued to be wet but the paper continued to discuss the drought. Page 30 of the June 2nd edition carried the headline *"Protecting Water Supplies"*. Richard Sturt, Chairman of the Consumer Council for Water (Southern Region) looked at how drought orders would affect the lives of people in Kent. He was quoted as saying *"1.6 million people living in Kent including Medway have been brought up with a start by talk of a drought"* and pointed out that the unenforced drought orders could potentially affect 1.2 million people and that five companies: Southern, South East, Mid Kent, Thames, Folkestone and Dover, supplied 440 million litres of water per day between them. He asked; *"How have we got in this situation?"* and placed the blame on a combination of increasing population, fragmentation of homes, climate change, and habitat reductions. In his estimation, demand for water would increase by 40% but demand reduction by customers would only save 20% and as he put it, *"...the 20% imbalance implies permanent water rationing"*. Sturt's main message was about planning for the future. This thread was followed on June 9th (page 6) when Alan Watkins reporting on the drought quoted Paul Seeley, Director of Mid Kent Water, admitting that too many homes were being planned for the southeast. *"I would like to say you cannot build homes but I can't and the company is obliged to supply the water."* His company would soon make a decision on a planned desalination plant but they were pressing for a review of a plan to build half a million new homes in the southeast. Seeley also argued that more needed to be done to tackle climate change. However, Mr Seeley delivered better news on the immediate water shortage. He said of the recent rainfall *"This is the wettest drought in history"* and went on to explain that Bewl reservoir was almost full and water was being pumped between Hampshire, Kent and Essex so there was no likelihood of standpipes after all.

#### 4.3.12 Capturing the History of the Drought in Their Own Words

Although the hydrological drought that affected Kent in 2006 was very serious in parts, few people living in the area at the time consider it to have been a notable drought episode. None of the participants in the Royal Tunbridge Wells focus group could recall there having been a drought in recent memory and recalled instead hosepipe bans which by their estimation happened every year (even though this is not the case), signaling that Kent was generally a dry area. The group described their water saving actions at that time as being actions they would take in any year to conserve water. They appeared to have been completely unaware of the severity of the drought conditions, expressing a general opinion that water companies had highlighted the dry winters and warmer than average temperatures to mask their inadequacies as water managers. The Drought appeared to them to be a convenient opportunity to increase prices to pay for infrastructure. One participant who had been living close to Bewl Water reservoir between 2004 and 2006 was convinced that media coverage of the drought used stock images of the reservoir from a previous drought. *“They kept using a photograph of the reservoir with the water level really low. But I lived there and it was almost full. I think they released that photograph because they wanted to increase the size of the reservoir. They’ve since got permission to do it.”* (DM15)

#### 4.3.13 Interpretation

*“Southern England is the part of the UK closest to continental Europe and as such can be subject to continental weather influences that bring cold spells in winter and hot, humid weather in summer. It is also furthest from the paths of most Atlantic depressions, with their associated cloud, wind and rain, so the climate is relatively quiescent.”* (Met Office, 2012)

This description of the climate in the area of study possibly underlines why the 2004 – 2006 hydrological drought went largely unnoticed by local people, despite a reasonable level of local media coverage and some notable national coverage in spring 2006. The drought in 2003, which was widespread across

Europe, drew the public's attention to climate change due to the summer heat wave and both 2005 and 2006 turned out to be in the top ten record-breaking years in terms of temperature. At the same time, the basic principle of warmer climate equating to a wetter one provided summer rain but also high evaporation rates. The dry winters failed to re-charge groundwater sources for which water companies in Kent are reliant to meet around 70% of customer demand. The burden of the potential threat of socio-economic drought therefore was placed onto customers who were banned from using hosepipes and asked to limit their water use inside the home. As the drought period extended through a second winter, water companies sought to impose heavier restrictions via drought orders which businesses dependent on water such as horticultural nurseries, window cleaners, and car wash operators, argued their case for exemption from. The unusually wet April and May of 2006 halted aquifer depletion and filled reservoirs. As a result, two key water companies serving households in Kent rolled back from implementing the Drought Orders that had been granted to them by the Secretary of State.

The use of statistics in the media was potentially misleading. Without citing sources for this important information, rainfall statistics that were stated as being above or below 'normal' or 'average' were open to scrutiny. The Met Office uses 30-year averages to compare rainfall and temperature and the actual rainfall data for southeast and central England region compared with the 1971 – 1990 average is shown in Table 8, which shows 22 months of below average rainfall and 13 months of above average rainfall (shaded in grey) in the 36-month period. According to Marsh et al (2008), Southern England recorded the third lowest rainfall since 1914 (1050mm), in the 21-month period between October 2004 and July 2006. (Marsh et al, 2008). The Met Office provides the following analysis of the 2004 – 06 rainfall:

*“If a period with below average rainfall includes winter months as well as the high-demand summer months, then conditions can become severe as the winter is the normal recharge time not only for reservoirs but the chalk aquifers upon which much of the region relies for water supplies. Examples include the period November 2004 to February 2006, when*

about 75% of the normal rainfall occurred over the area, making it the driest such period since 1932/33.” (Met Office, 2012)

**Table 8.**

Monthly rainfall totals for the years 2004, 2005 and 2006 Source: Met Office (2013) compared with percentage of 1971 – 2000 average. Source: Met Office (2012a). All quantities have been rounded up or down to nearest whole number.

	2004 (mm)	% 1971 - 2000	2005 (mm)	% 1971 - 2000	2006 (mm)	% 1971 - 2000
<b>Jan</b>	104	128	39	49	25	32
<b>Feb</b>	33	62	25	44	63	111
<b>Mar</b>	44	74	51	83	58	96
<b>Apr</b>	77	146	50	93	44	82
<b>May</b>	52	100	33	62	95	177
<b>Jun</b>	33	58	34	57	22	37
<b>Jul</b>	53	117	62	127	28	57
<b>Aug</b>	103	184	55	91	69	114
<b>Sep</b>	35	50	40	58	63	91
<b>Oct</b>	130	155	98	125	123	158
<b>Nov</b>	43	57	55	71	85	110
<b>Dec</b>	52	65	70	83	110	130
<b>Total</b>	759	98%	612	78%	786	100%

The presentation of these data highlights how the timing of precipitation events are very often more important than the volume. Slicing the data month-by-month or week-by-week may give rise to inappropriate action and over embellishment by the media. National media coverage relating to the potential implementation of Drought Orders highlighted confusion over who might be considered exempt from restrictions. This triggered a Defra consultation on the matter. As a result of this consultation the Water Use and Temporary Bans Order 2010 was introduced as part of the Flood and Water Management Act

2010. This provided clear guidance regarding activities that may or may not be included in Drought Orders.

### III

#### 4.4 The 2011 – 2012 Drought in England

Readers who have reached this section will no doubt be relieved to know that the final part is slightly shorter than previous drought histories, for two reasons. Firstly the author is keen to highlight the relatively short-lived period of socio-economic drought in England in the final six months of the drought, despite the hydrological phase spreading from the east Midlands and East Anglia southwards and westwards engulfing southern and central England and finally south west England, over a total period of 27 months from January 2010 to April 2012. Secondly, despite the drought building over a considerable period of time, the quantity of commentary on the drought is considerably larger and much harder to track than previously, due to the increase in new media sources, principally the Internet, where numerous local newspapers have a presence alongside national media, government agencies, and the public themselves, who in most instances are invited to comment as information is published. This makes the job of the researcher much harder as there is so much data to review and so many personal comments to take into account. The media and the public in the media have grown in size and the lines between the two have blurred. However, it does bring a welcome source of secondary material to grounded theory studies. This therefore is not a systematic review of a drought from one perspective or geographical location but an overview of key discussion points that emerged as the drought intensified in early 2012. The more detailed personal reactions to the drought from people living in the three study areas are covered more comprehensively in chapters five through seven.

##### 4.4.1 Another Two Consecutive Dry Winters and Another Very Warm Year

A brief summary of the drought was included in the methodology (chapter three, section 3.8). Just as in the 2004 – 2006 drought, the cause was two consecutive dry winters rather than exceptionally hot and dry summer months,

although 2011 now also holds a place in the list of top ten hottest years on record. Readers may find it useful to compare the relatively average rainfall in southeast and central England, and North Devon, in 2009 and the extraordinarily wet year of 2012 with the drought years of 2010 and 2011 shown in Table 9. The key drought period is shaded in grey and the period of socio economic drought is marked with an arrow.

**Table 9.**

Monthly rainfall total, years 2009 – 2012 for south east and central England

Source: Met Office (2012 *b*), compared with monthly rainfall total, years 2009 – 2012, Filleigh, North Devon. (Un-named source)

	2009 SE & Central (mm)	2009 North Devon (mm)	2010 SE & Central (mm)	2010 North Devon (mm)	2011 SE & Central (mm)	2011 North Devon (mm)	2012 SE & Central (mm)	2012 North Devon (mm)
<b>Jan</b>	90	112	73	77	99	123	49	123
<b>Feb</b>	67	54	98	91	59	59	19	40
<b>Mar</b>	38	90	59	80	16	28	27	34
<b>Apr</b>	40	52	23	29	4	13	133	140
<b>May</b>	36	108	30	46	27	42	39	31
<b>Jun</b>	33	44	33	27	82	108	138	189
<b>Jul</b>	84	205	26	96	49	96	104	153
<b>Aug</b>	36	69	100	147	78	85	56	109
<b>Sep</b>	28	56	51	109	40	98	64	96
<b>Oct</b>	66	65	78	80	36	123	130	212
<b>Nov</b>	190	218	76	111	45	75	101	178
<b>Dec</b>	113	104	42	47	94	220	142	244
<b>Total</b>	821	1177	689	940	629	1070	1002	1549

#### 4.4.2 A Crisis Emerges - Two Years After the Drought Began

The drought did not emerge as a point of discussion in the national media until mid-February 2012, almost two years after it began. On February 14<sup>th</sup> the Daily Express carried the headline on its front page: “*Britain Faces Drought Crisis*” (Rao, 2012). The paper claimed that the water shortage was the worst for 90 years and that hosepipe bans would be introduced early in the spring. Trevor Bishop of the Environment Agency was quoted as saying that after two years of low rainfall there was a risk of restrictions on water use, which would include hosepipe bans. The article likened the situation to the 1976 summer drought. Continuing on page five the paper compared images of very low water levels at Bewl reservoir and Rutland reservoir in East Anglia, with an image of Bewl reservoir when full. The paper painted a picture of widespread drought conditions covering the midlands, East Anglia, and south east England and carried details of low reservoir and aquifer levels, low flowing rivers, and farmers having to abstain from pumping water from rivers for irrigation. Although there had been some snow, the forecast was for dry weather to continue.

On February 20<sup>th</sup> Environment Minister, Caroline Spelman, held a drought summit. 2011 had been the second warmest year on record and rainfall had been roughly 20% below average. Reporting on the summit, the BBC quoted Rose Tremlett, Fresh Water spokesperson for WWF “*This is a drought we've seen coming. Rivers ...have been dry since September 2011. Back then everyone agreed we would be in a serious drought situation if we had another dry winter, but not much has been done about it.*” (BBC 2012 c). It seemed as though, just as in 2006, the timing of dry periods and the relatively wet summer in 2011 allowed water companies to maintain supplies to customers without severe restrictions. February rainfall in southeast and southern England amounted to only 19.2 mm (Met office 2013). Southern Water was granted a drought permit to refill Bewl reservoir with water from the river Medway (Environment Agency 2012 a).

March rainfall in the southeast remained low at 26.7 mm (Met Office 2013). On March 12<sup>th</sup> the Daily Mail carried a front-page headline: “*Hosepipe Ban for*

*Millions*” (Cohen, 2012a) which heralded forthcoming announcements regarding hosepipe bans, from water companies in the south and east. Even with the benefit of replenishment from the river Medway, Bewl reservoir was mentioned as being only 41% full. Other items mentioned included fish dying in rivers as they dried up and potato crops suffering. The counties of Lincolnshire, Cambridgeshire, Northamptonshire, Norfolk, London, Berkshire, Oxfordshire, Hertfordshire, Wiltshire, Gloucestershire, Hampshire, East and West Sussex, Surrey and Kent were all listed as being designated drought areas. The practical advice on how to manage in a drought soon followed. On March 24<sup>th</sup> the Guardian suggested: “*Threatened by a hosepipe ban? There’s no ifs...it has to be butts*” (Papworth, 2012), implying that gardeners should store rainwater in their gardens to beat the drought and stating that sales of water butts had increased by as much as 196%.

#### 4.4.3 The Meteorological Drought Ends but the Hydrological and Socio-Economic Phase Continues

By April 2012, the north of England was engulfed in snow and rain fell in the southeast. The drought had broken although this was not immediately noticeable. Unconvinced that the rain would be sustained and being concerned that there could be a third dry winter, the media public turned their attention to the water companies. On 6<sup>th</sup> April 2012 the Daily Mail (Cohen, 2012 b) reported on the drought situation and the financial health of water companies who had by then imposed hosepipe bans on their customers to conserve supplies. Using a table titled “*How flush is your water company?*” (reproduced in Table 10) Science Reporter, Tamara Cohen showed how water companies had paid foreign shareholders £500 million for the year 2010-11 and their top executives had collectively received over £4 million in bonuses. The table also revealed the majority ownership of the companies and the level of leakage from their pipes. Cohen’s article stated that 20 million customers were affected by hosepipe bans and later in the article claimed that enough water for 20 million people was leaked by water companies every day, although she did not state how she had come to this conclusion. On page 19 of the same edition of the paper, the cartoon titled “*More Champagne Sir?*” depicted a Thames water executive

sitting in a garden holding a large bonus cheque, being served champagne from a hosepipe by his butler. Whilst it is unfair to judge companies on these figures without a close examination of their company accounts and reports, it is clear from their use that in publishing these statistics and the accompanying article in this way, the Daily Mail sought, to uphold an opinion of water companies being run poorly, by over paid executives, to make profits for overseas owners/investors, and to imply that hosepipe bans would not be needed if leaks were eliminated. The Daily Mail is the second most widely read of twelve national daily newspapers in England with just over 1.9 million readers in March 2012, that then equated to 22% of total market share (The Guardian, 2012).

**Table 10.** Hose Ban 'till Next Year, *The Daily Mail*

Reproduced from Cohen, T. The Daily Mail, 6<sup>th</sup> April, 2012, page 13.

<b>HOW FLUSH IS YOUR WATER COMPANY?</b>							
* These are less because the company provides water only, not sewerage							
<b>Firms</b>	<b>Average Bills</b>	<b>Price rises this year</b>	<b>Leakage as a % of supply</b>	<b>Profits 2010 - 2011</b>	<b>Bonuses paid 2010 - 2011</b>	<b>Majority owner</b>	
Anglian	£423	5.4%	19%	£295.4 million	£1.52 million	Canadian / Australia investment funds	
South East	£204*	4.6%	17%	£36.1 million	£272,000	Canadian hedge fund	
Southern	£416	8.2%	16%	£12.1 million	£437,292	JP Morgan Asset Management (US)	
Sutton & East Surrey	£181*	7.3%	15%	£14.1 million	£110,000	Deutsche Bank	
Thames	£339	6.7%	26%	£208.5 million	£1.98 million	Australian Bank Marcquaire	
Veolia Central	£174*	1.8%	21%	£24.2 million	£0	Veolia (France)	
Veolia Southeast	£188*	3.3%	18%	Whole group	£0	Veolia (France)	

On the same day, other national newspapers focused on the drought in different ways. The Guardian carried a double page spread by Sam Jones titled "*Bring on the Water Butts: hosepipe ban fails to drain garden-lovers' spirits*" (Jones 2012) with a strap line: "*Lincolnshire has been in drought since June 2011. Growers hope nature – and parsimony – will triumph.*" The story highlighted Lincolnshire as an area that was now subject to its first hosepipe ban for twenty years. Five water companies were reported to have hosepipe bans in force. However, the article commented on the relaxed mood of gardeners by stating; "*meteorological panic is not stalking the aisles of the garden centre*". Jones went on to make several points: Firstly, gardeners were hoping for a return to 'traditional' British weather, whatever that may be, but that they were not concerned about the drought as they had water butts to rely on. Secondly, it was their opinion that water companies had blamed the past two harsh winters and associated pipe bursts for their failure to keep leaks under control to conserve supplies. A local Pumpkin grower was said to have expressed no concern, as there had been two and a half inches of rain in two days. However, shoppers were noted to be looking for drought tolerant plants and pointing out that they needed rain every week for three months to put things right.

#### 4.4.4 Restrictions Divide Communities

The *I* newspaper carried a small article titled "*Blooming unfair!*" with the strap line; "*Villagers seethe at hosepipe ban*" (O'Brien, 2012 p7). Residents in the village of Manton, right on the edge of the Thames Water hosepipe ban area were reportedly upset that they were being forced to observe restrictions. The nearby river Kennet had run dry in parts and Thames Water was accused of abstracting too much water from it and causing the problem. Conversations with residents focused on concerns about not being able to water hanging baskets. The villagers' neighbours who were supplied by a different water company were not subject to a ban and this was a source of animosity between them. Meanwhile, the Daily Telegraph asked the question: "*Will water ban make 2012 a damp squib?*" (Gray, 2012, p3). Environment correspondent, Louise Gray commented on the fact that for the first time the Thames Water drought restrictions included banning parks and recreation grounds from being watered,

and fountains from being run. The fountains in Trafalgar Square were set to be let to run dry and there was concern that the forthcoming Queen's Jubilee celebrations and the London Olympics would be spoiled because so many of London's green spaces would be "*a shade of brown by the end of July*". The Times published a guide to the hosepipe ban on page four, explaining comprehensively who was included and excluded. For the first time, disabled badge holders were exempt from the ban alongside window cleaners and car washers. Under the title "*Neighbours to police big turn-off*", it was noted that water companies were relying on the good will of their customers to follow the ban and hold their neighbours to account if they were spotted using hosepipes. The paper also highlighted that there had been a substantial increase in watering can sales. (Maclean & McCann, 2012 p4).

#### 4.4.5 The National Drought Debate

The rain continued to fall and six days later on April 12<sup>th</sup>, BBC Radio 4s *The Report* presented by Linda Presley, brought together the Environment Minister Caroline Spelman, representatives from the Environment Agency and water companies, conservation organisations, academics and local councilors, to discuss the drought. The programme began with the topic of gardeners and their use of hosepipes. Allotment owners in the Home Counties were presented as caring and prepared, having already elected to use watering cans rather than hosepipes. Trevor Bishop of the Environment Agency reminded listeners that a hosepipe running for one hour could use as much as cubic metre of water and that hosepipe bans were very effective. He also promoted the idea of four-minute showers, leaving lawns to go brown, and not running the tap when brushing one's teeth. The conversation moved on to agriculture. Farmers in East Anglia were reported to be growing earlier crops that would presumably be harvested before a hot, dry summer could materialize. The onion crop had been cut by 40%. As a result food shortages and higher prices were expected. It was noted that Barley was vulnerable in drought conditions and so there might be a shortage of beer. Farmers were also quick to point out that East Anglia was a 'hot spot' in terms of 25% of potable water being drawn down for agricultural

use, but that nationally usage of the national water supply for farming was only 1% of the total volume available.

A Royal Society for the Protection of Birds spokesperson, Phil Buston spoke of the state of the River Durrant, which had reached a low level of 15cm normally only seen in high summer. He complained that groundwater feeding the river had been exploited and the drought had added to the problem, blaming the Environment Agency for not acting to limit the damage. A new licensing structure that was anticipated to limit abstraction further was not expected to come into force until 2020 which was naturally considered to be too late. Southeast England was described as receiving less rain than Morocco and the two consecutive dry winters were highlighted as an example of climate variation.

The discussion moved onto the problem of lost water from leakage, which was stated as being 3.3 million litres per day in England and Wales, which was approximately 25% of the treated water supply. Thames Water was criticized for having a high level of unattended leaks each week. Professor Adrian McDonald of Leeds University interjected that it was ridiculous to imagine that in fifty years water would still be lost from the network at that rate. He suggested that leakage should be reduced to 10%, the current level in Germany. The Minister responded by saying that OFWAT was doing a good job in regulating the water companies and therefore leakage had already been reduced by 40% to a level that compared favorably with other countries. The discussion then moved to the transport of water from areas with plenty to areas that are water stressed. Paul Varella of Anglian Water said his company was working with a neighbouring water company to transport in 30 million litres of water per day from Wales. Professor McDonald pointed out that although water companies had invested heavily in infrastructure they had not set up strategic agreements with adjacent companies to share water, which was considered to be a product of privatization deals in the 1980s being focused on increasing investment. The Minister explained that a water trading was a key component in the water white paper but that building a water grid to transport more water to the south was not necessarily a sensible investment because drought does not always affect the

same area of the country, citing a short drought in 2010 which affected the north west of England.

The debate then turned to the prospect of a third dry winter. Would the nation cope? The Minister answered as if the Government was capable of organizing miracles by stating that the nation would always cope because the Government was responsible for putting in place a plan that made sure there was enough water for those who needed it. She did not elaborate on the fine detail of such a plan. The Minister was then asked about the prospect of standpipes but she would not comment, only to say that Drought Orders were much more likely if the drought continued into another dry winter. Michael Norton of the Institute of Civil Engineers expanded on the subject highlighting the serious nature of the situation and the prospect of a third, dry winter. He expected rivers to deteriorate, industries and agricultural businesses to go under, and standpipes to be distributed.

The presenter quickly re-positioned the argument pinpointing Kent as a problem area with regard to the sustainability of water resources in the future. Chris Lewis of Shepway District Council explained that in his area there were plans for 1,000 new homes alongside developments that would increase employment. He expressed some concern over the local water company being satisfied that future water demand could be met, explaining that the area suffered from water scarcity and that water companies were duty-bound to state that they could provide water. The Veolia water representative agreed that as water companies have an obligation to provide water they are unable to say no to new developments, suggesting that they were able to express concern but they had a statutory responsibility to meet future demand. The presenter helpfully reminded listeners that the UK population was expected to rise by 10 million by 2035. Professor McDonald argued that it was illogical to expect that expanding the population in the southeast was appropriate and that more development should take place in areas with more water and smaller populations such as Wales. He also criticized the fragmentation of the privatized water industry and the fact that there was no overarching body to draw them together to work together on tackling drought, which could in his opinion become an annual

problem. The programme concluded with the presenter suggesting that all English water companies were “*worried*” (BBC 2012 *d*)

#### 4.4.6 The Spread of the Socio-Economic Drought

The rain continued to fall but despite this, on April 16<sup>th</sup> the Daily Telegraph front page headline was “*Worst drought since 1976*” (Hall, 2012). The drought had spread from East to West and now affected a further 17 counties and a total of 35 million people. Seven water companies had imposed hosepipe bans on customers and water trading in large volumes was being organised between companies. Households were again urged to cut back on their use of water. The paper highlighted the need for almost continuous rain for several months to rectify the situation. On the same day the ‘*I*’ newspaper highlighted the severity of the situation claiming that water restrictions would last until Christmas. Trevor Bishop was apparently hoping for a rainy winter (McCarthy, 2012). Local newspapers in the southwest began to cover the drought. The Plymouth Evening Herald carried the headline on its front page “*We’re in a Drought*” (Ricks, 2012) and explored the fact that the southwest had been given official drought status but that the people of Plymouth would not be subjected to a hosepipe ban. The Western Morning News echoed calls for householders and businesses to save water and explained that according to South West Water, reservoirs held sufficient supplies to carry communities through the summer (84% full) without imposing a ban (Vennells, 2012 *a*). The paper pointed to 16 of the previous 25 months having lower than average rainfall and rainfall since October 2010 being the lowest for the same period since 1921-22 making it the second driest on record. There had been 35% of average rainfall in March 2012. There were concerns for wildlife and an additional worry that boreholes and wells could dry up. Three days later after continuous rain “...*ever since the Environment Agency made the [drought status] announcement*” (Vennells, 2012 *b*), the paper anticipated drought status to remain until winter even if there were to be substantial rainfall.

#### 4.4.7 The Public Have Their Say

Nationally, the BBC posted an online news article on April 16<sup>th</sup> that received 900 comments from members of the public. Below in Table 11, is an analysis of relevant comments. Each of the comments was assessed regarding the main discussion points, which break down into sixteen specific areas of concern. The number of comments in these areas is shown as a percentage of the 720 relevant comments. The 180 non-relevant comments were either abusive or unconnected to the topic. Of the 720 posts considered in this analysis the most prominent position of commentators was that they did not believe that there was a drought but that there was a shortage of potable water caused by inappropriate management by water companies that were more interested in making profits than securing water supplies for customers. Failure to tackle leaks was also discussed by many, alongside the idea of developing a robust water grid capable of bringing water from Scotland and Wales down to the South. A significant proportion of contributors blamed population pressure and expected continuous water shortages as the population increased and some blamed short-term Government planning for the predicament. Only 1% of commentators suggested putting the price of water up to curb demand. No one mentioned climate change.

On April 20<sup>th</sup>, BBC Radio 2 presented the public reaction to the drought. The Jeremy Vine show included a phone-in with self-styled money-saving expert, Martin Lewis. The key theme was saving money by saving water. The presenter summed up the situation; *“No sooner have water restrictions been imposed, we are treated to downpours and floods.”* (Vine, 2012). He asked listeners to consider whether money was flowing out of their pockets, whether they were having trouble deciding whether to opt to have a meter fitted and whether they would flush the toilet every time or leave urine to accumulate. Listeners telephoned in to share their experiences. Some were pleased they had had meters fitted because they were saving money, although to do so they were having to limit their water use. One caller kept a bucket by the bath and used the water in the garden. She had one son who would do the same but another that refused to. The message in this programme was clear – water is expensive

– and the expert’s advice was to be ‘*water tight*’. Another contributor described how she was replacing toilet flushing with regular applications of a bleach-based toilet cleaner, to save money. Whether this person’s total expenditure on toilet cleaner was lower than the cost of regular flushing is debatable.

**Table 11.**

Analysis of comments on the BBC article *Drought may last until Christmas: Environment Agency*. (BBC, 2012, e)

<b>Relevant comments (720)</b>	<b>% of total</b>
There is no drought it is simply a shortage of potable water caused by poor management of resources and infrastructure by water companies that is driven by greed (profiteering).	18.75%
We need a water grid to bring water from Scotland and Wales to the south	13.75%
Population pressure is the cause and so water shortages will be ongoing	12%
Failure to fix leaks is the cause of the drought	12%
Successive Governments have not planned effectively for water shortages	8%
We must all pull together and save water to solve the problem	7.5%
Universal metering is needed to solve the problem	6.25%
I have lived in far drier countries such as Australia and not experienced these problems	6.25%
Re-nationalise water companies	2.75%
Build more reservoirs	2.75%
I don’t care because I don’t pay the water bill	2.5%
There are no incentives to save water	2.5%
Put the price of water up to deter use	1.25%
Regulators are too soft on water companies	1.25%
It’s not fair because my neighbours are not in the hosepipe ban zone and I am	1.25%
Infrastructure has been planned but never completed	1.25%

#### 4.4.8 A Remarkable Turnaround

April 2012 turned out to be the wettest on record in England and Wales but by May 2012 eight water companies in southern and eastern England had hosepipe bans in place. Although the meteorological phase of the drought had most definitely ended, these restrictions were anticipated to remain in place until 2013 as a wet winter was needed in order to replenish ground water reserves in some of the most heavily populated parts of England (Natural Environment Research Council, 2012). After a 27-month period of drought, the socio-economic phase continued across the southern and eastern parts of England. The wettest April on record followed by a relatively wet May prompted criticism from the media (not necessarily the public) regarding hosepipe bans. This resulted in two contrasting comments. Firstly, Dr. Robert Ward of the British Geological Survey sought to explain why the recent rainfall was unlikely to replenish groundwater reserves:

*“Because the current drought has developed over a long period of time and groundwater levels are now so low, it will take four to five months of above average rainfall, like we’re experiencing now, to fully replenish affected aquifers. A groundwater drought can be likened to a bank account that is overdrawn. If we keep spending (abstracting water) the debt will increase (groundwater levels get lower). If the debt gets too bad, then when we pay in our wages (rainfall recharge) it won’t cover the debt. It’ll get even worse if our wages are cut (dry winters). If we are going to get out of debt we need reduce how much we spend (hose pipe bans and other restrictions) and keep paying in our wages — however much we get. It may take a long time until we’re back in the black just like it will take us a long time to overcome the current drought.”* (Ward, 2012)

Rather unexpectedly, the Environment Agency responded to the media by appearing to take the blame for a public that did not understand why hosepipe bans continued along with the rain. Trevor Bishop announced that the Agency would re-define drought. *“Drought is a very difficult word – it describes lots of problems. We’re thinking about how to communicate better all these differences, so that people can understand better.”* The word drought would be eradicated and the phrase *“environmental stress due to severe shortage of rain”*

used instead (Harvey, 2012). This caused one blogger to describe Mr. Bishop as “*Ugg the Cave Man*” (*stripytie*, 23<sup>rd</sup> May, 2012, 11.16pm in Harvey, 2012), and did nothing to quell media reports of sudden reversals on hosepipe bans due to the sudden and unpredicted high rainfall, implying a level of incompetency across the water management spectrum of responsibility.

#### 4.4.9 Interpretation

The wet April turned out to be part of a “*remarkable hydrological transformation*” (CEH, 2012) characterized by periods of extreme rainfall, which reversed the drought situation completely, allowing aquifers, reservoirs, and wetlands to recharge in the late spring and summer months of 2012, with all water use restrictions being lifted by July 9<sup>th</sup>, 2012 (BBC, 2012 e). There are some striking similarities with this drought and those in 1976 and 2006. The drought ended with record-breaking weather and water restrictions were implemented only when it rained. Of course, this was not planned but it did serve as a source of frustration to those who were affected.

Kent is an area that is clearly facing ongoing problems with rising demand for new housing and enterprise, and limited groundwater and reservoir capacity. The use of ‘snapshot’ rainfall statistics and images of dry reservoirs (mainly Bewl Water) made it hard to follow the hydrological and socio-economic phases of the drought. The availability of company accounts and leakage rates made water companies an easy target for criticism.

In 2012, the Environment Agency was criticized both for its inability to limit over abstraction and its poor performance in the media. This is presumably partly down to their choice of spokesperson and partly due to their role as enforcer and champion of natural habitats being at odds with commercial interests. The conflict between regulating water use for environmental benefit and enabling water companies to meet their statutory obligation to meet customer demand has the effect of neutralizing Environment Agency efforts, leaving them only to echo existing messages to the public to save water.

The introduction of clearer interpretation of drought restrictions to limit the impact of hosepipe bans on small enterprises such as window cleaning businesses, and disabled gardeners reduced confusion and enabled the media to report factually and clearly on what could and could not be done and the issue of fairness was confined mainly to the geographical boundaries where water companies implementing hosepipe bans sat alongside companies that had not introduced restrictions.

#### 4.5 Discussion

These long and detailed accounts of public and media dialogues and water user behaviours during droughts, form part of an important historical record that hitherto has not been collated or made accessible to those who are in the processes of determining how to manage water resources in future drought situations. Whilst it is possible to track historical hydrological and meteorological data alongside aggregated historical water use data from water companies, during water crises, there is no specific remit for the complete 'story' of a drought from various public perspectives to be charted. The socio-economic drought record is therefore incomplete. This is set to change as a new research project to begin in April 2014 will attempt to compile a complete drought inventory for the United Kingdom, utilising similar techniques to develop histories of droughts in living memory (NERC, 2013)<sup>5</sup>

News reporting in September 1976, April 2006 and April 2012, was broadly similar across all three of the drought situations described in this chapter. Each time the public were asked to reduce their water use, the media public was quick to apportion blame to the water authorities/companies and their poor management practices. In 2012 water companies were berated for their assumed predilection for putting profit before people. During the 2004 – 2006

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<sup>5</sup> The Natural Environment Research Council (NERC) recently announced as part of a call for drought and water scarcity research, a £1.5 million fund for an inventory of past drought episodes in the UK which will make use of oral histories and trace dialogues of drought, in order to re-frame public discourses on drought in the future.

<<http://www.nerc.ac.uk/research/programmes/droughts/events/ao.asp>>

drought, discussions about climate change played alongside reporting of the drought so that the public could make the link between the two if they chose to.

Population pressure was a key concern in all three droughts. Although the population increase in North Devon was seasonal, the timing of the drought had a similar impact to that experienced in Kent in 2006 and 2012. In 1976, large signs on the roads heading into the south west, and the removal of bath plugs in holiday accommodation bathrooms, failed to impress on visitors that they should use water sparingly. More recently, water saving information has become freely available to all water customers, regardless of whether there is a drought or not. The brick Ian put in his toilet cistern, to beat the drought, has been replaced by a plastic 'hippo' or 'water hog'. All water customers are encouraged to follow water-saving tips and there are few, if any, credible excuses for not already being a water saver. This has not diverted the media away from publishing water saving advice.

There is no evidence to show that in 2006 and 2012 water customers attempted to limit their water use, to go beyond their normal habitual activities. In 2012, many people did not believe there was a drought at all. Where hosepipe bans were eventually implemented, a substantial number of water uses were excluded. Disabled badge holders were able to continue using their hosepipes to water their gardens. Window cleaners were still able to operate their businesses and taxi drivers could wash their cars. It was still possible to water sports surfaces that would be in use for national sporting events, and horticultural businesses could still water their stock. It is known, from aerial photography taken in 1976 that shows a patchwork of brown/yellow and green gardens, in North Devon, that many people flouted the hosepipe ban. It is likely that the same would have happened in the east of England in 2012. It would have been interesting to see how much water was ultimately saved by customers abstaining, and whether, if the drought had continued, this would have been enough to stave off further rationing.

In all three of these drought histories, the hydrological drought phase was broken as soon as drought orders were set in place, and not before. It is as if

the weather, in each case, was waiting to make water companies look foolish for being concerned, but of course this cannot be the case. From the mid-2000s to 2012 it would appear that water companies' remit to provide, forces them to develop complicated strategies of drip-feeding the public with appeals to curb their water use, to avoid criticism and possibly panic. Ministers of state must ultimately do the same otherwise they risk being branded as 'buffoons'.

These three drought histories help to highlight the apparent importance water users place on feeling that they are being treated fairly, when water is being limited in some way, even though they may not behave fairly to one another. They do not reveal whether water users are capable of instinctively knowing when to hold back and none of the events described appear to have triggered a concern to save water, without being told to by others. This may have been because individual water users were comfortable with the probability of rain arriving in time to re-fill reservoirs and aquifers. It may also be that individual water users in these three histories became completely misguided by the ease at which water was made available to them, and the fact that they had a sense of ownership of water because they had contributed financially towards the development of water infrastructure in the past, and continued to pay for investment in the management and improvement of this infrastructure into the future. This may have worked in tandem with the lengthy process of reporting on dry weather and water availability, in local newspapers, that brought temporary relief when it rained, and concern when it was apparent that rainfall had not kept in step with the seasonal average expected, on a month-by-month basis.

Droughts are easier to view in retrospect and should provide us with a good idea of how to avoid falling into the hydro-illogical cycle (Wilhite, 1992) when the next one occurs. It is clear that after 1976, investment in infrastructure was used to improve water services substantially. After 2006, alongside increased investment in infrastructure, a period of consultation resulted in a new drought order, which allowed water companies some discretion over who would be included and excluded in hosepipe bans. To a certain extent this appears to have forced the national media into reporting on the impact of hosepipe bans

rather than the confusion surrounding them. In 2012, the development of improved infrastructure networks that will enable water companies to distribute resources to drier areas such as the southeast became a prominent talking point. However, this is not considered to be an affordable solution and so it is doubtful that the next severe drought period will be avoided due to increasing availability of supplies.

#### 4.6 Methodological Notes

As explained at the beginning of this chapter, the author collated these drought histories as separate small projects that could be cycled as part of the process of doing GT. There are long pauses in a GT study where it is best to walk away from the data and take a break from the tedious and complex job of constant comparative analysis. It is during these times that to keep one's mind off the premature development of a theory by impressing one's own opinions of subjects onto the data, finding something else to do is important. In this case, tracing the development of past droughts through local newspapers was an excellent method of continuing to research the overall topic of publics, droughts, and climate change, without reading or researching in the substantive area (present-day household water use). The 1976 drought history development was a very enjoyable endeavour providing an opportunity to dig systematically through a limited number of historic media sources that quite satisfactorily spanned the whole of the chosen time period. Locating and attracting a number of individuals willing to record their memories from that time, including some who had important jobs associated with the steps that were taken to manage water supplies, was both rewarding and uplifting. In comparison, researching the 2004 – 2006 drought was a much harder task. The number of available media resources was far greater and therefore necessarily restricted to those most commonly read in the area of Kent under study. The number of people with good memories of the drought was smaller than for 1976. It is not possible to say from this study, whether there is an optimum time to collect memories of an event and whether it was simply not far enough in the past for individuals to approach the questions from a historic perspective if one accepts Eden's critique as being fair, it is not surprising that the drought passed without making

a substantial impression on householders other than those living close to reservoirs. Piecing together the meteorological timeline was a lengthy process frustrated by the lack of rainfall data that could be attributed to specific areas of Kent rather than the much larger area of the south and southeast of England, whereas it was possible to find a local rainfall recorder close to Barnstaple who was happy to share daily, weekly and monthly rainfall data for that period with the researcher. The use of historical methods to explain socio-economic drought periods though fruitful is limited, by the willingness of volunteers to devote time to telling their stories and also by the methods by which data is captured and stored at the time.

The 2012 drought information was collected in real time. At that time, there were so many sources of commentary available that it was impossible to keep track of all of the lines of discussion. The method deployed for choosing which data to monitor was simply to be alert, listening to radio stations, reading newspapers, and watching television reports and noting down as much of the dialogue as possible. Directly approaching members of the public for their opinions would have been too close to the GT work but looking at a limited review of social media comments linked to the most prominent news sources was helpful in gauging the public mood generally.

Some of the dialogues collected for these works were set aside for use as secondary data for the GT study. There is an important reason why they could not be considered as primary data and this is because they were not collected alongside observations of subjects in their everyday lives. For this, time travel back to 1976 and 2006 would have been necessary. Instead, some of the little asides mentioned by the oral history subjects where they compared what they do now to what they did then, were separated out and added to the expanding resource of GT data.

In the next chapter the results of a survey of households in Royal Tunbridge Wells, Barnstaple, and Norwich are explored. The survey was undertaken between June and August 2011, and focused on the exceptionally dry spring of that year. The data collected goes some way to describing the thoughts and

actions of water users in a hydrological drought situation prior to it becoming a national point of discussion and between six and eight months before the socio-economic phase of the drought began to impact on the day-to-day routines of individual household members.

## Chapter Five

### **Water Use Questionnaires & Focus Groups**

#### 5.1 Introduction

Looking back on historical droughts is one way of establishing information about public behaviours when water resources are scarce. The historical timelines, incidents, and media responses reported in the previous chapter are a legitimate basis for generalisation on human behaviour. This chapter introduces the results of a baseline data collection questionnaire delivered to households, in Royal Tunbridge Wells, Kent, between 13<sup>th</sup> and 18<sup>th</sup> June 2011, in Norwich, Norfolk, between 25<sup>th</sup> and 29<sup>th</sup> July, 2011 and in Barnstaple, Devon, between 8<sup>th</sup> and 12<sup>th</sup> August, 2011. Additionally the results of the Royal Tunbridge Wells focus group activities are described. In the first section, details of how the Royal Tunbridge Wells questionnaire was devised and the method by which it was distributed, collected, and collated, are described in detail. An analysis of the results is also presented. Section 5.3 briefly describes the focus group activity that accompanied the questionnaire delivery. There follows, in section 5.4 the introduction of two further questionnaire samples, and details of their development, and basic analysis. In section 5.5 the results of all three questionnaires are brought together in an extended analysis and discussion relating to the research questions.

It is important at this stage to remind the reader that this thesis is not the product of a mixed method study viewed from a grounded theory approach. The separately researched and devised Classic Grounded Theory (presented in chapter seven) was developed over a considerable period of time during which, the author followed Glaser's prescription for pacing projects as a method of alleviating the depression one can suffer through the development of a theory, and distracting the researcher to a point where analysis can be carried out preconsciously in the back of one's mind so-to-speak, without at any time feeling the need to force ideas and opinions onto it. One of the key differences therefore between GT and the historical methods outlined in chapter four is that it is perfectly acceptable to make judgements on the behaviour of actors in the

histories of past droughts and to compare these judged behaviours against the existing models or segments, or the hydro-illogical cycle as the author has done. In contrast, the GT method ensures that a theory emerges from the data rather than being mapped onto it from other sources.

Classic GTs are generally not found in the Human Geographer's palette of methods to work with. This is understandable as they generally work well in a medical or business setting where the researcher can interview and observe a captive audience of patients/doctors/nurses on a ward or managers and their staff in an office or factory. It is harder to envisage how they work in a situation where the patient is the planet and the actors involved in the use of natural resources or who are affected by fluctuating weather, are the whole population. Finding a way into the lives of others in a way that would open up conversations and observations was hard for the author to imagine at first. The Classic GT developed for this thesis was difficult to achieve because it was hoped a theory relating to home water use would emerge from conversations with and observations of subjects in their homes. This required finding willing participants and the author was keen to be exposed to a large number of subjects. The question that arises when trying to find a start point for a Classic GT study of this nature, is how one might choose subjects to begin with and by choosing subjects is one already attempting to force the data? The use of a questionnaire in this instance therefore was primarily devised to initiate dialogue with members of the public with a clear intention of using the contact initiated through the delivery and collection of questionnaires as a method by which agreements could be made with individuals who were from the outset, unknown to the researcher, to interview them in their homes at a later date.

As described in chapter three (section 3.2) this programme of work was intended to stimulate new ideas and opinions on research in this area and to encourage movement away from traditional views of research methods and the often restrictive framings through which the results of data gathering exercises are viewed. Questionnaires have been used before in climate change perception studies that are designed to provide insight into the potential to manipulate demand management as an adaptation mechanism. However, the

usefulness of such studies is questionable when they provide no means of definitively matching stated behaviours with actual behaviours. In this case, the author sought to devise a simple questionnaire that would achieve two things. Firstly, to provide a mechanism to harvest opinions and ideas from home water users, as well as a modicum of basic water use data. Secondly, the questionnaire would bridge the gap between stated behaviours and actual behaviours by creating opportunities to talk to respondents directly and to observe their behaviours as part of the classic GT study. Both these objectives were not framed with a view to proving or disproving a specific hypothesis or substantiating an existing theory. The frameless approach made choosing which questions to ask a complex task. The resulting questions were therefore chosen from a selection inspired by the types of water saving advice currently given to households, and the assumptions implied by modern segmentation models that appear to split the population into those who care about climate change and are willing to mitigate and adapt and those who, for various reasons are assumed to be unreachable in this respect. The final choice was based on their appeal to a test audience in terms of ease of answering. The questions were designed to foster an open, two-way dialogue between the researcher and the subject. As such they are best analysed and reviewed in that context, as a primer for other research methods in this study rather than the primary source of data, and as a companion piece to chapters six and seven that follow.

The influence of local weather on the outcome of the test focus group discussion described in chapter three highlights the importance of including weather observations when considering these results. The Met Office account of the weather situation during these periods does not reflect the author's experience and so a personal account of the weather is very important in this instance. Royal Tunbridge Wells in June was unbearably hot and humid, with a heavy thunderstorm on the night of Wednesday 15<sup>th</sup> clearing the air somewhat. The following month in Norwich, the weather was warm and dry with a light sprinkling of misty rain on the morning of Thursday 28<sup>th</sup>. August in Barnstaple was cooler and wetter with at least two hours of heavy rain on each day.

### 5.1.1 The Royal Tunbridge Wells Questionnaire

The Royal Tunbridge Wells questionnaire was developed in conjunction with the Transition Tunbridge Wells Food Group. A reciprocal arrangement to distribute and collect a short questionnaire and collate the data supplied by respondents, having already been agreed between the researcher and the group at an earlier meeting. The first section of the questionnaire was comprised of questions designed by the researcher on behalf of the group, who were interested to get an idea of the types and quantities of fruit, vegetable and salad crops that were being grown in urban gardens in the area. The purpose of this questioning was to help the Food Group to decide whether there was an opportunity to organise regular food exchange events that growers could attend, to share their surpluses. As the answers to these questions were not directly related to the research questions, the results and analysis appertaining to these questions have been omitted from this chapter. However, they can be located in Appendix D. together with a copy of the complete questionnaire.

The main purpose for agreeing to do this work, was to utilise the questionnaire as a mechanism by which to get to know the area and possibly to recruit householders to the GT study. In order to achieve this, the questionnaire was divided into two sections. The first being about growing food at home, how much was grown, and what impact the dry weather was having on this activity. The second section, contained questions relating to the recent dry weather, respondents' opinions on its cause, and their efforts to reduce their household water use to avoid a socio-economic drought. There were nine questions devoted to this work. Three questions required yes or no answers, two provided a choice of answers for the respondent to select by ticking boxes, three questions were open questions and provided space for more detailed written answers, and one required a numerical answer. At the end of the questionnaire there was a section where respondents could elect to provide their contact details and sign to say they were willing to be interviewed at a later date. There was a deliberate intention to keep the questionnaire short, so as not to cover more than two sides of an A4 sheet of paper, and to avoid asking for personal

data such as age and gender, as it was felt this might reduce the number of respondents willing to participate.

### 5.1.2 Questionnaire Distribution and Collection

The detail of each question will be explored in turn below but initially it is worth discussing the method used for distribution and collection of the questionnaires. Attending to the triple aims of recruiting subjects for the GT study, collecting some baseline quantitative data about households in an emerging drought situation, and ensuring that the Transition Towns group were able to benefit from finding out more about people in the town who might be interested in attending fruit and vegetable exchange events made the process of development and distribution relatively unsystematic. Hand delivery was considered the most appropriate method of distribution in order to get to know the area. As it would certainly not be possible to deliver questionnaires to every household in the town, a method of drawing information from a suitably representative sample of the population was sought. After a considerable amount of thought, the availability of the online aerial mapping tool, Google Earth, became key to the sampling technique. Having located Royal Tunbridge Wells using this facility, it was possible to zoom into parts of the town and identify different types of housing. The range of housing types included large detached, semi-detached, and terraced properties, blocks of flats, maisonettes, and sheltered living complexes of small bungalows. It was possible to use this facility to zoom in and look at the size and types of gardens with each property, and to locate areas where it was likely that households would have the opportunity to grow some produce at home. From this virtual investigation of the town, circular walking routes covering the North, South, East, West, and central areas of the town were defined. These routes would enable the author to deliver questionnaires to samples of each type of housing, with the exception of flats without gardens for obvious reasons. The choice of routes was also influenced by the local knowledge of the Food Group members who identified the areas that they considered to be mainly populated by specific socio-economic groups, ranging from lower to higher. This helped the researcher to spread the questionnaire delivery across these groups, without having to collect socio-

economic data such as levels of earnings, employment, and educational attainment. Pre-planning circular routes eliminated doubling back and kept the distance covered on foot to a manageable level. The start point for each 'round' could be reached by public transport, or on foot from the researcher's lodgings. The nature of the sampling was determined by the visual appearance of properties. Properties that looked to be empty, or did not have a cultivated garden were excluded, along with properties displaying signs such as "beware of the dog" or "no cold callers" or "no unsolicited mail". To avoid being chased or bitten by a dog or generally annoying or upsetting individuals who clearly did not welcome unsolicited mail or unexpected visitors was considered important. Properties where the gardens were clearly tended were included and properties where there was evidence of vegetable or fruit growing were specifically targeted. The most obvious indicators being the tops of bean canes, fruit trees, and glasshouses rising above fences, and tomato plants in grow bags, often in south-facing porches.

It would have been possible to send a large number of questionnaires to a measured random sample of properties by using the mapping activity to highlight the areas to sample and then using planning maps showing numbered properties that could be selected from, by use of a random number table. However, this may have excluded a lot of properties with productive gardens, which was one of the primary targets for the work from the perspective of the food group. Also, without an attractive incentive on offer the author was concerned that the response rate would be low. A postal questionnaire could have been much longer and more carefully designed but the author was mindful not to collect too much information deliberately but to open up opportunities for dialogues on any aspect of water use. Too many questions would place respondents out of bounds to the GT research as they were quite likely to introduce a mental bias; the respondent forming an opinion of the motive of the research that would sustain a particular line of discussion that would be too narrow for GT.

Despite the less than scientific approach to the questionnaire, a great deal of care and attention was given to maximising the return rate. Each questionnaire

was folded in half to A5 size and placed in a re-sealable plastic bag of reasonable quality. In this case sandwich bags purchased from a major supermarket were used. The thickness of the plastic added strength to the package, making it easier to post and should it have rained, ensured the questionnaire would remain dry. It also made the questionnaire stand out amongst other items of mail such as advertising flyers and free newspapers. The researcher considered that knowing that the questionnaire was going to be collected by hand would encourage respondents to answer quickly. The questionnaire addressed the respondent directly:

*Dear Householder,*

*I am a PhD student at the University of Exeter, working with Transition Tunbridge Wells Food Group, to find out how many households grow their own food, the methods they use, and the types of food they grow. It would be really helpful if you could answer the questions on both sides of this sheet. It will only take a couple of minutes. I will call again tomorrow to collect your completed questionnaire. If you are not going to be at home, please leave it on your doorstep in the plastic bag provided.*

*Thank you*

Hand delivering questionnaires is a time consuming process and the deliverer needs to be fit enough to walk long distances. The folded and bagged questionnaires were carried in a lightweight cloth shopping bag that could be held on one wrist, enabling the distributor to reach in, pick up a questionnaire, and post it through the letter box, without having to put the bag down. As well as carrying the bag on her left wrist, the author also carried a small notebook with a pencil tied to it, in the same hand. The number of each property where a questionnaire was deposited was noted so that the delivery route could be re-traced the next day in order to pick up the completed questionnaires. On the first day, questionnaires were distributed over a period of four hours. On the second and third days, the researcher's time was split evenly between collecting questionnaires delivered the day before and delivering a fresh batch of questionnaires in another area. The final half-day was reserved for collection

only. Including walking to start points the researcher walked between nine and twelve miles each day.

In total 320 questionnaires were delivered and 133 were returned (42%). However, 27 of the returned questionnaires were not completed. Most of the returned questionnaires had been left outside as requested. At properties where there was no evidence of a questionnaire being left outside, the researcher knocked on the door. A surprising number of householders answered and handed over completed questionnaires, and at the same time were willing to discuss the questions. In one case the respondent had waited in to give her answers verbally. She explained that she was Russian and although she had been able to read the questions, she did not feel she would be able to answer well in English, so she preferred to explain in person. One householder said he had not had time to complete the questionnaire and filled it in on the doorstep. As the author had put her mobile telephone number on the front of the questionnaire, several respondents telephoned to say they had left the questionnaire out as requested and two asked specifically to arrange times to be interviewed because they felt they had some very useful observations to make.

Several respondents commented on their questionnaires that they did not grow food in their gardens so they did not think the questionnaire was for them. Having deliberately chosen properties where there was evidence of food growing the author concluded that perhaps having fruit trees in one's garden was not considered a form of food production. These planned and unplanned encounters with respondents provided an unexpectedly rich source of data to the GT study and enabled the researcher to learn a great deal about the local people and their water habits, particularly in relation to gardening. Many respondents offered tours of their gardens and inspections of water collecting arrangements, hosepipes, and watering cans. Householders also talked about their water habits ranging from detailed discussions on bathing to the frequency of power washing patios and driveways, when and if cars were washed, and how often toilets were flushed. They were all extremely keen to contribute and also to recruit friends and neighbours into conversations. It would not have been

possible to collect all of this data in a questionnaire, as it would have required hundreds of complex questions. Although this is what makes GT attractive to the author - the opportunity to keep on asking questions, until there are no more questions to ask – there is merit in exploring whether questionnaires are of use in this type of research.

### 5.1.3 Personal Safety

Knocking on the doors of strangers and conducting un-planned interviews exposes the researcher to an element of personal risk. For the benefit of any readers who might consider attempting a similar method of data collection it is appropriate to briefly describe the safety precautions taken. Firstly it is most important to operate a buddy system with someone who is monitoring your movements. In this case a member of the Food Group acted as primary buddy. The use of a mobile phone with a camera was very important. At the outset of each walking route the author would text the location, time, direction of travel, and a photograph of herself to the buddy. On entering each new road, another text message would be sent to indicate movement through the pre-agreed route. The buddy was instructed to call the police if regular contact was not made. The buddy would have useful information regarding last known whereabouts and an up-to-date photograph should anything happen. Stopping to talk to a respondent necessitated a catch-up message to explain the possible delay and to give details of the address. At the end of the discussion another text message was sent to signal the author's safe return to the delivery/collection route. The author's landlady also very kindly called periodically to check that everything was proceeding according to the plan. The author also followed a protocol when knocking on doors; firstly, to stand well back from the door after knocking, to avoid being grabbed and pulled inside. Secondly, to maintain dialogue on the doorstep if possible and finally, to decline any offers to go inside a person's home if there was any sense of danger. It is unlikely that any of these things will protect a person from someone who deliberately sets out to cause someone harm, but they are a reasonable first line of defense against opportunistic circumstances.

## 5.2 Analysis and Results

In this section each question will be discussed in the order it appeared on the questionnaire. Without a specific framework to work within, there is no need to structure the analysis to fit. Readers are invited to embark on a journey through the questions as if they were a respondent. The results are presented as given by respondents and also in comparison to two obvious anchor questions relating to water metering and perceived affordability. It is important to remember at this point that the author hoped to recruit respondents to be interviewed at a later date and fully intended to interpret the answers to these questions further by returning to them and discussing them in more detail with interview subjects, should the discussion move in a direction that led appropriately to a review of the questionnaire. The results of these interviews have been incorporated into the next chapter and therefore this chapter details an analysis of properline data, based on the first answers from respondents only. The raw data from the questionnaire was entered onto an Excel spreadsheet and subjected to basic analysis. The timing of this analysis was important. Answers to questions four through nine were held back for analysis until after the grounded theory was completed. This was to ensure that the author would not look to find specific behaviours to explain the questionnaire results. Written answers to questions ten through twelve were used as secondary data during coding and analysis of the GT study material. All percentages shown have been rounded up or down to the nearest whole number.

**Question 4. Do you think the particularly dry weather in March and April can be attributed to: Global Warming / Natural Variability / Climate Change? (please tick all that apply).**

This question was asked because the author was interested to consider how people perceive the relationship between human induced climate change and natural variability, and also to gauge whether respondents understood the difference between global warming, and climate change. It was assumed that anyone selecting 'natural variation' as the only response would be unlikely to believe in the warming effect of carbon emissions from human activity, although

this cannot be proven from these results alone. It was also important to illustrate how useful a question such as this is for understanding perceptions of climate in order to attend to the basic research questions.

The total number of respondents to this question was 104.

- Of the 75 respondents who selected only one answer, eight (10%) chose Global Warming, 15 (20%) chose Climate Change, and 52 (70%) chose Natural Variation.
- Seven respondents attributed the warm spring to a combination of global warming and climate change.
- Six respondents chose both natural variation and climate change.
- Two respondents selected both global warming and natural variation.
- Ten respondents, (10% of total respondents) selected all three answers.

There is no right answer to this question because it is not possible to attribute any specific weather event to anything other than climate variability. However, those who ticked all three possible answers are presumed to have clearly understood that all these factors can have an impact on local weather phenomenon. Of course it is not possible to assume that all 74 responses were an indicator of a level of public perception of climate. They may simply have heard or read of these phrases in the context of weather.

**Question 5. Has the dry spring had an impact on your ability to grow your own food? If yes, please describe the impact in the box below.**

This free box question was targeted specifically at the 63 home growers who provided answers to the Food Group questions. On reflection, asking all respondents to write only on the impact that the dry spring had had, could have allowed many people who were growing food but had not felt the impact of the dry spring to be mistaken for respondents who were not growing food. However, of the 106 respondents, 55 answered the question so it is probably acceptable to assume that all these respondents were food growers and possibly, other growers that did not respond, simply felt no noticeable impact on their crops and therefore did not consider the question to be relevant. Of those who answered;

- 20 respondents wrote in the free box to say that the dry spring had not had an impact on their food growing activities.
- 24 respondents stated that the dry spring had had an impact on their food growing activities.
- Four stated they had not been affected because they had just increased the amount of watering they did in the garden.
- Seven respondents suggested that it was too soon to say.

### **Question 6. How many water butts do you have in your garden?**

This question relates directly to waterwise messaging and was designed as a measure of gardeners' interest limiting their potable water use and making provision for dry spells by incorporating water butts into their gardens. An average water butt holds approximately 140 litres. The Royal Horticultural Society suggests that to maintain watering duties in a 200 square metre garden throughout a six-week summer drought one would need 180 water butts (RHS, 2004).

- 25 households (24%) did not have a water butt
- 17 households (16%) declined to answer this question. If we assume this was because they did not have a water butt then the total number of households without water butts was 42 (40%)
- 38 households (36%) had one water butt installed in their garden
- 16 households (15%) had two water butts
- 6 households (6%) had three water butts
- One household had four, one household had five, and two households had six water butts (4% - four or more).

### **Q7. How do you water your garden? Tick all that apply**

This question was designed to assess household resilience to drought conditions and resulting hosepipe bans. The cumulative totals of choices selected is shown below:

- |                                   |  |
|-----------------------------------|--|
| • Watering can (mains water) – 68 | • Watering can (stored rainwater) - 62 |
| • Hosepipe (mains water) – 49     | • Hosepipe (stored rainwater) - 4      |

- Irrigation system (mains water) – 1
- Irrigation system (stored rainwater) - 0
- Rely on rainfall only - 11

Other methods mentioned by respondents:

Saving washing up water – 1

Saving cold water whilst waiting for it to run hot (mains water) - 1

Sprinkler (mains water) - 1

- 56 respondents (53%) selected at least two methods of watering their gardens.
- 27 respondents (25%) were using just one method. Only one of these – from a metered household - relied purely on rainfall and nothing else. Ten respondents selected ‘rainfall only’ alongside other choices, even though they did not need to. Of the 27 single option respondents, 22 reported using a watering can. Half of these filled the can with stored rainwater, presumably from a water butt and half used potable or ‘mains’ water from the tap. Only four respondents were using a hosepipe but only two of the hosepipe users were drawing mains water.
- 17 respondents (16%) used three watering methods (two of these had selected the rainfall only option as well as two other methods). Ten respondents were using a combination of mains water in a can or via a hosepipe and stored rainwater in a can. This is the type of use one would expect of an experienced gardener with a well-stocked garden.
- Two respondents used four methods of watering, adding sprinklers and washing up water to their list of watering methods.
- Four respondents declined to answer.

### **Question 8. Do you have a water meter?**

Of the 101 respondents who answered this question, 59 (58%) were not metered and 42 (42%) were. The number of metered customers was slightly above the level of 38% required by OFWAT (OFWAT 2011) and broadly reflects the percentage of metered customers in the area (OFWAT 2007). Southern Water aim to have 92% of households fitted with water meters by 2015

(Southern Water, 2011). Question seven was designed to indicate how households would be affected during a hosepipe ban. The responses were combined with answers to question eight to see whether metered customers were more or less likely to utilise potable water for the garden.

**Table 12.** Watering Methods Used in Metered and Unmetered Households

<b>Watering Method</b>	<b>Number of Metered Customers per method (% of total metered)</b>	<b>Number of Unmetered Customers per method (% of total unmetered)</b>
Watering Can (potable)	23 (55%)	44 (73%)
Watering Can (rainwater)	28 (67%)	33 (55%)
Hosepipe (potable)	24 (57%)	26 (43%)
Hosepipe (rainwater)	2 (5%)	2 (3%)
Rainfall	2 (5%)	9 (15%)
Irrigation system (potable)	0 (0%)	1 (2%)
Irrigation system (rainwater)	0 (0%)	0 (0%)

**Q9. Do you think water is expensive?**

As has already been explored in the drought histories in chapter four, the price of water very often becomes a contentious issue when supplies are scarce. It is also generally agreed that metered customers use between 10 and 15% less water than unmetered customers and that this is due to their increased awareness of the fact that they are paying for the water they use (Herrington cited in OFWAT, 2011, p8). Eight respondents declined to answer this question but of those who did, 40 (41%) said they did not consider water to be expensive and 58 (59%) did consider it to be. The distribution of metered and unmetered customers by category is shown below:

**Table 13.** Opinions on the Cost of Water in Metered and Unmetered Households

Category	Metered customers	Unmetered customers
Yes, water is expensive	20	37
No, water is not expensive	20	21

**Q10. Do you think droughts will be more frequent in the future?**

This question was chosen to attempt to determine respondents' consideration of the risk of future drought events increasing in number in line with climate predictions.

- 35 (33%) did not anticipate an increased frequency of droughts.
- 53 (50%) did expect a higher frequency of drought episodes in future years.
- 18 (17%) respondents declined to answer this question.

**Q11. If you answered yes to question 10 above, why you think there will be more droughts in future years than in the past?**

Only 54% of those responding to question ten answered this question. Details of the 48 responses are shown below:

**Table 14.** Number of Respondents Attributing Specific Causes of Dry Weather

Suspected cause of increase in future drought episodes	Respondents
Climate change	15
Global warming	11
Rising demand for water and population increase	9
Natural trends	6
Natural trends and climate change	3
Mismanagement by water companies	3
Seasonal variation – early spring and summer	1

**Q 12. Do you do anything in particular to limit your household's use of water?**

94 respondents chose to answer this question. Ten of these admitted that they made no effort to save water. Eight of the ten were from unmetered households and only two were from metered households. The remaining 84 identified 27 specific measures they had taken to limit their household's water use. The answers are ranked by frequency in Table 15. Some respondents described more than one measure.

**Table 15.** Water Saving Activities in Respondent Households

<b>Activity</b>	<b>Respondents</b>
Shower instead of a bath	26
Never leave tap running when brushing teeth	10
Nothing	10
Waste water from washing up and/or baths on garden	7
Make sure I only do full loads of washing	6
Only boil the water I need in the kettle	6
Low flush/dual flush toilets	5
Don't flush the toilet every time	5
Block/hippo in toilet cistern	4
Limit use of dishwasher	4
Wash up by hand	3
Make sure dishwasher is full each time	3
Use water from washing vegetables on garden	3
Use rainwater in garden	3
Economy cycle on washing machine	2
When showering, switch off whilst lathering up	2
Don't leave taps running	1
Don't use sprinkler on the garden	1
Use baby bath water to flush toilet	1
Avoid using dishwasher	1
Try not to use hosepipe	1
All-over wash at sink rather than bath	1

Share baths	1
Flow-limiter in shower	1
No car washing	1
Wash car with bucket rather than hosepipe	1
Use bath water to flush the toilet	1
Observe hosepipe bans	1

### 5.2.1 Interpretation

This questionnaire was considered by the author to be a successful method of collecting baseline data, regarding stated public opinions of climate change and their actions (if any) to save water, intentionally, for any reason; whether driven by general environmental concern, cost saving, or prompts to save water from their water company, as was the case during the period of questionnaire distribution and collection. This is what the Classic Grounded Theorist regards as ‘properline’ data and may differ from actual behaviour and opinions. It should be noted that the gradually developing drought had not been officially declared at the time of delivery and although water customers were being asked not to use hosepipes, there was no official ban in force. Having insight into typical properline responses that may arise whilst researching a Classic GT is immensely helpful. However, to avoid forcing ideas onto the data is was important not to analyse these data until after the GT study was completed. It would be very satisfying at that time to be able to see whether properline responses had been correctly identified through the use of constant comparison and observation whereas to look too closely at this during the study may have resulted in forcing inappropriate ideas onto the data.

70% of respondents indicated that they believed the unusually dry spring to be caused by natural climate variation and not climate change or global warming, with only one tenth of this number opting to indicate both global warming and climate change as the cause. 10% of respondents chose to indicate that all three could be responsible for the dry spring. This may be because they had an understanding of the unpredictable nature of climate, and the predicted climate impacts associated with increasing global temperature. Or it may be that they

wanted to answer well, and when presented with a question without an obvious 'right' answer, they selected all three to maximise their chances of being connected with the most appropriate answer. Or, mindful of public scepticism, they may have not wanted to endorse one answer over another. Those clearly not comfortable with this question declined to answer, however, only four respondents chose to do this. As this was a very small sample of the population of Royal Tunbridge Wells, it is not appropriate to infer from these results that most individuals, when asked, are more inclined to ignore the possibility that global warming is causing the climate to change. But it is fair to say that probably around three quarters of the subjects in this sample did not believe that climate change was causing unusual and extreme variations in the English weather at that time.

These results conflict somewhat with the answers to questions 10 and 11, where half of all respondents indicated that they expected there to be a higher frequency of drought events in the future. Subjects were extremely reluctant to state what they expected to be the cause of increases in droughts but just over half of those responding to question ten indicated that climate change or global warming would be the cause. Only six respondents were prepared to state that natural trends in climate would be responsible. Nine respondents thought that rising water demand and population increase would result in drought (presumably the socio-economic kind).

If the survey, though small, based on a mix of housing styles and locations, is a reasonable indicator of households in Royal Tunbridge Wells (and this is debatable due to the potential bias in favouring gardening households), considering the level of population pressure and low rainfall, households do not appear to have sufficient rainwater storage to maintain gardens without resorting to using potable water when there is a shortage of rain. 40% of households did not have any water butts for the garden and 38% had just one. 10% of the sample said they had three or more water butts. This is consistent with the findings of question seven, where respondents indicated a range of watering methods that were used in their gardens, the most popular being a watering can filled with either mains water or stored water from a water butt.

46% of respondents still used a hosepipe connected to the mains supply as one of their watering options. However, it is important to note that the questionnaire did not ask about frequency of use for any of the watering options. This is both a fault of the questionnaire design and necessitated by the author's desire to make the questionnaire short and easy to answer. It would have been much better to perhaps ask only questions about garden watering but narrowing to one area of interest would limit the collection of properline answers in other areas. Nevertheless, half a dozen questions on garden watering including duration and time of year would have provided a comprehensive and useful profile of a water-based activity.

The presence of water meters did not necessarily diminish interest in watering the garden with potable water, with 55% of metered households filling their watering cans from the tap, as well as the water butt where one was available. 57% of metered households were still using a mains-fed hosepipe. 73% of unmetered households used mains water to fill their watering cans, although 66% of unmetered households had at least one water butt. Levels of alternative watering methods in unmetered households were similar to metered households. Surprisingly, 15% of unmetered households added rainfall to their list of garden watering methods, whereas only 5% of metered households mentioned rainfall as a key component. It may be too cynical to suggest that perhaps this was a mindful gesture from unmetered customers, eager to re-balance opinions on the levels of water use by customers who pay a fixed sum for water annually, no matter how much they use.

It is not clear from this survey if the price of water has a direct impact on how water is used, and whether using stored rainwater is part of efforts to reduce costs, environmental impact, or neither of these. Metered customers were evenly split between believing water is, or is not, an expensive natural commodity. Unmetered customers were more likely to say that they thought that water was expensive. The questionnaire did not qualify whether the person answering the questionnaire was directly responsible for paying the water bills (another mistake but also another question), and so this may also have had a bearing on the opinions of the respondents. 89% of respondents to question

twelve claimed to take action to limit water use in the home, the most popular action being to shower instead of having a bath. Ten respondents were clear that they made no effort to save water in the home and the majority of these were from unmetered households. Some of the water saving efforts suggested were more than likely water wasting, such as washing up by hand instead of using the dishwasher. The number of water saving activities per respondent was quite low in comparison to the long lists of actions recommended by water companies.

The questionnaire proved highly effective in recruiting 14 subjects to be interviewed as part of the GT study. Alongside booked interviews it also provided a wealth of opportunities – 13 in total - to discuss water practices with subjects in a less formal setting (usually the doorstep and garden area). These discussions helped to complete the picture of garden and home water use much more accurately.

### 5.3 Royal Tunbridge Wells Focus Group

The success of the questionnaire helped to sweeten the bitter pill of the almost complete failure of the focus groups. The reciprocal arrangement having been agreed with the food group was for the author to collect data on fruit and vegetable growing in gardens and to recruit householders who were interested in attending events where surpluses of food could be swapped. In return, the group would attend two focus group meetings where the topic of discussion would be home water use. At an initial meeting with the group, the author was able to collect their recollections of past drought events and opinions on water management. This was a very lengthy and productive discussion, which was used to develop the 2004 – 2006 drought history, and provided some direction for the GT study. At the end of the evening, all eleven members of the group agreed to attend the two carefully planned focus groups. Their contact details and future availability were collected and invitation letters were sent out in advance of the author's return to the area to conduct the survey. Unfortunately, during the intervening period, the group suffered a setback that was described to the author as a definitive split of the group caused by one member using

*“inappropriate behaviour”*. This resulted in only three people turning up to the first of two focus group sessions. The obvious problem with this is that a focus group consisting of only three people is not really a focus group at all. The large room, the author had equipped with writing materials, a tea and coffee station with a selection of cakes, flip charts, and break-out spaces, highlighted the diminutive nature of the trio. Whilst they were happy to engage in the process of discussing in detail their use of water in the home, it did not work with such a small number. Apologetic group members rallied the next day offering one-to-one interviews instead, and so a further four interviewees were added to the GT study, and the focus group idea was abandoned.

The unfortunate and unplanned complication that the author could not have foreseen in advance made her question whether it was worth cultivating groups in the other chosen geographical areas. The questionnaire was so successful in recruiting interview subjects and as will be shown in the next chapter, the interviews were so fruitful, that the author then decided, that with no agreed plan with a willing group in East Anglia, that the questionnaire approach could be re-deployed there and also in North Devon, and further focus group activity could be avoided altogether. In short, the reciprocal arrangement with the food group had helped the author to establish conversations with individuals and to gain confidence in her own abilities to locate and recruit interviewees. It had also provided a useful safeguarding buddy system. However, the extra effort in collecting data and planting a community garden for the group was an added burden that probably did not need to have taken place, as the full group were not able to reciprocate with attendance at the focus groups.

#### 5.4 Norwich, Norfolk and Barnstaple, North Devon

The successful completion of the Royal Tunbridge Wells questionnaire and close scrutiny of the overall research strategy prompted the researcher to consider carefully what could be gained in the other study areas by repeating the exercise in full. With no identified group to work with in East Anglia, the decision was made to update the questionnaire, removing the food group

questions and replacing them with other more useful water-related questions, and to distribute the revised questionnaire in two locations; the City of Norwich in Norfolk, and the Town of Barnstaple in North Devon. This decision is a good example of the process of GT development where new ideas prompted by work already carried out can be incorporated into new attempts to collect data. By the time the first field visit to Kent had been completed it was clear from the GT study that location of subjects might be important and as the original research brief anticipated comparisons between different locations across the northwest – southeast rainfall gradient and as the questionnaire was such a useful tool for recruiting subjects, it made perfect sense to go further with it, despite the questionnaire being of limited value in the context of GT, it was still a reliable recruitment tool. At the outset of the research, one hypothesis related to lasting memories of drought and for how long they might affect water users' habits. Having successfully collated the 1976 drought history for North Devon, it seemed appropriate to test this hypothesis there, and also in Norwich, where, rainfall is roughly half that of North Devon but hosepipe bans in the past have been far less frequent although using the GT method does not permit target questioning that is not directed by the data the author proceeded on the basis that something might come up that could be considered an indicator of influence of past events but equally, it might not. If this seems irrational the point to be made is the need for exposure. As previously stated, working in an area where the population of interest cannot be confined to a ward or office suggests that the primary goal of the researcher should be exposure to potential subjects and the questionnaire had proven its usefulness in achieving this even if it had not proven itself in other more traditional ways.

The amended Norfolk and Barnstaple questionnaire can be found in Appendix E. The key alteration to the questionnaire was the removal of questions one through three on the front of the sheet, which were replaced with questions designed to develop a more complete picture of the households surveyed. The initial address was also altered to reflect the fact that there was, by this time, a noticeable drought. To speed up collection times, respondents were asked to leave the questionnaire outside for collection. This would reduce the number of doorstep discussions, but without a dependable buddy, the author felt less

confident about using this method to gather data. Respondents were still asked to put themselves forward to be interviewed and the author anticipated an equally good response to this request as had been received in Royal Tunbridge Wells.

*Dear Householder,*

*I am a PhD student at the University of Exeter. I am interested in finding out whether the current drought is changing the way you complete some regular water-based tasks in and around the home. It would be really helpful if you could answer the questions on both sides of this sheet. It will only take a couple of minutes. **I will call again tomorrow to collect your completed questionnaire. Please leave it outside on your doorstep in the plastic bag provided.** (Please weight it down to stop it from blowing away.)*

*Thank you,*

*Rebecca Pearce*

#### 5.4.1 Analysis and Results

The results of the amended questionnaire are shown below with questions shown in the order in which they were asked. Where comparable, the Royal Tunbridge Wells data is also included. 320 questionnaires were each delivered to houses in Norwich, and Barnstaple, utilising the same method as previously described for Royal Tunbridge Wells. The number of completed questionnaires returned in Norwich was 114 (36%) and in Barnstaple, 103 (32%).

The questions as they appeared on the questionnaire are analysed below.

**Q 1. How many people are living in your household at present?**

**(please state number in the boxes provided)**

<b>Adults</b>	<b>Children</b>

Question one was asked in order to build up a picture of the range and size of households polled and to ensure that a reasonable spread of household

composition was sampled. The household composition of respondents in both locations are shown below:

**Table 16.** Household Composition – Barnstaple and Norwich samples

No of Adults & Children	Single Adult	Two Adults	3 - 4 Adults	One Adult, One – three children	Two Adults One - Two Children	Two Adults Tree – Five Children	Declined to answer
<b>Barnstaple</b>	21 (20%)	45 (44%)	9 (9%)	5 (5%)	16 (15%)	6 (6%)	1 (1%)
<b>Norwich</b>	25 (22%)	53 (47%)	9 (8%)	2 (4%)	19 (17%)	4 (3%)	2 (2%)

Roughly one quarter of households sampled in both locations were families. Around one fifth were single person households. In both towns, just over one half of the sampled properties comprised two or more adults. It is possible that some of the three and four adult households were families with children over the age of 18 but as the questionnaire did not ask for family details it is impossible to say if this is the case or not. According to the Office for National Statistics, 34% of all households in the UK are two-person households (Office for National Statistics, 2011). 44% of respondent households in Barnstaple and 47% of respondent households in Norfolk were two-person households. Although this is higher than the national average it may well be representative of the general population of the areas in which the survey was distributed.

**Q 2. From the list below, please indicate the number of water appliances you have in your household:**

This question was asked in order to gain a better understanding of plumbing arrangements inside respondents' homes.

- Across both geographical locations, 79% of respondents' households had just one main bathroom (indicated by the number of respondents with one bathroom sink).
- 44% of households also had at least one cloakroom with toilet and sink, in addition to a bathroom

- 95% of respondents that filled in the box for the number of baths in their home had at least one. However, 22 respondents declined to answer this question. It may be that these respondents also did not have baths and neglected to put a zero in the box. When adjusted to reflect the two respondents in Barnstaple that did not complete this section of the questionnaire, 86% of households had at least one bath and 14% did not have a bath.
- Likewise, with the shower question, 18 respondents declined to answer. Adjusted to reflect total non-respondents, 92% of households had at least one shower.
- By applying the same method to the dishwasher question, it would appear that only 39% of households had a dishwasher.
- In contrast, 97% of households had a washing machine.
- Perhaps unsurprisingly, the small numbers of households with between three and five bathrooms were among the largest families surveyed.
- Of the two households without kitchen sinks, one was a single occupancy property and the other housed two adults.
- Of the two households without a bathroom sink, a family of two adults and one child occupied one household and two adults occupied the other.

**Q3. Do you know how much water your household uses in a single day? (Indicate quantity in litres / cubic metres / gallons / or pints).**

This question was asked as there is a general opinion that very few people are aware of the extent of their water use. Across both geographical locations, 29 respondents declined to answer this question. Of the remaining respondents, 13 (7%) gave answers that may or may not have been accurate. Ten of these respondents were in Barnstaple and only three were in Norwich. Of the Barnstaple respondents, one answered by stating how much their water cost, per day. Three gave quarterly amounts in cubic metres, presumably taken from their water bills, and suggested that the author could work out the per day quantity. The rest gave answers either in litres, cubic metres or gallons. The equivalent quantities for twelve households are shown in the table below. The fact that 81% of respondents were happy to admit that they did not know how



**Table 18.** Water Consumption, Per Household, Per Day (respondent estimates)

	<b>Amount in litres per household, per day</b>	<b>Number of household members</b>
<b>Barnstaple</b>	77	2
	140	2
	100	2
	1,000	2
	1,700	2
	109	2
	87	1
	122	1
	45	1
<b>Norwich</b>	174	2
	150	3
	500	4

It is impossible to know how accurate these quantities are. To check one would need access to the metered customers' water bills and this was not possible. It would not be possible to get any accurate data from a non-metered household. In the GT study, subjects were encouraged to share their water bill information and their water meters were read for a period of time to get an accurate picture of their water use. A two-person household usage of 1,000 – 1,700 litres per day is extremely high. It could indicate an undetected underground leak, a misreading of the meter, or a miscalculation. If these quantities were correct, none are even close to the notional average, per person usage of 150 litres. Some of the quantities stated were clearly taken from household bills and so, if it is assumed that these figures more than likely reflect actual household usage per day then more insight into the individual respondent households' water practices would be needed to understand these results.

**Question 4. Do you think the particularly dry weather in March and April can be attributed to: Global Warming, Natural Variability, Climate Change? (please tick all that apply).**

The total number of respondents to this question in Norwich was 110 and in Barnstaple was 98.

- In Norwich, 85 respondents (77%) gave one answer. Of these respondents, 71 (84%) chose natural variation, 12 (14%) chose climate change, and two (2%) chose global warming.
- Of the Norwich respondents that gave two answers, ten (9% of question respondents) chose climate change and global warming, two (2% of question respondents) chose global warming and natural variation, and three (3% of question respondents) chose climate change and natural variation.
- Ten respondents from Norwich chose all three answers (9% of question respondents).
- In Barnstaple, 88 respondents (90%) gave one answer. Of these respondents, 67 (76%) chose natural variation, 16 (18%) chose climate change, and five (6%) chose global warming.
- Of the Barnstaple respondents that gave two answers, four respondents (4%) chose climate change and global warming, and two, (2%), chose climate change and natural variation.
- Four respondents from Barnstaple (4%) selected all three answers.

**Question 5. Has the dry spring had an impact on your ability to grow your own food? If yes, please describe the impact in the box below.**

Just as in Royal Tunbridge Wells, clearly not all respondents in the sample areas were active gardeners. 68 respondents from Barnstaple answered this question and 73 from Norwich.

- In Barnstaple, 51 respondents to this question (75%) said the dry weather had not had any effect. Seven respondents (10%) mentioned they had had to step up their watering activities, two of these mentioned the extra cost of topping up with mains water when water butts ran dry. Three respondents (4%) said most crops were ripening earlier. Two (3%) mentioned that it had been a good year for fruit but not so good for other crops. Four respondents (6%) said their vegetables were smaller or slow

to grow. One respondent (1%) suggested that the seasons appeared to be changing.

- In Norwich, respondents felt the impact of the dry weather more keenly. Only 28 of those responding to the question (38%) said they had not felt any impact at all. 19 (26%) said slow growth and low yields had been a significant problem. 21 respondents (29%) noted how much extra watering they had had to do but did not mention the cost. Three (4%) mentioned specifically that water butts had not filled as expected and so mains water was having to be used, at considerable expense. Two respondents (3%) thought the weather had improved their yields of fruit and brought the harvest earlier than other years.

**Question 6. How many water butts do you have in your garden?**

The response rate to this question was 101 in Norwich and 99 in Barnstaple. The table below shows the number of water butts per household. Figures from the Royal Tunbridge Wells questionnaire have been added for comparison.

**Table 19.** Number of Households (zero to eight water butts).

<b>Quantity</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<b>Norwich</b>	27	31	23	8	6	2	3	1	0
<b>B'staple</b>	30	27	20	13	5	1	2	0	1
<b>R.T.W</b>	25	38	16	6	1	1	2	0	0

**Q7. How do you water your garden? (Tick all that apply)**

Respondents were encouraged to identify all the methods they might use for watering their gardens and several combinations were possible. The choices from all three of the sample areas are shown in the Table 20.

- 38 respondents (33%) in Norwich were reliant on only one method of watering and 44 (42%) in Barnstaple (Royal Tunbridge Wells 54%).
- In Barnstaple, the most common single watering method was a watering can filled with rainwater (50% of single option respondents), followed by a watering can filled with mains water (25% of single option

respondents). 16% of respondents relying on one watering method left watering to nature and relied on rainfall only. 9% of respondents using only one watering option were using mains-fed hosepipes.

- In Norwich, the most common single watering method was also a watering can filled with rainwater (42% of single option respondents). Eight of the single option respondents (21%) relied on a watering can filled with mains water and another eight relied on rainfall only. Five, single option respondents (13%) used a hosepipe as their only method of watering and one respondent used a hosepipe fed with stored rainwater.

**Table 20.** Respondents' Watering Method Choices

<b>Watering Method</b>	<b>Norwich</b>	<b>B'stapse</b>	<b>R.T.W.</b>
Watering can (mains water)	64	40	68
Hosepipe (mains water)	60	25	49
Irrigation system (mains water)	2	3	1
Watering can (stored rainwater)	69	67	62
Hosepipe (stored rainwater)	5	4	4
Irrigation system (stored rainwater)	1	3	0
Rely on rainfall only	19	27	11

- In Norwich, 48 respondents selected at least two methods of watering their gardens and in Barnstaple, 52 selected two methods. Of the two methods used in Barnstaple, equally popular were, a combination of watering cans filled with rain water and tap water, (14 respondents) and a watering can filled with rainwater, and rainfall only (14 respondents), although as has been observed previously, there was no need for respondents to select the rainwater only option. Other combinations included; rainwater from a can and potable water from a hosepipe (10 respondents); watering can filled with tap water and hosepipe fed from the mains (7 respondents).
- In Norwich, 26 respondents were using three watering methods and in Barnstaple only six respondents were using three methods (Tunbridge Wells 13). Adjusted down to take into account the number of

respondents who chose rainfall only as one of their three options, three-method respondents in Norwich numbered 22, and in Barnstaple two. (Tunbridge Wells 12). The most popular three-option watering combination for all three geographical areas was a combination of rainwater from a can, potable water from a hosepipe and potable water from a can.

- Only a handful of respondents across all three samples were using four watering methods. Having adjusted down to account for respondents selecting rainfall only as one of their options, the number of four-method respondents was one in Norwich, one in Barnstaple, and two in Tunbridge wells. There were no five-method households.

Other watering methods described in the free box by respondents in Norwich, included the use of grey water such as that from washing up or showering and saving up the water that is run off while waiting for it to run either hot, or cold. Respondents in Barnstaple did not mention any alternative methods such as grey water usage.

The frequencies of watering methods used by respondents are shown below for each of the three sample areas in Table 21. There is a noticeable difference between the number of single choice respondents using rainwater from a can in Barnstaple in comparison to Norwich and Royal Tunbridge Wells, with over double the number in Barnstaple than the other two areas. A similarly stark difference is clear in comparing those choosing to use only potable water from a can and hosepipe which were more than twice in number in Norwich and Royal Tunbridge Wells than in Barnstaple. This may be associated with the higher rainfall in North Devon making it more likely that a household can collect reasonably large quantities of rainwater providing storage facilities are available. It may also be an indicator of the difference in price of water, it being much higher in North Devon than the other two locations (OFWAT 2011 *b*).

**Table 21.** Respondents’ Selections of One/Two/Three/Four Combination Watering Methods: Number of Respondents Choosing each Selection.

<b>Watering Method</b>	<b>Norwich</b>	<b>B’staple</b>	<b>R.T.W</b>
Rainwater from a can	17	36	14
Rainwater from a can + potable water from a can	12	15	17
Potable water from a can and from a hosepipe	18	8	19
Potable water from a can	11	13	13
Rainwater from a can + potable water from a hosepipe	14	10	15
Rainwater from a can + potable water from a can and a hosepipe	20	2	12
Rely on rainfall only	8	7	1
Potable water from a hosepipe	6	4	2
Stored rainwater from a hosepipe	2		2
Irrigation system – stored rainwater	0	2	1
Rainwater from a can and from a hosepipe	3	0	0
Irrigation system – stored rainwater + rainwater from a hosepipe	0	1	0
Irrigation – potable water + rainwater from a can + potable water from a hosepipe	1	0	0
Irrigation – stored water + rainwater from a can + potable water from a can	1	0	0
Rainwater from a can and from a hosepipe + potable water from a hosepipe and a can	1	0	1
Rainwater from a can + irrigation system using potable water + potable water from a hosepipe and a can	0	0	1
Irrigation system using rainwater + rainwater from a can + irrigation system using potable water + potable water from a can	0	1	0

**Question 8. Do you have a water meter?**

80% of respondents in Barnstaple had a water meter. According to OFWAT (2011b) 70% of domestic customers in the South West Water area (which

includes Barnstaple) have a meter and so this is slightly higher than the average for the South West and certainly the highest across the areas sampled for this research. 60% of respondent households in Norwich were metered, which is representative of metering rates in the Anglian Water area (OFWAT 2006). (The proportion of metered properties surveyed in Royal Tunbridge Wells was 42%).

Question seven was designed to indicate how households would be affected during a hosepipe ban. The responses were combined with answers to question eight to see whether metered customers were more or less likely to utilize potable water for the garden.

**Table 22.** Watering Method Choices by Metered and Unmetered Respondent Households

Watering Method	Number of Metered Customers			Number of Unmetered Customers		
	Norwich	B'stapse	RTW	Norwich	B'stapse	RTW
Watering Can (mains water)	35	27	23	26	13	44
Watering Can (rain water)	40	55	28	26	12	33
Hosepipe (mains water)	33	17	24	26	8	25
Hosepipe (rain water)	1	4	2	3	0	0
Rainfall Only	4	7		2	0	2
Irrigation system (mains water)	0	2	0	2	1	0
Irrigation system (rainwater)	0	3	0	0	0	0

It is perhaps understandable that in Barnstaple, the wettest sample area, the highest rate of households that were prepared to rely on rainfall only was recorded. This was still a small proportion of the total respondents and there is

no indication of the type or style of garden in each case. It is more surprising that any respondents in Norwich were prepared to leave garden watering to nature as this was the driest area surveyed.

The most notable trend in this data is that metered customers in Barnstaple and Norwich were more likely to store rainwater and apply it using a watering can. It is quite likely that the cost of potable water in these areas was a contributing factor but without asking respondents whether they were deliberately trying to save money by doing this, it is not possible to state that this is definitely the case. However, respondents were asked if they thought water was expensive.

**Q9. Do you think water is expensive?**

77% of metered respondents in Barnstaple considered water to be expensive and overall, 82% of all respondents in Barnstaple, whether metered or unmetered, considered water to be expensive. This is to be expected as South West Water customers consistently pay the highest amount for water in England (OFWAT 2011 *b*). In 2013 the price per cubic metre for water at the three sample sites is:

Norwich - £1.52

Tunbridge Wells - £1.69

Barnstaple £2.05

**Table 23.** Cost of Water Opinions (all sample locations)

Category	Number of metered customers			Number of unmetered customers		
	Norwich	B'staple	RTW	Norwich	B'staple	RTW
Yes	24	63	21	25	20	36
No	37	18	18	17	0	22

**Q10. Do you think droughts will be more frequent in the future?**

**Table 24.** Anticipated Frequency of Drought in the Future

	<b>Yes</b>	<b>No</b>	<b>Declined to answer</b>
<b>Norwich</b>	47	44	23
<b>Barnstaple</b>	32	48	23
<b>Tunbridge Wells</b>	53	35	16

The number of respondents that declined to answer this question, in each location, was relatively high (Norwich 20%, Barnstaple 22%, Royal Tunbridge Wells 15%). It would appear that not all respondents felt confident in making predictions. However, the survey was not specific in terms of near or distant future. This could possibly have assisted some to answer and dissuaded others from making judgements. Perhaps unsurprisingly, respondents from Barnstaple, the area with twice as much rainfall as the other sample areas, were less likely to anticipate an increase in the number of drought episodes in the future.

**Q11. If you answered yes to question 10 above, why do you think there will be more droughts in future years than in the past?**

Only a small number of respondents felt confident enough to answer this question. The results for all three, sample locations, are shown below in Table 25. It is interesting that respondents in Barnstaple did not use the term global warming in their answers, citing only climate change (which taken purely as an expression does not have to be linked to a warming of the planet due to increased carbon emissions). Climate change / global warming was by a considerable margin the top answer to this question. Few respondents were prepared to suggest that wasteful practices would be a problem.

**Table 25.** Respondents' Predictions of Causes of Future Drought Episodes

<b>Suspected cause</b>	<b>B'stapse</b>	<b>Norwich</b>	<b>R.T.W</b>
Climate change	13	17	15
Global warming		8	11
Rising demand for water and population increase	8	6	9
Mismanagement by water companies	1	1	3
Seasonal variation – early spring and summer	1	8	1
Natural trends	1		6
People being wasteful	1	3	
Natural trends and climate change			3
Lower rainfall generally (no specific cause)	3		
Proliferation of hard landscaping		3	
Increases in summer visitors	1		
Deforestation	1		
Not enough water available	1		

**Q 12. Please describe anything you normally do to limit your household's use of water.**

88 (85%) of the Barnstaple respondents and 99 (86%) of the Norwich respondents answered this question. Table 26 lists the variety of answers to this question and the number of respondents giving each answer. The results from Royal Tunbridge Wells have been added for comparison.

**Table 26.** Stated Year-Round Water Saving Activities

<b>Activity</b>	<b>Norwich</b>	<b>B'stapse</b>	<b>R.T.W.</b>
Shower instead of a bath	36	25	26
Don't flush the toilet every time	14	21	5
Never leave tap running when brushing teeth	16	11	10
Waste water from washing up and/or baths on garden	12	8	7
Make sure I only do full loads of washing	8	11	6
Low flush/dual flush toilets	11	7	5
Use rainwater in garden	13	7	3
Don't leave taps running	11	8	1
Collect and store water from running tap while waiting for it to run hot/cold	11	7	
Nothing	2	2	10
Try not to use hosepipe	6	6	1
Limit use of dishwasher	5	3	5
Only boil the water I need in the kettle	3	3	6
Share baths	6	5	1
Block/hippo in toilet cistern	5	3	4
Only wash up once a day	6	3	
Restrict use of washing machine	7	1	
Make sure dishwasher is full each time	1	4	3
Economy cycle on washing machine	5		2
No car washing	4	1	1
Wash car with bucket rather than hosepipe	1	3	1
Limit showering / shorter showers	4	1	
Wash up by hand		1	3
Shallow baths	4		

<b>Activity</b>	<b>Norwich</b>	<b>B'stapse</b>	<b>R.T.W.</b>
Don't water garden or lawn	2	2	
Use water from washing vegetables on garden			3
When showering, switch off whilst lathering up			2
Fewer baths	1	1	
Use bath water to flush the toilet	1		1
Don't use sprinkler on the garden	1		1
Use baby bath water to flush toilet			1
All-over wash at sink rather than bath			1
Flow-limiter in shower			1
Observe hosepipe bans			1
Wash car with rainwater		1	
Hand wash clothes		1	
Flush toilet with rainwater		1	
<b>Total</b>	<b>196</b>	<b>147</b>	<b>111</b>

Norwich respondents were by far the keenest water savers, implementing almost twice as many water saving actions as respondents in the Royal Tunbridge Wells sample. Barnstaple respondents averaged 1.6 actions per respondent. The most frequently cited actions across the sum of the three sample areas are shown at the top of the table. Showering instead of bathing was the most popular. As will be shown in the next chapter, it is not necessarily the case that subjects mentioning these actions will be using less water. However, these responses provide a good indication of the types of properline answers that one would expect to hear when interviewing subjects on the topic of water saving.

**Q13. Please describe anything you are doing in addition to that described above in question 12, to limit your use of water during the drought.**

This question was not asked in Royal Tunbridge Wells as the drought had not been officially declared. Having already mentioned such a large number of

every-day water saving activities, many respondents in Barnstaple and Norwich found it difficult to suggest any more. The total number of respondents to this question was 51 for Barnstaple and 48 for Norwich. Of these respondents, 13 in Norwich did not believe there was any need to act and four of these were not convinced that there was a drought. Ten of the Barnstaple respondents did not intend to alter their existing water regimen. For those who did think they could do more, their answers in the main, were broadly similar to those in question 12. However, some more specific garden-related techniques such as mulching borders and spot watering emerged for the first time and notably, in Barnstaple, a quarter of respondents to the question said they would either not wash their car at all, or only wash it with a bucket of water and not a running hosepipe.

**Table 27.** Respondents' Additional Water-Saving Activities Prompted by Drought

<b>Action</b>	<b>Norwich</b>	<b>Barnstaple</b>
Don't wash the car		10
Put grey water on the garden	5	7
Don't flush the toilet so often	3	5
Don't water garden with mains water	3	5
Collect rainwater in whatever containers are available	5	
Don't use the hosepipe	2	3
Don't leave taps running	1	3
Mulch garden borders	3	1
Take showers instead of baths	2	2
Full loads in dishwasher/washing machine		3
Water early am or late pm	2	
Put a hippo / brick in the toilet cistern		2
Change washers on dripping taps / fix leaks	1	1
Target water to specific plants rather than using sprays	1	1
Bath less often (no shower available)	1	1
Limit use of washing machine	1	1

<b>Action</b>	<b>Norwich</b>	<b>Barnstaple</b>
Save up washing up until there is a bowl full.	1	1
Shower at the gym		1
Use toilets elsewhere		1
Shallow bath		1
Don't clean windows		1
Don't overfill kettle	1	
Put water-retaining gel in hanging baskets	1	
Wash car with a bucket, not the hosepipe	1	
Only use rainwater on the garden	1	

### 5.5 Discussion and Further Analysis

It would appear that this method of data collection consistently provides a respectable return rate and a useful quantity of qualitative data from open questions that can help to shape and inform further environmental social studies. The questionnaire as a stand-alone piece of work is however, not terribly good. This may be acceptable in this particular case due to the recruitment objective of the exercise but it would not generally be suitable in a mixed method study. It took three weeks to deliver and collect the questionnaires and across all three of the sample sites, 323 completed questionnaires were returned. From these responses, 57 interview contacts were recruited. The prior 'snooping' on Google Earth helped to ensure that questionnaires were delivered to a broad mix of housing styles, which also helped to spread the questionnaire across a mix of age and socioeconomic groups. The family composition data from Norwich and Barnstaple confirmed to the author that an acceptable range of households in terms of size and age had been approached. Focusing on properties with gardens enabled the collection of opinions and details of habits and routines both inside and outside the home. The style of delivery and collection exposed the author to a variety of situations where new insights on water use could be developed. It would appear that gardening households are quite happy to share information and are also very happy to welcome researchers into their homes to discuss their water habits. It

is difficult to say whether the outcome would have been different if a different method, such as a lengthy postal questionnaire, had been used.

Turning to the research questions to determine to what extent this exercise contributed towards answering them, one must ask whether this is a useful method of unearthing personally held perceptions of drought and climate change. In this case, the public under scrutiny was urban / semi-urban householders with gardens. When asked to indicate the cause of the unusually dry weather the majority of respondents to the surveys indicated that changes in the weather were caused by natural climate variation. However, approximately 30% of respondents across all samples chose to implicate climate change and/or global warming. When asked if they perceived that there would be more droughts in the future, 50% of the total sample respondents answering this question said they believed there would be. 42% of the total sample respondents were prepared to predict the cause of an increase in future droughts, and the most common answer was climate change, followed by global warming. Whilst many acknowledged population increases and natural trends as an obvious cause, they often added climate change to their answers alongside these impacts. This merely suggests that a substantial portion of the public in this study were able to link drought and climate change in their minds but it is not proof of individually held perceptions of the developing drought any established link to climate change. The questionnaire responses did not suggest that any of the respondents had really noticed the drought building but that could be the fault of the questions. Without water restrictions, their lives had not been severely impacted and in most cases their gardens had fared reasonably well. The difficulties encountered were minimal and in some cases the dry weather had had a positive impact, for example, on early fruit yields. What was impossible to detect via the questionnaire but was evident in the doorstep conversations was, that the subject of hosepipe bans was raised by subjects and used as a signifier for drought. Respondents seemed only able to contemplate a drought situation if a hosepipe ban was in force. This may indicate that dry weather has been superseded as an indicator of drought by direct instructions from water companies to curb water use and therefore the timing of hosepipe bans in the future could be critical in turning individuals onto

water-saving activities in time to avert a water crisis. As it happens, without a drought warning from the water companies, despite the weather being dry and warm, there was, in their minds, no prospect of a drought. A good question to ask in follow-up work therefore might be *“How do you know when there is a drought?”* This however was not the opening question posed to subjects in the GT Study because the work was being conducted in parallel to the questionnaire delivery and collection.

Many respondents were already limiting their use of water on a day-to-day basis to save money. In some cases, this went hand-in-hand with saving energy. However, as will be discussed in more detail in the next chapter, not all the actions mentioned by respondents are advisable, and some may result in greater use of water and energy. Whilst subjects were already attempting to reduce their resource use, some of the cognitive barriers to acting may be concerned with how reductions are achieved and whether subjects will accept that some of their behaviours, though well intentioned, may not be as positive as they might consider them to be. Likewise institutional barriers may be created and sustained through inappropriate advice given by water companies and other agencies. These potential barriers will be explored further in the next two chapters.

There are signs in these results that imply that the cost of water may encourage water saving. It may be useful to re-visit Barnstaple as a study area in the future as from April 2013, water customers in that area will benefit from a £50 rebate on their annual water bills, in an attempt to address the notable discrepancy between the cost of water in the South West in comparison to other areas (OFWAT, 2011 *b*). It would be interesting to see if there is a corresponding relaxation of water-saving habits as a result.

During the course of this research another much larger survey of 1,802 water users in South and South East England was completed (Pullinger et al, 2013). 46% of respondents to this survey had a water meter, 57% owned a hosepipe, and 44% had gardens that they watered. From the survey, researchers noted that age, gender, socio-demographic affluence, and family structure could only

weakly predict water habits, and water efficiency programmes run by water companies that promoted water-saving technologies had limited influence (Pullinger et al, 2013, p4). Whilst this was a much larger and more comprehensive survey and the findings are consistent with this work, there is a danger that a survey on this scale can give the impression that the results are representative of all water users in all geographical locations.

## 5.6 Conclusion

If limiting water use is part of an effective public response to climate change then a large number of respondents in this survey claimed to be already willing participants in that response. The success of water saving campaigns may therefore be evident. However, it must be noted that there is nothing in the results of this exercise that suggests that these respondents' actions were motivated by an understanding of climate change and the threats it may pose to daily household routines. There is also nothing in the survey alone that can rule out the possibility that many of the self-reported water-saving habits were based on the best intentions of respondents, triggered by knowledge of water saving campaign suggestions, which in reality may not actually have been carried out by respondents at all. As it stands, if habits are maintained as the survey suggests, respondents' resilience to the impacts of climate change may be limited, particularly in terms of sustaining gardens. There were few signs of investment in sustainable infrastructure such as large rainwater tanks or altered gardening techniques. A third of respondents did not even have a single water butt. A small number of respondents mentioned applying mulches to soils to keep moisture in, and spot watering. A greater number of respondents were happy to use grey water from the washing up or bathing, to water their gardens. This might not have been an important finding if the survey had randomly selected from all types of housing, but in this instance, houses with gardens, and particularly gardens that looked to be well cultivated were deliberately targeted. A large number of gardeners in the driest survey areas were highly dependent on potable water. This may be connected to the price of water, which in Norwich, in particular, is very reasonable, considering the area is so dry and demand for water is high, especially during drought periods where demand for potable water for irrigating crops can rise from 5% to 60% (Burch,

2007). It is also of concern to note how few respondents were aware of the quantity of water they used each day and it would be interesting to see what difference could be made to water habits if actual volumes were more easily measured by users.

At this stage in a traditional mixed method study one might attempt to introduce themes from literature to interpret this data further. It would have been foolish to do this during the project cycling phase because of the risk of taking onboard opinions that one would then seek to confirm through the GT work. The unfinished nature of this work may be a source of irritation but it highlights the key difference between a grounded theory approach and the development of a Classic GT. One can never allow one's own opinions, or the opinions of others to obscure or direct the collection of data and so further analysis is traded against the prospect of generating a new theory.

The next chapter explores domestic water use in more detail, through the dialogue between the author and subjects in the GT study. The results from this questionnaire contributed a great deal to its structure and therefore the reader the reader is not going to be presented with a theory just yet. The water appliance data collected from Barnstaple and Norwich is used to describe some of the micro-components of home water use, and to explore the importance of plumbing and water appliances to this study.

## Chapter Six

### **The Micro-Components of Water Use: An Autoethnography**

#### 6.1 Introduction

There is a really obvious problem associated with the presentation of a Classic Grounded Theory in that it is impossible to see from the finished work exactly how the theory has emerged. If the researcher falls into the trap of trying to explain this in the theory it automatically slips back to being a descriptive piece. Therefore, the evidence behind the theory is not delivered to the reader and the method of constant comparison of data that is only recorded in field notes also remains invisible. The conceptual work is intended to be read, understood, and believed, without question. CGTs are generally satisfying to read but do they prove that the researcher has done the work and not simply made it all up? This is the question that is so often asked and this is probably why CGT is not prevalent in Human Geography. It serves best the people who know it well and believe in it (not Geographers).

Throughout this thesis the narrative has been designed to highlight the distance the researcher needs to maintain from literature to avoid forcing ideas onto the data. It has also been set out in an order that is meant to indicate the pacing of a GT through project cycling, and show how linked projects might be completed and their results described alongside a theory, partly as proof of work being done and partly to show where the GT method may be considered insufficient in some disciplines. This is thought to be a novel first for a geography thesis. Very often, first-time GT researchers at PhD level, stick to the GT only and quickly get exhausted, or the cycled projects are unrelated. The recommended way to prove that the process has been adhered to faithfully and completed without forcing being to litter the written work with reference numbers that correlate with the multitude of written memos and coded data caches that they are drawn from. These referenced pieces of data are not generally published although one or two usually find their way to the appendices

as examples. This is not helpful for those new to GT as it provides no clue to what it is really like to follow the Classic GT method. This thesis therefore attempts to use alternative methods and discussion of the fieldwork in separate accounts, to set the scene for the final theoretical work. This highlights where Classic GT may take the Human Geographer further than just a mixed method study and also how to protect against falling back into old descriptive habits, abandoning the process in favour of a grounded theory approach.

In this chapter, the author provides an account of her own water habits and those of some of the subjects in the GT study, to reveal some of the often hidden aspects of personal water regimen that are referred to as the micro-components of water use (Medd and Chappells, 2008). In this instance, the author is a *“visible actor in the text”* (Anderson, 2006, p383), and therefore it is written in the first person, to highlight the very personal nature of the investigation and to bring out some of the motivations behind specific water-based actions that cannot be detected from questionnaire responses. Beginning with a baseline of recommended water-saving actions that closely mirror those suggested by respondents in the water use questionnaire sample, the author uses detailed descriptions of her own attempts to save water and extracts of conversations with subjects in the GT study to give the reader insight into the complexity of water use and how it is guided by a combination of habit, personal views about comfort and affordability, and plumbing arrangements. In the final section, the author discusses the psychology of changing water habits and the importance of perceived personal benefit beyond financial savings, by describing a recipe for reducing her home water use by 40% over the duration of this study.

#### 6.1.1 Introducing the Micro-Components of Water Use

In this chapter I am attempting to shed light on some of the results from the household survey, by presenting some observations of water use I have made during encounters with subjects, and also some close observations of my own water use regimen. Also, if the Classic GT to follow is a conceptual piece then this is the practical precursor to it. Here the reader will find details of every-day

uses for water that will set the scene for the theory more accurately than if left to the imagination. I have chosen not to provide endless lists of the multiple variations of water practices I have observed and/or discussed with the subjects in my study, instead I hope to bring to life a small sample of the micro-componentry of every-day water-based practices, drawn from my experiences and feelings that are documented in my field notes. These I believe are “*vital data for understanding the world that is being observed*” (Anderson, 2006, p384), and I anticipate this will illustrate more powerfully the complexity of the topic of study and where my theory might fit into the water research landscape.

This chapter is based on subjective experiences but it is not designed to be an entirely evocative narrative. It is both descriptive and analytical and so falls somewhere between the style of evocative autoethnography promoted by Carolyn Ellis, who believes, as I do, that “*the conversational style of communication has more potential to transform and change the world for the better*” (Ellis & Bochner, 2006), and the prescription for an analytic autoethnography described by Anderson (2006), who proposed five key features of such an approach:

- Complete member researcher status (to be an active member of the group being studied)
- analytic reflexivity
- narrative visibility of the researcher’s self,
- dialogue with informants beyond the self, and
- commitment to theoretical analysis

(Anderson, 2006, p378)

I do have strong leanings towards careful narration so that my research will be pleasurable to read, and above all understandable. I also feel, that for all its benefits and the clarity that comes with achieving parsimoniousness of data (Glaser & Strauss, 2010) my theory will carry greater meaning if I have spent some time engaging readers more deeply, with the subjects and their water habits, beforehand. The use of autoethnography in this research highlights another method that can be used to bring to life details of personal water

practices, in a way that cannot be achieved through the use of questionnaires or historical assembly of memories and records from the past.

### 6.1.2 Water Saving Advice: The Micro-Components of Water Saving?

The following extract from Defra's (2008) publication *Future Water* lists the water saving activities it encourages the public to engage in for environmental reasons:

- *Turn off the tap while we brush our teeth, shave, wash our hands or wash up, saving up to 6 litres of water per minute.*
- *Fix dripping taps. A dripping tap can waste up to 15 litres of water a day, or almost 5,500 litres per year.*
- *Replace worn washers for a quick and cheap way of saving water.*
- *Wait until we have a full load before switching on dishwashers and washing machines.*
- *Use the minimum amount of water required when boiling water in saucepans and kettles; that way we'll save energy as well as water.*
- *Reduce the water used to flush toilets by fitting a water saving device such as a 'hippo' or fitting a dual flush toilet.*
- *When replacing our toilets, we should look out for low flush or dual flush models.*
- *Wash vegetables and fruit in a bowl rather than under a running tap. The water collected might even be used for watering pot plants.*
- *Lag water pipes and external taps to prevent bursts in cold weather.*
- *Collect rainwater in water butts and use a watering can instead of a hose. If we need to use a hosepipe, a trigger nozzle can be fitted to control the flow.*
- *Wash our cars using a bucket and sponge, rinsing with a watering can. Just 30 minutes with a hosepipe will use more water than the average family uses in a day.*
- *We can also change how we use our water in more fundamental ways,*

*such as taking short showers instead of baths, and having drought-resistant plants in our gardens.*

This list forms the mainstay of an ongoing campaign to substantially reduce per capita water consumption.

*“We are confident that with today’s technology for metering, tariffs and water efficiency that per capita consumption of water can be reduced, through cost effective measures, to an average of 130 litres per person per day (l/p/d) by 2030. We hope that developments in new technology and future innovation will improve the cost effectiveness of these measures over time and that this can drive consumption down further to an average of 120 l/p/d per day by 2030.” (Defra 2008, p25)*

In addition to the water-saving tips provided by Defra, web-based guidance from the ten water and sewerage utility providers on using water wisely at home and in the garden provides some more detailed and thoughtful ideas, and implies a slightly more comprehensive understanding of consumers’ water practices:

- *If you have a gas combination boiler, run the hot tap slowly to begin with to reduce the amount of water lost before the water becomes hot.*
- *Mulch plants in the garden to keep moisture in the soil and reduce the frequency of watering required.*
- *Reduce the length of time spent in power showers*
- *Put a jug of water in the fridge so that chilled water is always available and avoid having to run the tap until water is cold*
- *If you do have a bath, check the temperature as you run it. Don’t wait until you have run the bath and then find you have to add lots of cold water to cool it down.*
- *When you have to run the tap to get either hot or cold water, collect the water and use it for plants*
- *Maintain the height of your lawn at one inch to maintain water and keep them green for longer during hot spells*
- *Before you purchase a water-using appliance, check how much water it uses*

- *Before you water the garden, check the weather forecast; it might rain tomorrow*
- *Water your garden at dusk so less water evaporates*
- *Use a bowl when hand washing dishes*
- *Use a basin for personal washing*
- *Try to avoid rinsing dishes before putting them in the dishwasher*
- *Hand wash small amounts of clothes in a bowl*
- *Give children a water pistol rather than a hosepipe to play with*
- *Use a broom to sweep paths rather than hose dust and debris away*

Most of these tips relate to personal water habits rather than water-saving technologies. Although all water companies promote the use of shower and toilet and tap modifications that will automatically save water, this style of guidance outlines the human effort in altering established habits to achieve the goals that have been set for the future.

## 6.2 Bringing the Qualitative Data from the Questionnaire to Life

In the previous chapter I presented the details from 323 questionnaires that members of the public had used to write down details of their water-saving habits and the numbers of different types of water appliances that were located in their homes. When asked to describe what they did to avoid wasting water, most of the respondents mentioned at least one of the water-saving ideas promoted by Defra and the English water companies.

I discovered, on visiting some of the respondents, in my quest to develop a theory related to home water use, that although on paper they may have the same number of baths, showers, and sinks, not all bathrooms and kitchens are the same and not all water users are the same. The style, quality, design, and location of water appliances had a direct bearing on the micro-components of water use in these homes. Other distinct variables contributing to the mix of water regimen included; personal likes and dislikes, cultural beliefs, and the ease at which water apparatus could be used, their availability, and their functionality. Therefore, not all basic uses of water can be considered as being

the same across all households and inevitably, one person's interpretation of a water-saving activity may appear similar in a questionnaire but in practice may be quite different. After all, who is to say what constitutes a shallow bath? A person who normally enjoys a very deep bath, by volunteering to reduce the depth of their bath water to make a saving, may still use more water than another person who only fills their bath to a depth of a few centimetres as part of his or her normal bathing practice. The same could be said for shorter showers – how short? Or for that matter, flushing less often – it depends on how often flushing was done previously. Does saving dirty dishes to the end of the day save water? It depends whether it can all be done in one bowl of water or if the water has to be changed several times because of the amount of crockery, cutlery, and pans that have accumulated for washing. This is how one identifies the fundamental flaws in water-saving campaigns, as there is no agreed standard water allowance per person to work to. There is a notional per person, per day, average that Defra “*aspires*” for water companies to achieve (The targets they originally set for reducing water use have been recently re-branded as aspirations.) but this is not a binding agreement with water customers. There can still be high and low water users who just average out between each other. Therefore it is not terribly useful to compare one household or individual with another, from questionnaire data. It is more satisfying to look carefully at individual water habits and identify which are the most economical and then to see what scope there is to instigate an intervention that might result in more people developing these habits.

### 6.2.1 Reflexive Self Observation

In the very early stages of the development of this research I realised that asking the public about their perceptions of drought and climate change would not necessarily bring any new insight to this area of research. I also realised that dressing up a study in this way would do little to help find ways of curbing household water use, to boost the resilience of the public to an increasing frequency of drought and water scarcity events in the future. Having held some detailed interviews with water specialists working in the Environment Agency, Defra, and OFWAT, I had noticed a distinctive theme amongst them of blaming

the public for overuse of water and placing all responsibility on them to change their ways. I felt that I was running the risk of becoming superiorly judgemental by assuming that all water users were using too much. I therefore concluded that a good place to start would be in my own home, where I could conduct some detailed self-analysis. I had found it very easy to criticise the assumed water habits of others, and then swiftly realised that I was very conveniently ignoring my only chance to observe a person's daily water regimen in all its complex detail. The most important thing to do before passing judgement on the habits of others, I thought, was to critically assess my own. This is very relevant in a GT because Barney Glaser's initial advice to any potential theorists who want to know where to begin is to interview themselves (Glaser, 2012, personal communication).

I personally find it quite odd that the self is missing from a lot of work in the area of environmental behaviour studies. Researchers observe others without ever attempting self-comparison. I can understand that it might lead to feelings of discomfort, to expose one's personal habits to close scrutiny. However, I postulate that keeping oneself out of research into basic human activities is a form of self-deception, to ensure one avoids finding out whether, in environmental terms, one is as disingenuous as the subjects we generally expose as such. This exposure is generally accidental. In GT, when one crosses the properline and gets to the heart of a matter, very often subjects can appear disingenuous, as what they say and do can contradict one another. It is important to learn how to witness these moments of cognitive dissonance without judging subjects too harshly for reacting in what appears to be perverse fashion.

In March 2010 I decided that to proceed any further without an examination of the self would be a mistake and so I resolved to keep a water diary for two weeks. I would note down how, when, and where I used water, throughout each day. In the first week I would operate as normal and in the second week I would deliberately attempt to save water where possible. It was a sobering exercise. I felt when I started that I was not the sort of person that would waste water but I very soon realised that there were plenty of opportunities I could have taken

that would have reduced my water use substantially. Why I didn't take them was hard to explain. Was it laziness? Ignorance? Absentmindedness? Were there other factors outside of my control that had a bearing on my actions? I realised immediately that prior to the diary exercise I was automatically using water in a way that was convenient and comfortable for me. I was not thinking about how much water I used and I certainly was not questioning whether I needed to use it at all. I just assumed I would not waste water because I was environmentally aware. Making things comfortable for me was not simply about luxury, it was also related to the quality and functionality of water appliances in my home.

Reading through the extracts from my water diary, the constant thread of personal water use in my life from dawn to dusk is highlighted. I mainly work from home and so it was fairly easy to write up my experiences during the day. I was living in a rented first-floor apartment with my husband, Jay, at the time and so I was able to closely compare my water habits with his, to his amusement. He laughed as I strode down the stairs wearing rubber gloves, carrying an old fork that I was about to use to flip open the water meter cover in the street. I thought, perhaps this is one of the reasons why so many of the metered survey respondents did not know how much water they used. They were too embarrassed to find out. Reading an English water meter is not a very pleasant activity. One has to pick a time of day when the light is good enough to see a small dial down a dark hole, and there aren't too many pedestrians around to trip over you. You can take a torch but then you need someone with you to write down the numbers as you shout them out. Gloves are important because a lot of debris somehow collects under the metal flap in the pavement, and spiders love to live around the meter. I don't understand how anyone can say they are saving water when they don't know how much water they use in the first place, but I can understand why very few people can be bothered to read their meters. For my self-analysis there would be three meter readings, so I had to be comfortable with doing it. A second reading would be done at the end of the first week, to establish the baseline weekly water total. A third reading would be taken at the end of the second week to establish whether my weekly usage had been reduced.

In our apartment we had two bathrooms, one with a shower, toilet, and sink, which we never used because it was too cold, and one with a deep bath with a shower over it, toilet, and sink, which was much warmer so we used this all the time. We had a large kitchen sink and a washing machine. Although I would have liked to have a dishwasher, there was no room for one. Because we were on the first floor, there was no garden or outside space.

## **Week One**

In the first week I recorded all of my water-based activity in detail. I would shower every morning (six litres per minute) and wash at the sink in the evening (8 litres per wash). I cleaned my teeth twice a day (1 litre approx.) I did not leave the tap running whilst brushing but I did rinse the brush in running water and leave the water running whilst I cupped my hands to collect water to rinse my mouth with, several times. I would wash my hair in the shower every other day so then the shower would take two or three minutes longer. I did three loads of washing in the machine (35 litres per wash) and some hand washing of silk items in a bowl (9 litres). On average I would thoroughly wash my hands twelve times a day, then there were the times during cooking or cleaning when a quick rinse under a short burst from the tap would suffice. This sounded like a lot but one of the early diary entries explains the frequency well:

*“I wash my hands. I wash my hands a lot. Because I am female and the principal cook and housekeeper and I do a lot of dirty jobs and cooking jobs and wash my hands frequently before, during, and after these activities. This is a hygiene issue but I do like to wash my hands in warm, running water, so this is energy and water intensive.”*

During the first week I washed my car using three buckets of water, one to rinse off the dirt, a second to apply hot wax, and a third to rinse off before polishing. Car washing is not something I enjoy so I don't do it on a weekly basis, more when I think the car needs it, which is probably monthly, or even bi-monthly. I have always been quite proud of my ability to wash a car thoroughly without

needing a hosepipe. It took 24 litres of water – enough for a four-minute shower.

I would fill and boil the kettle five or six times each day and flush the toilet six times. I did not know the volume of the toilet cistern because it was cleverly enclosed behind a tiled false wall. I would run water to wash vegetables and fill cooking pots, at least twice a day. And I would drink six glasses of water. I washed up at least twice a day. The open plan nature of the living arrangements in the apartment meant having to look at piles of dirty dishes on the work surface in the kitchen whilst working. This made the whole place feel untidy and I found it hard to work when I felt like I was surrounded by clutter. I would wash up after breakfast and this would include the dishes from the evening before. I could leave those out while I was sleeping. I would always wash up after my lunch to keep the surfaces clean and clear.

I did a considerable amount of damp dusting where I would run a cloth under the tap for a few seconds, wring it out, and then wipe the dust off surfaces, returning to the tap to wash the dust away down the sink. I feel dry dusting is actually just moving piles of dust around. I washed the kitchen floor twice a week with a mop and an almost full bucket of hot soapy water. The kitchen floor was approximately twelve square metres and probably did not need eight litres of water. I quickly got to realise how much hot water I used and how water use was also energy use.

*“I empty my floor-washing bucket and rinse it with cold running water. In writing this account of my water use I am coming to realise how often I say something is warm and soapy. I wonder whether I would get just as good results washing the floor simply with cold water? Could I save soap and energy by doing this and would it make any difference to my personal hygiene? We don't eat off the floor we just walk on it. Outdoor shoes are removed at the front door and we both wear slippers around the flat so how dirty can the floor be?”*

My other water-based activities included rinsing out and re-filling the cat's water

bowl every day, filling the windscreen washer reservoir in the car, and watering houseplants.

I soon managed to identify a whole lot of water wasting. Some actions I could limit, some I could not because they were pre-determined by the plumbing and infrastructure in the apartment. The water in the apartment did not taste all that good.

*“I always drink a glass of water before bed. I run the cold tap in the kitchen for a short while because if I don’t the water has a peculiar metallic taste.”*

The gas combination boiler that heated water on demand was quite old, and took a while to spark into action when the taps were turned on. It was also at the opposite end of the apartment to the kitchen and main bathroom of choice. This meant that I would run hot taps and the shower, for a period of time whilst waiting for the hot water to come through. If I tried taking the water company advice and only turning the tap on a little so as not to waste too much water before the boiler started, it simply just wouldn’t start. Also, for some unknown reason, the hot tap at the bathroom sink appeared to have a permanent air lock and it would splutter air and water for what seemed an eternity on switching on, spraying across the top of the sink and up the wall, and then flow as normal after a while. I was quite polite about this in my diary even though I found it very annoying.

*“I have a face cleansing ritual that I follow every evening. I tie my hair up and layer cream onto my face. I fill the washbasin with hot water. This necessitates my running the hot tap for quite some time before the water has reached the appropriate temperature.”*

At the end of week one, our joint household water use was 2,250 litres. This averaged out at the national 160-litre average per person usage and I was very disappointed. I really had hoped to use less than that. I decided there must be a leak somewhere and after testing discovered a loss of 0.02 cubic metres in

eight hours (60 litres per day). Adjusting our water use figures down to account for this I arrived at a more pleasing 130 litres, per person, per day. But I wasn't proud of that, we did not have a garden and so I really thought our water use should have been lower still. With no visible signs of water leaking within the house, I informed the landlord and a pressure test was commissioned to determine whether underground pipes were leaking and this was inconclusive. After considerable thought I left the lid up on the toilets for a couple of hours to let the sides of the pans dry out. I then placed a piece of tissue paper above the water line, on the inside each of the toilet bowls. Returning a few minutes later I had my answer, a small, barely detectable trickle of water was running down the side of the pan of the toilet in our preferred bathroom and the tissue paper had soaked it up. This is apparently a common problem with modern low-flush toilet cisterns that overflow back into the toilet. After a lot of negotiating with the landlord, a plumber was called to fix the problem. His attempts were futile and so in the end we isolated the flow of water to the toilet and resolved to rely on the toilet in the 'cold' bathroom from then on.

Having dealt with the leaking toilet I set about drawing up a plan for reducing my water use. I noted all my 'bad' habits and drew up a water saving table. I decided it should be possible to save 75 litres of water per day by instigating a strict regimen of actions that would not have a detrimental effect on my lifestyle but would drastically reduce my water use. My list of water saving actions was as follows:

- *Switch off shower whilst soaping up*
- *Reduce water for floor washing by only filling bucket half way*
- *Regarding toilet flushing, follow the rule: if it's yellow, let it mellow, if it's brown, flush it down!*
- *Save up dirty dishes and wash them once a day. Scrape plates and bowls with a spatula first so that the water stays cleaner for longer.*
- *Weigh washing loads and make sure each one is the full five kilogrammes that the machine can take.*
- *Invest in a bodyflick (a squeegee for the body) to reduce the number of bath towels going into the wash each week*
- *Don't wash clothes so frequently you're not that dirty!*

- *Keep the same cup for drinks all day*
- *Wash vegetables in a bowl, not under the running tap*

## **Week Two**

In the second week as I struggled to adjust, I wrote in my water diary:

*“The language of bathing and washing products is of luxury, quality time, scents, treats, freshness, sparkling results. The language of water saving is of efficiency and waste reduction. Not terribly desirable.”*

At the end of the week I had saved 180 litres of water, just over 30% of my target amount. But I had added another water use to my regimen. I’m a keen kayaker, the weather was good, and the open water season had started. I had rinsed out my wetsuit and buoyancy aid in the shower, after a long paddle. Even though I had only made a modest saving, during the week I had seemingly enjoyed the task, particularly reducing the amount of washing I had to do.

*“I am living on a sort of natural high from frugality. Periodically I glance at the washing basket just to see if I might do some washing, but there just isn’t enough there to warrant putting the machine on! Freedom from the drudgery of washing and knowing I am saving water, energy, and detergent at the same time is really quite exciting for me.”*

I even noticed when I fell by the wayside:

*“I lapse briefly and wash a carrot under the running tap whilst making a packed lunch. I have to remind myself that this isn’t how things are going to continue.”*

But I also deliberately ignored some of my rules. Our ‘warmer’ bathroom was still not warm enough for me to switch off whilst soaping up. I soon became cold and put the shower back on again.

I didn’t really experience any hardship or loss and I did quite enjoy the challenge. Although there would be a financial benefit to saving water this was small, approximately 77 pence per week. I had achieved a 10% reduction in our household water use. I noted:

*“A similar sized reduction in energy consumption would have resulted in savings*

*of approximately £70 per annum (£1.34 per week), I can see why energy saving might be more prevalent.”*

### 6.2.2 Other People's Recipes for Water Use

I now want to share some of my experiences with subjects in the Plymouth household water study, Norwich interviews, chance encounters in Royal Tunbridge Wells, and interviews with industry insiders and regulators. The primary goal in a Classic GT study is a conceptual piece of work that describes a theory rather than describing the incidents observed in the discovery of that theory. I sought to discover my theory during encounters with subjects in their homes and on their doorsteps, in Plymouth, Royal Tunbridge Wells, Norwich, and Barnstaple, and to pursue various lines of enquiry determined by the baseline data collection and subsequent follow-up conversations in person, and during telephone interviews. A common difficulty grounded theorists encounter in presenting their work to those who are used to reading the details of predominantly qualitative work from mixed method studies, is that of the lack of obvious direct evidence. Readers expect to find detailed descriptions and comparisons to other similar work, combined with verbatim quotes from subjects. The presentation of conceptual work can therefore appear thin and unsubstantiated to those less familiar with Classic Grounded Theories. I present here some of the descriptive work that relates directly to individual responses from subjects in this study, to alleviate these potential concerns. In line with the GT method I did not record interviews with subjects. I took notes as I went along. I have a habit of jotting down key phrases that interest me as we talk and then as soon as I leave I rush to the car or a nearby café and scribble down the rest of the conversation as I remember it. Therefore I cannot say that the conversations I am re-creating here are comprised of verbatim quotes from subjects but I am very confident that they are accurate enough that the picture I am trying to paint has not been distorted.

I have not named the subjects but they each have a code based on my encounter with them either through the home study (HS), or interviews &

chance encounters (IV number+town), or discussions with industry insiders and regulators (DM).

## **HS 1&2**

HS 1 joined the study group because she was new to the area and thought it would be a way of meeting new people. She lived in a four bedroom terraced house with her husband (HS2) and three-month old baby. They had one large family bathroom, one en-suite shower room, a ground floor cloakroom and a separate shower only room on the half landing. They also had a dishwasher and washing machine, and a large one and a half bowl sink in the kitchen. With the daily distraction of a new baby, I did not ask HS1 to complete a water diary. Instead I asked if I could talk to her whilst she was doing tasks with water. This would typically happen as other members of the family and friends passed in and out of the house, occasionally chipping into the conversation. On my first visit, HS 1 appeared disappointingly unaware of any need to manage her water use.

*“I think we have a water meter. I don’t know where it is. We’ll have to ask HS2 [husband] where it is. I know it costs us quite a lot of money.”*

*“Do you want to reduce the cost?”*

*“Well I don’t see how. I mean we need water.”*

I watch HS1 washing the dishes. The hot tap runs continuously throughout. She has a cloth in her hand and a pump dispenser next to the sink. She pumps washing up liquid onto the cloth and wipes a plate with the soapy cloth. Then she rinses the plate under the tap. Then, to my surprise, the plate is placed in the dishwasher. This process continues for around 10 minutes.

*“Do you always wash your dishes before you put them in the dishwasher?”* I hope she will say that she is only doing it so that she won’t appear like a bad housewife.

*“Yeah, always.”*

*“Have you ever thought of just scraping the dishes and putting them straight in the dishwasher?”*

*“No, I don’t think they would get clean.”*

We talk about HS1s other water habits. She apparently bathes and then showers afterwards.

*“In my culture, (HS1 is a practicing Hindu) we don’t believe in wallowing in dirty water. We have to have clean water washing over us. So I have a bath to relax and then I have a shower to wash the dirty water away. That’s why in our culture we wash babies by throwing bowls of water over them.”*

We chat generally about water and how many loads of washing are done since the new baby arrived. It appears that the washing machine is deployed every day and still sometimes they run out of baby clothes. When HS2 arrives, he shows me where the water meter is. He’s never read it. I have my rubber gloves and old fork with me. There is an ant nest inside the meter chamber that I have to dig my way through. Two weeks later I return to take the second reading. HS 1&2 + baby are using 900 litres of water a day. I check my calculation several times to be sure. An upstairs window opens and HS2 pops his head out.

*“I’m bathing the baby, come on up.”*

I am intrigued to see the special bathing method and surprised to find HS2 kneeling by the bath with baby inside a small plastic bath, carefully contained within. While the baby splashes about and giggles HS2 gets to tell me more about the family water habits. Yes, HS2 does dish water over baby’s head, for practical reasons, to rinse soap from his hair. Essentially baby is sitting in his dirty water and HS2 is unconcerned.

*“HS1 and I have quite different opinions about water. If she tries to tell you she is careful with it, take no notice. I watch her every morning brushing her teeth with the tap running.”* He points to the ‘his and hers’ sinks in the bathroom.

HS2 has a trigger hose that he uses to water the garden and he never washes his car. Or rather he takes the car to a roadside car wash. They have a small water leak above the downstairs cloakroom that they have not had time to fix. There is a large brown stain on the ceiling. Having a baby appears to be all HS1&2 have time for. Water saving is not something they are concerned about.

### HS3

HS3 is a medical student. He shares an apartment with a friend. They have two bathrooms. One has an electric shower and the other has a thermostatic mixer shower that is fed from an electric immersion tank.

*“I don’t know how much water we use but I know how much we spend on it. Our bill is the same every time. We try to use as little as possible. I have to be careful because my shower is fed from the tank and sometimes it runs out of hot water. So I don’t tend to stay in it for long. We save up the dishes until there are no clean ones and then we do a big wash up. It doesn’t look good but we don’t really care. I try not to flush the toilet if I am just going for a wee.”*

HS3 leans forward as if he is going to tell me something very important. He looks around to see if anyone else is listening.

*“Occasionally I forget and flush by accident, and I get really angry with myself. It’s different when I go home because my Dad isn’t on a meter. I just run a deep bath right to the top and jump in! I don’t care at all when I’m there.”*

### HS4

HS4’s family fluctuates in size on a six-week cycle. For four weeks it’s just HS4, her teenage son and baby daughter in the house, then for two weeks her husband and his two children are at home. Their combined household water usage averages out at 850 litres per day but it actually fluctuates quite dramatically, week-by-week, depending on who is at home. The house is a large Victorian villa and the plumbing is not terribly up-to-date. None of the three toilets have a low flush option.

*“Do you think you could save some water by putting hippos in your toilet cisterns?”*

*“Well I don’t think our toilets use that much water anyway. I used to wait and flush the toilet in my en-suite with the baby’s bath water but now she has just got to that stage where she is pulling herself up by things, including the toilet, so now I make sure I flush it every time.”*

HS4 tells me that when all of the family are at home she puts the dishwasher on once a day and usually does one bowl of washing up a day. She rinses all the dirty dishes under the tap before they are washed or put into the machine.

*“It’s probably my biggest waste of water. I don’t leave the tap running. I switch it on for a quick burst and then switch it off again each time. I only boil the water I need in the kettle and I only wash out the cat’s dishes every other day, and because I am a bit of a tight-wad, the tumble dryer is a condensing machine and so I use the water from there to do that.”*

HS4 boils the kettle to warm up a bottle for the baby. I notice that she fills it right up and there is still half a kettle full left when the job is done.

*“Have you thought about just scraping the dishes before washing them?”*

*“I don’t think they would be clean enough, although, having said that, when my husband is home, he never rinses anything before it goes in the dishwasher.”*

*“Do you know how much water you use every day?”*

*“I don’t know the quantity. I spend between £250 and £350 a quarter on water, I’d like it to be cheaper.”*

There is a water cooler in the kitchen. *“How often do you buy those big bottles of water for the cooler?”*

*“Probably about once a fortnight, it’s £6 for 19 litres which is cheaper than the supermarket.”*

*“That’s about 30 pence a litre and tap water is less than a penny a litre, why don’t you want to drink tap water?”*

*“Where we used to live, the water tasted awful and black bits came out of the tap.”*

## **HS5**

HS5 presented as a victim from the beginning. I arrived at her new, second-floor apartment and HS5 welcomed me with her proper line water-saving address.

*“I’ve been on a water meter since 1989 and so my perception of water use has been conditioned. I have become very economical with water. My awareness has changed. I am aware that every litre costs. I am very conscious about how much I use.”*

*“Why do you want to join my study group?”* I asked.

*“Well, I just can’t believe they [the water company] want to put my direct debit up again. I am hoping if I join your group, you will help me to bring the cost of my water down.”*

Regular monthly payments direct from the bank have become a popular way to pay for household utilities. Payments are evenly spread throughout the year and the water company adjusts the payment level up and down depending on usage. Customers pay for what they use and the one thing I was sure about was that the rising cost of water was not something I could alter.

*“Oh I see, well, I am afraid the cost of water is not going to come down. It is only ever likely to rise. And you are, as you say, very careful with water. What if I can’t help you?”*

HS5 looked confused.

*“You must be able to. I am sure they have got it wrong. I mean I cannot possibly be using as much as they say I am.”*

*“Ah well, perhaps you have a leak. Have you done the leak test I asked you to do?”*

*“Yes, and no, I haven’t got a leak”*

*“Well, as I say, you may not get the result you are looking for. Are you sure you still want to be part of the study group?”*

*“Yes, yes, I am desperate. I am existing on a tight budget. So I must find a way.”*

HS5 had filled in the water diary I had sent in advance. She also had looked at her water bills from previous properties.

*“There, 18 cubic metres in three months in a four bedroom house, 19 cubic metres the next quarter, and now I’m here.”*

I had asked HS5 to read her meter at the beginning of her diary period and at the end. HS5 had not read the digits after the decimal point and so the total quantity recorded could, in effect, be rounded down by as much as 999 litres. From her figures, her water use in 14 days had been 3 cubic metres, which equates to 214 litres per day. Having checked that she lived alone in her old house, I explained to HS5 that based on the figures from her old water bills, her water use had gone up a little, as the average then would have been around 205 litres per day.

*“But I’m here now in my new flat, with low flush toilets. How can this be?”*

I suggested we work through the water diary and look at the water appliances used. We could measure volumes and flow rates and see whether there were any adjustments she could make to reduce her usage and consequently, the amount she was paying for water.

According to HS5s diary, the first thing she did in the morning was take a shower. With two showers in the apartment to choose from, she chose the one that she enjoyed being in the most. The flow rate of this shower was 12 litres per minute. Although HS5 did not time the length of her morning shower she estimated it to be about three minutes (36 litres). HS5 washed her hands eight times each day (2 litres) and cleaned her teeth morning and night (0.75 litres). She flushed the toilet four times on the low, 6-litre flush (24 litres) and then in the evening had a bath (50 litres), which she claimed helped her to sleep. Other things HS5 did on a daily basis included washing up (10 litres), and hand washing delicate items of clothing (6 litres). HS5 used water for cooking and drinking (5 litres) and used the washing machine once a week, which averaged out over seven days to use 6.2 litres per day. There were roughly 74 litres each day unaccounted for.

Perplexed, HS5 showed me her main bathroom. We made a rough measurement of the volume of the bath and worked out that the evening bath would be at least 100 litres. The hand-washing bowl would need around ten litres for washing delicates and then there would be some rinse water required. Hand washing would also use slightly more water than assumed. Then HS5 brought back the old refrain of water saving.

*“As I said, I am very conscious about the amount of water I use. I watch Countryfile, I have seen how dry it is in other parts of the country. It’s a real problem for agriculture. Surrey is the driest.”*

I nodded in agreement, *“yes, and as you say, you are very careful with your water use.”*

HS5 continued. *“As soon as my parents went on a water meter, they told me I had got to be careful with water. It stuck with me.”*

I was sitting in an arm chair in the main living area and HS5 was standing in the middle of the room, waving her arms about as if to ram home the idea that she

could tell a large volume of water from a small one. Then she suddenly sank into the armchair opposite me.

*“What am I saying? I keep telling you I am so good with water when I am using so much!”*

*“So, do you have the manual for your washing machine? I think I can help you.”*

HS5 and I worked our way through the washing machine and dishwasher manuals and calculated the flow rates of taps and the volumes of sinks. After three hours we came to an arrangement. HS5 would not forego her evening bath because she felt she could not sleep without it, and so more drastic cuts would be made elsewhere. The daily shower would be reduced to three mornings per week. Hand washing delicate items would continue because despite modern washing machines having very good wash programmes for delicates, HS5 could not entrust her under garments to a potentially damaging machine. However, she could save the washing water and use it to flush the toilet. Washing up in the sink would continue because although she could load the dishwasher over a few days and then switch it on, saving around 30 litres of water, HS5 was not prepared to entrust some of her finer china to a machine. On this basis, we estimated that at least 25 litres of water could be saved each day.

HS5 continued to read her water meter (including the numbers after the decimal point for accuracy) for the next twelve weeks. Her total water use over the 84-day period was 15.2 cubic metres or 180.85 litres per day. I went back to visit HS5, to congratulate her on her progress. I asked her to think back to my first visit and her admission that she wasn't really a water saver, despite telling me many times during my visit that she was. I wanted to know what she thought was happening while she so desperately wanted to prove to me that she did not waste water. Was it a form of self-deception?

*“I suppose a good way of describing it would be a sort of expediency amnesia.”*

#### **IV Norwich1 (IVN1)**

IVN1 lived with his wife in a modest house. I reviewed his quarterly water bills

and their water use averaged out at 127 litres, per person, per day, which is just below the Defra ideal for 2030.

*“I’m over 70. We live in Egypt for half the year and water is a lot cheaper than it is here, and it’s all desalinated. Here, water just falls out of the sky and we always have a surplus. We’ve got water coming out of our ears! My daughter and her kids use water like it grows on trees! I remember when we used to heat up water for a bath in the copper. The energy for hot water has to be produced so I am careful with it. We’ve got a new shower. The old one didn’t have a thermostatic control so we had to juggle a bit to get it to the right temperature and that wastes water. It’s very good. I haven’t had a bath in over a year. I don’t use a hosepipe and I wash the car with two buckets; one to soap and one to clean off.”*

*“Do you think you can find any more areas where you could save water?”*

*“Well, it’s in our interest now to save because we are on a meter. I don’t think we could save any more, unless I take two showers, one indoors and one in the rain!”*

#### **IV Norwich 3 (IVN3)**

IVN3 lived with his wife and two children in Norwich. His answers to my questions represent the majority of subjects in the GT study.

*“I am asking people about the dry weather and whether it has made a difference to the amount of water they use. Do you know the volume of water you use each day?”*

*“I have no idea how much water we use. I know our direct debit is about £60 a month.”*

*“Have you noticed how dry the weather is lately?”*

*“We did have a dry spell of about three weeks. The water butts in the garden emptied and I started using bath and washing up water. I do adapt and use wastewater when there is no rain. I haven’t noticed a particularly dry spell apart from those three weeks. It rained then. I prefer not to use tap water on the garden but I will use it when other sources are exhausted.”*

*“You said you adapt to use wastewater when it doesn’t rain. Do you usually*

*have set habits for water use that you have had all your life?”*

*“I have adopted my own habits over the years.”*

*“Can you give me some examples of your water habits?”*

*“ I am 50 and when I was young it used to be one bath a week on Sundays. Now I shower once a day, sometimes twice. For luxury I have a bath twice a week and I might spend an hour in there reading. My boys both shower every day. They are 14 and eight. The 14-year-old would stay in there all day if he could! He’s not paying for it. It might be different when he has to pay for it.”*

*“Have you received any water saving information from your water company lately?”*

*“I don’t feel under pressure to save water but they do give good advice. Although some stuff is not useful - like putting a brick in the cistern - you don’t get the force of a full flush so you end up flushing twice! Mainly I don’t need their advice. I just use common sense, not gadgets. I’m fairly conscious of what we use. We aren’t excessive; we use what we need in a modern world.”*

*“If there was a really severe drought, say like in 1976 and the water company had to impose a lot of restrictions, is there anything you could do to save more water?”*

*“I would cut down to one bath a week – would still shower every day. I do know people who measure out a cup of water to boil in the kettle but that is a bit excessive. We’ve got two cars and we wash them both about once a month. First I rinse with the hose, then wash with a bucket, and then rinse off the suds with the hose. I use this method because it is convenient. I know the water meter is whizzing around as I do it!”*

*“Aren’t you concerned about how much water you are using and the cost?”*

*“Things are changing. Australia is running out of water in 10 to 20 years. We tend to see things in our own lifetime. We will have to develop ways of storing water – my lads will do this when they are my age – in 10, 15, 20 years, attitudes will change; bigger population, more demand. Everyone is intelligent, if they are paying for it. Water isn’t really expensive if you take into account the amount of treatment it has.”*

### IV RTW 3

IVRTW3 was in his front garden when I delivered the water questionnaire. He was tending a spectacular display of bedding plants. I handed him the questionnaire, explaining briefly what the questions were about. Then I decided to ask him about his garden.

*“You have put a lot of effort into this wonderful display.”*

*“Well, it keeps me going. I do it every year. I like to follow a colour scheme normally but this year I have just gone for the rainbow!”*

*“It is very impressive - all these lovely containers - have you had to do a lot of watering this year?”*

*“Have to every year.”*

*“Do you do it by hand?”*

*“In the back I use the hosepipe but it doesn’t reach out here. Come and see what I’ve got.”*

He beckons me over to one corner filled with tall barrels overflowing with petunias. He peers over the top and makes hand gestures to get me to look closer.

*“I’ve got all these hidden water butts. I’ve got them attached to the neighbour’s downpipe – he doesn’t know – I’ve got them nicely covered with this mesh and climbers and things. They keep me going during a hosepipe ban. We have one every year. You wait. Soon they’ll bring one in.”*

For a brief moment, the sky goes dark and light rain begins to fall. A young man walking down the street stops, looks to the heavens, opens his arms wide and calls out *“Ah, at last!”* I say goodbye to the secret rainwater stealer and carry on to the next drop off. The rain only lasts a few minutes but it is enough to trigger a flurry of activity in IV RTW4’s garden.

### IV RTW 4

I am just posting the questionnaire through IVRTW4s letterbox when a voice from behind says:

*“Can I help you? We were in the garden.”*

A little startled I explain why I am delivering the questionnaire and I am invited to view the garden. IVRTW4s wife is hurrying back and forth with buckets drawn from a row of water butts at the side of the house.

*“Do you need to do that now it’s raining?”*

*“Well, we think deep watering has a greater impact so when we have a little bit of rain we empty the water butts as well. We know they will re-fill and the garden gets a really good drink.”*

The garden is exceptional in terms of design and variety of plants.

*“Our son is a head gardener. He brings home lots of exotics.”*

*“Do you ever use a hosepipe?”*

*“No, we don’t, our son is very strict about this. He’s into the environment. We’re not on a meter so it wouldn’t cost us more but I think the plants fare better with rainwater anyway. But you know, if they bring in another hosepipe ban this year I will go indoors, draw the curtains and turn all the taps on and let them run all day and all night. I think it’s outrageous that they can’t provide enough water. IV4 RTW gestures towards the housing estate beyond the end of the garden. When we first moved here all that was open fields. We’re just trying to accommodate too many people.”*

## **HS9**

HS9 is a single parent with a teenage daughter.

*“There’s just the two of us but the water bills are really high. If they bring in a hosepipe ban this year I will bloody well refuse to pay the bill. They can’t have it all ways. If they want to make excessive charges for their service then they will have to provide the service and make sure there is enough water to go around regardless of the weather!”*

## **DM4**

DM4 is supposed to be working on a water saving strategy. He has joined a conversation I am having with one of his junior colleagues. Having introduced himself as the team leader he can’t wait to tell me about his water habits.

*“I’ve got four kids and I keep a tight rein on their water use. I shower every*

*day but only for a couple of minutes. We have every water-saving device available. I have kept a record of our water use on a spreadsheet for several years. I can share it with you if you like.”*

Thank you that would be really interesting. So, if you are able to keep your water use very low, what plans do you have in your strategy for getting other households to do the same?

*“Well, we don’t really have a plan. I mean, we thought that the Act on Co2 campaign would really scare people into using less water and less energy but it has been an absolute failure. We realise that now. But we don’t have anything else in the pipeline if you’ll excuse the pun. We’re waiting for next year’s budget. It’ll probably be about £1.5 million. In the meantime we’re commissioning more research. We want to know how best to get our message across. At the moment nothing really works.”*

“Oh dear, does this mean that you are unlikely to be able to meet your water use reduction target?”

*“Well, we don’t have targets any more. We have aspirations.”*

### 6.3 Influencing Water Habits

In this chapter I have brought to the reader details of personal water habits, and individuals’ observations and considerations regarding these habits and the environment. In some cases the behaviours discussed are those that it is considered important to alter for the sake of the environment and long-term viability of water resources. In this section I will try to place these observations in context with aspects of research designed to explore habitual influences. I am particularly highlighting the psychological concept of intrinsic satisfaction, which I believe I experienced during my water saving experiment.

At the start of this experiment I was aware of my strong water habits, practiced over many years, and I wasn’t all that interested in changing them. I didn’t think I needed to. My water saving experiment was done at a time where there were no obvious external influences to conserve water. There was no drought or water scarcity of any kind, no evident public water-saving campaigns being run

and no enforceable penalties – financial or otherwise – for using too much water. I was not prompted by others to conserve water but instead had to rely on an “*intrinsic motive to conserve*” (De Young 1996) triggered by an interest in this research. Only achieving one third of the anticipated water savings was mainly due to automaticity of behaviour and an unwillingness to abandon a behaviour in favour of a less comfortable alternative.

De young (1996) notes that these intrinsic motives can be nurtured and intrinsic benefits are self-reinforcing. A motivation to reduce the number of loads of washing I did each week led to my self-motivating to reduce the number of towels I put for washing that led to the self-motivation to switch from towel drying after a shower, to using a bodyflick. The overall positive effect was enjoyable, even exciting, and served to reinforce the notion that water conservation can be a positive activity. In contrast, HS1 and 2 were not going to experience that intrinsic satisfaction because they were not interested in saving water and saw no need to.

Looking at my water company’s charges, a saving of 25 litres per day represented a financial saving of £40.29 per annum or 77 pence per week. Presuming all the water saved was hot water I would also have reduced my gas bill by between £8 and £15 per annum (15 – 28 pence per week), depending on the tariff. Whilst it was pleasing to save money, this does not represent a significant external influence but for HS3 and HS5 it was the only motivating factor for water saving.

### 6.3.1 Building on Intrinsic Satisfaction

A lot has happened since I wrote my water diary. Jay and I have moved from our rented apartment where we were not in a position to alter the plumbing arrangements, into a new home that we have built ourselves. We have done our very best to make our new home one that is conducive to water saving. Our bathroom is a heavily insulated and properly ventilated capsule where the temperature never drops below 21 degrees Celsius. The bath is the smallest on the market, with a volume of only 80 litres, which we never use. The shower

over the bath is a modern, water-saving model that is very attractive looking and has that power shower feel but only flows at six litres per minute. Because the bathroom is so warm, switching off the shower whilst lathering up is quite comfortable and because the sink tap is a very high quality mixer tap with aerated flow, and situated right next to the source of hot water (a solar thermal store), it always runs hot in a few seconds. The bathroom sink is also almost conical in shape rather than the very broad, shallow sink at the apartment. Because of this, one needs to run very little water to achieve a level in the basin that is suitable for washing. As a result we will very often have a strip wash at the sink rather than a shower.

We have a dishwasher that only uses nine litres of water to wash eight place settings. Although I have a very nice pottery dinner service, the thick nature of the plates and bowls mean they don't fit the dishwasher very well and are sometimes too close together to get clean. Rather than resort to bowl washing, I recently purchased £20 worth of bone china at a second hand stall and the slimmer plates and shallower bowls fit in the dishwasher really well and come out sparkling clean every time. We still have a washing up bowl but it is used very occasionally. The bowl is about half the size of the one we had before and is made of flexible rubber. This means we can wash large, odd-shaped pans in only six litres of water, because the bowl will stretch to fit. We have kept our old washing machine because we have found that a 35 litre, five-kilogramme wash is still very economical in comparison with most new models on the market. I always wear an apron when cooking and I save 'dirty' clothes for gardening in, so I don't wash my clothes so often.

We have got rid of our mop and bucket and invested in an e-mop. This is a microfibre cloth that adheres to a flat plate on the end of a long handle. I rinse it in cold water and no detergent of any kind is needed. I wring it out and then massage the floor with it. The fibres collect dirt and bacteria (according to the marketing information from e-cloth) and I use less than four litres of water to wash all the solid floors in the house (approx. 80 square metres). I also use e-cloths for cleaning the bathroom and the kitchen because I then don't have to use any special cleaning fluids and if I don't use special cleaning fluids, I don't

have to rinse off the residue. We have imported toilets from Sweden that have two flush options: three or six litres.

I keep a watering can outside the back door that I pour vegetable washing water into for use on the garden. I have planted some fruit trees and each one has a watering tube (a piece of ducting filled with gravel) where I pour water from the can, straight to the roots, when the weather is very dry. The south-facing part of the garden is planted with drought tolerant plants that I don't need to water, although in establishing the garden we have had to use some potable water on very dry days. Our water use is now down to 77 litres per person, per day. Our next water saving project will be to install a large 800-litre capacity rainwater tank in the garden. We will use the stored water to wash our kayaks, bicycles, and car. We may soon get our water use down to Gleick's recommended 50 litres per person, per day (Gleick, 1999). I still feel awkward standing in the street reading the water meter but I enjoy watching the number of cubic metres we use each quarter going down, and get quite excited when our water bills arrive. For me, water saving has become an enjoyable experience. I feel I am working in partnership with design and technology and the result is a happy and hygienic existence.

#### 6.4 Discussion

Because they are heavily regulated, water companies are not able to price their commodity relative to its scarcity and so as a customer I am assured (possibly falsely) of continuity of protected supply. Having read the self-reports of water saving in the questionnaire responses and spoken to water users about their habits and attitudes towards water saving, I can see that Government and commercial advice on ways to save water appears to be relevant and applicable, and all of the members of the public I encountered for this research were able to list several water-saving actions that they could take. However, as I have shown, there are more ways of saving water and the best results come from combining water saving technologies and products with new ways of doing things, in a very personal recipe.

For me, prohibition and punitive pricing by my water company would undoubtedly have resulted in reduced water use to a point, just as it would in most of the households I visited, but no such restrictions or inducements were in place at the time. Whilst I had a better understanding of the global water commons as a shared resource than the individuals in the home water study, it did not make me a water saver. I had to work hard to become one and once I had, I benefitted not just from lower water bills but also a feeling that I was having a positive experience that made my life more enjoyable. De Young (1996) has argued that it is better to harness intrinsic satisfaction rather than use coercive measures to invoke environmentally positive behaviour. In this case, the most powerful motivator for change was the personal satisfaction of saving time, energy, detergent, and money, as well as water.

All the subjects revealed in this chapter had their own personal recipe for using water to do tasks, and they relied on dependable ingredients to guarantee a satisfactory outcome for themselves. Some of these dependable ingredients were water appliances that could have been upgraded or replaced so that a certain amount of water saving could have taken place without any alteration to habits. Few subjects were motivated to investigate these technological fixes. Subjects' resistance to change, whether to a more economical wash cycle or a less powerful shower was very strong, and their loyalty to existing habits appeared detached from a general view that water is expensive and they would like to save money where possible. In the minds of many, water fell freely from the sky and subsequently ran into their homes, there would always be plenty because it was always falling, which, considering the fact that all these conversations took place during a building drought phase, seems implausible, but nevertheless, is true. The most effective water savers in this study were keen to save money by using less but their achievements were limited by lack of investment in new technologies (whether by them or their landlords), and adherence to habitual practices.

In the next chapter I present my grounded theory, which is derived from systematic coding and analysis of all the primary, and secondary data collected from questionnaires, oral history events, focus groups, home visits, doorstep

conversations, and telephone interviews. Whilst some examples of typical behaviours are used to explain specific properties and categories of the theory, it is void of direct references to these methodological explorations and specific subjects therein.

If the reader is concerned to ask why I do not simply continue to describe individual encounters with subjects until all my material is exhausted, then I must explain that this is strictly not a GT activity. Although I am certain more of these experiences would be very interesting to read about, the presentation of data in this chapter limits my ability to compare, analyse, and make sense of the subjects' behaviours and opinions. For me it is important to lift the data up to a conceptual piece that incorporates all of the verbal and visual encounters, rather than resort to cultural classifications and very probably, the development of yet another segmentation model. Using the GT method I can explain in far fewer words, simple concepts that relate to all water users. However, this chapter has allowed the reader a glimpse of the back-story to the theory and the types of conversations and activities that led to its development.

## Chapter Seven

### 7. Blind Belief in a Commodified Natural Resource – A Classic Grounded Theory

*The word theory has the same Greek root as theatre. Both are concerned with putting on a show. Theory in science is no more than what seems to its author a plausible way of dressing up the facts and presenting them to the audience. Like plays, theories are judged according to several different, and barely connected, criteria. Artistic content is important; a theory that is elegant, inspiring, and presented with craftsmanship is universally appreciated but hard-working scientists like best, theories that are full of predictions, which can easily be tested. It matters little whether the view of the theorizer is right or wrong: investigation and research are stimulated, new facts discovered, and new theories composed. (Lovelock, 1995, p41)*

#### 7.1 Introduction

Classic Grounded Theory emerged in the 1960s from a six-year study of nursing and medical personnel caring for terminal patients in hospitals in the San Francisco metropolitan area. In the case of dying patients a new approach was needed to thoroughly explore such a delicate topic. As a result, careful observation of social interactions between physicians, nurses, patients and their concerned relatives led to the discovery of a new methodology and a new theory of awareness. This theory is cleverly documented in the monograph, *Awareness of Dying* (Glaser & Strauss, 1965), which, despite the subject matter, is essential reading for any social researcher who feels mature enough to want to break new ground with their work and to engage with the process of “*discovering theory from data*” (Glaser & Strauss, 1967, p1) rather than selecting data from their research that verifies existing theories. I say mature because it requires a steady determination and belief that if one spends long

enough observing and interacting with subjects that a theory will emerge. A younger researcher might not have the patience to complete this task.

Classic GT provides an excellent example of a circumstance for which more commonly used methods of analysis in social research are inadequate. By circumstance, I mean to describe a situation where direct questioning may not be appropriate as discussion of the topic might break an established taboo. Glaser and Strauss knew that it was not going to be appropriate to challenge people directly about their awareness of their own mortality. Instead they used field notes taken on the wards by observers, who were able to view the scene around a patient and crucially to record both what was said or done and not said or done, and who was involved. These recorded scenes provided a wealth of data for analysts that were not confined to the view of one actor in the scene and therefore provided a depth of quality that is usually absent in work that is based on collections of materials from individual respondents.

In this research, the decision to use Classic GT developed over a period of time during which I had begun to feel that studies attempting to bring environmental and social aspects together did not fit comfortably under the banners of either qualitative or quantitative research. The common alternative - a standard mixed method study - I also felt would leave the researcher wanting, when studying an area where the presence of alarmism and skepticism affords individuals to make light of the core topic (climate change), just as one might make light of the subject of death or dying, or prefer to focus on other deaths than the prospect of one's own demise. As someone who has spent time with a dying relative in hospital, in reading *Awareness of Dying*, I could immediately identify aspects of the awareness theory that I had observed and experienced myself. This is because Glaser and Strauss chose not to research and verify facts but to do research and explain the findings. The emphasis in this case is on explanation rather than description, which is an important distinction to make, as inductively developing a theory requires one to move from description to a conceptual level. Therefore, what follows in this chapter is not a descriptive piece underpinned by quotations from interview scripts but an explanation of the relationship between household water users and water, in the context of

scarcity and drought, which I hope will display the qualities insisted upon by Glaser; that of *“logical consistency, clarity, parsimony, density, scope, integration and fit, and ability to apply”* (Glaser & Strauss, 2010, p5). In particular, it is my expectation that the theory will be suited to its supposed use in relation to drought and water management, and so the reader must understand that this theory is unique to southern England and may be generally applied to one specific class of social units, namely water users in urban domestic households. This presentation of the theory of blind belief in a commodified resource is in the discussional form, to indicate that it is *“ever developing”* (Glaser, 2010, p32), and others are welcome to build upon it as society develops.

In some respects it is disappointing that the theory of awareness is so recognisable today, as the primary purpose of its development was to *“contribute towards making the management of dying – by patients, families and health professionals – more rational and compassionate”* (Glaser & Strauss, 1965, viii) and as I have identified so easily with the theory it is clear that its value has not been exported to the UK with much success. However, in contrast, a combination of collective will, technological, moral, and social development could make the theory of blind belief in a commodified resource unrecognisable, in a short time, if there is a concerted effort to alleviate the pressures on fragile water systems from increasing populations, climate change and environmental degradation, through systematic attention to the core properties described below. If the reader sees him or herself in this theory then I will consider my job to have been done well. If the reader sets out on a path of re-examination of the micro-components of their water use, having read this theory, then this will be an even better outcome. Water is after all, an essential, environmental resource, that we are privileged to have access to.

#### 7.1.1 Jumping In

Just as everyone dies, everyone needs water. However, not everyone wants to talk about dying and very few people want to talk about their uses of water or to be observed whilst using it. In most dwellings in England, a great deal of water

is used by individuals behind closed doors, in the privacy of the bathroom or water closet, in the kitchen, and also more conspicuously in the garden. For this Classic GT study I set out merely to find out more about what water users chose to do with water in and around their homes in times of scarcity. There was no structured plan other than to maximise my chances of talking to as many adult water users as possible and to make sure they felt comfortable in speaking at length about their water habits. The absence of a formal plan or structure is critical in a Classic GT study, where the process of collecting data in one setting has a direct bearing on the next opportunity. My intention was to discover a theory through application of theoretical sampling and the constant comparative method, analysing and altering techniques and subject sources, allowing the theory to emerge as the work progressed.

It was not my intention to collect a bundle of data from a pre-determined sample of subjects, and then to code and analyse transcripts of interviews. Interview subjects would be self-selecting at first and as coding and analysing would begin after the very first encounter, new sources of data would be sought as themes and properties emerged from the analysis. By maximising the number of opportunities to access individuals in their home environments I was maximising the number of opportunities available to me to visit and re-visit scenarios and ideas with subjects until I felt I had asked all the questions I needed to. The method also allowed me to regularly review my methods and to adjust them to fit the situation and to incorporate new lines of questioning as patterns began to emerge. The study would end when I was certain that saturation had been reached (where in this case it became impossible to unearth any new opinions, habits, patterns or situations). Therefore, the data already collected through work on oral histories of past droughts and the free-box data set from the Royal Tunbridge Wells, Norfolk, and Barnstaple questionnaires, were classified as secondary data for the purpose of developing the theory. As a secondary source, I used these caches of data to distinguish between properline and authentic responses, the former being what subjects assumed I would like to hear, and the latter being the frank utterances of subjects who were at ease and happy to reveal their least appealing and oddest

habits alongside behaviours that would be applauded by any organization promoting resource-saving activities.

The theory I shall outline at the end of this chapter is based on 35 home visits; planned and un-planned, 22 telephone interviews, and numerous un-planned conversations with strangers, conducted whenever I had an opportunity to do so, which was mostly whilst traveling on public transport, to and from the sample sites. Before revealing my theory in the next two sections I will describe the development of the study and the techniques that I deployed in line with the Classic Glaserian methodology and then move onto describing some of the tools and abilities I needed in order to complete successful home visits.

## 7.2 Notes on the Classic Grounded Theory Methodology

The simplest way of distinguishing between a Classic GT study and a mixed method study is that prior to entering the field, the process and direction of the fieldwork is not carefully planned. There is no definitive list of interviews to collect or a set of interview questions. This is deliberate to allow the theory to emerge from the data and is in complete contrast to a standard mixed method study that attempts to identify aspects of the data that support existing theories and similar studies. Verification is specifically not the end goal of Classic GT. Discovery is of primary importance and leaving one's concerns and ideas behind and approaching encounters with an open mind is of paramount importance, if a theory is genuinely to develop from the fieldwork. My preparation for this task was unusual in that all my efforts were directed towards avoiding reading in the substantive area so I would not be tempted to force my ideas onto the data, and setting up as many opportunities to talk with people; about how they use water, the dry weather, drought, and climate change. This is a very isolating task and to begin with I felt very odd but I can honestly say that every encounter I had with subjects was relaxed, enjoyable, and deeply interesting and I soon managed to stop feeling self-conscious and generally awkward about what I was doing, although the mantle of 'the water lady' as I was often referred to took a while to adjust to.

Barney Glaser is the discoverer and primary promoter of Classic GT (CGT) and through his dogmatic stance against those who seek to alter the basics of CGT to suit their preferred approaches he leads a small but growing number of promoters from his Grounded Theory Institute in Mill Valley, California. Having 'discovered' CGT almost 50 years ago, he still writes prolifically on the subject and organises seminars for budding theorists around the world. The fact that Glaser has started his own movement and developed a new paradigm to work within, that he fiercely protects, is understandable. It is not easy to 'get' CGT and once on the road to a theory it is very difficult to stay on track. There are lots of tempting shortcuts and alternative methods of analysis that can prove more attractive when things get tough.

According to Glaser (1978), there are three specific stages a researcher will go through while collecting, coding, and analyzing data:

- Input - when one is completely absorbed in the collection and reading of field notes
- The drugless trip – the memo phase when one sifts and sorts the coded data and mentally flourishes, writing down endless ideas and observations.
- Saturation – when the trip is over and nothing new is forthcoming. The work looks decidedly dull and memories of the exciting input phase begin to become a bit hazy.

These stages are punctuated with depression, a deep emotional trough one slips into when the drugless trip comes to an end; and writing, when some time after saturation; one feels able to begin to piece the theory together. The depression is particularly difficult to deal with because one of the few golden rules of CGT is not to talk about one's research with others, to avoid breaking the first golden rule – forcing one's own ideas on the data – by elaborating and imagining a theory that does not really exist. Having deliberately cut oneself off from anyone likely to enquire about the status of the research, the only thing to do is tough-out this lonely and miserable phase alone.

### 7.2.1 The Sampling Method

Because it was not possible for me to sample the whole population of water users in England, CGT stood out as a methodology that would be appropriate for this research because it required me to become immersed in the field i.e. to get to know water users. I felt I stood a good chance of getting to know a broad mix of water users, providing I found the right method of contact. Using the questionnaire to recruit individuals to the home water user study worked well by bringing me into contact with 57 people whom I did not already know. Each of these active participants in my research had their own personal water use regimen, and most of them were very happy to talk frankly and openly about their water habits, and during home visits they were also very happy to show me all their water appliances and to demonstrate how they used them. I could never have captured all that I was able to observe and everything these individuals told me, in a questionnaire. I would not have known what to ask. I became immersed in the field for a considerable period of time, watching and listening by day, and then coding my field notes line-by-line in the evening. In using the constant comparative method, I quickly began to see patterns and these directed me to pursue new lines of enquiry. To begin with, for each encounter I crafted an increasing number of questions and then, as the patterns emerged, I found my field notes getting shorter and shorter as so many of the habits subjects had in common with each other could be noted down in a couple of words and all of the properline addresses could be summarised in a simple code. For example *"I never leave the tap running while I am cleaning my teeth"*, could be shortened to 'Tap-Teeth'. Discussions over decisions on when to flush the toilet could, in the main, be reduced to 'Mellow-Yellow' and so on. Then, I began to ask fewer and fewer questions as the same substantive codes emerged from my notes, visit, after visit, and as such the process was automatically de-limiting.

All of the conversations and home visits were unique and I probably could have continued enjoying the process for a lot longer and discovered yet more theories. However, for this research, time only allowed for one. The fact that each encounter has a bearing on the next makes the process exciting but a

difficult one to document and explain. My aim was to continue to collect data until I reached saturation. Saturation occurs when no new data relating to the substantive area of research is forthcoming. If I had mistaken the properline answers to my questions for the truth, then I would have reached saturation after about a dozen encounters but I soon realised that if I watched people doing things with water, their properline address was far removed from their actual habits. This is not to say that subjects were deliberately trying to deceive me. In all cases they genuinely believed that saying something meant they would do the same. However, it rarely worked that way.

I can honestly say, that as predicted, I experienced all of the stages described by Glaser during the development of this theory. The data collection was exhilarating. Never knowing where I would end up, or what I would find, and reveling in the results was extremely satisfying. Being freed from the constraints of taping and transcribing interviews was also a pleasing aside. The ideas flowed so fast and so well, I was indeed heady with excitement at times, and then when I was faced with the uphill struggle to write and re-write my theory until it was so lean, it seemed too simple for words, I was certainly depressed. Attending one of Barney's seminars provided some very helpful light relief and the opportunity to share my data with other grounded theorists, who rapidly analysed what I had, and showered me with their own, un-tainted observations. It was Dr Judith Holton, who noted there that all the subjects in the study seemed to have blind faith in the availability of water and this is partly where the title of my theory originates. Reading Barney's books on CGT method was also extremely helpful in keeping my mind from wandering from the process. However, much of the work on a CGT is done in the subconscious whilst cycling other, less demanding work, which in this case was the development of the drought histories that have been presented in chapter four and the delivery and collection of household questionnaires, presented in chapter five.

### 7.2.2 Preconscious Processing

Analysing data in the CGT process appears to be quite an outdated process. No complex computer programmes are needed. All one needs is pencil, paper,

and time. This is because the process is heavily reliant on pre-conscious processing (Dixon, 1981), the mental sifting of data in the mind, that is triggered by perception without conscious awareness. This is why seeing as well as listening was so important in this study. Although I made very good field notes, there was much more information available to me that was accepted by me mentally, without my noticing at the time. According to Dixon (1981), the main advocate of preconscious processing, at night, while you are asleep, the content of consciousness in your brain is shifted from what is perceived to what is remembered and it is then that you begin to make sense of what you have experienced. This processing method makes the sifting and grouping of all the coded data much easier, as when one views all the notes and codes spread across the table, it can feel as though it is impossible to manage. However, after a good night's sleep, complex memos identifying patterns suddenly spring to mind. I kept a notepad next to the bed throughout this process, and it was worthwhile doing so. Memos therefore are probably the most important part of doing GT. They add a layer of material that brings all the actions of subjects into focus rather than simply the dialogue. They are triggered through mentally playing back whole scenes rather than re-reading lines of text. It is only then that the researcher can interpret what is really happening rather than simply what is being said and there is often a great difference between the two.

Preconscious processing often takes place when you are occupied on other tasks. This is why Glaser advocates cycling CGT with other projects and I was able to use the collection of drought histories as a way of removing myself from the data for a while. I also found I could write at least half a dozen memos during a presentation on an unrelated topic. Concentrating on someone else's research appeared to free space in my brain to process some of my own data. Barney Glaser apparently finds that watching television helps him to process information. Sometimes this worked for me and sometimes it did not and consequently I believe that successful processing whilst watching television requires the programme of choice to be pretty dull and uninteresting otherwise one gets too involved to be able to let ideas surface mentally. Overnight is also not always enough time to process field notes and memos. I would put my work away for several weeks and then return to it and view it in a completely different

light. I likened the process to maturing cheeses. Every so often I would turn the cheese, or in this case, open a drawer, pull out the data, sift through it and put it back again. After a while it matured into a theory. If the reader struggles to believe in this process, then I suggest a good way to test preconscious processing is to attempt a crossword puzzle before bed. In the morning you are very likely to know the answer to any clues you could not break the night before. While you have been asleep, your brain will have continued to mull over the puzzle and work out the answers. What I learnt from this process is that the harder one tries to explain something or to find the answer to a question, the less likely it is that a satisfactory explanation or the right word can be found. Remaining detached and abstaining from judging the evidence too quickly allows one to process the available information more effectively, to generate an answer with very little conscious effort. This is why remaining detached from the subject and trusting that one will be able to make sense of what is happening without having to make judgements based on other theories is so important. Through CGT one finds the ability to believe in one's own abilities in spotting latent patterns that are not immediately obvious. There is no place in CGT for verification. Once a pattern is observed it is committed to the theory without critical engagement with other theoretical works and this is only possible if one believes that preconscious processing actually works. I do but the reader is invited to make up his or her own mind.

### 7.2.3 Theoretical Coding

Theoretical coding in a Classic GT takes place when one begins to identify patterns of patterns, taking groups of substantive codes and identifying the links and similarities between them. A good way to perceive how this works is to consider throwing a pack of cards in the air and letting them fall to the ground. To reestablish the pack in order, the process of firstly spotting the different suits takes a while but very soon you have four neat piles of cards. The suits in a GT are much the same as groups of theoretical codes. For Glaser, as a sociologist, the process of theoretical coding is reliant on a professional knowledge of commonly used theoretical codes. I am not a sociologist and so I was relieved to find a helpful list of theoretical code 'families' in the book, *Theoretical*

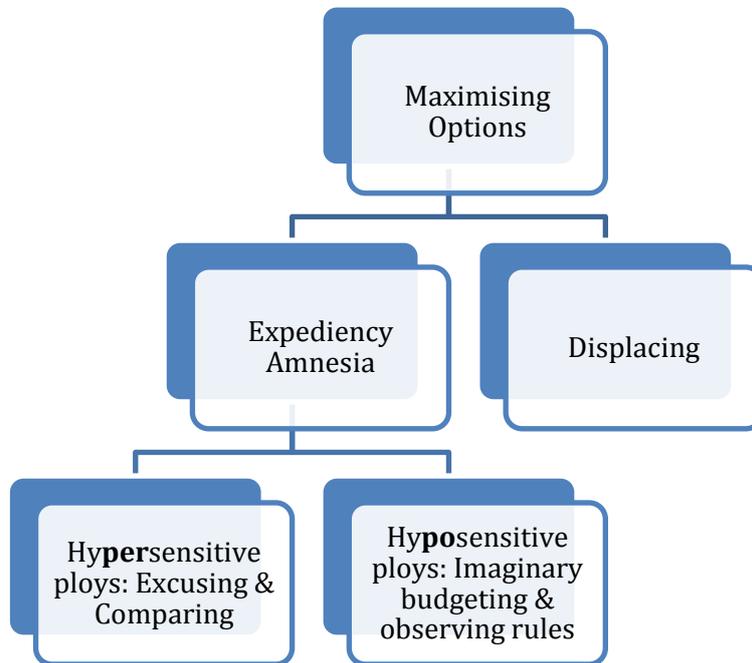
*Sensitivity* (Glaser, 1978). The codes that provided the best fit for my data were taken from the strategy family (Glaser, 1978, p76), - *strategies, tactics mechanisms, managed, way, manipulation, maneuverings, dealings with, handling, techniques, ploys, means goals, arrangements, dominating positioning*. Viewing the substantive codes from a strategising perspective helped me to distinguish when subjects were consciously deploying a strategy for my benefit, to maintain the properline as opposed to the moments where the let details of their actual behaviours slip past. If one takes a moment to look back to HS 5 in chapter six (p237), I had to wait for around three hours to get past the properline and then only fleetingly. I had much more success on a subsequent visit. I theorised for a while that subjects' main concerns might be to maintain the properline of water saving when questioned about water during a drought but eventually it was possible to leave the sociological codes behind and concentrate on developing my own set of codes around true main concern which is to maintain consonance with the idea of water as a dependably available commodity at all times. These codes helped me to identify causal loops whereby one coded action would link directly to a string of codes which from that point forward could be grouped into a category, and from there become properties of that one category, just as the pack of cards arranged in order, by suit. This is how one delimits the information into a recognisable substantive theory and the point at which the euphoria of discovery is swiftly replaced with anxiety and doubt when suddenly, the simplicity of the theory becomes obvious and one feels as though one is about to present to one's peers, something akin to the emperor's new clothes; a new theory that is so obviously recognised by water users that it hardly seems new or indeed interesting, it is simply the naked truth, without embellishment.

The diagram below describes the simplicity of the final theory which is comprised of one core category (the core activity of subjects who are anxious to deal with their main concern), two sub categories (the key actions that subjects engage in to deal with their main concern), and four distinct properties relating to one of these sub-categories which represent the changing behaviours of subjects that are dependent on external influences and personal preferences. In this pack of GT cards there are only two suits and they are not evenly matched.

The full theory is conceptualised in section 7.4 below and so I reserve any further explanation to that point.

Diagram 7 a)

The core category, sub categories and their properties relating to the main concern (the problem) of maintaining blind belief in fluctuations in the weather, that naturally balance out over time.



### 7.3 Working in the Field

One can be confident in the method of CGT but until one is in the field, it is impossible to know how successful one will be in discovering theory. Glaser suggests that a good way to start discovering theory is to interview oneself. I had already, at an early stage in this research, carefully analysed my own water habits and so I had a good idea of the tools I might need to explore water use with other people. I felt a good ice-breaker with the home study group in Plymouth would be to read the subjects' water meters and to return a couple of weeks later to take a second reading. I would be able to calculate their fortnightly water use and get to know them by briefly introducing myself on the first meter reading visit and then having a more detailed discussion on my return for the second reading. I did not indicate to participants for how long I would continue with fortnightly readings and this meant I had further

opportunities to return to gather more data. Although this might seem like a slight deception, the actual water data was a great help in positioning water users against their own estimates of home water use volumes and it proved a good way to start a conversation once I had reminded myself what the study was for as it is very easy to get distracted and focus too heavily on water consumption rather than general water behaviour.

### 7.3.1 Setting off in the wrong direction

It is important to explain at this stage that my quest began from a completely inappropriate position and was substantially adjusted after the first interview and it is worth briefly explaining why. With what was anticipated to be several months of primary data collection ahead, after the first interview I became extremely concerned that I might end up with a theory about something other than water use. This was because CGT is commonly used to research a problem. The problem, that I had originally intended to research, was the one presented to me in discussion with industry insiders and staff from various Government departments responsible for water, and also by representatives of OFWAT and Water Wise. The problem was over use of water and naturally, when water is scarce, this is considered by all these people to be unacceptable behaviour. It was apparent at that time that the task ahead was clear cut, in that the study would be worthwhile as it would result in a theory that would help these poor individuals (the public), to cure themselves of their inability to know when enough was enough. This was implicit in the original PhD proposal, and in discussion with the project supervisors, and was foremost in my mind when I first set out.

It was common knowledge, or so I assumed, that individuals always used more water than they needed. However, within minutes of starting the first interview, I realised that the phenomenon of over consumption is the problem of water companies, environmental regulators, and Government departments. It is not the problem of water customers in their homes. They have plenty of problems, but as will be revealed as the theory unfolds, over-using water is not one of them.

This is a point of perspective. From the perspective of the home water user, there is no motivation to examine personal water use from the position of whether it is generally at a fair and acceptable level in the minds of others. Without rationing in place, this situation never arises. This is a classic example of how CGT can turn a situation on its head and open it up for examination from a completely new position. Whilst this embarrassing mistake brought me to my senses very quickly, it served to eliminate any possibility of forcing the data. Although to me, it was slightly unnerving to approach individuals without a clue what to say, other than, *“I would like you to talk to me about how you use water”* this approach worked perfectly well, and interviews were even more fruitful when the subjects were observed doing tasks with water at the same time. Most commonly it was possible to hold a discussion whilst the subject was doing the washing up, or loading the dishwasher or washing machine. However, other activities included garden watering, bathing the baby, washing the car, emptying and re-filling a garden pond, hand washing garments, and cleaning windows. All of the planned household visits incorporated tours of bathrooms, cloakrooms, utility areas, and kitchens.

### 7.3.2 Having the Correct Tools and Demeanour for the Job

Having the right personality for the role of interviewer is always very important. According to Glaser, the purpose of interviewing in CGT is to *“instill a spill”* (Glaser, personal communication, 2011). One needs to reach this point in order to get below the properline. Generally, once an interviewee feels relaxed enough to share ideas, information, and details of water practices that would not usually surface above the properline, the only limit to the flow of information is time. At some point, it will be judged by either the interviewer or the interviewee that it is time to stop. The length of time spent with subjects for this study varied considerably from between 45 minutes and three hours. The time expended was dependent on how long a subject had set aside for the visit and how comfortable they felt discussing water habits and opinions. It is hard to describe the qualities of someone who is capable of instilling a spill but certainly having an open and honest nature is important as well as expressing genuine interest

in viewing bathrooms and plumbing fixtures, and listening to subjects' habits, rituals, and beliefs and their connections to water.

There are also some practical tools that were exceedingly helpful for home visits. Alongside a notebook and pencil, I took a calculator, tape measure, plastic two-litre water jug, suspension scale with a hook, and a stopwatch, to subjects' homes. These tools were needed to quickly calculate the flow rates of taps and showers, to weigh bags of washing, to calculate per head water usage rates from subjects' water bills, and to roughly quantify the volumes of baths, bowls, and toilet cisterns. These objects were not always routinely used but when subjects were keen to discuss their water habits in detail, authoritatively, it was important to be able to assess the quantities of water that were being used. Doing something practical such as measuring the flow rate of a shower provided additional opportunities to probe deeper on the topic in a way that would not have been possible with a carefully scripted interview. Crucially in this case, it also provided an opportunity to assess the plumbing arrangements in homes, which had a direct bearing on the water practices of household members.

This is an area that deserves further systematic investigation. Prior to this study I had not paid much attention to plumbing arrangements in different households but my time spent looking at the ranges of sanitary ware, the complexity of plumbing arrangements, and the vast array of water appliances and water heating systems in homes in this study leads me to conclude that a lot more can be done to advise and assist householders in improving their water systems to save time, energy, water, and money. This is where CGT is limited in terms of inability to provide a comprehensive overview of an integrated system. The emergence of a conceptual theoretical piece comes at a price and does not allow in this case for a detailed analysis of sink sizes and shapes or shower head models, even though investigation of these things would be immensely helpful.

### 7.3.3 Refining the Interview Technique: The Properline

The doorstep conversations in Tunbridge Wells allowed me time to experiment with my interview style and general approach. To develop a credible GT one must search above and below the properline. After the third interview, a pattern emerged and the key properline dialogue became apparent. As such, home and garden water users automatically consider themselves to be the very best kind: automatic water savers. These subjects profess to be pre-programmed to treat water with respect and only to use what is needed. By only using what they need, they eliminate the possibility of wasting water. They are, by default, water savers. When asked to quantify their basic water needs however, subjects are unable to define what would be considered an essential daily amount of water they would use. There are no prohibited activities. Every water activity counts as a need. None are considered outside the daily notional water ration of “*enough*”.

If one asks a person about water saving they immediately move to establish their credibility as a conscientious water user through a positioning statement. This is firstly done by emphasising that they do not waste water and they observe various doctrines such as not leaving taps running, and by comparing themselves against others. Typical others include children that spend too long in the shower, or neighbours who use sprinklers. Others will position themselves as speaking from a position of authority and experience having lived, worked, or visited a hot, dry country and thereby gained an understanding of what it means to live with less water. Examples given by subjects included water recycling in Egypt, absence of flushing toilets in Africa, and desalination plants in Australia. Properline responses portray a rounded personality that understands water-wise messaging but this is achieved by presenting a superficial personality. Water user personalities beneath the properline are different; contradictory, selfish, absent-minded. In the next section I present the theory as it was discovered.

## 7.4 Blind Belief in a Commodified Resource: A Grounded Theory

### 7.4.1 Blind Belief: Weather and Climate Change

Across southern England, in urban households, when questions arise over the sustainability of potable water supplies, the main concern of water users is to avoid disruptions to their daily water regimen by sustaining their blind belief in the enduring availability of water. This blind belief is made possible by a dependable English climate, and individual water users' abilities to maximise their opportunities to access water. In the opinion of all participants in this study, regardless of their location, gender, age, occupation, or interests, the English climate is characterised by copious quantities of rainfall throughout the seasons, despite their being considerable differences between the actual quantity and frequency of rainfall in their respective home locations. This firm belief in England as a land greened by lush vegetation, criss-crossed by natural and engineered waterways, and temperate in climate, is universally held in urban households in this study spanning parts of the Southern portion of England from east to west. In Norwich, water users freely admit to living in the driest part of England but argue that rainfall is still plentiful enough to service industry, food production, and households. In Kent, individuals are able to state that population pressure as well as high personal use of water by others (never themselves), pose a threat to water supplies. At the same time they remain steadfast in stating that rainfall is still so high that there is more than enough water to go around, as long as it is managed properly and shared fairly and equally. In Plymouth, the notion that water might ever become scarce is not evident in conversations with householders. In North Devon, where rainfall is roughly double that of East Anglia, water users find the idea of water shortages laughable – *“come to sunny Devon, rain six days out of seven!”* Whatever the location all water users believe in a natural balance in weather systems where dry periods are followed by wet periods. The feeling that the weather fluctuates within acceptable limits permeates every conversation. The idea that the status quo might be threatened by climate change is not evident in discussion with and between water users. Instead climate change appears to have become an

acceptable phrase to describe the changeable weather in that it supports the idea that English weather is naturally volatile.

Those that are working or interested in climate science or climate adaptation policy development hold differing opinions. The prevalent one being that the public is generally misguided in its belief that the weather always fluctuates between extremes, because the public is generally ignorant about climate change. To a climate scientist or an environmentalist, public confidence in the hydrological cycle may be considered a little too complacent. However, to the average water user there remains a sense of security, based on personal experience, where the unpredictability of climate change fits positively with the apparently unpredictable English weather. This complacency is bolstered by the fact that the plentiful, natural, and free water resource is monopolised by a regulated private water industry, at an unavoidable financial cost to householders, that secures water in their minds as a commodity, available on demand, regardless of natural phenomena such as drought.

Sustaining a blind belief in the ongoing availability of water is not a daily action for householders but one that is triggered occasionally by the threat of water restrictions. Without this threat, there is no need for concern and therefore no need to examine water-based regimen to identify where they may be curtailed. In this study, the prospect of water restriction was brought into the conscious mind of subjects (household water users), through media reports and appeals by water companies for customers to save water, and by the researcher in asking to discuss the very dry weather conditions and how water was used in the home. It was not possible to work with subjects whose access to water was deliberately limited as no prohibitions were in force in the locations chosen during the time that interviews were sought. As it is the job of water companies and government agencies to ensure water customers are protected from such difficulties, this is not therefore considered to be a failed exploration. However, it must be noted that this theory only relates to publics that have unrestricted access to water. Different results may be revealed if this study is tested against publics in a severe rationing situation.

#### 7.4.2 Sustaining Blind Belief in the Availability of Water: Maximising Options

The main mechanism by which individuals maintain blind belief in water as a commodified resource during times of scarcity is by ensuring there are widespread opportunities to access water, in all aspects of their daily life, through the basic social process of *maximising options*. To achieve maximisation, the subject must feel that all water practices whether notionally or actually curtailed may still be accomplished if desired, regardless of the weather. This personally perceived dominance of water resources from a customer perspective is built upon a sense of ownership of a once-free, natural resource that is considered to be abundant in England. *Maximising options* is the core category in this theory and all other categories and their properties are related to it. It is of course the opposite of what one might expect to find when looking to generate theories about water saving.

Although no water restrictions impinged on households in this study at the time of visiting, it is important to explain that water was available to all households, as a commodified resource. However, most households exercised cost cutting in various forms and in some cases saving water was seen as a way to save money. Individuals in households where this was evident were operating under a self-imposed restriction to save water. Regardless of the difference in motivation, this theory applies to both the self-restricted and the unrestricted.

The constant resolution of problems, to *maximise options* for access to water is brought about through the twin strategies of *expediency amnesia* and *displacing*. *Expediency amnesia* is an in vivo code that was used by a subject in the home water study, who described a brief waning of her carefully rehearsed water-saving mantra, whereby she was able to temporarily suspend water-saving activities to undertake practices that were inherently water-wasting, whilst continuing to advocate limiting water use to conserve supplies. This amnesic tendency serves to maximise the individual's opportunities to use water, whilst appearing to economise. It is, in the main, a subconscious strategy that only surfaces when observed by another (in this case the researcher). *Displacing* describes the action individuals take to deliberately use water from

places other than their home to complete tasks in their daily water regimen. This can involve re-locating a water habit to another place, or bringing water into the home from elsewhere.

#### 7.4.3 Expediency Amnesia

The properties of expediency amnesia bifurcate into two main areas; hypersensitive ploys which are explained by subjects to be triggered by a type of acute sensitivity, and hyposensitive ploys which are exercised by subjects through a deadening of sensitivity to their immediate environment or an ability to overlook specific situations that ought to be noticeable. All expediency amnesia sufferers can recite a minimum standard list of water-saving actions in their properline addresses. Not running the tap whilst brushing one's teeth, only flushing the toilet after defecating and not after urinating, and substituting showering for bathing, are predominant, and other actions such as not using the dishwasher or only using economy wash cycles are less well cited.

*Excusing* is a hypersensitive ploy that is made possible through aesthetic reasoning. The appearance of a dirty lavatory, or a pile of dirty crockery waiting to be washed, leads to the individual excusing him or herself from water-saving so that the visual or olfactory offence can be remedied. Using the same ploy, longer wash cycles can be permitted to ensure washing emerges in a cleaner state than expected from an economy wash, delicate items can be hand washed separately to avoid potentially being damaged, and fine china and glassware can escape the dishwasher to avoid cracking and bleaching. Any task can be achieved by using water on the grounds that it is necessary for the sake of aesthetic appearance, preservation, or convenience. This ploy stems from sensitivity to changes in long-standing rituals or visual appearances.

*Comparing* is a sub-category of *Excusing*, which is based on a simple rule structure. This structure is hypersensitive and relies on awareness of the water habits of others, within the household, in other households in England, and in other cultures abroad. The basic rule of *comparing* is to ensure that the person making the comparison appears to be a more conservative water user than the

person they are comparing themselves against. It is a positioning strategy designed to excuse all water-based tasks that are perceived to use less water than the example given. Parents most commonly compare their own showering habits to that of their teenage children who take excessively long showers. They are then free to maintain their showering habits without bowing to pressure to use less water. A neighbour's habit of using a sprinkler to water his lawn is compared to the subject who is happy to water flower borders beds with a hosepipe. An individual who likes to take long showers will compare him/herself to someone in the family who prefers to take regular baths. This is the obverse of properline comparing where for example, an individual who has lived in a very dry country expects others to accept that his water habits will automatically be more respectful of limited resources than the habits of those who have not experienced life in similar circumstances. There is no limit to the amount of hypersensitive excusing a subject can deploy on a daily basis. As a result, water saving can be totally eradicated from a subjects daily regimen while the water-saving dialogue is upheld. The intention to behave responsibly is there but the action is neutralised by competing sensitivities.

A notable property of expediency amnesia is *imaginary budgeting*. When asked, all water users hold in their minds a notional water budget, which equates to "enough for my needs". 'Enough' is therefore not a defined quantity. This serves to maintain a boundary-free state where at any moment the individual can elasticise the budget by adding or removing water-based tasks from his or her daily regimen, at will. This would not be possible in a real-life rationing situation and so the need to maintain blind belief through maximising options is dependent on unrestricted access to water and the absence of water use data. *Imaginary budgeting* is a hyposensitive ploy that is dependent on one of two variables. In some cases, the water user deploys a sudden, feigned sensory dysfunction – temporary sightlessness – where he/she finds it impossible to visually or otherwise, conceptualise volumes of water used, or to see the part of a water bill where the quantity used is shown, or to interpret the dial on a water meter. In other cases, the water user does not have the mathematical acumen to calculate volumes of water and genuinely has to rely on personal estimates, which are mostly, wildly inaccurate.

Sensory deficiency is also an important factor in another property of maximising options, which is *observing notional rules*. *Observing notional rules* relates to the rules created by individuals that automatically serve to direct them to use water rather than to abstain from or curtail water practices. The basis of this hyposensitive ploy is that of holding up a rule by which the individual will consider there is a need to conserve water. The primary rule adopted by all individuals relates to their key determinant for water-saving activity, which is the hosepipe ban. This rule states that unless there is a hosepipe ban in force, there is no drought, regardless of the weather, newspaper reports, or appeals from water companies for customers to be “*water wise*”. There is a deliberate deadening of the sense of a building drought through deliberately ignoring the obvious signs and waiting to be told there is a hosepipe ban. This has a similar affect to excusing where, in the main, no water saving takes place until a ban is imposed, despite the rhetoric of water saving being repeatedly utilised in conversations. A secondary rule is applied based on the weather. If an individual observes that it is raining then he / she automatically defaults to the normal water-based regimen of unrestricted access, unless told by someone in authority that water use must be restricted. Rule observing is often revealed in a properline response but in a properline conversation, rules are set to provide a source of annoyance that will enable the direction of anger or threats towards a water company. The primary most common threat relates to an individual refusing to pay for water if a hosepipe ban is served. A less prevalent rule but potentially more damaging to the resource is when an individual threatens to leave all his taps open, to punish a water company for imposing a hosepipe ban. Beneath the properline when there are no restrictions one can consider these empty threats.

#### 7.4.4 Displacing

The category of *displacing* is the act of using water from outside the home where that water would normally be drawn inside the home. Using water from a water butt to water the garden, or wash the car, is a legitimate act of displacement and one that is encouraged. However, displacing is a strategy

drawn upon by individuals who are motivated to both reduce costs and/ or maximise options and so it is in every-day use in some households as well as being used by most households during droughts. Temporary interruptions to water supplies can also produce similar behaviours in all water users. Typical examples of displacing include: showering at the gym; washing the car at a car wash; taking laundry to the laundrette; surreptitiously tapping into a neighbour's downpipe to collect rainwater for the garden; washing home-grown vegetables at the allotment before bringing them home; bringing canisters of water from the allotment to use on the home garden; bringing bottles of water home from the water cooler at work; bathing at a relative's house; putting the children's paddling pool up at a grandparents home. This is not a definitive list but a selection of displacing activities that were mentioned by individuals in the home study. Typically, for those mindful of the cost of water, any activity that is perceived as using a lot of water will be transferred to a notionally 'free' resource where possible. A parent commenting on her young son's sudden enthusiasm for running taps out of curiosity directs the child away from the home bathroom and promises the practice can go ahead at a grandparent's home instead. A keen sports person with a current gym membership will ensure all showering is done at the gym, even when they are not going to work out or attend a class. An allotment owner who has noted their water use increasing when he/she brings home 'just dug' root vegetables covered in earth, will lament the ease at which pre-washed vegetables from the supermarket can be prepared and resort to washing vegetables in a bucket, on the allotment, before bringing them home. Water users intent on saving money experience small 'eureka' moments when they find a way of displacing water. There does not need to be a drought for displacing to become part of a person's everyday water regimen. Saving money is a key driver in this activity. However, when water is scarce, all water users resort to these behaviours to maximise their options to access water, regardless of their financial concerns.

## 7.5 Discussion

Although it may seem disappointingly short, this is the theory that emerged from the data. All subjects observed in this study sought to maximise their options to

access water as an automatic response to the threat of water restrictions. This may not be a surprise to readers as to a certain extent it makes sense when something as important as water is limited, to do everything in one's power to maintain access to it.

At this point I ask the reader therefore; can you see yourself in this theory? Can you honestly say you have never displaced, compared, or excused? Is your water budget real or imaginary? Do you exercise the hosepipe ban rule when the weather is dry? Any reader feeling a slight twinge of guilt in reading this may already be beginning to review their water use behaviour. As such, this theory may already work as an intervention to alter habits and increase understanding between water users, of their place in the shared water commons.

To describe my theory I have dug beneath the properline to reveal the contrary nature of current attitudes towards water use, and feel most keenly that whilst individuals are in the business of maximising their options to use water, they do not deliberately intend to over-use a natural resource. For them, the resource has become a commodity for their exclusive use and because of this, their behaviour is perfectly acceptable. The ploys described in the theory are legitimate and sensible and only appear perverse when compared to water-wise messages from Government agencies and water companies. Maximising is a sensible option when shortages are expected.

One of the most concerning aspects of the theory is displacing. Although showering at the gym after working out is a legitimate activity, many times, displacing is done as a subversive activity. This places an additional burden on venues, services, and individuals who are unwittingly enabling displacing to continue, and in most cases shifting water use to the bottom line of commercial enterprises. It is difficult to tell what percentage of the volume of personal water use has been re-distributed to commercial users in recent years but this will have served to distort average user statistics. It is easy to drop 20 litres if you can move it elsewhere. As I have shown in earlier chapters, it is much harder to drop 20 litres at home, if displacing is not an option. Wherever one attempts displacing, if the facilities used are not technologically advanced and designed

to save water, one's total water use may actually increase. The satisfaction experienced by the intrinsic motivation to conserve in this case, can have an unintended consequence, that over time could become increasingly damaging to natural water resources. Promoting the notion of saving water to save money has, in some cases, become a double-edged sword for water companies. It is therefore not appropriate to maintain the view that water-wise messaging results in an overall reduction in water use and a corresponding environmental benefit.

It would appear that the adoption of the phrase climate change into everyday parlance helps water users to maintain blind belief in the availability of water (the commodified natural resource in question) and it may be that environmental framing of climate and water issues is limiting progress towards reducing water use in English households. In the next chapter I will discuss this alongside all the findings from the different approaches to this research topic.

## Chapter Eight

### **Discussion and Conclusion**

#### 8.1 Introduction

In this final chapter, the author discusses the links between publics' perceptions of climate change, weather extremes, and home water use regimen. The strategy for mixing methods in this study is discussed and the relevance of the three drought histories presented in chapter four is highlighted. Then, through a series of pertinent questions, the results of the questionnaires and the theory of blind belief in a commodified resource are used to describe household water users more accurately and to assess their potential for managing water resources effectively. Alternative approaches to demand management, including the measures introduced in Australia during the recent long drought are explored. The chapter concludes with the author's answers to the research questions.

#### 8.2 The Right Climate for Water Saving

Throughout this dissertation, the underlying theme has been a growing scientific awareness that water resources are under threat. However, while background temperatures continue to rise globally, due to increasing quantities of greenhouse gases in the atmosphere, the climate in the UK has not been consistent with predictions during the course of this research. Although an increase in the number of heat waves and a decrease in available water resources have been predicted for southern England (Rance et al, 2012, Charlton & Arnell, 2011), there have been two consecutive cold, winter drought periods, punctuated by wet, cool, summers. 2012 was the wettest on record in the southwest, and almost the wettest on record in the south east of England (Met Office 2012). As a result of this, it is possible to say that climate change is making the weather more unpredictable from day to day. But without the anticipated hot summers, water users are clearly inclined to attribute this unpredictability to the typical English climate of yesteryear.

Had this work been completed in the mid-2000s things may have been different. After a series of 'hottest years' (Harley, 2010), climate change was prevalent in the media and extremely plausible and therefore aggressively challenged. The disaster literature published around these record-breaking years, (Pearce, 2006, Monbiot, 2006, Gore, 2006, McIntosh, 2008) attempted to illustrate the causes and possible solutions to climate change. In England, the 2004 – 2006 drought coincided with a pique in the interests of Government and environmental organizations, in climate change and its human causes, which led to a plethora of behaviour change theories and environmental behaviour typologies. In more recent times, the public's ability to act on such doom and gloom predictions has begun to slide, and skepticism remains a strong theme in public and media discourses (Witmarsh, 2011), and properline conversations.

This research points towards a growing reliance by individuals, on their belief in the typically unpredictable English climate, over a dramatically altered global climate. The small survey indicated a majority of water users were content to rely on the idea of natural climate variation to explain extreme weather events such as the dry spring of 2011, more so than global warming. These survey respondents may be right if the current cool phase is a consequence of a long, la Nina period, although a significant number of respondents were expecting future droughts, should they occur, to be caused by a combination of climate change and over development of water-stressed areas. The public in the survey perceived climate change as something that would happen in the future, and did not perceive drought at all, without the threat of a hosepipe ban. Even with their understanding of growing competition for resources, this research appears to have exposed an absence of motivation in householders to limit their use of water, unless definitive prohibitions are in force. When viewed through the lens of climate change, individuals appear further removed from the global commons (Hardin, 1968) than ever, and in their roles as home water users, they do not appear to consider themselves to be part of a global water commons (Barr, 2008). Pressure on existing water infrastructure does not signal a need to use less water. It signals a need for water customers to put pressure on water companies to facilitate the development of new infrastructure, so that unlimited

access to potable water (a commodified resource), can continue to be guaranteed, unless there is a shortage of rainfall sufficiently serious to prompt applications to the secretary of state, to introduce measures to curtail water use. As a result, measures such as hosepipe bans, are seldom taken by water companies, who struggle to maintain positive identities in the media and are reluctant to curtail customer activities. Despite there having been two dry winters during the course of this research, the introduction of temporary restrictions came very late and lasted for a relatively short period of time, due to the fact, that by then, the rain had arrived. This was a common factor across all of the three droughts described in chapter four.

The extremely wet period in 2012 may well be directly linked to climate change. If a warmer world is a wetter one, then it could have been expected. To the uninformed English water users in this study, more rain means more water and it is easy to assume that providing it can be stored and treated properly, there will be plenty to go around. However, increased evaporation rates and the need to reduce greenhouse gases in future years are very likely to curtail water company activities. The high environmental and financial cost of engineering methods to capture, store, and treat water, may one day, go beyond customers' capacity to pay. The selfish consumerist (McIntosh, 2009) may have to take a step back and review his or her actions regarding water use, in the future. The prospect of this has served to ease the public sector into believing that somehow, household water users can be blamed for their profligacy and incentivised to use less. At the same time, constant innovation is expected to keep costs down. But there is a fundamental problem with this idea because no one knows what his or her fair share of water is. Without setting a volumetric limit, it is hard to accuse any individual of profligacy and impossible to set a standard minimum or maximum daily water allocation. If prices remain low, there is no self-limiting factor of affordability either. The customer has no idea that reform is required, even though ideas for sustainable futures are reliant on individuals living within known limits, and the Defra aspiration for there to be no water stressed areas by 2030 cannot be achieved without cooperation from water customers (Defra, 2008). An intention to foster the right to fair distribution of water extends only as far as water companies (Defra 2011), who are

expected to meet customer demands without imposing limits. Without controls on usage, customers can produce socio-economic drought conditions at any time. The fairness principle suggested in the Walker review (Walker, 2009) relates to almost universal metering and the idea that every customer should pay for what they use, and no more. This is an important component of water saving, as knowing how much one has used is a key aspect of personal water management. However, at the same time, metering maintains a modern view of water services as privately funded commodities that are always available to those who can pay for them, without deferring to the global water commons to check whether the distribution of resources is fair to other users and the environment. Knowing how much water one uses would of course be even more important to the customer if water was rationed. However, it is difficult to imagine a successful private water industry that is attractive to investors where unlimited growth is prohibited.

### 8.3 Mixing Methods to get Results

This research incorporates a mix of methods, both in an attempt to get closer to revealing personal habits and to create opportunities to cycle discrete projects, which is an essential part of CGT development. Without this mixing of styles and approaches to data collection, it would not have been possible to bring to life such a broad range of personal water behaviours. It is disappointing that not all the planned focus group activity went ahead and perhaps the author should have persisted with other events. However, more than enough data was collected for the GT as so many more participants agreed to be interviewed than had been anticipated at the outset. This was a pleasant surprise for the author and therefore makes this particular approach to data collection justifiable.

The drought histories narrated in chapter four provided the reader with insight into three contrasting drought situations. Re-living the 1976 drought, revealed what happens in communities when personal access to water in the home is withdrawn, not unilaterally, but on a case-by-case basis. Since 1976, privatization of the water industry in the UK has imposed a mandate on water

companies to provide. Customers have strengthened their resolve to get what they pay for, regardless of the weather. It is difficult to imagine what might happen if standpipes were introduced in a future drought. Would the 'Dunkirk spirit' return or would individuals find more ways of sabotaging attempts to limit access to water? Media reporting and an inappropriate use of rainfall data was shown to uphold Eden's critique of the 2004 – 2006 drought in south east England. The increased interest in climate change at the time is notable but by the 2012 drought, it was clear that it had not been sustained. The way the Environment Minister, Caroline Spelman, handled discussion on the subject allowed for an interpretation of drought as something that can be controlled by Government, rather than the weather or climate change. All three historical droughts showed how the public can quickly become trapped in the hydro-illogical cycle (Wilhite, 1992), and highlight how, simply using the weather as a gauge to tell us when to save water, is unreliable.

In this research the author has made a point of distinguishing between what grounded theorists consider properline data and then the truth of the matter, which can be found after digging below the surface. It is clear from the survey responses, and interview discussions, that the Phantom Public (Lipmann, 1930) in the hydro-illogical cycle exists purely above the properline and is not the right subject to moralise with over water saving campaigns. Home water users have learnt to repeat the water-saving tips offered by water companies but not necessarily how to use them to make their water practices less resource-hungry. Ajzen's (1991) theory of planned behaviour is still relevant and the attitude action gap is located between the properline spoken by individuals and their actual practices, which rarely mirror each other. As Van Vliet, et al, (2005) suggested, many tasks done in the home using water have perceived barriers around them and these barriers prevent water saving. This was highlighted by the behaviour of subjects in the home study who were not willing to make any substantial changes to their water use habits, only small adjustments that would preserve existing regimen that they were comfortable with.

#### 8.4 What do the Results of the Surveys tell us about Water Users in England?

From the household survey it is possible to see that roughly half of gardeners in the sample areas included the hosepipe in their mix of garden watering styles. There is a general assumption that non-metered households will use more potable water in their gardens and this was marginally the case in Royal Tunbridge Wells. Approximately 50% fewer gardeners in Barnstaple relied on potable water in their gardens. This could be because North Devon is so much wetter than the other two sites, and also could be because of the cost of water there. This is one of the most interesting findings of the questionnaire, when considered in relation to metering rates and water and sewerage prices. Certainly, more unmetered customers in Royal Tunbridge Wells thought that water is expensive but because the price of water is linked to ratable value of a property and not the quantity of water used, they found no incentive to save water in order to save money. With 40% of customers considering water not to be expensive it is difficult to see how promoting the idea of saving water to save money would encourage a large proportion of water users in Royal Tunbridge Wells. In contrast, over 80% of respondents in Barnstaple thought water was expensive, and this is consistent with the fact that they pay the highest rates for water in England. It is important to note the geographical dimension of the water survey in contrast to the blanket approach to water-wise messaging that presumes applicability to all water customers, wherever they reside, which is inconsistent with the varied water pricing structures and climates across England.

When asked to forecast the probability of future droughts and their causes, a substantial number of respondents declined to answer, although when they did, they were happy to cite global warming and climate change as being the most likely cause. This is interesting because these topics were rarely brought into the conversation in interviews or in visits to home study participants. Overall, it is the author's opinion that subjects in this study were not inclined to perceive drought and climate change as threats to their futures. They did not perceive drought and climate change but they were happy to use these words in

properline conversations and survey answers, which signifies the fact climate skepticism is still prevalent in their thoughts.

When asked about conserving supplies of water and measures users would take to do this, showering instead of bathing was consistently the most cited water-saving habit that respondents admitted to, although it is not inevitable that these actions would lead to water savings. Most of the showers inspected on home visits had flow rates between nine and twelve litres per minute and householders in the home water study tended to underestimate the length of time they spent in the shower. When they were asked to time themselves, they realised an estimated couple of minutes very often became ten. Some of the home study participants left the plug in while they showered and realized by the end that they had probably used as much water as if they were running a bath. Respondents in Norwich cited the highest number of water saving activities between them. This may be due to the fact that it was the driest area in the survey or it may be because the water company was better at promoting water saving than companies in the other sample areas. Flushing the toilet less often was much more prevalent in Barnstaple and Norwich than in Royal Tunbridge Wells, where five times more people there were prepared to say they did nothing to save water than in the other two sample areas. This again, highlights the need to consider differences between geographical locations before launching further water-saving campaigns. Approaches should be appropriate to specific habitual uses of water, water appliances and locations.

An overwhelming majority of questionnaire respondents in Norwich and Barnstaple did not know how much water was used in their household on a daily basis. This might be because they found it difficult to calculate, or they may not have had a water meter to consult. Alternatively, they may not have cared. It is impossible to know for certain. Of the few that answered, almost all were in Barnstaple. This is to be expected because such a large proportion of households are metered and the cost of water in Barnstaple is much higher than in Norwich. However, the quantities given bear no resemblance to the 150 – 160 average use, per person, per day, quoted by Defra and water companies.

Mirroring the rainfall gradient between the East and South west of England, gardeners in Norwich were much more likely to have noticed the impact the dry weather was having on their gardens where as in Barnstaple, where it rains twice as much, there were few noticeable impacts. Over 70% of householders in all three sample locations had at least one water butt in the garden, whether they were growing vegetables or not. It was a mistake on the part of the author not to ask anyone in the study how they had come by their water butts as it is quite likely that successive campaigns by water companies encouraging householders to invest in water butts, and making them available to customers either free of charge, or at a reduced rate, has resulted in most homes having at least one.

#### 8.5 What does the Theory of Blind Belief in a Commodified Resource tell us about Publics' Capacity to Manage Water Resources?

In a drought situation when consumers are asked directly to save water, some of the barriers they perceive around alternative ways of doing things, can be overcome, as long as the individual does not master the art of *excusing*. It may however, be dangerous to cultivate intrinsic satisfaction in customers, to save money, by promoting the *calculable acts* (Clarke et al, 2007) that contribute to water saving. In many cases this leads to *displacing* water activities elsewhere to unrestricted commercial sources, and no real savings are made. Water companies promote impact-oriented behaviours but these can be manipulated through *displacing* so that the positive impact of water saving becomes a negative impact in another location. Working within the so-called 'triangle of change', bringing businesses together with water consumers may help to tackle *displacing* activities. It is not that a genuine need to shower at the gym should be stopped but that additional showers at the gym need to be kept within sensible limits. Pullinger et al (2013) found that 33% of respondents in their survey showered away from home regularly. Most of these were young, active people more likely to have opportunities to shower away from home. It would not be right to ignore *displacing*, as a person who switches showering to a commercial venue may also increase the length and luxury of the experience, not simply at the expense of the host but also the environment.

If one views this theory through a nudging lens (Sunstein and Thaler, 2008), in the absence of water restrictions, at home, there are two choice architects, the plumbing and the individual water user. When a hosepipe ban is in force, nothing changes inside the home. The only function that is affected is garden watering by hosepipe, and there are lots of work-around methods that gardeners can and do use, such as watering cans and drip irrigation. It will be possible to improve gardeners' resilience to drought by encouraging them to invest in alternative plants and planting methods, and larger water storage facilities. Altering the plumbing inside homes and encouraging water users to switch their personal water regimen where needed will be a more difficult task to achieve.

At the start of this research, the author chose to review her own water use habits and found that relying on common sense was not a robust strategy for ensuring that she was a practicing water saver and not a water waster. The key thing that was needed to begin the water saving process was information relating to volumes of water used for various tasks. Without this basic information, it was difficult to make choices on the actions to take that would save the most water and cause the least discomfort. Later, when designing a new plumbing system that would use the least water possible, a great number of hours were expended in researching products and struggling to find the right combination of water appliances to make a substantial reduction in the combined home water use. Finding the right sink for example took several months. It was the only model on the market of a shape and size that would help to limit water use. It was not sold as a water saving product but as a designer product, at a designer price.

In the home study, it was only HS5 who actively pursued the development of new water practices to save water and thereby money. However, her attempts were limited by an unwillingness to try new things or to trust delicate objects to machines. This severely curtailed her progress on water saving and whilst she did reduce her water use, it was only in a small way. The majority of water users in this study were very happy with their existing regimen, assuming they used

only enough water for their needs, and they were automatically not wasteful people.

In all but one case, the author's intervening in the lives of water users and bringing to their attention the amount of water they used each day, and where they could possibly save some water, resulted in no change in subjects' habits at all. There was no motivation to change. Those who were keen to save money believed they already did everything they could to limit their water use and were not interested in exploring new technologies. For those living in rented accommodation, the prospect of altering the plumbing was out of the question, and for those living in their own homes, altering plumbing was a low priority and aesthetic qualities of bathroom products etc. would take precedence over more economical facilities. So, if the product didn't look good, it wouldn't get incorporated in to the house. This adds an external determining factor of fashion to the potential for water saving in households. If large baths, power showers, and wide shallow sinks are in vogue, then the chances of designing in an element of automatic water saving to an existing home, is lost.

In the case of new properties, recently introduced building regulations attempt to curtail the use of water appliances in homes to ensure that water use per person is limited to between 80 and 125 litres a day. All appliances and details of their flow rates and/or volumes are entered into a water efficiency calculator (Department for Communities and Local Government, 2009) and a daily volume is calculated based on the size of home, and type and number of appliances. Based on the author's fixtures in her newly plumbed home, this calculator expected a daily, per person usage, of 115 litres. Through careful thought the author consistently managed to sustain water use at 77 litres. There was no hardship or discomfort experienced in doing this. The new water appliances were easy to use, and of high quality. Lifestyle generally was not affected by the author's revised water-saving regimen. However, unlike the subjects in the home study, the author wanted to save water for environmental reasons, as well as being assured that if/when water is rationed in the future, a comfortable, clean lifestyle will be possible. For water users in existing homes, it would appear that a lack of money to invest in new water saving appliances, and a

general lack of trust in new alternative ways of washing, showering, laundering and bathing, is inhibiting progress but the most serious threat above this, to the development of a water wise culture in the UK, is blind belief in water as a commodified resource.

In the absence of a definition of water that is needed over water that is nice to use but not essential, every subject in this study, pre-determined, that all their water use was based on need. There was no limit to the number of actions a person should take in a day based on this perceived need. As long as they had water, they could use it however they wished. Although they claimed they only ever used enough, in reality, they behaved as though they could never get enough. Because water is relatively cheap, only the poorest, self-limited their water uses to stay within a limited budget. Others reveled in the intrinsic satisfaction of knowing that someone else was paying for the water they used, by *displacing* as many activities as they could. And most others simply expanded their mental water budgets to fit whatever they wanted to do, in a buy now, pay later frenzy. Meyer's (2000) proposed application of precaution and equity to the use of resources in this case, is literally a pipe dream.

Medd and Shove (2007) were right to a point in that the average water user does not exist. This person certainly was not evident in this study as all participants had very individual ways of using water and different plumbing arrangements. When asked to save water, they did not however always use water subconsciously. Most of the time they consciously chose how, when, and where to use water. Deliberate *displacing* was, indeed, based on an assessment of cost and benefit to the individual and *imaginary budgeting* likewise. For those who consider water affordable or cheap, choosing to use a hosepipe to wash the car instead of a bucket is a calculated choice based on convenience and likely cost. They are unlikely to know the exact cost of a particular task because they do not have ready access to data that would tell them what fraction of a cubic metre it would take. This would be a step too far at present because there is no need when there is no cap on water use per person, or per task. It may be very different if there were.

In chapter one, a series of sub-questions were introduced that related to the author's concern for this research not to be reduced to another set of behavior types. Although it has resulted in a series of behaviours rather than behavior types, this thesis may not sufficiently answer the question regarding the methods that are best suited to the study of perceptions. Classic GT is clearly a method whereby perception or lack of it, can be measured by what is not said or done beneath the rather deceptive properline activity that is evident in questionnaires and opinion polls. However, perception of climate change in this study could not be measured by degrees and it was not evident at all in the GT. Although the phrases climate change, global warming, and natural variation were used in the recruitment questionnaire, this did not provide proof of understanding or perception, just an indication of recognition of the different phrases.

The drought histories indicate that the public experience and react to the impact of a drought on their daily practices when prohibitions are enforced or threatened, rather than sensing it build and adjusting accordingly. The presentation of data in the auto ethnography and the hyposensitive ploy of only acting when a hosepipe ban is in place also imply that public reaction is triggered by curtailment of activities by water companies rather than sensory experiences of dry weather. Attempting to measure the impact of a drought from a social media perspective during the event presents difficulties in terms of the enormous amounts of data that are available. Gaining access to subjects at home during a time of prohibition would be immensely valuable. The drought history of 1976 provided an insightful analysis of what happened but the population of respondents to draw from was self-selecting and the circumstances were specific to the geographical location and water management authority of the time. Nevertheless, it is much easier to have conversations about historic droughts than more recent episodes of water scarcity. Reflecting on past behaviours in droughts that have long since passed is certainly a more enjoyable and fruitful activity than attempting to elicit memories of more recent droughts. In the context of household water users, the best types of drought to study from the point of view of someone who wishes to measure mitigative behaviours can only be ones where publics are specifically asked to make reductions to their water usage. It is hard to decipher from this

thesis, which are the main indicators of the impact of droughts on households in southern England, unless they are droughts where strict prohibitions were in place such as in 1976.

The use of CGT in this study and the presentation of data in three distinct styles highlight the progression of the research from above to below the properline. It does not guarantee that all CGT studies go further and deeper into their subject areas but it is possible that combining methods in this way serves to highlight to the researcher where the properline ends and the truth begins. This is extremely important because it would appear from the problems outlined in chapter two that government departments with a responsibility for ensuring continuity of natural water resources in a changing climate may not be addressing the problem of over abstraction and use of water from the correct perspective because they are preoccupied with what is above the properline. As a result their policies and demands on water companies are inappropriate.

In many medical CGTs the properline is hardly discussed at all. This is because it varies between patients based on their personal circumstances. The researcher sees no need to discuss individual instances of properline discussion because there is no obvious pattern or problem associated with it. In this study however, the properline was consistent with water-wise messaging and consistently recorded across all interactions with subjects. It was extremely strong and dominated the scene although in the end, with persistence, the realities of water behaviours were revealed. The key benefits of doing this CGT are therefore considered by the author to point to two extremely important messages for policy makers and water companies. Firstly, water-wise messaging is only helpful when subjects need to save water. In the future this might be because prohibitions are in force or it might be because there has been an alteration of their view of their place in the water commons. Secondly but probably more importantly, blind belief in water as a commodity is unshakeable at present. The natural response to water scarcity is not water saving but maximising options. Without enforceable prohibitions, in drought situations, this behavior will substantially reduce the ability of water companies to manage resources. These are powerful statements. They leave the

researcher few words to hide behind or to sweeten the experience for the serious reader. This is where alternatives such as autoethnography can be seen as safer approaches to research. They allow for some optimism. In the analysis of the author's own water regimen it was easy to show how developing intrinsic satisfaction through an emphasis on re-plumbing and water saving could be very positive for water management. However the author was not restricted in her water use and there is no guarantee that under restriction the temptation to maximise may surface in one form or another.

## 8.6 Conclusion and Points for Further Research

In attempting to answer the research questions, this study has brought into the open the properline – practice gap that appears to be a barrier to making progress in demand management. When considering how the public perceives drought and climate change, it is possible to see why using the prospect of climate change as an agent for change in household practices, is supporting individuals in their quest to *maximise options* for obtaining water. The typically changeable English climate can be blamed for fluctuating wet and dry periods and climate change can remain a problem to be resolved by future generations, not one that is impacting on water resources now. As such, climate change is perceived as a concept but not felt as an impact on daily life. There is no need to be disappointed about this finding however, as de-coupling the experience of weather extremes from the concept of climate change, and from water management, could be an important first step in driving individual water users to change their habits. Letting the weather decide how one should behave with water is not appropriate. Water companies need to foster better relations with their customers so that knowledge of available reserves becomes a standard indicator for water use behaviour. Socio-economic drought can strike at any time when population pressure is applied. Blind belief in rain tomorrow, whilst comforting for the individual water user, will not protect water customers from rationing in the years ahead. If those that are excessive users are unaware of their profligacy, then the outcome will be unfair and unmanageable.

In the case of householders in the geographical locations studied, when experiencing drought conditions, most subjects felt they were already economical with water and could do little to reduce their usage further. A hosepipe ban had to be in place before any additional water saving activities would be considered necessary. The everyday water-saving practices that survey respondents mentioned included some that would automatically result in energy saving. Only filling the kettle with enough water for one's needs, making sure the washing machine was full each time, and taking shorter showers are all examples of automated practices or practices that rely on hot water, that would save energy. However, as was observed in the home study, many stated practices are above the properline and do not actually happen in practice.

If saving water is an effective public response to climate change then one cognitive barrier to this is blind belief in water as a commodified resource. Without a belief in the inevitability of rain, and the duty of water companies to provide water on demand, users would automatically treat water differently. A second cognitive barrier is one that afflicts many, and that is an inability to perceive or calculate volumes. Without this ability, the home water user is not in a position to assess whether his or her use is fair or excessive. This barrier can be lifted in part by the introduction of smart meters in homes. Institutional barriers, in the main, relate to how the public is perceived by Government agency staff, which allow a blame culture to exist between water companies and their customers, and persistently do not deliver a mandate to companies to introduce unilateral compulsory metering. Upholding the notion that individuals can be tempted to save water and money by following one-size-fits-all tips and fitting water-saving technologies, without having a limit set to work their way down to, is also an institutional barrier that is unlikely to be removed, unless there is a water crisis, at least as severe as, or greater than that experienced in 1976. It is worth considering whether removing these institutional barriers may not be possible with a privatised water industry in place that is reliant on increasing profits for shareholders and improving its media profile.

There are some practical barriers that warrant further research as they may be more easily broken down. Confidence in new technologies and new ways of

doing things is generally low amongst water users. Individuals tend not to be interested in reading instruction manuals for water appliances and so, highly technical pieces of equipment are rarely used to their full water and energy saving potential. Some work could be done with manufacturers to improve communications with customers, so that they are more confident in using the full range of programmes to maximise water and energy saving possibilities. As a companion to this, other work could be done to help appliance users to understand the differences between 'economy' and 'quick' cycles on washing machines and dishwashers, as they very often choose the latter thinking that they are saving water when the former will take more time but use less water. The design of water appliances is still primarily style orientated. Working with designers to make and market appliances that design-in economical use and are desirable because they are fashionable as well as practical, would be extremely beneficial.

For this research, the author set out to make an original contribution to environmental social science and to test a mixture of methods and methodologies. The purpose of using such a range of methods was twofold. Firstly it enabled the cycling of distinct projects and created spaces both spatially and across time that facilitated theoretical discovery. Secondly, it highlighted the relative usefulness of various approaches and techniques when used systematically to support each other. Their strengths combined are considerably more powerful than when viewed in isolation. This is particularly the case with the rather organically evolving questionnaires and opportunistic doorstep conversations, which alone would not appear credible. As an aside it also enabled the author to explore a basic hypothesis that viewing social processes through a climate change frame is an unnecessary complication.

In the case of drought, it is perhaps unfair to expect individuals to play the role of ecological citizens and water consumers at the same time. The inevitable conflicts and dissonances that are observed may be as much a product of the framing as of personal behaviour traits. In a country where water resources have been commodified by privately run companies, the barriers between individuals and the global water commons are so high, it is possibly unreasonable to expect water customers to see over them, in times of water

scarcity. These barriers could of course be broken down if water customers were appraised of the size of their fair share of the potable water commons.

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## Chapter Two

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## **Appendix A.**

Pearce, R., Dessai, S., Barr, S., (2013) Re-Framing Environmental Social Science Research for Sustainable Water Management in a Changing Climate *Water Resources Management*, Vol 27, Issue 4, pp 959 - 979

The publication is available at <http://www.springerlink.com>

This paper was written during the ESRC-Funded PhD Studentship and is substantially my own work. I acknowledge the support and guidance of my supervisors, Suraje Dessai and Stewart Barr who I have named as co-authors and in particular, the unnamed reviewers whose comments and guidance were instrumental in the final shaping of the paper.

## **Re-framing Environmental Social Science Research for Sustainable Water Management in a Changing Climate.**

**Rebecca Pearce**, Geography, College of Life and Environmental Sciences, University of Exeter, EX4 4RJ, UK

**Suraje Dessai**, Sustainability Research Institute and ESRC Centre for Climate Change Economics and Policy, School of Earth and Environment, University of Leeds, LS2 9JT, UK

**Stewart Barr**, Geography, College of Life and Environmental Sciences, University of Exeter, EX4 4RJ, UK

e-mail: [rp292@exeter.ac.uk](mailto:rp292@exeter.ac.uk)

The final publication is available at Springer via <http://dx.doi.org/10.1007%2Fs11269-012-0184-0>

### **Abstract**

This paper considers aspects of environmental social science research in the UK and explores an obvious bias towards the development of instruments to manage demand as an adaptation to climate change, and consequently the predominance of interest in the customer from a demand-side perspective. In the case of water, this has resulted in an inappropriate mixing of individualist research methods designed to measure public perceptions of risk and water-based practices, with mass consumption data that cannot be specifically linked

to the individual. This mixing has a tendency to reinforce a long-standing blame culture that drives interest in the development of behaviour change initiatives while the relatively unchallenged hydraulic mission to provide safe drinking water and sanitation progresses. With this in mind this paper reviews examples of water use research from California, Australia, and the UK and highlights the more effective routes to understanding water customers and developing behaviour change initiatives that utilise stages of change models and grounded techniques incorporating qualitative and quantitative data from individual sources. A secondary aim is to argue for re-framing the relations between various actors in a changing climate to allow the development of new policy approaches, learning, and openness, from industry, regulators, and customers, based on new theories from the field.

## **Introduction**

The anticipated effects of climate change combined with lifestyle change and increasing population density brings forth the prospect of water scarcity and damage to ecosystems from over abstraction and pollution (European Commission, 2007, Environment Agency, 2009). Under a medium emissions scenario the Department for Environment, Food and Rural Affairs (Defra), in their UK Climate Change Risk Assessment (Defra 2012 a) anticipates with medium confidence, up to a 30% decrease in deployable output of water by 2050, which will affect between 27 and 59 million people. This reduction is most likely to impact areas of southern England with large populations (Rance et al, 2012). Charlton and Arnell (2011) point out that as a consequence, “*there is considerable potential for substantial and potentially dangerous supply failures as a result of climate change by 2035, in the absence of adaptation.*” (Charlton & Arnell, 2011, p243). The Water Act 2003 handed additional powers to the Environment Agency to regulate abstraction to achieve sustainable water resources management. Prior to this privatization of water services in England and Wales in 1989 had introduced the Agency’s forerunner, the National Rivers Authority, which took responsibility for the aquatic environment, and the Drinking Water Inspectorate, which was created to reassure customers regarding the quality of drinking water. The 1991 Water Industry Act provided both economic regulation and good customer relations through the formation of

an economic regulator, the Water Services Regulation Authority (Ofwat) and a Non Departmental Government Body, the Consumer Council for Water. Working under the close scrutiny of these four organizations, the task for water managers in this uniquely privatized industry in England and Wales therefore, is one of securing supplies of a finite, though infinitely recyclable natural resource, to meet customers' demands, often within a highly regulated market where price, quality, and environmental stewardship are technically equally important. For example, adhering to the Water Framework Directive, water companies are required to ensure *"sustainable water resources that benefit people and wildlife"* (Environment Agency 2003) through careful management of water bodies and a combination of metering, pricing, infrastructural development, and water-saving initiatives (Ofwat 2010). However, the emphasis placed by the water industry on meeting demands of customers often overshadows compliance with environmental legislation. The water white paper published in December 2011, describes the situation well in asking these questions:

*"How do we protect the environment and take less water from our rivers, while meeting the demands of a growing population? How do we encourage innovation and dynamism in the water sector while ensuring it remains a low-risk choice for investors? How do we incentivise less wasteful use of water while keeping water affordable for everyone?"* (Defra 2011 p8).

The expectation of a sustainable water industry therefore has still not been met and the dichotomous nature of these questions highlights the competing aspects of sustainable water management.

Since the 1989 Water Act paved the way for privatisation of the water and sewerage sectors in the UK (House of Lords Science and Technology Committee, 2006), water has been viewed both as a natural resource and a commodity, their treatment and management regulated by separate agencies. Commodification and regulation have framed water from two distinct perspectives or sides: demand and supply. As a consequence water sector research in the UK is generally divided between that which focuses on engineering and technical solutions to problems of supply and pollution, and separate behavioural analysis of customer demand. The former possibly harking back to a great *"hydraulic mission"* (Turton & Meissner, 2002, p2) of

government, to use technology and engineering to bring water and sanitation to populated areas, the latter attending to the framing of climate change as a customer issue and the dominance of the attitude–behaviour-choice (ABC) paradigm. According to Shove (2010) this paradigm has for a period of 20 years or more resulted in “*patchy*” geography and sociology dominated by psychology and economics in commissioned research, where: “*The popularity of the ABC framework is an indication of the extent to which responsibility for responding to climate change is thought to lie with individuals whose behaviour choices will make the difference.*” (Shove, 2010, p1247). This split between water engineering and social engineering is reinforced in Sofoulis’ opinion by a conventional division between “*non-human and material sciences from sciences of the human*” (Sofoulis, 2005, p 446), although traces of the hydraulic mission remain evident in technological development. Recently, the Technology Strategy Board (March 2012) invited applicants to compete for funding for “*a product, process, service, or business model that has the potential to save or make available for use 1,000 million litres a day (Ml/d) of water, within a defined global market, from the blue water cycle.*” This highlights the potential opportunity for the technology sector to profit from innovations designed to tackle the threat of water scarcity. However, Gleick (1998) points to the twin constraints of economy and environment that make it increasingly difficult to build new water supply systems in developed nations which have resulted in a “*a growing interest in exploring options on the other side of the equation – the demand side.*” (Gleick, 1998, p571). It is therefore the increasingly noticeable bias towards anthropocentric demand-side aspects of water management research that this paper is concerned with. In writing about this bias the authors will go some way to explain how specific framings around water management issues maintain the apparent dichotomy. As a result this paper calls for new approaches to research that allow new theories to emerge from the field, rather than repeated verification studies that rely on popular methods and paradigms, as these are stifling progress in an area of research that should be making an important contribution to sustainable development goals.

This review is a part contribution to an Economic and Social Research Council funded PhD studentship, which looks at the impact of drought and climate

change on water customer behaviour. Although it primarily explores the blame culture that exists between water managers, policy-makers and water customers, the core purpose of writing this paper is to identify problems in environmental social science research that have resulted in a lack of forward movement in this area and a reinforcement of the blame culture to the benefit of water companies and the detriment of the environment. In section two, the conflicting messages of security and scarcity and accompanying industry and policy-based blame cultures are analysed from both customer and user perspectives. The role of environmental social science researchers in sustaining this position is developed in the context of individualist and systemic paradigms (Spaargaren, 2011). Section three introduces the demand-supply debate in the context of sustainable development and how this has been utilised to emphasise the attitude-action gap and the importance of interventions to effect behaviour change that are based on attitudinal typologies. In section four, the application of research techniques and models that allow water use to be viewed through alternative 'frames' are discussed. The limited choice of theoretical positions, perspectives and models chosen by environmental social researchers in the context of encouraging behaviour change is critiqued and examples of the framing of recent customer research in the UK are used to illustrate the points made. Section five looks at the popular development of water user typologies and segmentation models and discusses whether these are inappropriate for use in other areas of environmental research. The nature of frames that block the emergence of alternative views of behaviours is contrasted against research methods that follow stages of change and are not therefore rooted to a pre-set perspective. Section six argues for a more open and holistic approach to environmental social science research for water management, that is less directed by concerns over climate change, sustainability, lifestyle, and scarcity, that are used to frame such research. Section seven highlights the limited scope of prevalent social science methods to investigate and analyse a broad spectrum of social, technical, and infrastructural aspects of water demand and highlights the more satisfactory results obtained through the use of grounded methods. A call for theories that are grounded in empirical data from water customer studies is furthered through the introduction of Classic Grounded Theory as a workable methodology for

research in this area. The paper concludes with optimism for the future of a more flexibly framed format to environmental social science research for water management that is approached with an open mind.

## **2. Aspects of demand-side water research: sustaining a blame culture**

The driver of demand-side water research is an as yet unknown future climate and the desire to know whether the public will continue to use water as they do now, or if they can be encouraged to demand less, should frequent drought and an increasing population impact on the quantity and quality of natural resources available. In the UK, increases in the numbers of single person households, and appliances that use water are both cited as key factors driving demand (House of Lords Science and Technology Committee, 2006). For those involved in the provision of potable water and sewerage services in England and Wales, to be able to predict future trends and anticipate future problems is particularly desirable as customers have become accustomed to protected entitlement (Sofoulis, 2011) to the water they pay for. The ability to model future climate and to place alongside observations from past and present consumer behaviour creates a new imagined future of scarcity and escalating costs. However, Dessai and Hulme (2004) have questioned the usefulness of using climate change probabilities as a tool to positively manipulate future human behaviour patterns, drawing the conclusion that human reflexive uncertainty ensures we cannot predict how things will turn out. Receipt of this type of information does not guarantee appropriate action by the individual.

Varying levels of uncertainty regarding possible outcomes impact on water management and decision-making. As Dessai and Hulme (2007) have shown, for the east of England, the models and techniques used to assess the robustness of water resource management plans can reinforce the expectation of secure supplies. But at the same time, these models cannot predict changes in customer demand in future years that are likely to emerge from individual water use habits that are formed and re-formed by cultural, technical and value changes. Medd and Shove (2007, p3) have argued that work already completed in analysing the water industry's existing infrastructure and standard

approaches to water management, coupled with knowledge of consumer preferences, and cultural influences, reveals that we are experiencing a “*crisis in the making*” and that “*Much of the future is already with us.*” As such, the prophecy of a water-scarce future driven by myriad consumption practice scenarios that are constantly unfolding in the present, coupled with out-of-date infrastructure and management based on our past, is already upon us. As Bakker (2003, p28) reminds us, this is not an absolute scarcity of water but a socially produced scarcity, without which market-based solutions to water management and provision will not work (Swyngedouw, 2010). However, the development of new infrastructure and securing of existing supplies is known to generate positive feedbacks that increase water consumption (Kallis, 2010, p800). It is not in water companies’ interests to sell less of their product. A logical approach is to smooth peaks in demand when natural events such as droughts limit supplies but generally to promote the notion of security of supply at other times to ensure maximum uptake of the product, for profit (Kallis, 2008 p 101).

The need to tackle climate change through reduced consumption in addition to implementing measures to avoid socially produced water scarcity may partly explain the increasing prevalence of research focused on demand-side aspects of water management. Johnson and Handmer (2002) have identified a redistribution of risk to water customers by the water industry. In the past, the water industry has engineered out uncertainty of climate variability through increased storage and network transfer capacity but instead it is now actively shifting focus onto “*demand-fix solutions*” (Johnson & Handmer, 2002, p347) due to reduced opportunities and high costs associated with major infrastructure projects. This has created an opportunity to allocate blame for supply failures onto customers by re-framing the issue as a problem of uncontrolled demand, which has not been sufficiently curtailed by the threat of climate change. Taking an example from Australia, Sofoulis (2005) describes the situation well, explaining how water has become “*in its taken-for-granted abundance a ‘utility’, part of the inconspicuous background of urban life,*” and the customer, externalised from the commodification of the water cycle by large utility companies, is left with a “*remnant of responsibility*” as a ‘user’; the bulk of the

responsibility being maintained by water companies whose revenues will decrease if water-saving measures are successful, and the bulk of the blame being apportioned to customers who remain largely out of the control of utility companies. The constricting nature of maintained revenue combined with limited development opportunities, alongside customer confidence in supplies and unrestricted consumption, in the context of climate change, is therefore mainly dealt with by shaming the end user. This allows policy-makers, regulators, and researchers to view the situation through an industrial provision frame where customers appear to be uncontrolled / uncontrollable while water companies are free to operate outside of this frame, virtually unimpeded, ensuring that measures to restrict customer demand such as financial penalties for high consumption households remain a last resort. This serves to re-emphasize the importance of strengthening resilience through investment in infrastructure wherever possible.

The perpetuated view of customers controlling suppliers through inexorable demands in the face of disastrous climate change, chimes with Swyngedouw's (2007) post political, post democracy where this type of socio-eco problem is an external side effect of neoliberal capitalism, where the interests of 'the people' and 'the environment' are depoliticised while *"responsible scientists, environmentalists of a variety of ideological stripes and colours, together with a growing number of world leaders and politicians, keep on spreading apocalyptic and dystopian messages."* (Swyngedouw, 2007, p16). In this environment it is possible for the environmental social scientist to be drawn to these dystopian messages and uphold the notion that public consumption is the problem, allowing an argument for increased investment in infrastructure to persist. Nevarez (1996) charted a similar effect in his observations of a discourse of survival driven by water managers during the 1985 – 1991 drought in California, where continual development of infrastructure and take-up of water resources for economic growth shielded domestic customers from the realities of scarcity by enabling the provision of 'water on whim' to continue. As the drought worsened water managers were able to use emergency rationing to frame their need for more infrastructure investment for growth as a 'survival' project, forcing customers to take the blame.

This paper does not however seek to defend mass consumption of water through a critique of the evident blame culture. Instead it seeks to highlight how the UK water industry has moved away from an evenly balanced ‘twin-track’ approach to developing engineering solutions to water scarcity and encouraging modest behaviour change in customers, and has moved towards placing the burden of responsibility onto customers (House of Lords Science and Technology Committee, 2006). This move has resulted in a substantial increase in environmental behaviour and market research in the area of water demand, that alongside similar work in the field of energy use and waste minimization aims to contribute towards the development of behaviour change initiatives and takes its cue from the rhetoric of the evident blame culture. As a result the current dichotomy in demand management policy is that it is based both on the systemic and individual paradigms (Spaargaren, 2011), assuming that ‘the public’ will eventually be forced to use water appropriately through a combination of strictly enforced regulations, prohibitive pricing, and systematically applied technological innovation but at the same time preaching to the public’s moral responsibility to use less as a responsible reaction to increasing demand pressure. Spaargaren (2011) is equally critical of both paradigms; one allowing the individual to have too much choice, the other restricting the individuals’ opportunities to choose to adapt positively in their own way, suggesting that failing to take time to understand the social systems and technological restraints that impact on the actions of individuals is “*socially naive*” (Spaargaren, 2011, p2). However, assuming that from an industry perspective, the paradigms that support the blame culture are of little interest, perhaps it is more appropriate to describe modern approaches to water demand management as a product of clumsily mixing historic with rational and responsible consumer models as described by Sofoulis and Strengers (2011, cited in Sofoulis, 2011), in an attempt to create integrated models that secure a sustainable future for both water companies and their customers.

### 3. The Water Customer as Consumer

It is an inescapable fact that ever increasing demand for water resources cannot be sustained. Through the rhetoric of sustainability, the protection of the environment, which may be degraded through over abstraction, is considered equally important to the provision of sanitation and clean water. Whilst exposure to the risk of not achieving the fine balance between potable water provision, waste water management and ecosystem management, can be imposed on the customer through poor management by utility companies, it is also reasonable to say that customers can inadvertently expose themselves to the risk of socio-economic drought and environmental degradation through unchecked profligate personal use of water when supplies are limited. That the water industry is not sustainable in England can therefore be blamed on both sides - customers and water managers – as both have their part to play in protecting the environment and themselves. The principles of sustainable development are predicated on improved lifestyle management, described by O’Riordan (2004, p240) as

*“The management of an evolution for a more resilient humanity on a robust planet and its peoples within ecological limits that requires losers to be aided by gainers.”*

Developed nations stand accused of doing little to bring about sustainable resource use whilst suffering from an *“imaginary helplessness in the face of rising conspicuous consumption”* (Roy & Pal, 2009) and this apparent condition is worthy of research. As a result, the notion that the customer has to take full responsibility for its actions and ameliorate the prospect of water shortages through behaviour change has somewhat dominated policy initiatives in recent years, leading to a succession of studies of water-related behaviour, which according to Lam (1999) is a relative latecomer to other perceived environmental behaviours such as recycling and energy conservation, and is mainly focused on minimization actions (Barr et al, 2011a) and price increases (Allon 2006).

There are two lenses through which one can view changes to water use behaviour; ‘customer’ and ‘user’ represent two sides in the argument of motivation and personality versus perception and culture. On examining the

supply of water from a purely commercial perspective, the customer is simply required to hold a very narrow, selfish view of water as a commodity provided on demand in return for payment. When the supply of water is examined from a sustainability perspective, the customer becomes a user and is anticipated to have a much broader vision of water as a priceless environmental resource to be shared equitably within and between communities. According to James (2007 p579) this dichotomy may be resolved:

*“if we recognize that culture is a statistical concept, emphasizing the recurrent regularities and persistent relations exhibited by members of a group, while personality is a clinical concept for the unique, identified individual who may participate in maintaining these group regularities but never fully conforms, always utilizing these cultural patterns in his idiomatic way for the goals and purposes he individually seeks to attain.”*

In the case of potable water, the prevalent water customer ‘culture’ is constructed by water managers through proxy measurements such as quantity used, over time (peaks and troughs in demand). This serves to overlook the individual user or ‘personality’, who has his or her own habits and requirements, that are impossible to identify from large data sets, and operates within the overall parameters uniquely and independently. The customer is metaphorically pitched against a conglomerate of notional water user personalities developed from attitude survey responses, allowing the predominant blame culture to persist.

Arguably, environmental social scientists attend to this by focusing on one of two extreme positions; either the individual or whole populations, and presenting water behaviour either in terms of *“looming masses of populations consuming water by the gigalitre, or the little bundles of attitudes, anxieties, opinions, values and preferences called ‘individuals’ who are randomly encountered in close-ups of the consumer markets they constitute”* (Sofoulis, 2005 p 446). More recently, these subjects of investigation have been confused further through the application of a filter - the concept of climate change – which encourages researchers to target the individual personality through perception studies that seek to gauge willingness to act (reduce water use) to tackle the prospect of potentially diminishing water supplies, which presume the subject to

have an understanding of the links between climate and water availability. These perception studies are very often contrasted against assessments of actual user practices (Dessai and Simms, 2010) with the results tending to reinforce the notion of there being an attitude-action gap or a mismatch between the stated intentions of the informed customer and evidence of actual practices by the user. However, it is not correct to assume that a combination of willingness to adapt to climate change through changes in behaviour and observed behaviours that do not conform to perceived water-saving actions constitutes an attitude action gap. Without having considerable knowledge of the individual's specific circumstances, strategies, and reasoning for maintaining particular practices, and individual consumption data, it is unreasonable to make sweeping judgements that the individual customer is not behaving appropriately. However, these judgements are frequently made and this has maintained the bulk of water-related social research at "the cross-roads of personal characteristics and behavioural intentions" (Hurlimann et al, 2009, p47), and in turn has led to the development of various typologies or groups of behaviours based on stated attitudinal factors such as those described by Gilg & Barr, (2005). These groups have then become targets for policy-driven information campaigns, and the circular nature of this investment in understanding, labeling, informing, observing, and understanding continues unabated. This perpetuates the attitude-behaviour-choice paradigm and in Shove's (2010) opinion;

*"In commissioning research to address the attitude-action gap, funders reproduce precisely that understanding of social change which has generated the problem in the first place; after all the gap is only mystifying if we suppose that values do (or should) translate into action."*  
(Shove, 2010, p1276).

A recent UK Department for the Environment, Food and Rural Affairs (Defra 2012 b) call for further research into water-wise messaging and how these messages can be conveyed to the public to instigate behaviour change provides further evidence that in the case of water resources management, environmental social science research has reached a rather inconclusive plateau. It also serves to maintain the predominant views within the

dichotomous nature of water management without challenging any aspect of the situation directly. It is here that the authors would like to reinforce the arguments made by Shove (2010) for the application of new theoretical perspectives, and Sofoulis (2011) for the inclusion of humanities, arts and social sciences in the design phase of research projects in this area. Accordingly, this paper will review environmental social science research that utilizes (with varying degrees of success) methods designed to go beyond the ABC.

The authors have looked for environmental social science research methods that can bridge the divide between mass culture and individual personality, to find new ways to address the problem of rising demand for water. This is not the only area where policy makers are seeking to intervene to manipulate predominant public attitudes and there have been some notable successes in areas such as health, where the balance of responsibility is more evenly distributed between actors. For example, the National Treatment Agency for Substance Misuse (NTA) recognizes the importance of supporting the families of drug users, alongside providing treatment to addicts for sustained recovery from drug abuse (NTA 2010). Although the authors are not experts in this area of research it is apparent that research undertaken on behalf of the NTA is predicated on the existence of a quantifiable problem – number of known drug users seeking treatment – and combines qualitative and quantitative data obtained through various standard methods such as questionnaires, data analysis, and interviews. The difference between this area of research and that which we are concerned with in this paper is that the problem is clearly identified and quantified and the users in this case drug users, not water company customers, are identifiable once they ask for treatment for their addiction. Perhaps our dissatisfaction with water research will not be relieved until the individuals we are targeting are identified fully through accurate consumption data but as it stands, in England and Wales, 60% of households do not have water meters (Ofwat, 2011). This is a legacy of state water management where households paid an annual charge for water based on the size of their property rather than the quantity they actually used. Customers can choose to have a meter installed and in some water-stressed areas programmes to fit water meters in households are ongoing but for now, how and

when we reach the point of 100% metered supply is not for discussion here. However, the fact that accurate per household data is not available across the supply network is key to our argument.

#### **4. Individualist Approaches to Water Use**

For a considerable period of time, policy makers have been preoccupied with finding the right mechanisms to change behaviour. Particularly focusing on smoking habits, drug addiction, obesity, energy consumption, travel choices, and to a lesser extent water saving. The distinction between approaches to curb eating habits for personal welfare, and initiatives to promote good environmental practices like water-saving, has not been clearly defined and is currently overshadowed by interest in narrowing the gap between expressed concern for climate change and willingness to make lifestyle changes that serve to mitigate the problem. However, our point made previously about measurement and the availability of data on known problems such as the number of obese patients or passengers making specific journeys, makes it easier to identify problems and solutions. The existence of Defra's Centre of Expertise in Influencing Behaviours (CEIB) has legitimized the absorption of initiatives that attempt to identify messages, actions, and points in time where behaviour can be influenced, into the sustainability agenda. These initiatives fall within the so called 'triangle of change' which is assumed to link government, business, and civil society together via explicit changes in habits on an individual and/or collective scale (Darnton et al, 2011, CIEB, 2011). Consequently, demand-side research has become intertwined with a dialogue of sustainability and the measures associated with demand-fix solutions (altered practices, habits, and consumer choices) are measured against environmental targets (CIEB, 2011). This in water terms has been translated by Defra to equate to an ambition to reduce household per capita consumption from between 150 and 160 litres to 125 litres per day. Unfortunately, without a complex collaboration between water customers, water researchers, and water companies it is not possible to identify individual over-users of water and so the successful research recipe for health-related problems cannot be followed. This is presumably why water use research is lodged principally in the domain of

behavioural economics, a blend of economic theory and psychology (Jackson 2005, Darnton, 2008).

Some actions are more easily quantifiable and defined as pro-environmental consumer behaviour than water use, and are therefore more easily researched. Choosing alternative transport methods or purchasing fair trade goods are examples of pro-environmental consumer behaviour. Jackson (2005) suggests that the conservation of water and energy are not consumer behaviours in the strictest sense of purchasing and might be more appropriately termed 'citizen' behaviours, as price and quality are not necessarily considered during everyday water-based tasks as the determining factors for use. This alternate label of water use as citizen behaviour may have steered research efforts towards reliance on one frequently cited model, the Theory of Planned Behaviour (Ajzen, 1991). In a comprehensive review of theoretical models, Jackson (2005) describes the extensive use of a variety of methods, approaches, and ways of presenting results, asserting, "*it is virtually impossible to derive universal causal models that one can construct behaviour change initiatives from*" and therefore it is perplexing that so much emphasis has been placed on this model. To shed some light on other models researchers might deploy, Darnton (2008) helpfully provides a complete review of theoretical models, which are used to make sense of specific behaviours, and theories of change that can track adjustments in behaviours over time and are useful in developing interventions for the future. It is here that we argue that to break away from the circular research mode they have settled into, environmental social scientists should consider moving on from theories of behaviour at an individual level that describe attitudes, values, norms, habits and beliefs that are present, to stages of change models that can be tracked over time and begin at a measurable baseline. For example, successes in personal behaviour change for health reasons have been unpicked via the Transtheoretical Model (Velicer et al, 1998), which identifies stages of change and utilizes decisional balance and temptation scales to analyse emotions, cognitions and behaviours. In this model, self-efficacy is instrumental in providing a tipping point from one behaviour, to another that is perceived to positively benefit the individual (Bandura, 1977). Despite its popularity in psychology and health, this model has generally failed to grab the

attention of environmental social scientists that are interested in investigating triggers for positive environmental behaviour.

Exceptionally, Freestone and McGoldrick (2008, p445) were breaking new ground when they applied the transtheoretical model to ethical consumerism in an attempt to identify a consumer value shift towards an “*environmentally proactive mindset*”. However, as ethical considerations of water sit more comfortably in conservation rather than consumption, water did not feature as a consumable in this particular study. Nevertheless consideration of the use of stages of change models allows some scope to debate moving customer demand from the centre of the field and instead considering water a high-value environmental product that meets all our cleansing needs, and defining a set of appropriate citizen behaviours that go with conservative use. Or alternatively, developing the concept of profligate water use as a ‘bad’ habit similar to that of smoking or alcohol abuse, that enables the treatment of individuals for the symptoms of excessive habitual use. It is after all just as easy to blame tobacco companies for encouraging consumers to buy cigarettes, as it is to blame addicted smokers for not having the willpower to quit, while water companies are supported in being able to continue to feed the individuals habit for deep baths and to abstain from responsibility for dripping taps. At the very least we should be asking if it is individuals that should be somehow inspired to change behaviour through exposure to environmental messaging and climate change or if success might come through altering the context in which policy makers are developing such initiatives. It is not possible to do this while environmental social scientists rely so heavily on one or two perspectives, theories, models, and policy stances. Focusing on demand by individuals without being able to distill the quantity of water supplied to individuals from the available aggregated data leads to generalization and weak observations, which are transformed by policy-makers into one-size-fits-all messages that in the main are unworkable at the household level.

There is nothing wrong with maintaining an individualist approach to environmental social science research in the context of water management providing increasing our knowledge of customer habits, values, beliefs, and

motivations is paired with detailed knowledge of actual consumption. Sadly the circular activity of behaviour research in the face of climate change and the scarcity of water framed in terms of environmental disaster and consumerism has firmly split apart the union between hydrocycle and habit, which is where technology, the water industry, and policy are positioned. Medd and Shove (2007) suggest expanding the frame of consumption research to include methods that relate to infrastructure and technology as well as consumer habits and preferences. However, water companies with a remit to promote conservation to their customers re-frame water saving from a policy perspective as new behaviour that can be learned through marketing and advice, without registering the importance of understanding the differences between customers in volumetric terms, or understanding the cultural and technical factors that set baseline consumption levels. Barr et al, (2011a) point out that social marketing reduces sustainable lifestyles down to an unproblematic and discrete set of practices. In this case these practices are all prohibitions or restrictions of water flow whilst carrying out daily tasks that range from brushing one's teeth to watering the garden. Barr & Gilg (2006) attempted to identify the characteristics of the water saver with the intention of helping policy makers target initiatives for water conservation more accurately, and note the fracture between the sectoral approach to promoting environmental action and lived experiences, arguing for research to take place where practices are undertaken. Shove (2002) has outlined through her studies of laundering behaviour, that this has resulted in an emphasis on defining beliefs, values, and attitudes, and developing persuasive methods to reduce water use. Whereas Shove advocates that the bulk of research attention should be aimed at routine practices that are bound up - in the case of laundering - in systems within a sociotechnical system, and where consumption practices are understood as part of performing services rather than utilising resources. This analytical rather than conceptual approach supplemented with usage data would result in a clear appraisal of modern domestic water use that might possibly be used to highlight the gap between stated intention and action but could be put to much better use in defining the behavioural, technological, cultural and contextual changes that are going to be effective in tackling water resource scarcity.

The subtlety of the distinction between these two approaches and the usefulness of accurately recorded usage data remains unexplored in recent social research commissioned by Ofwat (Creative Research, 2011a) which was designed to “*explore high-level customer views and attitudes to climate change and its impact on the water and sewerage services*” and in particular “*customers’ attitudes to service and price in relation to the challenge of climate change in the long term*” and “*customers’ appetite for changing their behaviour to use water more efficiently and manage water entering the sewers, and the trade-offs they are willing to make.*” The data was collected at ten extended focus group events during which participants discussed future climate scenarios that are anticipated to result in periodic drought and flood, and their impact on the water industry’s infrastructure such as cracked pipes caused by water-logging and drying of soils; the contamination of treated water by flood water; and environmental pollution from overburdened sewage works. Unsurprisingly the resulting discussion revealed participants were inclined towards the idea of ‘spending to save’, in other words, to pay more for water now, to ensure that water companies are able to invest in infrastructure improvements such as larger sewers and flood protection that will increase resilience against the impact of drought and flood on vulnerable and overburdened networks in the future.

It is not necessarily the topic of discussion, or the result of this research however that causes concern but the framing and the method. Participants were screened to ensure an even spread from ‘climate believer’ to ‘climate skeptic’ were included and representation from upper and lower socio-economic groups guaranteed. The presenters closely guided the discussion and stimulus materials were provided. Facilitators were briefed to introduce the idea of spending to save into the discussion should it not be raised spontaneously (Creative Research, 2011b, p92). This highlights the preconceived ideas already held by the researchers and therefore their interest in guiding the actors to the response they were already looking for. The conclusions reported were framed within the assumption that future climate change will impact on water services, behaviour change is necessary, that trade-offs are inevitable, and price is a determining factor. In other words, there could only be one of two

conclusions; either the majority of customers are willing to spend to save, or they are not. Whether the conclusions would have been the same if the subjects were not so obviously guided towards these answers is not clear and to a certain extent, this type of research and analysis is contributing to what Sofoulis (2005 p446) has called a *“dense fog obscuring where most research should be, framed through particular histories, discourses, and conventions.”* Instead, under the banner of climate change we are *“re-framing the notions of environmental practice”* in a way that allows *“socio-ecological conflict”* to arise (Barr et al 2011b). Similarly, Shove and Warde (1998) observe that the *“sociology of consumption is not well equipped to deal with environmentally critical forms of inconspicuous consumption”*.

## **5. Framing Water Use / Practices**

The framing of environmental practices or what Jackson might term citizen behaviours in the context of climate change deserves careful analysis because it leads researchers to believe that the profiles they develop of individuals and groups whilst working in one area of resource use are transferrable to other resources. The authors would argue that the framing should be specific to the task at hand. The Ofwat-funded research cited in section four above has much in common with deliberative research completed on behalf of the Consumer Council for Water (Opinion Leader, 2006) with the aim of building *“a holistic view of consumers’ awareness, attitudes and behaviours towards water and its value in their lives.”* Both pieces of research developed a set of *“psychographic variables”* (Opinion Leader 2006, p8) or a *“tentative typology”* (Creative Research, 2011b, p 83) that are attempts to categorise observed water-saving stances and propensity to adopt certain behaviour changes. These attempts to segment participant responses and build a general typology that can be applied elsewhere in society to categorise attitudes, perceptions and behaviours are used in the same way as one might traditionally draw upon various theories to substantiate one’s views on a research outcome. However, to think that one might apply the results of this research to other study groups is probably inadvisable because it ignores the *“psychological plasticity of individuals”* highlighted by Levy-Leboyer (1988 p780) who noted the ease with which new psychological theories and techniques could be taken up without an

understanding of their initial framing or theoretical underpinnings, where they became part of the “*sad story of psychological fads.*” (Levy-Leboyer, 1988, p780). It is therefore possible that social science researchers may follow fads more willingly than breaking new ground and experimenting with new methods, and developing new theoretical stances that might come from a less restricted view of the current situation or the change of discourse that Sofoulis (2005) advocates.

The Ofwat commissioned research cited above used two frames; participants were guided through a dystopian disaster frame and the results were viewed through a behaviour frame. Owen et al (2009) dispensed with one frame by masking the topic of their research into the public understanding of sustainable water use in the home, to ensure subjects (home diarists and focus group attendees) gave honest answers. However, their assessment of the outcome of the research was framed within a rigid set of criteria based on a constructed definition of sustainable water use that related to specific types of technological adaptation of the home and specific adjustments to practices such as brushing teeth. Dispensing with all framing, Allon (2006 p 9) set “*the environment aside as the main focus of attention,*” to uncover the habits and expectations of water diarists recruited to the Everyday Water project. The diaries collected provided a breadth of information that included the authors’ feelings and motivations, and how they used water as a part of every-day life. This type of research sheds new light on the social construction of scarcity and the decisions individuals make regarding their choice of where and how to use water, within a “*world of things, technologies, and sociotechnical systems*” (Allon, 2006, p20), allowing the researcher to consider a philosophical and theoretical basis for future research with substantial underpinnings that is much more likely to stand the test of time than a set of typologies.

Whilst our research observations are made in the present and immediately move into the past, theories can travel forwards in time with us, and are used to make sense of new observations rather than new observations leading to new typologies. Theories can therefore go some way to explaining behaviours but methods of investigation and the perspectives from which researchers observe

subjects could be a limiting factor. Jensen (2008) provides a critique of behaviour change initiatives in Denmark where lifestyle has been the general frame within which different behaviours are observed in relation to actions that are based on environmental knowledge, or are positive in that they are perceived to be less detrimental to the environment than other possible choices. Jensen highlights the problem with linking observed actions, stated awareness of environmental issues and measured consumption data, with the elements of various typologies or segmentation models. He argues that while consumption data can highlight differences between consumers, it cannot reveal the individual reasoning behind specific consumption choices, or the unique blend of physical, infrastructural, and fiscal constraints that are out of the control of the actor, and cultural influences upon the actor, which also have a bearing on behaviour outcomes. Jensen concludes that the persistent lifestyle frame, within which such studies are made, still places the individual consumer at the centre, despite the obvious limits to effecting change from this position. This is concerning as research by Jensen (2008, p359) also reveals the importance placed by individuals on not being seen as part of a “*greeny segment*” and as a consequence their avoidance of consumption reducing technology or habits. Jensen suggests therefore that we should openly research individual actions without being preoccupied with the root of the motivations behind them, as many every-day practices are ‘green’ but are not motivated by knowledge of environmental issues. Indeed one should possibly ask at this juncture whether environmental practices even exist for people who are not environmentally aware and if this is important?

This recommendation opens up other opportunities that have already been explored by Krantz (2006) in her use of Hagerstrand’s (1985) time-geography and Lenntorps (1998) pockets of local order (cited in Krantz, 2006, pp227 - 241) in making the case for not restricting studies of behaviour to isolated activities but to view activities through different constraints in varying combinations. Accordingly, time-geography identifies three specific types of constraint: capability (ability to use), coupling (consumption and transactions), and steering (authority, time, space, customs, legislature, and habits). These constraints are described as determining what is “*in reach*” of the individual (Krantz, 2006, p231

- 232). In the case of household routines that utilise water these are invariably habitual and carried out in a particular way in a specific place at a specific time. The allowance of these habits or rituals such as laundering creates pockets of local order, which Krantz identifies as a useful analytical tool for studying stages of change.

## **6. Questioning the Methods**

The methods utilised for environmental social science research that are open to observing myriad components of resource use within and without what has come to be regarded as conventional framing of water consumption in the context of individual motivation and use, have to capture information from multiple perspectives and surely must be structured in a way that captures data from a broader baseline of activities. Medd and Shove (2007) also argue for the inclusion of methods that relate to infrastructure and technology as well as consumer habits and preferences. However there are plenty of studies that maintain the gap between water consumer and water provider and settle on consumer behaviour and preferences utilising perception studies and questionnaires, without acknowledging their failure to look beyond stated perceptions to the worlds within which the lifestyles of study are situated or the constraints these worlds apply to subjects. This leads to an inevitable shortfall of ideas and interventions and a reliance on labeling.

The gap between our choice of research methods and society's needs has been highlighted by Ansoff (1986 p21) who argued, "*most research is being done from the vantage point of single disciplines, whereas the key social problems are multi-disciplinary.*" However, our desire to problem-solve drives us to ask customers about their perceptions of climate and willingness to alter personal water habits or pay for increased security of supply in times of scarcity such as drought, and to apply a theoretical basis to our analysis of the results and speculate on how future outcomes might be manipulated using various technological, financial and moral sticks and carrots. This rather one-sided activity presumes a great deal regarding the behaviour and perceptions of water managers and future technological development. The problem with this

approach is that climate and behaviour are subjects of study that are gradually changing over time. We can see this by looking at climate and historical records. The world is gradually warming and consumer preferences are changing. The daily or twice daily shower has replaced the weekly bath. In the sphere of water management, weather events and precipitation are less predictable and often more extreme, and household demand for water has become inexorable. The background to the picture is constantly changing and the frame therefore doesn't always fit.

Ansoff (1986 p 28) has also argued that; "*A substantial body of social science research is not applied for the simple reason that it is not intended to be applicable.*" In this statement he is not implying that researchers deliberately ensure that the results of their work are of no use to anyone but that in the absence of a universally specified taxonomy of social science, researchers get confused, and often start out without identifying whether they are attempting to increase general understanding, or to solve a specific problem. The authors would argue that this statement holds true for a great number of studies that attempt to contribute to understanding of water customers' habits, beliefs, perceptions, and demands upon supply. Firstly, the framing of water customers as demanding and water providers as suppliers is too rudimentary (and worthy of lengthy debate elsewhere). Secondly, it is clear that most behavioural studies relating to consumption practices are aimed at problem solving, but due to the methods used stop short of reaching their goals by adding to our perceived knowledge of the consumer/citizen without providing robust and reliable empirically grounded data we can trust to provide firm foundations for behaviour change strategies. These concerns over our methods and achievements can be found within most studies as either critiques of others working in the field (as done in this paper), or dissatisfaction with the limit of usefulness of results. As an example, Moore et al (1994) present a longitudinal study of domestic water conservation behaviour with a caveat that self-reports from customers may not be reliable. Whereas Syme et al (1990) highlight the importance of the 'proper' use of data after finding a method of extracting the quantity of water used by consumers outside the home on activities such as garden watering and car washing from their total household consumption, to gain a greater

understanding of links between attitudes towards conservation and external water use. More confidently, Reiss and White (2008) describe customer-billing data as a sound platform from which to interpret fluctuations in use. It would seem that researchers who are prepared to acknowledge the limits of their data and methods are often less satisfied than those who believe that they have got the right method and the right data to work with. The key here could be to be less ambitious about what we can achieve in a single study and more specific about where that study fits within the frame we are using.

Launching the Traces of Water series of UK Water Industry Research funded workshops in 2005, Medd and Shove (2007) discussed the fundamental challenges to the development of the social science of domestic water consumption, including the difficulty in distinguishing between approaches to either understanding or changing consumption and their seeming interchangeability in social science. Alongside this they voiced the importance of understanding the past history of water as a commodity and getting better acquainted with personal water practice routines, before suggesting what may or may not trigger a re-valuing as a resource by the customer and/or a change of habits or an investment in water-saving technology. The conflicting views of the domestic water customer as an individual who makes choices based on needs and wants, framed within affordability, or who utilises water without thought as part of a series of daily practices was assumed to warrant serious examination. The inclusion of researchers interested in probing the history of the commodification of water was an important step in broadening the landscape and the actors in the frame. Trentmann and Taylor (2006) analysed the historical development that has led us to the position we find ourselves in today, meanwhile Priscoli (1998) has made a very strong case for looking at our water past and in particular water conflicts, to predict likely outcomes for water use in the future. However, the package of necessary approaches to the analysis of water use that would accomplish useful results cannot be brought together without an understanding of the individual histories surrounding the communities that comprise the consumer element of our studies. The famed participant observer, William Foote Whyte (1984) described the great contribution less experienced researchers made to his Peruvian studies by not

only recording details of the participants they were sent to observe but also collecting their back stories and local histories, opening up a wealth of ideas and explanations that he personally would never have thought to collect.

## **7. A Grounded Theory Approach**

Over three decades ago, Bunting and Guelke (1979) described research based on intended behaviour and stated perception alone as questionable, and argued that a new emphasis on actual behaviour was important. More recently, Medd and Chappells (2008) have called for further studies that go beyond self-reported intentions. Matching observations of behaviours to theories is a legitimate activity for the environmental social scientist and it leads to substantial quantities of descriptive work that can be used retrospectively to pinpoint changes in behaviour over time and deviation from stated intentions. The problem being that the researcher remains confined within the original constraints of past research, following the same patterns, asking the same questions and possibly repeating errors. To avoid this it is advisable to add to the research repertoire so-called grounded methods that are admittedly time consuming and therefore costly but can be carried out by just one person and require no specialist equipment or complicated computer analysis, yet can yield thousands of unique observations that help to build a more comprehensive picture of the field of research; observations that are not limited to stated perceptions and behaviours but draw on visual appraisals of the subjects surroundings and activities as well as their opinions, past histories, practices, and preferences. This rich data can be utilised to build up a picture of the present that includes dialogues from all sides, not just the consumer but also the water manager and the technology developer. The observed can also become the researcher by engaging in data collection through keeping diaries, and developing their own materials that help them to explain what they are thinking, feeling and doing, and the constraints they know are present that may not be obvious to the outsider. Freestone and McGoldrick (2008) for example introduced the Zaltman Metaphor Elicitation Technique, a patented market research tool to their work and encouraged interview subjects to produce images that helped them to convey their thoughts and feelings “*The advantage*

*of such a technique is that issues emerge from the data collected by the respondents as opposed to the researchers imposing their own thoughts and structures.”* (Freestone & McGoldrick, 2008, p 451) Those being researched provided their own frames in this piece of work.

An alternative method, and to our knowledge, hitherto unused in this sphere of research is Classic Grounded Theory (Glaser & Strauss, 1967), which is considered by its devotees as neither a qualitative or quantitative method but “*a general research methodology occupying its own distinct paradigm on the research landscape*” (Holton, 2010), naturally separated from other forms of research and arguably perfect for application at the intersection between water management, water technology, climate change, and consumer. All types of data can be utilised to develop theory including in the case of water, questionnaire results, interviews, meter readings, diaries, photographs, secondary data from previous studies and so on. This method is not to be confused with other ‘grounded theory approaches’ that researchers such as Sofoulis and Allon and many others have used, where a mix of methods are deployed to collect data from subjects but a theory specifically grounded in the subject area does not emerge.

According to Charmaz (2006), Grounded Theory dispels the positivist notion of passive observers and provides systematic guidelines for probing beneath the surface and “*digging into the scene*” (Charmaz, 2006, p23). This framework allows for systematic movement back and forth from field research to analysis. The researcher uses whatever techniques are appropriate in the field to observe, memorize, code, and identify categories with specific properties. These categories and properties are explored and analysed individually and comparatively leading to the generation of new categories and properties and so on, as the researcher returns repeatedly to the field to gather more data. This is the process of theoretical sampling (Charmaz, 2006, p96) through which theory is developed. Re-visiting and re-contextualising data collected requires the development of many evolving hypotheses, which are pursued simultaneously and directed by the researcher who is guided by the mantra that “*all is data*” (Glaser, 1998). The resulting caches are both analysed and used

to prompt introspection by participants and the researcher, leading to deeper analysis and further introspection, with the aim of reaching theoretical saturation and from this point, abstracting substantive theory. The emerging theory is then subjected to a process of delimiting, described by Glaser and Strauss (1967, p111) as *“the reduction of terminology and consequent generalizing, forced by constant comparisons”* leading to what they consider to be two major requirements of theory: *“parsimony of variables and formulations and scope in the applicability of the theory to a wide range of situations, while keeping a close correspondence of theory and data.”*

What sets Classic Grounded Theory apart from other methods is the discipline the researcher follows in not forcing their own ideas and opinions onto the data they collect. The theory must emerge from the data rather than be overlaid on the results and chopped where it hangs over the edges or manipulated to fit. Unlike the Ofwat sponsored research mentioned earlier, the researcher sets out to hear and see *“what’s doin”* (Glaser, 2011) and to build a new theory from scratch around his/her observations rather than selecting to record observations based on their fit with pre-existing theories. As a consequence, it is impossible to predict at the outset of the research what the outcome will be and therefore a frame to set the research within is not required. If the method is followed in detail and research continues until saturation of data is reached (no new observations forthcoming) the researcher will identify a problem that needs a solution and it is quite likely that an intervention can be devised to deal with the problem once it has been identified. In the case of water consumption, the problem is unlikely to fit neatly with the behaviour changes policy makers are looking for, but it may be key to unlocking other aspects of lifestyle that by association maintain higher levels of water use than can be sustained in the long term. As an example, in their *Theory of Forging a Path to Abstinence*, a classic grounded theory study of Heroin users seeking detoxification, McDonnell and Van Hout (2011) identified *“getting clean”* as their main concern or problem and note that *“The path which heroin users shape towards abstinence is defined by the resources available to them.”*(McDonnell & Van Hout, 2011, p20). In identifying a process of steps towards abstinence that the heroin users followed they were able to show how access to and quality of resources such as

knowledge, treatments, and therapeutic alliances were important in determining whether an addict would choose to self-manage their withdrawal from heroin unsafely, or obtain appropriate support through the process. These observations pointed towards a need for an increase in the number of local services for heroin users to avoid the normalization of self-management of the detoxification process that can have serious medical consequences.

A key difference between doing classic grounded theory and developing social research projects using a mix of standard qualitative and quantitative methods is that while the results of other types of research can all too easily be swept up into catchy interventions that are often taken up in policy realms where there is a danger that they will be misused, Classic Grounded Theories are highly portable and can be built upon through time but they are also always connected to the subject of study. To deal with Ansoff's (1986) observations that research is often done for the sake of it and not necessarily to be applied, the Classic Grounded Theorist has to move from the substantive level to the conceptual level. According to Glaser (2011) a substantive theory that is recognisable in every-day life can be elevated to formal theory. In the case of water research and behaviour change, an intervention that grows from a substantive theory is likely to be much more useful and beneficial in the short-term, and more appealing to policy makers who may fund its development. This would be preferable than to continue to fund research that perpetuates the position environmental social scientists appear to be stuck in at present. The fact that Classic Grounded Theory was developed in the 1960s and is still in use today is testament to its appeal to researchers and usefulness in identifying and solving problems. Classic Grounded Theory is mostly used in the areas of medical and corporate research but this should not mean that its methods cannot be learned by environmental social scientists and deployed in the area of resource management, particularly as it offers the researcher an opportunity to delve into 'rich' data with a great deal of depth. The authors accept that this should not be considered the sole method by which forward motion in water demand research will be triggered after such a prolonged period of stagnation but we believe it is certainly worthy of consideration, particularly as such a broad range of data

which could include individual consumption data can be incorporated into the development of a grounded theory successfully.

## **8. Conclusion**

In this paper, the authors have reviewed the literature on the social science of water, explored a methodological problem, and suggested that framing of consumer-citizen behaviour research in the context of water use should be reconsidered and a more holistic approach that acknowledges the dichotomous nature of water management applied. Implicit in the discussion has been a viewpoint that environmental social science research is inadvertently supporting a blame culture that serves to perpetuate policy stances with impossible and contradictory goals while the needs of industry and customers are met at the expense of natural ecosystems. In highlighting this unintentional yet damaging state of affairs where researchers continue to make observations without making any forward progress, an opportunity has arisen to open the door to a plethora of research techniques and paradigms that might be explored in order to achieve the progress so desperately required in this important area of sustainable resource management. The authors have outlined a few alternative methods and there are undoubtedly many more combinations of methods, theories, and models that can be used and a wealth of interventions that could be experimented with, in an attempt to change behaviour for positive environmental benefit, without losing sight of overall policy goals.

A key message that this paper is designed to convey is the benefit of approaching environmental social research with an open mind, rather than using techniques such as interviews, questionnaires, and focus groups within a specific frame, or trying to fit observations into a pre-selected framing of choice (like the ABC); to accept that it is possible to shed new light in areas where research appears static, by removing the frame altogether and letting the subjects build a new picture of their own. As Denscombe (2007, p91) explains;

*“An open mind is not a blank mind on a subject. It is informed about an area, even quite aware of previous theories that might apply, but does not approach the analysis of data using preordained ways of seeing things. It avoids using previous theories and concepts to make sense of*

*the data and thus is open to discovering new factors of relevance to an explanation of that area.”*

The authors would also argue that specifically in the case of attempts to reduce customer demand in the privatised water sector in the UK, individualist approaches to research should include consumption data that is applicable to studies of the individual. The point of departure for the next phase of water research therefore could be argued to be not in deciding on the frame and the filters that should be applied, but who or what should be the centre of the research and which methodology should be followed. As pressure on our most precious natural resource increases, it is more important than ever to establish clearly the reasoning decisions are based upon and what is anticipated to be achieved by continuing to research behaviours from a demand-side perspective alone, without the inclusion of a great deal of quantitative and qualitative data collected in a variety of ways. This therefore is our call to environmental social scientists to grasp the opportunity to advance our understanding of the social, cultural, and technical background to consumption decisions and practices.

### *Acknowledgements*

Rebecca Pearce was supported by an Economic and Social Research Council (ESRC) CASE studentship with the Environment Agency (ES/G041040/1). Suraje Dessai was supported by the ARCC-Water project funded by the Engineering and Physical Sciences Research Council and ESRC (EP/G061181/1). Dr. Julian Wright is thanked for useful discussions. We would also like to thank the anonymous reviewers for their most helpful and insightful comments. Any errors remain our own.

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## **Appendix B.**

Be Water Wise - Extract from Bathroom Manufacturers Association Website<sup>6</sup>

### ***Be Water Wise***

There are many ways we can reduce waste and save water. Below is a selection of useful hints and tips to help you save water. We must save water because there are approximately 60 million people living in the UK, using on average 150 litres of water per day for washing, cooking and drinking. Improvements in lifestyle and new technologies within the domestic environment mean we use 55% more water than we did 25 years ago, with half of this being used within the bathroom environment. As climate change takes a greater hold on the environment, we are constantly being asked to use water wisely. The BMA has put together a 'top twenty' of helpful hints and tips to help you use less water and save money. The less water you use, the less you pay and even better, the less you pay for heating hot water. Today's modern bathroom equipment has been designed to use less water – so the ultimate in saving water is to change that old water guzzling bathroom suite with an ultra modern one, that will enhance your lifestyle, help the environment and will actually increase the value of your home – what are you waiting for!

#### ***TOP TWENTY TIPS FOR SAVING WATER IN THE BATHROOM***

1. Did you know when you brush your teeth under running water you can use as much as 10 litres of water per minute. The British Dental Health Foundation suggests that, to maintain oral hygiene, you spend 5 minutes a day cleaning your teeth– if you leave the tap running for all that time you use 18,250 litres per year. Using a tumbler, instead of running the tap water for rinsing can save 9 litres of water per minute, that's 16,425 litres of water per person, saved

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<sup>6</sup> Available at:

<http://www.water-efficiencylabel.org.uk/waterwise.asp> (accessed on 13th June, 2012)

during 12 months. Across the nation that's 960 billion litres of water saved during 1 year. See [www.dentalhealth.org.uk](http://www.dentalhealth.org.uk)

2. Fix that dripping tap – for every tap that is constantly dripping around 90 litres of water is wasted every week, that's 4,680 litres wasted every year.

3. Did you know that on average you go to the loo 5 times a day - as much as 10,950 litres of water can be wasted per person over a one-year period. Today's modern toilets flush on less than 6 litres of water, older ones can flush as much as 13 litres of water – that's more than a 50% saving – change that loo today! Dual flush toilets operating on 6 and 4 litres or less save the most water.

4. Did you know that for every bath you take you use a minimum of 100 litres of water? Install a new bath made from acrylic and the water will stay warmer longer – no need to keep topping up with hot water!

5. Taking a shower instead of a bath can save up to 40% of the water that you use.

6. Reducing the time you spend in the shower will save water and energy. If your shower uses 9 litres of water per minute and you reduce the time you spend in it by 1 minute you could save a total of 3,285 litres of water a year, plus you will reduce your heating costs.

7. Don't overfill the bath. You can save water and energy by not over filling it.

8. Put the plug in when washing hands or shaving in a basin, rather than leaving the tap running. On average, basin taps deliver 6 litres of water a minute. In normal use a basin will take 3 litres of water, that's a saving of 50%.

9. Many of us use the toilet as a waste bin – the BMA has heard of people throwing make-up tissues, the cast off contents of their hairbrush, captured spiders and even dead goldfish down the loo. To save unnecessary waste of water, wrap and throw them away in a suitable bin.

10. Fit new washers in cisterns that are overflowing.

11. Install press taps in cloakroom basins. Most people only use the basin in cloakrooms for rinsing hands.

12. When cleaning the bathroom, turn the tap on only to rinse the cleaning product, rinse the cloth in the basin – with the plug in!

13. Insulate all exposed water pipes. Dead leg of water (the water that remains in the pipe once the delivery mechanism has been turned off) can cause damage if the pipes burst.

14. When planning your bathroom keep these 'dead-legs' in your hot-water supply to a minimum. If you have to run the basin or bath taps or the shower until the cooled water is removed and the hot water arrives, you can run off more water than is actually used.
15. Know where your stop taps are located. If a pipe bursts, you can waste copious amounts of water, and cause untold damage to the home.
16. Consider fitting a water meter. It will help you to be more conscious about using water and save you money!
17. Use bath water to water garden plants and the lawn especially in hot dry summers.
18. Increasingly becoming more popular, why not consider fitting a domestic urinal for the men in your home. These can flush with just two litres of water and if fitted in all British homes, we would save almost 300 billion litres of water per year.
19. Consider fitting other water efficient appliances in your home such as modern washing machines and dishwashers. These will save water and energy too.
20. We don't want to return to the practices of three generations ago - no flushing toilets, communal privy, squares of news papers and the old tin bath, so let's make sure we're efficient with the water we have now and use it wisely so that we can continue to enjoy modern bathrooms.

## Appendix C



Rebecca Pearce  
Geography, College of Life  
and Environmental Sciences  
University of Exeter  
Amory Building, Rennes Drive  
Exeter, EX4 4RJ  
United Kingdom  
Tel: 07812 404 175  
E-mail: [rp292@exeter.ac.uk](mailto:rp292@exeter.ac.uk)

Dear

Code reference HS007

Public Perceptions of Drought and Climate Change, Project 3: A Grounded Theory of the Micro-Components of Water Use

Thank you for agreeing to participate in the above project. This research would not be possible without the involvement of volunteers and I am most grateful to you for taking the time to get involved.

Please read the project introduction and when you are satisfied that you understand the implications of your involvement fully, sign the declaration on page three and return the form to me in the envelope provided.

Please also be aware that as a volunteer you are under no obligation to continue with this research if you do not wish to and can opt out of the project at any time.

I will be the sole researcher on this project and I look forward to working with you over the coming months.

Yours sincerely,

## Introduction

This research is part of a three-year study exploring links between climate and water use. It has been designed to identify the micro-components of water use in the home i.e. how, when and where water is used, and in what quantities. Although it is possible to obtain aggregated water use data from water companies, there is very little data available relating to individual household water requirements and there is no data available that compares variations in the quantities of water used in individual households with variations in weather and temperature, although anecdotally it is assumed that most households use more water in summer when the weather is hot than in colder months.

## Project Brief

This project is designed to do two things:

1. To take fortnightly water readings for a sample of households in Plymouth for a period of twelve months and to plot the data collected against temperature and rainfall data for the area to reveal whether changes in the weather do alter the quantity of water used in participating households.

At the outset, participating households will be asked by the researcher to provide basic information regarding the number of occupants in the property and number of water-using appliances such as toilets, dishwashers, sinks, showers etc. This information will be used solely to interpret differences in water use between households of different sizes with varying water appliances.

2. To compile a comprehensive analysis of the micro-components of water use in the study households with a view to broadening the knowledge base of how, when and why water is used in the home, through discussion and observation with volunteer participants.

This will be achieved through group discussions at mutually convenient venues, and visits to volunteer participants' households where the researcher may ask to observe participants completing tasks such as washing up or watering the garden and to talk about their activities. In some instances, volunteers may be asked to test water-saving appliances or other water-saving methods and to report on their usefulness to the researcher.

All group discussions will be digitally recorded to ensure that the researcher is able to compile a complete transcript of each member's contribution to the discussion. At other times the researcher will make notes regarding observations and discussions held in participant households.

**All data will be recorded anonymously. Participant records will be coded ensuring that individual's comments, personal details and home address details, remain confidential and cannot be traced.**

Participant HS007

**Declaration**

I  
(name) \_\_\_\_\_  
\_\_\_\_\_

have read and understand the project introduction and brief.

I am a willing volunteer in Project 3: A Grounded Theory of the Micro-Components of Water Use and have the authority to and give consent for, fortnightly meter readings being taken at my property:

Address:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ Post  
Code \_\_\_\_\_

Contact Telephone \_\_\_\_\_

I also agree to attend and contribute to group and individual discussions and should the need arise, by prior arrangement with the researcher, to observations of household water use in my home.

I understand that as a volunteer I may withdraw from all or part of this study at any time.

Signed  
\_\_\_\_\_

Date  
\_\_\_\_\_



Public Perceptions of Drought and Climate Change, ESRC Case Studentship

### **Introduction**

The frequency and nature of drought episodes in the UK are variable and the impact of climate change is projected to result in a higher number of short summer droughts that may impact on water companies' ability to manage supplies. This implies a need for customers to reduce their use of water at times when demand is generally at its highest. Whilst water-saving campaigns are useful short-term measures for reducing water demand, there is little evidence of a sustained public interest in preparing for drought and limiting water demand to protect the environment.

This research takes inspiration from the Economic and Social Research Council (ESRC) seminar series Mapping the Public Policy Landscape, and in particular the 2008 seminar entitled Behavioral Change and Water Efficiency, which sought to define the role of social science in influencing the behaviour of individuals as water users. It was based on the future scenario that climate change, lifestyle change, and increasing population density, would result in water scarcity and damage to ecosystems from over abstraction and pollution . It raised the possibility that water companies will struggle to meet their obligations to supply customers fairly and affordably in the future, in line with the

Water Framework Directive (2003) that seeks to ensure “*sustainable water resources that benefit people and wildlife*” through careful management of all water bodies.

Balancing demand and supply through a combination of metering and pricing, infrastructural development, and customer awareness of water scarcity and water saving initiatives, has been the focus of drought planning in the water industry to date. At the same time, reducing carbon emissions has also been placed on the industry’s agenda and home energy saving initiatives now include advice to householders to reduce their use of hot water as a way of saving energy. Acknowledging the need to reduce demand and thereby contribute to climate change mitigation as well as adaptation strategies, the Government has set a target to reduce per capita water consumption from an average of 150 to 130 litres per day by 2030. However with per capita demand higher than average (160 litres per person, per day), in the South East of England - an area designated as one of severe water stress - the importance of fostering a water saving culture cannot be ignored. The key social points raised in the ESRC seminar were: variations in personally perceived legitimate use of water; varying emphases on the value of saving water; the little-researched scope for changing water habits and modes of provision of water alongside water saving technologies; and factors impacting water consumption such as price, convenience and perceived need. The aim of this research is to bring together these social, behavioural, technical, and economic references, and view them in combination through the eyes of the public in a changing climate, with the objective of answering the following questions:

- Does experiencing drought lead to mitigative behaviour in terms of water consumption and energy use? (Project 1. Memories of Drought: Water Saving Then and Now)
- How does the public perceive and conceptualise drought and climate change? Is there a link between the two? (Project 2. Drought and Climate Focus Groups)

- What are the cognitive and institutional barriers to an effective public response to climate change? (Project 3. Sharing the Global Water Commons: A Grounded Theory of the Micro-components of Water Use)

This focus group forms part of Project one described above and is intended to be the inspiration behind a twelve-month period of grounded theory research with members of the public. The interview will be recorded and the resulting transcript will be analysed alongside other interview/focus group transcripts. The results of this analysis will be reported within the final PhD thesis, which will be publicly available. It may also form part of future academic publications.

Revealing the identity and occupation of the interview subjects is preferred however, if you wish to remain anonymous your name can be removed from the transcript and replaced with the code DM\_\_\_\_\_

Please sign the following statements indicating your willingness to participate in the focus group and whether you are happy to be named in the final thesis and any future publications.

Print Name

.....

Address.....

Contact telephone/ e-mail .....

Please tick all that apply:

- I consent to be recorded for the research described above
- I am happy for my name to appear in the final thesis and any future publications relating to this research
- I would prefer to remain anonymous in the final thesis and any future publications relating to this research



organising a series of 'Free Fayres' where people can bring their surplus produce and swap it for other types. If you would be interested in making use of this service, please tick the last box.

Surplus item description	Month produce is expected to be ready to harvest	Bottle/ Preserve for later	Give to family and friends	Other (please describe)	I would like to attend a Free Fayre to swap produce with other growers

Please turn over and continue questionnaire overleaf

**Q4.** Do you think the particularly dry weather in March and April can be attributed to: (please tick all that apply)

Global Warming		Natural Variability		Climate Change	
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**Q5.** Has the dry spring had an impact on your ability to grow your own food? If yes, please describe the impact in the box below:

**Q6.** How many water butts do you have in your garden? (please state number here)

**Q7.** How do you water your garden? Please tick all that apply

Watering can (mains water)		Hosepipe (mains water)		Irrigation system (mains water)		Rely on rainfall only	
Watering can (stored rainwater)		Hosepipe (stored rainwater)		Irrigation system (stored rainwater)		Other, please describe below:	

**Questions 8 – 10,** please tick either yes or no to the following:

	Yes	No
<b>Q8.</b> Do you have a water meter?		
<b>Q9.</b> Do you think water is expensive?		
<b>Q10.</b> Do you think droughts will be more frequent in the future?	(If yes go to question 11.)	(If no go to question 12.)

**Q11.** If you answered yes to question 10 above, why you think there will be more droughts in future years than in the past? Please white your answer in the box below:

**Q 12.** Do you do anything in particular to limit your household's use of water? Please write your answer in the box below:

--

**Thank you for taking the time to complete this questionnaire.**

If you would like to receive further information about Free Fayre events, or are willing to be interviewed on the subject of household water use, please put your details in the box below:

Name:		Yes, I would like more information on Free Fayre events (please tick)	I am happy to be interviewed regarding household water use (please tick)
Address:			
e-mail:			
Phone:			

**The results of this questionnaire are purely for research purposes only. Your details will be separated from the data and only used to contact you if you have asked us to.**

Questions 1 - 3, Results:

Of the 104 respondents, 63 people were growing fruit and vegetables and 29 of these expected to have surpluses. Each of these 29 people distributed their surpluses amongst friends and family and eleven of them also preserved fruit and vegetables for later in the year. Twelve people were interested to hear more about the free fayre idea but none of the respondents expected to have a surplus in 2011.

The distribution of fruit, vegetables, herbs, and salads were as follows:

Type	Number of people growing
Tomatoes	42
Lettuce	29
Mint	27
Potatoes	25
Runner Beans	24
Strawberries	22
Parsley	21
Thyme, Chives	20
Rosemary, Apples	18
Carrots	16
Sage, Basil, Rhubarb	15
Raspberries, Courgettes	14
Onions	13
Beetroot, Radish	11
Peas, Cucumber	10
Peppers	9
French Beans, Broad Beans	8
Blackcurrant, Rocket, Chillies, Sweetcorn	7
Cabbage, Spinach, Garlic, Plums, Blueberries, Gooseberries	6
Bay	5
Sprouts, Spring onions	4
Dill, Fennel, Asparagus	3
Swede, Sorrell, Borage, Cress, Aubergine, Fig, Tarragon	2
Tayberry, Pakchoi, Loganberry, Grapes, Lemon	1

Balm, Cauliflower, Squash, Kale, Curry Plant, Whitecurrant,	
---	--

39% of respondents were growing between one and three items. 55% were growing up to six items. The remaining 6% were the dedicated growers growing between 18 and 34 items.

Certainly the highest return rates were in the more affluent parts of Tunbridge Wells where the largest gardens are. A core nucleus of streets around Royal Chase returned the highest number of questionnaires.

## Appendix E

### Norwich and Barnstaple Questionnaire



Contact  
Rebecca Pearce  
telephone: 07812 404 175

Dear Householder,

I am a PhD student at the University of Exeter. I am interested in finding out whether the current drought is changing the way you complete some regular water-based tasks in and around the home. It would be really helpful if you could answer the questions on both sides of this sheet. It will only take a couple of minutes. **I will call again tomorrow to collect your completed questionnaire. Please leave it outside on your doorstep in the plastic bag provided.** (Please weight it down to stop it from blowing away.)

Thank you, Rebecca Pearce

**Q 1.** How many people are living in your household at present? Adults      Children  
(please state number in the boxes provided)

**Q 2.** From the list below, please indicate the number of water appliances you have in your household:

Type of Appliance	Number	Type of Appliance	Number
Bathroom Sink		Dishwasher	
Cloakroom Sink		Washing Machine	
Kitchen Sink		Other (please state)	
Flushing Toilet			
Bath			
Shower			

**Q3.** Do you know how much water your household uses in a single day? Yes      No  
(Please indicate quantity in either litres, cubic metres, gallons, or pints) (go to question 4)

**Q4.** Do you think the particularly dry weather in March and April this year can be attributed to:  
(please tick all that apply)

**Q5.** Has the dry spring had an impact on your ability to grow vegetables, flowers, or fruit in your garden? If yes, please describe the impact in the box below:

**Q6.** How many water butts do you have in your garden? (please state number here)

**Q7.** How do you water your garden?

(Please tick all that apply)

Watering can (mains water)	Hosepipe (mains water)	Irrigation system (mains water)	Rely on rainfall only
Watering can (stored rainwater)	Hosepipe (stored rainwater)	Irrigation system (stored rainwater)	Other, please describe below:

**Questions 8 – 10.** Please tick either yes or no to answer the following:

**Q8.** Do you have a water meter?

**Q9.** Do you think water is expensive?

**Q10.** Do you think droughts will be more frequent in the future?

| Yes                      No

(If yes go to  
question 11.)

(If no go to  
question 12.)

**Q11.** If you answered yes to question 10 above, **why do you think there will be more droughts in future years than in the past?** Please write your answer in the box below:

**Q 12.** Please describe anything you normally do to limit your household's use of water. Please write your answers in the box below:

**Q13.** Please describe anything you are doing in addition to that described above in question 12, to limit your use of water during the drought. Please write your answer in the box below:

Thank you for taking the time to complete this questionnaire. The results will be used for research purposes only. Your personal details will be separated from the data and only used to contact you if you have asked me to.

**If you are willing to be interviewed in more detail on the subject of household water use, please put your details in the box below:**

Name:

\_\_\_\_\_

I am happy to be interviewed regarding household water use (please sign)

Address:

\_\_\_\_\_

Postcode

\_\_\_\_\_

e-mail:

Phone:

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