Government in The Republic of Cyprus: Responding to the Problems of Water Scarcity and Quality

Alexis Pericli

December 2018

Submitted to the University of Hertfordshire in partial fulfilment of the requirement of the degree of Doctor of Philosophy

ABSTRACT

Water management is a significant challenge in The Republic of Cyprus. The country is subject to a number of water problems based on scarcity and quality, with these stemming from limited precipitation inputs, drought, the overuse of groundwater, as well as the spatial disparity of supply and demand due to population growth, agriculture, tourism, and climate change. The convergence of these aspects has generated water problems, which necessitate the use of particular problem-solving responses by government that are targeted at securing the provision of water services and sustaining socio-economic development.

To understand how government in Cyprus has responded to water management problems this thesis adopts an understanding based on John Dryzek's (2013) problem-solving rationalities of administrative rationalism, democratic pragmatism, and economic rationalism. These reflect and build on the three methods that societies use to coordinate and organise responses to socio-environmental problems, namely mandatory, voluntary, and economic approaches. The problem-solving rationalities provide a unique way of understanding government problem-solving due to an interpretation that focuses on the specifics of problem-solving, based on; actor roles, motives, and behaviour; rhetoric; the evolution of responses over time; as well as the use of multiple concepts that are brought together to offer a more inclusive conceptualisation.

This research adopts a qualitative approach to data collection and utilises semi-structured interviews to understand the views, roles, and experiences of key actors in problem-solving. A case study approach provides an appropriate context and facilitates detailed analysis of the problem-solving rationalities. The Republic of Cyprus offers a unique and appropriate case study setting. This is justified based on; tangible problems of scarcity and quality in practice; the potential to generate new insights in relation to small, Mediterranean, and peripheral EU state experiences; as well as limited previous research understanding government responses and considering actor roles and behaviour when responding to water problems.

Based on the findings, Dryzek's rationalities demonstrated a good level of applicability, with certain aspects shown to be justifiable such as the basis of administrative rationalism, the idea that some civil servants act in the public interest, and evidence of management challenges expected by Dryzek. Some differences were also found in relation to the existence or non-existence of certain methods or constructs; differences in some natural relationships; as well as variability in actor type, role, behaviour, and motivation. A range of emerging themes were identified as a result of the findings. These included; an alternative understanding of the evolutionary format of problem-solving; the role and influence of supranational governance; the importance of aspects such as culture and economic status; as well as the strong influence of politics. Ultimately, the management challenges of the rationalities, similarities and differences found in practice relating to the characteristics of the rationalities, as well as the emerging themes identified through the findings, have been utilised to develop understanding of problem-solving in Cyprus.

Acknowledgements

First and foremost, I would like to thank God for providing me with guidance and strength - Κύριε Ἰησοῦ Χριστέ, Υἱὲ τοῦ Θεοῦ, ἐλέησόν με τὸν ἁμαρτωλόν.

In turn, there are many people I wish to thank for the kindness and generosity shown to me during this study, which at times seemed to be never-ending!

Thanks are accorded to all those individuals who agreed to be interviewed, and without whom this thesis would not have been possible. A huge thanks to James Jenkins for commitment to my work, it has been a challenging but enjoyable experience. I will always be grateful for your help. Also, big thanks are due to Darren Crook for discussion and guidance along the way.

My Mum and Dad are due particular thanks. I know how hard they have worked to allow me to seek the opportunities I have desired in life. I hope this goes some way towards repaying the debt of gratitude I feel. You have made all this possible. I love you both.

To my Sister, family, and close friends - thanks for putting up with me during this journey and for being so thoughtful and caring!

Last and by no means least, Andrea, thank you for your support, love, patience, and understanding. You have been amazing - I couldn't have done it without you pidge!

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Abbreviations

ADR	Alternative Dispute Resolution
AKEL	AKEL [Ανορθωτικό Κόμμα Εργαζόμενου Λαού] The Progressive Party of Working People
DofA	Department of Agriculture
DISY	DISY [Δημοκρατικός Συναγερμός] The Democratic Rally Party
EIA	Environmental Impact Assessment
EU	European Union
GSD	Geological Survey Department
IWM Law	Integrated Water Management Law
MANRE	Ministry of Agriculture, Natural Resources, and the Environment [subsequently changed to The Ministry of Agriculture, Rural Development, and Environment]
WDD	Water Development Department
WFD	Water Framework Directive
WPM Law	Water Protection and Management Law
WSPC Law	Water and Soil Pollution Control Law

Chapter 1: Introduction

> *"Contemporary water resources decision-making is an inherently complex undertaking. Every decision affects people in some way, whether as individuals, industries, communities, regional economies, or the environments on which they depend."* (Hart & Doolan, 2017: pg xix)

> *"Our current intellectual challenge is to develop the analytical and theoretical underpinnings of an understanding of the relationship between social and natural systems. Our policy challenge is to identify and implement effective decision-making approaches to managing the global environment."* (Choucri, 2006: pg ix)

1.1 Context and motivation for research

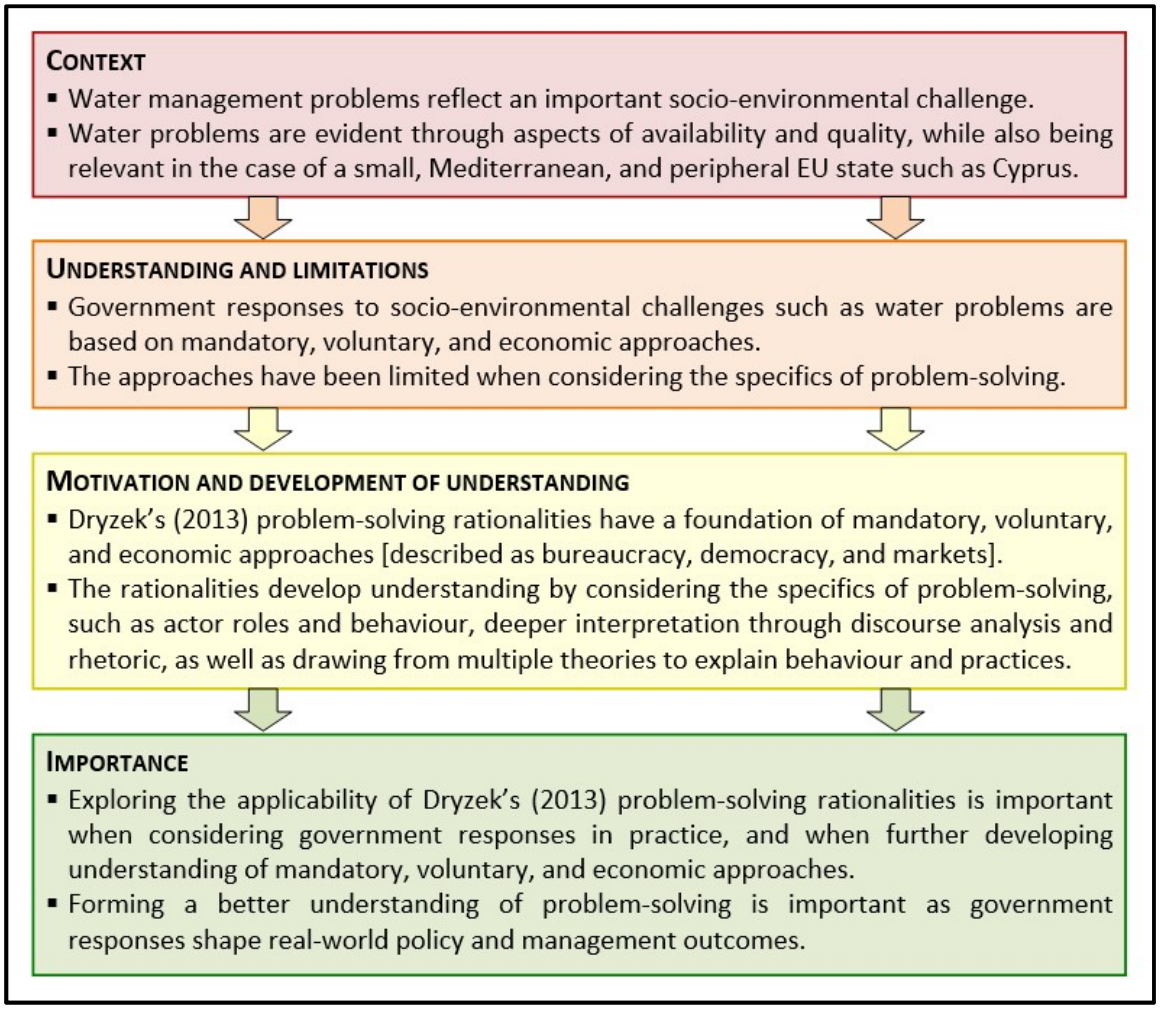
This is a timely thesis that investigates the importance of water problems and how they have been managed in relation to government responses, within the context of a first-world, European, Mediterranean, peripheral EU, and small state perspective. A Cypriot case study is used to explore water problems and is justified based on the unique perspective this gives as a result of; tangible problems of scarcity and quality in practice; status as a small, Mediterranean, and peripheral EU state; as well as limited previous research considering government approaches and actor roles or behaviour when responding to water problems.

To explore government responses to water problems in Cyprus the thesis adopts an understanding based on the three social-coordination mechanisms that are defined through mandatory, voluntary, and economic approaches. These form a basis of understanding and have been used to categorise government responses (Cubbage, O'Laughlin, & Peterson, 2017; Kraft, 2017). A theoretical framework is applied, which is founded on the approaches and developed through John Dryzek's (2013) problem-solving rationalities that provide a unique way of understanding government problem-solving. In this case, Dryzek (2013) provides a unique interpretation by focusing on the specifics of problem-solving, particularly; actor roles, motives, and behaviour; management practices; rhetoric; the evolution of responses over time; and the use of multiple concepts that are brought together to offer a more inclusive conceptualisation.

Ultimately, it is important to better comprehend government problem-solving as it is these responses that shape real-world policy and management outcomes when attempting to solve socio-environmental issues such as water problems (Carter, 2018; Conca & Weinthal, 2018). Figure 1.1 outlines the context and motivation of this research. The rest of this chapter

introduces the thesis, providing the context for the research, while the rationale and objectives are highlighted, and an outline of the thesis structure is also provided.

Figure 1.1: The context and motivation of this research



1.1.1 How water management problems have been explored

Water management problems such as scarcity, the over-abstraction of groundwater resources, pollution, and declines in freshwater quality have provided significant management and policy dilemmas for central governments and governing agencies (see Gleick, 2000; Dryzek & Schlosberg, 2005; Barr, 2008; Mauser, 2009; Grover, 2016; Cook, 2017; Conca & Weinthal, 2018). These issues have occurred as a result of unsustainable human activities and associated socio-environmental challenges including resource exploitation, population growth, the intensification of agricultural activities, ecosystem encroachment, and climate change (Stephenson, 2003; Goudie, 2006; Middleton, 2008; Mulroy, 2017). Over time, an improved scientific understanding and awareness of water management problems, as a threat towards human populations and socio-economic development, has also prompted concern within the

public realm and an increase in political attention (see Fransson & Gärling, 1999; Anisfield, 2010; Cook, 2017; Doolan & Hart, 2017; Hossen, 2017; Jensen, Lange, & Refsgaard, 2018).

Traditionally, water resources have been managed by government and service providers through approaches that focus on the two key attributes of availability/scarcity and quality (see Gleick, 2000; Sterner, 2003; Biswas, 2008; Anisfield, 2010; Grover, 2016; Cook, 2017). Water management problems in these categories have been tackled through a variety of pathways, with responses broadly differentiated based on; supply and demand management in terms of availability, and pollution management in terms of quality (see Whipple, 1998; Gleick, 2000; Mauser, 2009; Anisfield, 2010; McDonald, & Mitchell, 2014; Lubell & Balazs, 2018).

A significant proportion of the literature relating to water management has also focused on developing understanding of physical processes, concepts of supply and demand management, industry adaptation, climate change scenarios and their potential influences on water, conflict, as well as the use of specific management tools in given political settings (see Dobson, 1995; Smith, 1995; Arnell, 1999; Barr, 2008; Hansen, 2010; Cook, 2017; Edalat & Abdi, 2017; Mulroy, 2017; Lonergan, 2018). Furthermore, it is well established that water resource and management problems faced by society are directly related to governance, and thus may be resolved through more effective decision-making, policy, and governance (Conca, 2006; Ballabh, 2008; Iyer, 2008; Tortajada, 2010; Carter, 2018; Conca & Weinthal, 2018).

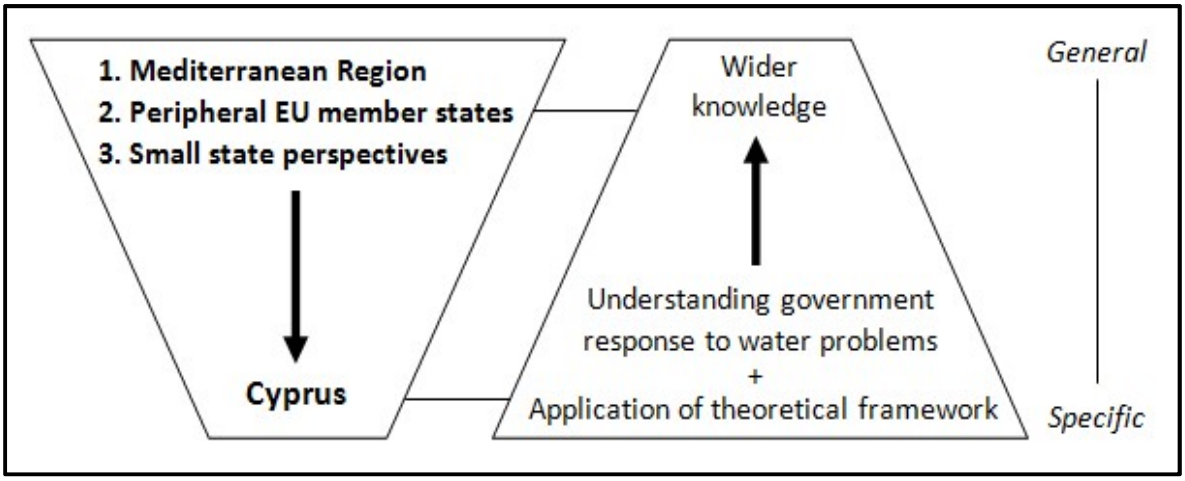
Research investigating the governance of water has tended to focus on; describing and exploring institutional structures; availability scenarios for specific countries, regions, sectors or industries; adaptation measures in relation to regimes, practices, and policy; as well as exploring the roles and actions of state and private institutions in the provision of services (see Brenton, 1994; Smith, 1995; Weale, Pridham, Williams, & Porter, 1996; Lowe & Ward, 1998; Szarka, 2002; Biswas, 2005; Gupta, 2009; Araral, 2010; Bakker, 2013; Dinar & Tsur, 2014; Lautze, De Silva, Giordano, & Sanford, 2014; Araral & Wu, 2016; Padowski, Carrera, & Jawitz, 2016; Owens, 2017). However, attempts to understand the processes and relationships that drive governing agents to act and behave in a particular manner have been more limited, despite evidence of some work on social, institutional, and economic perspectives to water issue problem-solving that have explored topics such as stakeholder engagement, integrated planning, and governance (see Dobbie, Brown, & Farrelly, 2016; Tawfik, 2016). Nevertheless, attempts have often focused on general characteristics or certain singular perspectives, while an

understanding of water management and decision-making intricacies has been underdeveloped, particularly in relation to the role, motives, and behaviour of actors and the broad rationales they employ, key tools used, as well as the evolution of responses. As a result, the specifics of problem-solving at actor level require further analysis as they can offer an important insight into how governments tackle water management challenges, which is critical when developing effective responses and policy. Ultimately, when exploring these aspects in practice and understanding government responses to water problems, a country-specific context is necessary to consider the specifics of problem-solving and provide greater detail on the characteristics and behaviours that cause those in a given system to operate in a certain way.

1.1.2 Rationale for a case study focused on the Republic of Cyprus

In order to effectively investigate government responses to water problems a suitable context must be established. The Republic of Cyprus has been selected as it offers a unique, relevant, and appropriate case study setting, which is important for furthering knowledge as well as being suitable for exploring responses to water problems and considering the applicability of Dryzek's (2013) rationalities when advancing understanding of mandatory, voluntary, and economic approaches. The suitability of a Cypriot case study is based on; an experience of tangible water problems through availability/scarcity and quality in practice; limited previous research considering actor roles and behaviour when responding to water problems; alongside the potential to generate new insight and understanding in relation to a Mediterranean perspective, a small state perspective, as well as a peripheral EU nation perspective. Figure 1.2 outlines this focus from the general to the specific, while the noted aspects that make Cyprus suitable are expanded upon in the following sections.

Figure 1.2: Research focus - from the general to the specific



Wider perspectives

From a Mediterranean state perspective, although it is noted that the region is not homogenous in terms of hydrologic and demographic features (Burak & Margat, 2016), Cyprus does represent a range of characteristics that apply more widely. These include; a semi-arid climate, an experience of scarcity and drought, the challenge of increasing demand, as well as the over-consumption of groundwater (Chartzoulakis & Bertaki, 2006; Garcia-Ruiz *et al*., 2011; Papadaskalopoulou *et al*., 2015a; Myronidis *et al*., 2018).

Cyprus is a nation that has limited water resources, which must be managed carefully in terms of pressures such as population growth, climate change, and the increasing demands of agricultural activities and tourism (Charalambous, Bruggeman, & Lange, 2011; Iacovides, 2011a; Sofroniou & Bishop, 2014; Naukkarinen, 2015). These challenges are also reflected in other Mediterranean nations, and thus many of the water problems faced in Cyprus are relevant in the wider region. For example, previous research has explored a range of aspects, including; scarcity and drought (Correia, 1999; Lange & Donta, 2006; Holst-Warhaft, 2010); supply management adaptation (Kumar *et al*., 2016); water quality and irrigation (Faycel, 2010); demand changes (Grouillet *et al*., 2015); water reuse, recycling, and desalination (Ait-Mouheb *et al*., 2018; Navarro, 2018); the risks of scarcity and climate change (Iglesias *et al*., 2007); the application of policies to manage use conflicts, scarcity, and non-renewable water consumption (Burak & Margat, 2016); as well as principles of integrated management (Moutsopoulos & Petalas, 2018). Despite extensive research on water problems in the Mediterranean, a gap in knowledge is apparent when considering different government responses, through mandatory, voluntary, and economic approaches that have been used to manage these water problems, as well as actor roles, motives, and behaviour and how responses have evolved.

From a small state perspective, there is scope to use a Cypriot case study to further develop understanding of government problem-solving through comparison between experiences in smaller and larger states[1]. This can raise questions as to whether government responses and institutional approaches have been similar or different relative to state size, scale, and systems in place, while allowing for understanding of the potential drivers of similarities or differences.

[1] For the purposes of this study, an EU state is regarded as small or large based on relative shares of votes in day-to-day decision-making in the EU's Council of Ministers. For example, as Panke (2015: pg59) notes "all states that possess fewer than average votes in qualified majority voting in the EU's Council of Ministers as the venue in which states' interests are expressed during EU secondary law-making are regarded as being small". In this case, Cyprus is one of the three smallest EU states based on voting weight (Kirsch, 2010).

This small state perspective can be developed according to similarities or differences between larger and smaller EU nations. Previous research has focused on institutional approaches and administrative procedures, power and influence in legislative processes, as well as economic capacity (Panke, 2015; Thorhallsson, 2016; Grimaud, 2018). In terms of governance, smaller states such as Cyprus have been found to exhibit certain vulnerabilities that differ from larger states, including; limited administrative size, lack of expertise and experience, political disadvantages in EU council setting, and also limited economic capacity (Grimaud, 2018). Furthermore, previous research regarding comparisons of water management in different EU states has explored a range of aspects, including; responses to scarcity and climate change (Francés *et al*., 2017); water markets and economic instruments (Rey *et al*., 2018); flood risk management and citizen involvement (Mees *et al*., 2016); efficiency of utilities (Cruz *et al*., 2012); agricultural use, technological change, and cost recovery (Llop & Ponce-Alifonso, 2016); water reuse (Angelakis & Gikas, 2014); as well as implementation, economic challenges, and experiences associated with directives (Kelly *et al*., 2009; Berbel & Expósito, 2018). Despite evidence of comparisons in the literature on aspects of water management as well as differences between smaller and larger EU state governance, the understanding of the specifics of government problem-solving in such context has been limited. In this case, work on regulatory processes (Berbel & Expósito, 2018) and the application of economic instruments (Rey *et al*., 2018) reflect the mandatory and economic approaches respectively, however, a deeper understanding of problem-solving responses that can emerge through exploring actor roles, motives, relationships, and behaviour has been less forthcoming. As a result, there is potential to explore this area further.

From an EU state perspective, two important aspects emerge when developing understanding, namely; EU member status and how this influences and shapes problem-solving; as well as Cyprus' standing as a peripheral EU state[2]. Previous research on water problems and management in EU member states has been extensive, with a range of topics considered. These include; scarcity, drought, and demand (Staddon, 2010; Spinoni *et al*., 2017; Stavenhagen, Buurman, & Tortajada, 2018; Tuncok & Eslamian, 2018); pollution and quality (Diamantini,

[2] The concept of peripherality is complex and involves administrative, organisational, geographic, economic, environmental, and cultural variables that relate to the standing and contextual status of a nation within a wider system (Yearley, Baker, & Milton, 1994; Baimbridge *et al*., 2018). For the purposes of this study, a peripheral EU state is defined as the standing of a nation based on; the noted variables, comparison with large or core nations, and decision-making power in the context of the EU system. Notably for Cyprus, certain peripheral characteristics are evident such as; economic peripherality due to a smaller economy; geographic peripherality due to a location at the edge of Europe; and administrative peripherality due to status as a small EU state with limited decision-making power (Sepos, 2008; Kirsch, 2010; Michael, 2011; Demetriades, 2017).

2018); climate change adaptation (Quevauviller, 2011; Bosello *et al*., 2018); groundwater use and control (De Stefano *et al*., 2015); integrated management of shared resources (Mylopoulos & Kolokytha, 2008); agricultural water management (Iglesias & Garrote, 2015); water reuse and recycling (Angelakis, Bontoux, & Lazarova, 2003; Paranychianakis *et al*., 2015); economic approaches and privatisation (Liotard & McGiffen, 2009; Reynaud, 2016); as well as implementation of EU directives (Chave, 2001; Moss, 2008; Bähr, 2016; Voulvoulis, Arpon & Giakoumis, 2017; Berbel & Expósito, 2018). In these cases a range of findings were noted, including; core water issues being widely applicable; the need for greater integration across sectors when tackling water issues; groundwater issues being primarily related to agricultural use; EU directive requirements remaining distant from practical realities; the potential for cost recovery to impact water affordability, which gives justification for governments to develop targeted policies; while for responses to environmental issues it was often political, economic, and social aspects that prevailed over the legal obligations set by supranational authorities.

In terms of peripheral EU member states, previous research has explored aspects such as; core-periphery dynamics, which consider interactions and conflict between core and peripheral nations (Laffan, 2016; Magone, Laffan & Schweiger, 2016); economic policy and structural changes (Barry, 2002; Bieler & Jordan, 2017; Parker & Tsarouhas, 2018); as well as politics and trade (Baimbridge *et al*., 2018). In relation to water, there has been a focus on aspects like management of scarcity, quality, and governance (Zachariadis, 2010; Celma, 2012; Izquierdo, 2012; Sofroniou & Bishop, 2014); economic challenges (Bieler & Jordan, 2017); the liberalisation of public services and imposed pressures of privatisation (Bieler, 2017; Van Den Berge, Boelens, & Vos, 2018); water reuse and technology such as desalination (Ortiz *et al*., 2010; Angelakis & Gikas, 2014; March, Sauri & Rico-Amorós, 2014); as well as management through the Water Framework Directive (Munné, Ginebreda & Prat, 2016). The focus on these aspects has generated a range of findings. For example; water problems of scarcity or quality [or both] were widely applicable; there have been concerted attempts to apply comprehensive stakeholder engagement; directives have had uneven application, with this implying that specific policies or methods were more or less effective for certain peripheral nations; while economic challenges through austerity and restructuring imposed on peripheral nations were noted to have resulted in pressure to privatise state assets such as water.

Despite this extensive work, the wider literature on EU influences and peripheral status has been limited when investigating the specifics of government problem-solving. In this case,

more detailed components such as actor roles, motives, relationships, and behaviour, as well as rhetoric and changes in response have had limited focus despite their potential for furthering the understanding of government problem-solving.

A greater focus

The justification of Cyprus as a case study is also validated as a result of underdeveloped research considering water policy and decision-making in this specific setting. Previous work has primarily focused on investigating water through a range of topics, such as; water scarcity and potential for integrated management (Socratous, 2011a; Sofroniou & Bishop, 2014); water management and drought (Charalambous, 2001; Myronidis *et al*., 2018); agricultural water use and associated impacts (Iacovides, 2011a); the water-energy-food nexus (Halbe, Pahl-Wostl, Lange, & Velonis, 2015); groundwater management (Demetriou & Georgiou, 2004); the analysis of supply infrastructure (Iacovides, 2011b; Hoffmann, 2018); the role and feasibility of desalination (Tsiourtis, 2001; Loucaides & Koutsakos, 2015); sustainability and water ecosystem management (Birol, Koundouri, & Koundouris, 2008); water pricing and subsidies (Stedman, 2012; Kossida, Tekidou, & Mimikou, 2015); consumer attitudes and demand (Papasozomenou & Dimitrios, 2009; Polycarpou & Zachariadis, 2013); the potential impacts of climate change on water (Zachariadis, 2010; Papadaskalopoulou *et al*., 2015b; Zachariadis, 2016); as well as the implementation of EU water directives (Koundouri & Birol, 2011). In the case of the focus on these aspects, a range of findings were also noted. These included; tangible water issues of scarcity, drought, and groundwater quality decline widely evident in practice; the need for a range of options when managing water problems and drivers such as climate change; as well as the need for greater integration across sectors for water management.

Despite these findings, the understanding of government responses to water problems in Cyprus has been limited from the perspective of mandatory, voluntary, and economic approaches. Therefore, an opportunity emerges for the chance to develop understanding of government problem-solving, the roles and behaviours of governing actors, as well as responses to water management problems; with this possible through the use of Dryzek's (2013) problem-solving rationalities [explored in the next section].

Taking this into account, a Cypriot case study is based on three key elements from the general to the specific. Firstly, a need for research as a result of underdeveloped knowledge for Mediterranean, small, or peripheral EU nations in terms of government responses to water

problems. Secondly, a need for research based on; the importance and relevance of understanding the specifics of problem-solving, and the role of governing agents with regard to water management problems in a country [and wider region] that experiences stresses on both availability and quality. Thirdly, a need for research to better comprehend government responses to water problems in Cyprus, based on the intensifying threats these issues pose to environmental ecosystems, agricultural subsistence, and socio-economic development.

Ultimately, this thesis offers the opportunity to address underdeveloped areas of research and contribute to empirical evidence and wider knowledge. This is achieved by; investigating a theoretical framework in the new and unique context of Cyprus, which is situated as a small, Mediterranean, and peripheral EU state; as well as furthering knowledge of government problem-solving by developing understanding of mandatory, voluntary, and economic approaches through exploring the specifics of given responses based on the role, motives, relationships, and behaviours of governing actors. The lessons learnt in Cyprus, relating to responses to water problems and particularly scarcity and drought, are pertinent within the wider region and thus give the study greater relevance. This is necessary when attempting to offer a contribution to knowledge.

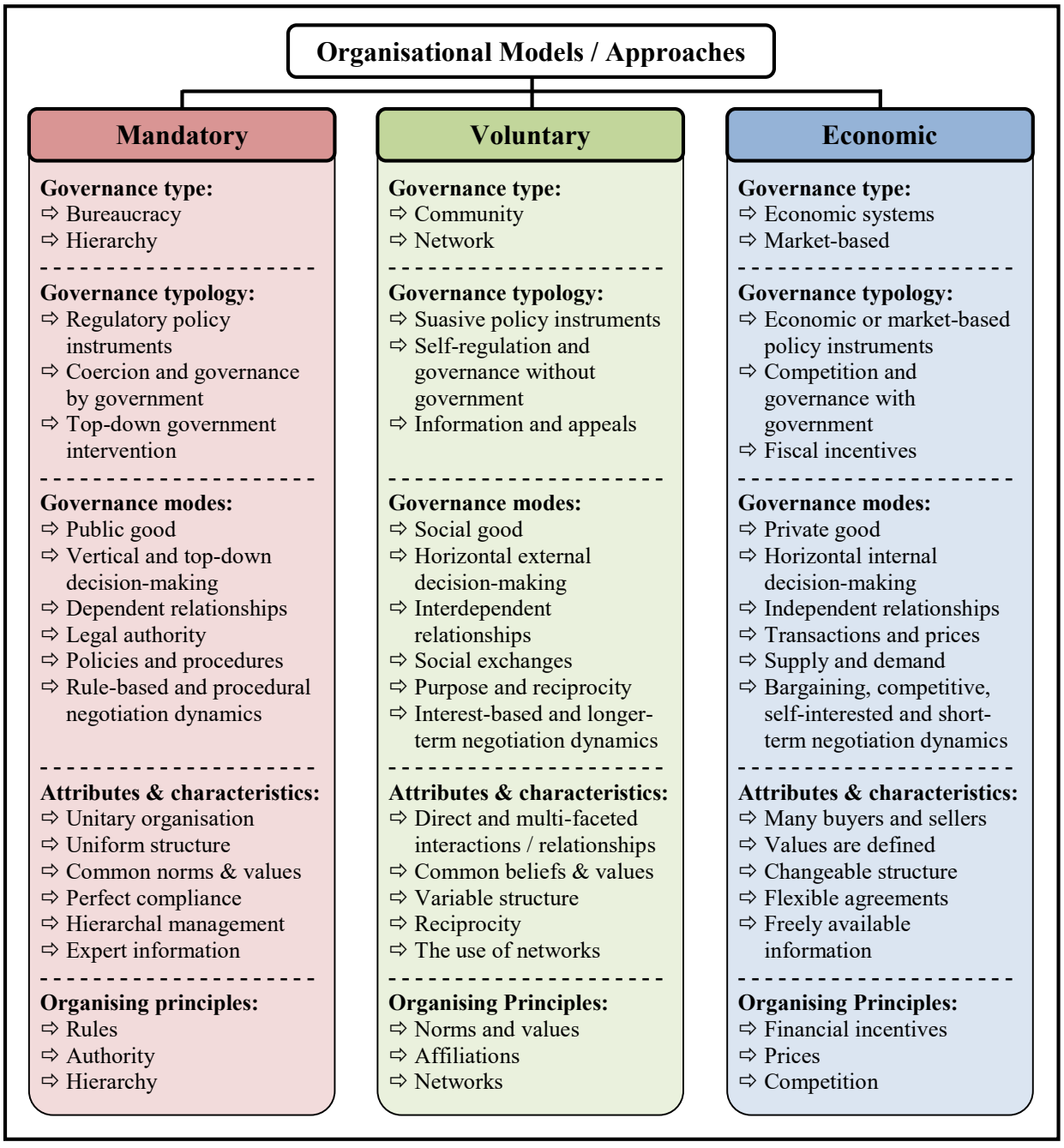
1.1.3 Social coordination mechanisms and Dryzek's problem-solving rationalities

To understand how governments have responded to water management problems in Cyprus this thesis adopts an understanding based on three social coordination mechanisms that are defined through mandatory, voluntary, and economic approaches. These reflect the methods that societies use to coordinate and organise responses to socio-environmental problems [such as those based on water availability/scarcity and quality]. Notably, Dryzek's (2013) problem-solving rationalities build on these mechanisms, which are reflected by the definitions of bureaucracy, democracy, and markets.

The coordination mechanisms are highlighted as the basis of organisation and governance by a range of comparable definitions and examples (see Hood, 1976; Taylor, 1982; Powell, 1990; Frances, Levačić, Mitchell, & Thompson, 1991; Wurzel, Zito, & Jordan, 2013; Hill & Hupe, 2014; Normand, 2016). Indeed, each of the approaches is centred on a different set of organisational principles, defined as accepted forms of social coordination (Colebatch & Larmour, 1993; Parsons, 1995), governance typologies (Wurzel *et al*., 2013), and modes of organisation (Powell, 1990; Keast, 2016), while ultimately being deemed to be the most

effective way of enabling society to collectively tackle problems. Figure 1.3 outlines the mandatory, voluntary, and economic approaches, with the definitions and characteristics used to describe these also given.

Figure 1.3: Methods of social coordination: key characteristics and organising principles
(Hood, 1976; Taylor, 1982; Colebatch & Larmour, 1993; Wurzel *et al*., 2013; Hill & Hupe, 2014; Keast, 2016)



In the case of environmental policy, the three mechanisms have also been identified through a variety of typologies and focuses. Firstly, mandatory approaches have been defined through terms such as regulation, command-and-control, legislative and traditional regulation, as well as interventionist and hierarchical instruments (see Holzinger, Knill & Schäfer, 2006; Bähr, 2010;

Jordan, Wurzel & Zito, 2013). Secondly, voluntary approaches have been defined using terms such as cooperative, suasive, communication-based, informational, and voluntarism (see Bemelmans-Videc, Rist & Verdung, 1997; Gunningham, Grabosky & Sinclair, 1998; Bähr, 2010; Halpern, 2010). Thirdly, economic approaches have been defined through terms such as competition, market-based, financial instruments, and subsidisation (see De Bruijn & Hufen, 1998; Golub, 1998; Holzinger, Knill & Lenschow, 2009).

A range of understandings are argued to be relevant in terms of how the mandatory, voluntary, and economic approaches have been applied in practice. This relates to interpretations of institutional processes, policy implementation, and actor motivations. These understandings are positioned in terms of each approach [and are discussed in more detail within chapter three].

Firstly, for mandatory approaches, understandings involve; top-down and bottom-up perspectives, bargaining and negotiation, power approaches such as elitism and technocracy, as well as public choice theories focused on bureaucratic structure. These have been situated in terms of bureaucracy, while being explored as they are seen to reflect characteristics associated with the mandatory approach, such as; governance based on hierarchy; authority; unitary and administrative organisation; dependent relationships; as well as vertical forms of decision-making (see Mitchell, 1991; Colebatch & Larmour, 1993; Holzinger *et al*., 2006; Wurzel *et al*., 2013; Hill & Hupe, 2014; Keast, 2016). Notably, mandatory approaches have been applied in terms of water and through these aspects in relation to; enforced pollution policies (Ribaudo, 2009); sustainable water governance (Reese & Gawel, 2017); climate change mitigation through water (Srinivasan *et al*., 2018); top-down interpretations of water footprints (Feng *et al*., 2011); water policy and technological elitism (Feldman, 1991); as well as water restrictions through regulation (Grafton & Ward, 2008).

Secondly, for voluntary approaches, understandings include the concept of pluralism as well as policy networks and communities. These are explored as they reflect specific characteristics associated with the voluntary approach, such as; governance based on networks; multifaceted interaction; interdependent and multi-dimensional relationships; the concept of community; cooperation; as well as horizontal but external forms of decision-making (see Taylor, 1982; Powell, 1990; Thompson, 1991; Colebatch & Larmour, 1993; Wurzel *et al*., 2013; Hill & Hupe, 2014; Keast, 2016). Indeed, voluntary approaches have been applied in relation to water and through these aspects, with examples involving; urban water demand management (Fielding *et*

al., 2013); networks and policy implementation (Bourblanc, 2017); pluralism and social rights for water and sanitation (Obani & Gupta, 2014); transnational policy networks (Goldman, 2007); voluntary pollution control (Suter *et al*., 2010); as well as water governance and stakeholder networks (Medema *et al*., 2017; Ogada *et al*., 2017).

Thirdly, for economic approaches, understandings involve; economic models of understanding, public choice theories focused on economic interpretation, as well as the concept of economic institutionalism. These have been explored as they are seen to reflect characteristics associated with the economic approach, in particular; market-based governance and structures; variables of self-interest; competition; multiple buyers and sellers; pricing; independent relationships involving exchange; as well as horizontal but internal forms of decision-making (see Levačić, 1991; Colebatch & Larmour, 1993; Parsons, 1995; Wurzel *et al*., 2013; Hill & Hupe, 2014; Keast, 2016). Notably, economic approaches have been applied in terms of water and through these aspects in relation to; incentives for water quality protection (Olmstead, 2010; Shortle, 2017); market instruments and governance (Metz & Leifield, 2018); water rights (Wang, 2018); institutional arrangements (Hassenforder & Barone, 2018); as well as water markets (Owens, 2016; Pérez, 2017; Raffensperger & Milke, 2017; Holley & Sinclair, 2018).

The mandatory, voluntary, and economic approaches, as well as the various understandings that can be positioned in terms of these approaches, have been useful in understanding general models of coordination and modes of governance. However, these approaches have still been limited when conceptualising the specifics of problem-solving, in particular, representing; a lack of specific details in approaches and individual understandings; limited recognition of interactions between actors that form the dynamics of problem-solving; and also a lack of focus on actor behaviour which is vital to understanding different conceptions of problems as well as how and why certain responses develop or are selected in reality.

Rationale for Dryzek's problem-solving rationalities

To build on the mandatory, voluntary, and economic approaches, and explore government responses to water problems in Cyprus, this thesis investigates the applicability of the problem-solving rationalities of; administrative rationalism, democratic pragmatism, and economic rationalism, as conceptualised by John Dryzek (2005; 2013). Notably, the mandatory, voluntary, and economic approaches form the basis of this research, however, Dryzek's (2013) rationalities reflect and develop the understanding of these approaches. In this case, the

rationalities advance understanding by providing an interpretation that focuses on the specific details and interactions of problem-solving, particularly; actor roles, motives, and behaviours; management practices; rhetoric; the evolution of responses; and the use of multiple concepts that are brought together to offer a more inclusive conceptualisation. This helps to provide a deeper understanding of actor behaviour and the interactions of problem-solving, which are vital components of how a problem is understood and how certain responses are selected.

In theoretical terms for Dryzek (2013), three organisational approaches are embraced by democratic societies, namely; bureaucracy, democracy, and markets, with these being accepted principles of organisational action that reflect the mandatory, voluntary, and economic approaches. As a result, the approaches of bureaucracy [mandatory], democracy [voluntary], and markets [economic] generate the three problem-solving rationalities that are defined with the use of discourse analysis by Dryzek (2013).

Dryzek's (2013) problem-solving rationalities serve as a focus of this study. The key feature of these rationalities [and his associated discourse analysis], which differs from other conceptions, emerges through a unique interpretation of how democratic societies organise problem-solving responses within the context of the three social coordination mechanisms. This interpretation considers bureaucracy, democracy, and markets as a foundation, while also noting the processes in which institutions and practices, associated with a given response, converge and interact as a result of the behaviour of policy actors. In particular, Dryzek (2013) is interested in exploring how basic entities are recognised or constructed; the assumptions organisations make with regard to natural relationships; how the involvement of agents or actors in policy-making, along with their motives, can vary; as well as how metaphors and rhetorical devices are used to justify certain positions. This focus encourages an evaluation of the rationale for different approaches, and gains importance as each problem-solving approach generates a different viewpoint as to the meaning and nature of a specific problem. Indeed, understanding the justifications for adopting a given approach is central to understanding the behaviour of those involved in decision-making, and thus why policy has been implemented in a certain way (Parsons, 1995; Lowe & Ward, 1998; Dryzek, 2013). This can provide insight into the way problems have been tackled by government.

Dryzek's (2013) rationalities differ from previous singular theoretical understandings as he instead utilises multiple theories to explain behaviours and actions relative to each of the

proposed rationalities. This is relevant in terms of mandatory, voluntary, and economic approaches, as in many cases these have been considered in isolation (see Tang, Liu, & Yi, 2016; Tietenberg & Lewis, 2016; Brink 2017) or through particular individual constructs such as public choice theory (Raymond, 2014; Holcombe, 2016), pluralism (Smith, 1990; Hoberg, 1992), or economic institutionalism (Saleth & Dinar, 2004). Thus, Dryzek's (2013) technique of drawing from different theories is unique and relevant when forming a framework to understand real-world problem-solving which is made up of complex behaviours and practices. Moreover, specifically for interpretations of public choice theory, Dryzek's (2013) rationalities are further distinguished as he moves away from considering self-interest as the primary driver for bureaucratic action, and instead suggests that public servants often act [or have the ability to act] in the public interest. This directly contrasts with other rational conceptualisations such as work by Niskanen (1971) relating to budget maximisation and the bureau-shaping model put forward by Dunleavy (1986; 1991).

The three problem-solving rationalities proposed by Dryzek (2013) also consider how policy responses change over time. This is based on an understanding of evolving responses and how change coincides with certain characteristics, institutional changes, or policy outcomes. Dryzek (2013) implies that problem-solving occurs in a successive evolutionary format, with alternative responses developing as a result of challenges associated with preceding approaches. In this case, administrative rationalism develops as the foundation of problem-solving, with democratic pragmatism and then economic rationalism subsequently emerging. This is a notable feature for understanding change over time, as it is argued that policy development and implementation should be analysed over an appropriate timeframe to account for changing policy dynamics, variable roles or influences in decision-making, as well as the intended and unintended outcomes of policy (Bernstein, 1976; Sabatier, 1986; Nelson, 1993; Jordan, 1995; Agere & Mandaza, 1999; Weimer & Vining, 2016).

The concept of change also relates to the development of mandatory, voluntary, and economic approaches, which can be considered to be; focused on a foundation of strong hierarchy with a joining of economic aspects in relation to the organisation of educational structures (Greany & Higham, 2018); as well as based on varying scales of organisational independence and relationship types that can result in competitive or cooperative prevailing structural formats (Thompson, 1991). In the case of environmental policy instruments, changes in responses have been identified through a range of findings. Firstly, the adoption of approaches and policy

instruments can vary in speed and scale in different jurisdictions, with particular policy instruments considered more appropriate in certain contexts (Wurzel *et al*., 2013). Secondly, once established within a particular jurisdiction policy instruments often retained their relative role, with this related to the dominant role of regulation and the importance of the state (Bell & Hindmoor, 2009). Thirdly, in line with neoliberal economic theory, sequence patterns were argued to begin with soft policy, involving horizontal governance related to voluntary approaches, and proceed to harder policy, namely coercive top-down government linked to mandatory approaches (Verdung, 1997; Gunningham *et al*., 1998; Salamon, 2002). In contrast to this view, it has also been argued that a pattern emerges in which traditional environmental regulations that reflect mandatory approaches are adopted first, and then supported by other softer instruments characteristic of voluntary and economic approaches (Jordan *et al*., 2012).

1.2 Aims and objectives

As a result of the preceding discussion, it is possible to identify a range of interesting questions concerning how governments respond to water management problems and how actor roles, motives, and behaviour vary according to different responses. In particular, how can the understanding of mandatory, voluntary, and economic approaches be developed? How can knowledge of problem-solving and policy implementation in Cyprus, which represents a small, Mediterranean, and peripheral EU state, be advanced? How do actor roles and behaviour vary in the context of different responses or according to other variables such as supranational governance, socio-cultural constructs, or politics?

To address these questions, this thesis utilises the problem-solving rationalities developed by Dryzek (2013) and applies these to Cyprus. Notably, previous work in relation to the rationalities has focused on; general interpretations of environmental discourses (Adger, Benjaminsen, Brown, & Svarstad, 2001; Hajer & Versteeg, 2005; Mühlhäusler & Peace, 2006); the implementation of EU drinking water policy (Jenkins, 2007); the underlying role of administrative rationalism in terms of water quality and agricultural policy (Raina & Sangar, 2002); evidence of the discourses with regard to conflict in environmental partnerships (Poncelet, 2004); as well as consideration of the discourses when exploring public perceptions of climate change (Schüle, 2001). However, research has been limited when considering the rationalities, and also the roles, behaviours, and motivations of key governing agents, in terms of Cyprus, as well as small, Mediterranean, and peripheral EU state experiences; and explicitly

set in the context of understanding how mandatory, voluntary, and economic approaches work. Thus, by developing an understanding of government problem-solving through how actors coordinate responses it is possible to explain policy and the outcomes of decision-making, which in turn can provide a contribution to knowledge in the case of Cyprus.

Aim

- ⇨ To investigate government problem-solving responses by developing an understanding of how government in Cyprus is tackling water problems.

Objectives

1. To advance understanding of how mandatory, voluntary, and economic approaches operate, and to build on these using Dryzek's (2013) problem-solving rationalities.
2. To ascertain the potential utility and applicability of Dryzek's (2013) problem-solving rationalities in Cyprus.
3. To widen the empirical understanding of small, Mediterranean, and peripheral EU state experiences through Cyprus.
4. To examine the roles, behaviours, and motivations of key governing agents in relation to water problems in Cyprus, thus contributing to empirical findings on these aspects that have been underdeveloped in previous research.

1.3 Organisation of the thesis

The thesis is comprised of nine chapters, with this introduction being the first. The topics discussed within subsequent chapters are outlined in the following sections.

Chapter two: government responses to water resource issues

The aim of chapter two is to present an overview of different approaches that have been adopted by governing agents, industry actors, and authorities, when tackling water management problems such as scarcity, groundwater exploitation, pollution, and quality decline. These aspects are explored from the perspectives of small, Mediterranean, and peripheral EU states that relate to Cyprus. The key elements of availability and quality are contextualised in terms of mandatory, voluntary, and economic approaches, while water management is considered in terms of broad responses that have focused on supply and demand solutions for availability, as well as pollution control for quality. The chapter relates to objectives one and three.

Chapter three: understanding problem-solving responses

Chapter three is structured according to the three mechanisms used to conceptualise how societies coordinate responses to problems, namely through mandatory, voluntary, and economic approaches. Within the context of these approaches, the chapter focuses on how government responses to water problems have been understood, while subsequently comparing and developing these with Dryzek's (2013) problem-solving rationalities. For example, different concepts and perspectives including top-down, bottom-up, elitism, technocracy, negotiation, institutionalism, policy networks, and public choice have been analysed in terms of the coordination mechanisms, based on commonalities or disparities between key elements, structural characteristics, and theoretical concepts. Notably, the limitations of past approaches and studies, in addressing management challenges, have helped to form the focus of this overview, with recognition of the idea that limitations assist in generating alternative approaches. Indeed, this reflects Dryzek's (2013) understanding of how different rationalities emerge as a result of the practical limitations of previous attempts at problem-solving.

The latter part of the chapter explores Dryzek's (2013) problem-solving rationalities, which are defined as administrative rationalism, democratic pragmatism, and economic rationalism. These offer useful insights by building on the previously discussed perspectives that sit within the context of mandatory, voluntary, and economic approaches. Dryzek (2013) offers an alternative way of differentiating between responses by interpreting the specifics of problem-solving and drawing on multiple theories, while also establishing a unique understanding with regard to actor roles and behaviour, the concept of self-interest, and the evolution of problem-solving. Notably, this chapter relates to objectives one and two.

Chapter four: research methodology

Chapter four outlines the methodological approach used for this thesis. A justification for this selection is given, while the rationale and importance of a Cypriot research setting is also recognised. The methods used to select potential interviewees are discussed, with reasons for selection noted, alongside the method used and the need for secondary data as part of a process of triangulation. Subsequent sections clarify the development of the interview structure and procedure, questions asked of the interviewees, the collection and analysis of data, as well as the detailed applicability analysis used to compare the expected characteristics of the rationalities with real-world findings in Cyprus.

Chapter five: water management in Cyprus

Chapter five develops understanding of how government has managed water problems in Cyprus. The first section explores water problems in Cyprus, and these have been categorised in terms of availability and quality, which are the main categories of water management identified in chapter two. Specific issues for Cyprus include; scarcity that is inherent or imposed; groundwater over-abstraction and associated quality issues such as saline intrusion; as well as the threat of drought.

The second section considers the different phases of water management that are identified in Cyprus, and it is argued that these have occurred to address the observed water problems. The three phases have been identified by the researcher and validated through primary and secondary data. They are important when understanding the evolution and change of problem-solving responses.

The third section outlines the organisational structure of the water sector in Cyprus. This considers the different departments, bodies, and actor groups that have been responsible for the provision of services and management responses to identified water problems. This structure has been formed through primary and secondary data, with an understanding of institutions and government departments being useful when exploring the characteristics of Dryzek's (2013) rationalities in Cyprus. The chapter relates to objectives two, three, and four.

Chapter six: administrative rationalism in Cyprus

Chapter six develops understanding of how government in Cyprus has responded to water problems by considering the existence of administrative rationalism. This is the first of Dryzek's (2013) rationalities, and it is considered to reflect the mandatory approach.

The main section of the chapter discusses administrative rationalism and the characteristics of Dryzek's (2013) discourse analysis in comparison to real-world government responses observed in Cyprus. In this case, practical observations and the existence of the characteristics that signal administrative rationalism are explored, while also being compared with other theoretical understandings such as public choice theory, power approaches, and the top-down perspective. The discussion is also positioned and related more broadly to the mandatory approach. The practical management challenges of administrative rationalism are explored in the concluding sub-section of the chapter, with these discussed according to Dryzek's (2013) interpretation and

their relative existence in Cyprus. Challenges such as implementation gaps, problem displacement, shifts in locus of control, and dispersed or limited expertise, exist as the perceived and observed challenges to the rationality. These are expected to develop and are argued to prompt the evolution of other problem-solving approaches (Dryzek, 2013). This chapter relates to objectives one and three.

Chapter seven: democratic pragmatism in Cyprus

Chapter seven continues to develop understanding of how government in Cyprus has managed and responded to water problems by considering the existence of democratic pragmatism. This is the second of Dryzek's (2013) rationalities, and it is considered to reflect the voluntary approach. The discussion follows on from the chapter on administrative rationalism, as democratic pragmatism signals the evolutionary progression of problem-solving.

The main section of the chapter explores democratic pragmatism and the key topics of Dryzek's (2013) discourse analysis in comparison to the real-world responses observed in Cyprus. In this case, practical observations and the existence of characteristics that signal democratic pragmatism are explored, while being compared with other theoretical understandings such as pluralism, policy networks, and the bottom-up perspective. The discussion is also positioned and related more broadly to the voluntary approach. The practical challenges of democratic pragmatism are explored in the concluding sub-section of the chapter, with these discussed according to Dryzek's (2013) interpretation and their relevance in Cyprus. Challenges such as the existence and influence of political power, conceptions of reasoned debate and public interest, as well as the privileged position of business and its influence on public opinion, exist as perceived and observed challenges to the rationality. These are important in terms of the evolution of problem-solving, as Dryzek (2013) notes how economic rationalism emerges as a remedy to the challenges of democratic pragmatism [and also administrative rationalism]. The chapter also relates to objectives one and three.

Chapter eight: economic rationalism in Cyprus

Chapter eight continues to develop understanding of how government in Cyprus has managed and responded to water problems by considering the existence of economic rationalism. This is the third of Dryzek's (2013) rationalities, and it is considered to reflect the economic approach. The discussion follows on from the chapters on administrative rationalism and democratic

pragmatism, as economic rationalism signals the final stage of problem-solving in the context of Dryzek's (2013) framework.

The main section of the chapter discusses economic rationalism and the topics of Dryzek's (2013) discourse analysis in comparison to real-world responses observed in Cyprus. In this case, practical observations and the existence of characteristics that signal economic rationalism are explored, while being compared with other theoretical understandings, such as; economic institutionalism, elitism, top-down approaches, as well as economic models of understanding including budget-maximising and bureau-shaping. The discussion is also positioned and related more broadly to the economic approach. The practical challenges of economic rationalism are explored in the concluding sub-section of the chapter, with these considered according to Dryzek's (2013) interpretation and their relevance in Cyprus. Challenges such as the slow diffusion of economic approaches, limited institutional change, resistance of established norms, political influences, implementation gaps, as well as the limited recognition of certain agents, exist as perceived and observed challenges to the rationality. These challenges are important in relation to the evolution of problem-solving, as Dryzek (2013) notes how they guide the development of alternative perspectives such as ecological modernisation and green radicalism [that are beyond the scope of this study]. This chapter relates back to objectvies one and three.

Chapter nine: conclusions

Chapter nine summarises the applicability of Dryzek's (2013) problem-solving rationalities, and builds on the findings by recognising the existence, role, and influence of emerging themes identified in Cyprus. This relates to objectives two, three, and four. The first section of the chapter validates the use of Dryzek's (2013) work by considering key findings and evidence in Cyprus. This includes a summary of the applicability analysis (appendix 6), which compares the theoretical characteristics of the rationalities with the findings. The second section of the chapter is separated into parts that discuss the emerging themes identified in Cyprus. These include; the understanding of sequentiality and the evolutionary format of problem-solving; the role and influence of supranational governance; the importance of factors such as culture and economic status; as well as the role and influence of politics. The final section of the chapter summarises and reflects on the study as a whole, while also offering scope for potential further research that can build on the study findings through future work.

Chapter 2: Government Responses to Water Resource Issues

2.1 Chapter overview

The main aim of this chapter is to present an overview of government responses used to manage and tackle water problems, with these generally categorised in terms of availability and quality. The chapter is structured in two sections. Firstly, the management of water resources is considered in terms of the broad responses of availability and quality. This focuses on supply and demand solutions as well as pollution control, which involve issues such as scarcity, groundwater exploitation, and quality decline. In this case, the different management responses used are considered in terms of small, Mediterranean, and peripheral EU state experiences, which relate to Cyprus. Secondly, these water management responses are also explored and contextualised in terms of mandatory, voluntary, and economic approaches, which relate to Dryzek's (2013) problem-solving rationalities. A concluding section provides a summary and links this discussion with the next chapter.

2.2 Managing water resources

A realisation of the threat water resource issues pose to human populations has prompted an increase in concern within public and political realms (see Arnell, 1999; Fransson & Gärling, 1999; Dryzek & Schlosberg, 2005; Barr, 2008; Grover, 2016; Cook, 2017; Carter, 2018). As a consequence of growing public concern, a strengthening environmental movement, and demand for action, governments have faced increasing pressure to generate reasoned responses and effective approaches to water problems. In particular to manage; increasing scarcity, drought, groundwater depletion, desertification, flood risk, and climate change (see Smith, 1995; Frederick & Major, 1997; Şen, 2009; Hansen, 2010; Kanakoudis *et al*., 2017; Conca & Weinthal, 2018; Lubell & Balazs, 2018).

As a result, there has been a convergence of scientific, political, economic, and public realms, through which various agents, such as political scientists, hydrologists, biologists, economists, and government actors, have attempted to develop responses that utilise appropriate forms of governance in order to solve these water problems (Dobson, 1995; Smith, 1995; Wapner, 1995; Connelly & Smith, 2003; Oates & Portney, 2003; Kraft, 2007; Gober, 2018).

Traditionally, water resource problems have been managed through approaches that focus on the two key attributes of availability and quality (Gleick, 2000; Sterner, 2003; Biswas, 2008; Gober, 2018). These management responses have been further differentiated in terms of supply, demand, and pollution management (Whipple, 1998; Mauser, 2009; Cook, 2017; McMillan, 2017; Abansi, Hall, & Siason, 2018). The management pathways based on availability and quality are explored in the following sections.

2.3 Water availability

The concept of availability involves both supply and demand aspects of management, which are each bound by a range of parameters, including; the status of existing hydrological systems, relative water requirements of different group interests, and the adequacy of infrastructure systems to enable efficient resource allocation and distribution (Love, 1999; De Villiers, 2001; Simon, 2003; Anisfield, 2010; Brouziyne *et al*., 2018). The concept of water availability has been a primary management focus for governments, as the control of spatial and temporal variability has been necessary to ensure a reliable service to public, agricultural, industrial, and corporate consumers (Hoekstra, 1998; Gleick, 2000; Johnson & Handmer, 2002; Reese & Gawel, 2017). Thus, the management of supply and the control of demand have gained importance as governments have endeavoured to effectively manage availability and maintain the water requirements necessary for socio-economic development (Gleick, 2000; Hoekstra & Chapagain, 2008; Grover, 2016; Gober, 2018).

2.3.1 Supply management

Historically, supply management has been widely used as an approach to solve issues relating to water availability (Gleick, 2000; Anisfield, 2010). This response seeks to increase availability by expanding the supply system, and involves the control, organisation, and development of water resources, primarily through the improvement of network facilities and extensive infrastructure projects (Dzurik, 2003; Stephenson, 2003; Johnson, Ratnayaka, & Brandt, 2009; Edalat & Abdi, 2017). The approach has often been driven by a developmental paradigm based on an ideology of unrestricted growth, which has caused governing agents to adopt a ‘predict and provide’ response to the expansion of supply (Gleick, 2000; Carter, 2007; Stephenson, 2012).

Water management, planning, and development have been largely dependent on the projection of key variables such as population growth, per capita demand, agricultural production, and the extent of productivity in a given economic system, which were considered to directly influence water needs (Gleick, 1996; Griffin & Mjelde, 2000; Dzurik, Kulkarni & Boland, 2019). These variables were predicted to continuously increase over time, and so the need for water was also expected to rise, thus meaning that future water demands would surpass existing supplies, ultimately leading to a supply-demand gap (Mauser, 2009; Anisfield, 2010; Cech, 2018). As a result, more traditional [often deemed as pre-1980] management responses were centred on paradigms of growth and focused on the use of supply-side solutions to address the supply-demand gap (Dziegielewski, 2003; Solomon, 2010; Grigg, 2011; Clausen, 2017).

In the case of small, Mediterranean, and peripheral EU states, problems of availability and responses focused on supply management have been explored through a range of topics. Firstly, for small states these have included; supply challenges caused by tourism development (Essex, Kent, & Newnham, 2010; Gössling, Hall & Scott, 2015); and also, the need for a supply mix involving a range of methods (Voivontas *et al*., 2003; Emmanuel & Clayton, 2017). Secondly, for Mediterranean experiences, these have involved; water sustainability and adaptation strategies in relation to climate change (Collet *et al*., 2015); supply-demand ratios based on global change scenarios (Garcia-Ruiz *et al*., 2011; Boithias *et al*., 2014); supply challenges associated with non-perennial rivers (Skoulikidis *et al*., 2017); adaptation for supply in drought prone basins (Kumar *et al*., 2016); environmental impacts of supply in water stressed regions (Uche *et al*., 2015); as well as supply control through integrated management (Moutsopoulos & Petalas, 2018). Thirdly, for peripheral EU states, these have been considered through; a focus on developing supply infrastructure and the emergence of desalination (March, Sauri & Rico-Amoros, 2014); supply variation and drought resilience (Di Matteo *et al*., 2017); management through EU directives (Moutsopoulos & Petalas, 2018); and also influences of privatisation (Martinez-Espineira, Garcia-Valinas & Gonzalez-Gomez, 2009).

2.3.2 Demand management

The failure of supply management approaches to solve water problems, alongside changes in social values [toward the environment], political conditions, and economic systems, forced governing agents and planners to consider an alternative paradigm of water development (Gleick, 2003; Sokolov, 2011; Smith, McDonald & Murray, 2014; Cook, 2017; Edalat & Abdi, 2017). This has emerged through the management of demand-side variables (Dziegielewski,

2003; Brooks & Linton, 2009; Mualla, 2018). The response is not solely dependent on supply expansion, but instead, it involves a form of management that utilises an array of policy tools, such as incentives to change behaviour, to reduce user demand for water (Winpenny, 1997; Buckle, 2004; Pahl-Wostl, 2007; Brooks & Linton, 2009; Sipes, 2010; Pahl-Wostl *et al*., 2011; McDonald & Mitchell, 2014).

Demand management has also been defined as an approach employed by governing agents and suppliers that seeks to better control water consumption, while motivating different user groups to regulate their usage and adopt opportunities to increase efficiency through technology (Savenije, 2002; Brooks, 2006; Anisfield, 2010; Russell & Fielding, 2010; Mualla, 2018). The approach focuses on controlling demand for water, to ensure levels of demand do not exceed the levels of supply that are deemed sustainable for a given region, basin, or groundwater source (Baroudy, 2005; Brooks, 2006; Mays, 2007; Abansi *et al*., 2018).

Demand management has been utilised to tackle water resource issues through three main factors. Firstly, the approach seeks to challenge the societal and behavioural status-quo regarding water use, as its core principles oppose overconsumption and exploitative pathways (Mehta, 2000; Gleick, 2003; Cook, 2017). Secondly, it may be employed by governing agents and service providers in an attempt to improve overall water savings, through an increase in system and usage efficiency, the appropriate allocation of water to specific sector needs, as well as participatory mechanisms (Gleick, 2000; Cech, 2018; Dzurik *et al*., 2019). Thirdly, water quality may be safeguarded by utilising appropriate water types, such as greywater, wastewater, green-water, and brackish water, which are deemed suitable for specific activities (Baroudy, 2005; Brooks, 2006; Loucks & van Beek, 2017).

Much research has been produced in relation to demand management, including; work based on general concepts and principles associated with the approach (see Gleick, 2000; Simon, 2003; Brooks, 2006; Brooks & Linton, 2009; Lane, Ryan & Norton, 2017); theoretical understanding and analysis (see Guy, 1996; Savenije & van der Zaag, 2002; Buckle, 2004; Cantin, Shrubsole, & Aït-Ouyahia, 2005; Pahl-Wostl *et al*., 2011; Xiao, Fang & Hipel, 2018); practical application and tangible results (Billings & Day, 1989; Edwards, 2006; Roaf, 2006; Vairavamoorthy & Mansoor, 2006; Stavenhagen, Buurman & Tortajada, 2018); as well as definitions of soft path management and more integrated management responses involving notions of public participation and sustainable basin management (see Wolff & Gleick, 2002; Gleick, 2003;

Priscoli, 2004; Arnell & Delaney, 2006; Pahl-Wostl, 2007; Roumasset & Wada, 2015; Fritsch, 2017; Elfithri & Mokhtar, 2018).

In the case of small, Mediterranean, and peripheral EU states, problems of availability and responses focused on demand management have been evident through a range of examples. Firstly, for small states these have included; social, economic, and institutional influences (Abansi *et al*., 2018); impacts of tourism on demand (Garcia & Servera, 2004); as well as management for agriculture and responses to the pressures of groundwater over-abstraction (Hallett *et al*., 2017). Secondly, in terms of Mediterranean experiences, these have involved; relationships between urban growth and demand (Bouziotas, Rozos & Makropoulos, 2015); the influence of residential tourism (Morote, Sauri, & Hernandez, 2016); and also, agricultural water demand management (Hamdy, Abu-Zeid & Lacirignola, 2009). Thirdly, for peripheral EU states, these have been considered through; analysing determinants of demand (Romano, Salvati & Guerrini, 2014); urban typology and influences on demand (Kolokytha & Mylopoulos, 2004; Morote & Hernandez, 2016); as well as the design and application of demand management schemes (Baki, Rozos & Makropoulos, 2018).

2.4 Water quality

The second parameter of water resources management, which exists in parallel with availability, involves the management of water quality that often occurs through the control and mitigation of pollution (Grigg, 1996; Farmer, 1997; Bouwer, 2000; Hunt, 2004; Cook, 2017). The concept of water quality relates to the physical, chemical, and biological properties of a given water resource [surface, groundwater, or marine] that may be altered through natural processes or human activities (Agarwal, 2009). The management of pollution has been regarded as a prominent water issue facing society due to the visible effects of pollutant accumulation on the environment and the direct potential impacts on public health (Larsen, Ipsen, & Ulmgren, 1997; Perry & Vanderklein, 2009; Grover, 2016). More specifically, for small, Mediterranean, and peripheral EU states, problems of quality have been explored through a range of aspects, including; hydrological and quality trends (Lutz *et al*., 2016); the impact of variables such as climate change, land use, and agricultural activities (Casali *et al*., 2008; Serpa *et al*., 2017); the effects of point and non-point pollution (Gikas, 2017); the quality of groundwater and reservoirs (Onorati *et al*., 2006; Hildebrandt *et al*., 2008; Marce & Armengol, 2010; Stamatis *et*

al., 2011); as well as water quality trends and variation (Bouza-Deano, Ternero-Rodriguez & Fernandez-Espinosa, 2008).

2.4.1 Pollution management

Sources of pollution for water are wide-ranging and variable. They can be fundamentally defined as any substance, waste product, effluent, contaminant, or catalyst for change that enters a water system and alters the natural properties of the ambient quality, thereby causing harm to either humans or the natural environment (Farmer, 1997; Peirce, Weiner, & Vasilind, 1998; Agarwal, 2009; Boyd, 2015). For example, pollutants may include chemical effluents released into a river as a result of industrial processes; fertilizer and pesticide by-products generated by intensive agricultural practices; or the saline intrusion of groundwater aquifers due to seawater encroachment in coastal areas (Logan, 1993; Bouwer, 2000; Rajaram & Das, 2008; Cook, 2017; Marignani *et al*., 2017).

Pollution can have either singular or diffuse characteristics [also termed point or non-point], with diffuse pollution posing the most significant management dilemma as the source location is often unknown and highly variable (Smith, 1995; Novotny, 2003; Laws, 2017). Pollution can have an effect on water resources in two distinct ways, namely; the concept of quality-scarcity and also system capacity (Kinnersley, 1994; Chave, 1997; Stauffer, 2013).

Firstly, an increase in polluting substances can have an adverse effect on availability, by causing water to become ‘quality-scarce’ (Kinnersley, 1994; Stephenson, 2003). This occurs when a decline in quality causes a reduction in the quantity of water available for activities that require an adequate level of quality above a given threshold (Stephenson, 2003; Tebbutt, 2013). These levels of quality relate to the water requirements of specific activities and may be categorised in terms of a water-use hierarchy (Postel, 1992; Grigg, 2011). For example, sources for public supply and drinking water need the highest level of quality due to the potential impact of poor-quality water on public health, while water used for navigation and transport holds a lower threshold due to limited human contact (Kinnersley, 1994). Subsequently, if pollutants are permitted to accumulate in a water system, the quality of this resource declines, and so, the availability of high-quality water also declines, ultimately causing a condition of scarcity that emerges due to the initial decline in quality (Gautier, 2008; Tebbutt, 2013).

Secondly, the effect of pollution on water can occur as a result of the water environment's interconnected character and limited capacity to absorb wastes, especially those that are highly toxic or persistent (Kinnersley, 1994; Curley, 2011; McMillan, 2017). This is considered to be the system capacity to mitigate pollution. A management challenge emerges as pollution poses a threat to both the natural environment, through impacts on ecosystems, as well as human populations, through an influence on public health and a potential decline in social security (see Larsen *et al*., 1997; Novotny, 2003; Hranova, 2006; Perry & Vanderklein, 2009; Benson *et al*., 2017; Cech, 2018).

Management responses to water pollution also exhibit common principles, which remain fundamental to government approaches and are evident in different legislative cases and at a variety of management levels (Larsen *et al*, 1997; Peirce *et al*., 1998; Tebbutt, 2013). For example, these involve; approaches that utilise preventative, precautionary, and polluter-pays principles; the use of regulatory mechanisms; as well as the integration of economic instruments alongside regulations (Grigg, 1996; Chave, 1997; Larsen *et al*., 1997; Burchell & Lightfoot, 2001; de Sadeleer, 2002; Stephenson, 2003; Peel, 2005; Beder, 2006; Siebert, 2008; Bell *et al*., 2017; Clausen, 2017). In this case, regulatory mechanisms, such as strict pollution standards or also nudge regulations reflect mandatory approaches, while economic instruments such as tradable permits, incentives, or taxes, reflect economic approaches.

Notably, the preventative, precautionary, and polluter-pays principles have often been applied in practice through the use of tools that relate to mandatory and economic approaches, namely; regulations, pollution standards, as well as economic forms of management such as incentives (Young & Karkoski, 2000; Sterner, 2003; Bell *et al*., 2017). Regulations involve strict rules or guidelines that are formed, developed, and enforced by governing agents or institutions, in order to restrict or completely prohibit a specific behaviour or action (Carter, 2018). Standards attempt to set defined limits on polluting actions or variables, such as the concentration of a pollutant permitted or the specific types of pollutant that are permitted to be released from a source (Beder, 2006). Economic management tools involve market mechanisms that are used to modify polluter behaviour and limit harmful practices (Smith, 2011). Various economic tools have been used to control water pollution, namely; pricing adjustments, charges, marketable permits, licenses, subsidies, and enforcement incentives (Gayer & Horowitz, 2006; Borghesi, 2014; Gómez Gómez *et al*., 2018).

In the case of small, Mediterranean, and peripheral EU states, problems of quality and responses focused on pollution control have been evident through a range of examples. For small states these have involved; spatial and temporal influences of pollution (Daou, Nabbout, & Kassouf, 2016); agricultural practices and wastewater (Dare & Mohtar, 2018); and river contamination due to heavy metals (Shehu *et al*., 2016). In turn, for Mediterranean nations, topics have included; managing non-point pollution (Patterson, Smith & Bellamy, 2013); assessing groundwater pollution (Libutti & Monteleone, 2017; Miglietta *et al*., 2017); and also analysing relationships between pollution, scarcity, and river ecosystems (Karaouzas *et al*., 2018a). Furthermore, for peripheral EU states, responses to pollution have been considered through; assessments of pollution sources (Palma *et al*., 2009); pollution in temporary rivers (Karaouzas *et al*., 2018b); as well as the use of EU directives to determine the existence of pollutants (Golfinopoulos *et al*., 2016).

2.5 Contextualising water management and policy responses

The dominant forms of approach used by government [and society] when responding to socio-environmental problems such as water resource issues, can be contextualised in terms of the three coordination mechanisms identified in chapter one. These are mandatory, voluntary, and economic approaches (Frances *et al*., 1991; Kelly & Palumbo, 1992; Freeden, 1996; Rhodes, 1996; MacKenzie, 2003; Meuleman, 2008; Powers, 2010; Birkland, 2011).

A range of policy responses have been utilised to varying degrees to tackle water management problems (Cantin *et al*., 2005; Arnell & Delaney, 2006; Conca, 2006; Pahl-Wostl, 2007). These responses reflect the mandatory, voluntary, and economic approaches through; regulations; public participation and stakeholder interaction; as well as market-based system approaches and instruments (Wu & Babcock, 1999; Papadakis & Grant, 2003; Keast, 2016). Firstly, in response to surface and groundwater use, regulatory measures have been established to manage and control practices, as shown by the EU Water Framework Directive (2000/60/EC) and the EU Groundwater Directive (2006/118). Also, when addressing the pollution of water systems, regulation has been important in controlling water quality, as noted in the cases of; the US Clean Water Act; the EU Urban Waste Water Treatment Directive 91/271; and the EU Drinking Water Directive 98/83 (Gross & Dodge, 2005; EU Water, 2012). Secondly, voluntary approaches have been evident in the case of reducing ambient pollution (Suter *et al*., 2010), and when managing urban water demand (Fielding *et al*., 2013) or encouraging water conservation

(Khoo, 2009). Thirdly, economic forms of management, such as permits, have been established in certain cases to encourage the reallocation of existing resources, as shown by the Water Act 2003 [of England and Wales] (Dinar, 1998; NetRegs, 2011), while economic instruments such as pricing, taxes, penalties, incentives, and subsidies have been used to manage demand and scarcity, encourage certain behaviours such as the uptake of recycled water for irrigation, as well as control supply during drought periods (see Zoumides & Zachariadis, 2009; Renwick, 2017; Shortle & Horan, 2017; Berbel & Expósito, 2018; Gómez Gómez *et al*., 2018).

In relation to the tangible successes and failures of policy outcomes and management responses, it is argued that in many cases new approaches will often be sought if; existing responses do not satisfy policy objectives, outcomes are inadequate in the face of public demands, or specific responses attract widespread scientific, public, or political criticism (Gray, 1997; Hahn, 2001; Lazarus, 2004). This procedure represents a form of incrementalism, through which the response to a problem is continually adjusted and evolves in accordance with different variables such as increasing scientific knowledge, change in public opinion or demand, and political or external pressure for improvement (Burstein, 2010; Dye, 2016). For example, the introduction of market-based and voluntary policy instruments has occurred over time due to the perceived failures of regulatory actions, as many water issues, including the pollution of waterways and the exploitation of groundwater sources, have continued to deteriorate despite seemingly strict regulation and control (Frances *et al*., 1991; Hahn & Stavins, 1991; Kraft, 2017).

2.6 Conclusion

Government responses to water issues have been framed and explored according to specific challenges encountered. A significant proportion of the literature relating to water management has been devoted to a better understanding of availability and quality (Stephenson, 2012; Boyd, 2015; Cook, 2017). This has emerged through work on general approaches and challenges associated with the provision of services, such as supply and demand solutions, pollution control, as well as mitigation and adaption methods employed to tackle scarcity and quality issues (Smith & Thomassey, 2002; Wescoat Jr. & White, 2003; Arnell & Delaney, 2006; Pereira, Cordery, & Iacovides, 2009). For example, work relating to supply-side development and infrastructure (Gleick, 2000; Griffin & Mjelde, 2000; Jin & Young, 2001; Moutsopoulos & Petalas, 2018) as well as the management and control of demand (Guy, 1996; Dziegielewski, 1999; Dziegielewski, 2003; Gleick, 2003; Brooks, 2006; Brooks & Holtz, 2009; Brooks &

Linton, 2009; Pereira *et al*., 2009; Sokolov, 2011; Abansi *et al*., 2018) has been extensive, while in terms of quality, different responses to pollution management and technological advances have been considered (Logan, 1993; Bouwer, 2000; Novotny, 2003; Ribaudo, 2009; Suter *et al*., 2010; Parris, 2011; McMillan, 2017).

It is acknowledged that the effective management and provision of water services is often dependent on appropriate institutional responses, and thus research in this case has tended to focus on; describing and exploring institutional structures; availability scenarios for specific countries, regions, sectors or industries; as well as adaptation measures in relation to regimes, practices, and policy (Smith, 1995; Saleth & Dinar, 1997; Dinar, 1998; Subak, 2000; de Loë, Kreutzwiser, & Moraru, 2001; Crabbé & Robin, 2006; Dessai & Hulme, 2007; Larson *et al*., 2009). The understanding of management and decision-making intricacies has however been underdeveloped, particularly the role, motives, and behaviour of actors and the broad rationales they employ, key tools used, as well as the evolution of responses. The aspects discussed in this chapter have also been quite limited in scope, being concentrated on certain countries such as the United Kingdom (Hassan, 1998; Ducros & Watson, 2002; Rouse, 2017), France (Ladrech, 1994; Szarka, 2002; Salvetti & Canneva, 2016; Colon, Richard, & Roche, 2017), China (Xie *et al*., 2009; Yining, 2010; Araral & Wu, 2016), Australia (Crase, 2008; Tisdell & Ward, 2011; Grafton & Horne, 2014), and the United States (Gleick, 2009; Glennon, 2009; Lindstrom, 2011; Robinson, 2013; Mulroy, 2017), while being underdeveloped in certain contexts, such as for small, Mediterranean, and peripheral EU nations [such as Cyprus].

Now attention will turn to methods of problem-solving, which have been used to form collective responses to existing and emerging water management problems, such as the issues of availability and quality that are of detriment to the future provision of water resources.

Chapter 3: Understanding Problem-Solving Responses

3.1 Chapter overview

This chapter explores how government responses to socio-environmental problems have been understood from a range of approaches and perspectives.

The first section considers the three core approaches used to conceptualise how societies coordinate collective responses to socio-environmental problems, namely through mandatory, voluntary, and economic approaches. Each of these exhibit certain types of governance, formats of decision-making, policy instruments, modes of organisation, as well as interactions between governing actors and those being governed (Wurzel *et al*., 2013). Notably, the approaches are considered through a range of aspects such as; bureaucratic systems and methods for understanding policy implementation and the roles of key agents; democratic and pluralist approaches such as policy networks and communities; as well as economic models of understanding and market-based concepts. Different perspectives, including top-down and bottom-up understandings, bargaining, policy networks, public choice theory, and economic institutionalism, have been analysed in terms of each relevant approach based on commonalities between key elements and structural characteristics. Notably, the limitations of previous approaches have helped to form the focus of this analysis and overview, with recognition of the idea that limitations help to generate alternative approaches. This reflects Dryzek's (2013) understanding of how different rationalities emerge as a result of the practical limitations and challenges of previous problem-solving responses.

The second section focuses on exploring the three problem-solving rationalities developed by Dryzek (2013), namely administrative rationalism, democratic pragmatism, and economic rationalism. These form a key part of the study, and reflect and build on the mandatory, voluntary, and economic approaches. It is proposed that Dryzek's (2013) rationalities have the potential to offer useful and unique insights into understanding how governments respond to socio-environmental problems. This argument is based on how Dryzek (2013) offers an alternative way of differentiating between responses, while also establishing a unique understanding of policy actor roles, motivation, behaviour, the concept of self-interest, rhetoric, and the evolution of problem-solving, through his discourse analysis.

3.2 Mandatory approaches

The mandatory approach has been the basis of government responses to socio-environmental problems, essentially involving approaches based on administrative and bureaucratic structures (Mitchell, 1991; Hill & Hupe, 2014). It has been characterised through aspects such as unitary organisation and a dependence on administrative organisation, task specialisation, and rational methods (Holzinger *et al*., 2006; Hill & Hupe, 2014); while as a bureaucratic model, the main organising principles are identified as rules, authority, and hierarchy (Hood, 1976; Colebatch & Larmour, 1993). Furthermore, in terms of environmental problem-solving, it can be generally defined as an approach based on regulation, command-and-control, and the idea of behaviour being altered through the threat of punishment (Connelly & Smith, 2003; Wurzel *et al*., 2013; Cubbage, O'Laughlin & Peterson, 2017).

The mandatory approach exhibits a range of characteristics, namely; governance based on hierarchy; policy instrument types that are identified as administrative regulations; government intervention in a top-down format; as well as interactions between actors that are based on coercion in the form of governance by government (Bevir, 2012; Wurzel *et al*., 2013). The approach has also been defined through a state mode of governance that is based on aspects including; a service focus on the public good; a locale of bureaucracy and hierarchy; decision-making in a vertical and top-down format; a focus on dependent relationships; rule-based and procedural styles of negotiation; as well as integration mechanisms such as legal authority, formal rules, policies, procedures, and regulations (Powell, 1990; Keast, 2016). The main characteristics of the approach, namely hierarchy and bureaucracy, have also been described according to specific modes of organisation and compliance. These involve; the notion of coercive relationships (Etzioni, 1961); the idea of command (Rigby, 1990); the feeling of threat (Boulding, 1990); as well as a basis of authority (Lindblom, 1977; Bradach & Eccles, 1991). Notably, these conceptualisations highlight how the mandatory approach can be defined, what it aims to do, and the constructs associated with it. However, an understanding of the specifics of problem-solving, by considering how and why actors behave in a certain way and how these actors can be distinguished, remains an underdeveloped area in terms of water problems and small, Mediterranean, and peripheral EU state experiences, as noted in chapter two. It is in this context that Dryzek's (2013) rationalities can be useful to advance understanding.

The following sections explore different understandings and perspectives that relate to the mandatory approach. Firstly, the concept of bureaucracy is considered as the foundation of

mandatory approaches. Secondly, the top-down and bottom-up perspectives offer insight into the role of governing agents in terms of policy implementation. Thirdly, bargaining and negotiation consider the interactions between governing agents, with the policy-action continuum emerging as a component for understanding implementation and the application of bargaining constructs. Fourthly, power approaches such as elitism and technocracy are explored, as these help to explain the importance of hierarchy and the roles of certain actor types. For elitism, importance is placed on bureaucratic hierarchy and control by a group of elites, while technocracy focuses on control through technical experts.

3.2.1 Understanding bureaucracy

The concept of bureaucracy is characterised as a system of administration through which the officials and experts of a government or organisation are given responsibility for the formation, development, and implementation of policy (Beetham, 1991; Mitchell, 1991; Parsons, 1995; Smith & Ingram, 2002; Workman, 2015). This relates to the mandatory approach through characteristics such as traditional forms of regulation, hierarchy, and command-and-control policy (Holzinger *et al*., 2009; Bähr, 2010; Wurzel *et al*., 2013). In these terms, bureaucracy seeks to exercise control based on knowledge and relies on a hierarchal organisational structure to tackle problems by consolidating individuals and experts into groups to ultimately establish a prevailing problem-solving and policy direction (Desveaux, 1995; Meier & O'Toole, 2006). Bureaucracy is noted to be a centralised form of coordination that focuses on implementing decisions made by actors with authority, while restricting isolated autonomy in decision-making (Sartori, 1991; Page & Jenkins, 2005; Tullock, 2005; Garston, 2012).

Administration relates to the concept of bureaucracy and can be defined as the coordination and implementation of policy in response to a given issue (Parsons, 1995; Milakovich & Gordon, 2013). A system of administration can be understood as the organisation of offices or agencies, for example within a government, institution, or organisation, concerned with the formation and development of policy and legislation (Beetham, 1991; Peters, 2010). As a construct, policy exists as a political solution to contested interests that emerge because of different resource or socio-economic requirements (Miller, 2002; Schmid, 2002; Pahl-Wostl, 2015). Governing agents[3] are faced with the challenge of developing, guiding, and implementing policy in response to water management problems related to availability and quality, including; scarcity,

[3] For example, these agents include civil servants, administrative officials, ministers, cabinet members, decision-makers, experts, managers, bureaucrats, and planners (Parsons, 1995; Dryzek, 2013)

drought, over-use, and a decline in surface and groundwater quality (Roberts, 2004; Allan, 2005; Miller, 2009; Kraft, 2017; Smith, 2017; Cech, 2018).

A range of aspects have been explored regarding bureaucracy, bureaucratic administration, and hierarchal organisational systems. This has included; definitions, operational structures, and theoretical constructs (see Weber, 1946; Hall, 1963; Niskanen, 1971; Tullock, 1987; Wilson, 1989; Frances *et al*., 1991; Downs, 1993; Weber, 1998; Du Gay, 2000; Parkin, 2002; Sager & Rosser, 2009); individual and collective motivations in bureaucratic structures (see Crewson, 1997; Page & Jenkins, 2005; Powers, 2010; Hodder, 2011; Schermerhorn, 2011); the function of bureaucracy in relation to democracy, competition, and the issue of corruption (see Meier, 1997; Drugov, 2010; Peters, 2010; Hodder, 2011; Vohnsen, 2017); as well as related policy tools and the concept of representative bureaucracy (see Selden, 1997; Sowa & Selden, 2003; Bradbury & Kellough, 2011; Kingsley, 2016).

3.2.2 The top-down perspective

The top-down perspective has been used to understand policy processes and the results of decision-making procedures. It reflects the mandatory approach based on the characteristics of hierarchy and a focus on the governing agents at the top of the policy process, including senior government officials, high-level bureaucrats, and elected politicians (Sabatier, 1986; Younis, 1990; Dye, 2002; Howlett & Ramesh, 2003; Zafarullah & Huque, 2017). As Miller (2002) and Hummel (2008) argue, the concept of bureaucracy, which is a part of mandatory approaches, can be considered the archetypal top-down perspective as a result of an importance placed on certain organisational features. These include; a hierarchal system of management; decision-making at the top of the policy chain; increasing authority in a vertical format within government or an administrative body; as well as senior governing agents having the primary role in policy implementation (Dye, 2002; Miller, 2002; Birkland, 2015).

The top-down perspective offers a particular view on how socio-environmental problems have been tackled by drawing attention to the role of senior officials and arguing that they directly shape policy (Stewart, Hedge & Lester, 2008; Sabatier, 2014). Research on this has focused on a diverse range of aspects, including; definitions and concepts (Hood, 1976; Ringquist, 1993; Sapru, 2004; Birkland, 2015); the formation of theoretical models and analytical frameworks to identify policy realisation (see Pressman & Wildavsky, 1973; Sabatier & Mazmanian, 1979; Mazmanian & Sabatier, 1983; Sabatier, 1986); the analysis of tangible outcomes [both positive

and negative] involving case studies and policy examples that have been shaped through top-down frameworks (see Pülzl & Treib, 2007; Winkler, Höhne, & den Elzen, 2008; Brandes & Curran, 2017); as well as suggested parameters that are considered to be necessary for effective policy implementation (see Sabatier & Mazmanian, 1979; Hogwood & Gunn, 1984; Knill & Lenschow, 2000; Sabatier, 2014; Birkland, 2015; Azhoni, Jude, & Holman, 2018).

In relation to water policy, the top-down perspective has been used to explain and interpret policy implementation issues, thus giving an insight into this specific aspect of the mandatory approach. Firstly, in the context of EU water policy, the Bathing Water Directive (76/100), the Urban Waste Water Treatment Directive (91/271/EEC), and the Water Framework Directive (2000/60/EC) experienced problematic implementation in certain cases based on a lack of member state government commitment, insufficient financial capability or support, and the failure of the EU Commission to impose directives in separate member states (Jordan, Ward, & Buller, 1998; Barnes & Barnes, 1999; Wurzel, 2002; Voulvoulis, Arpon, & Giakoumis, 2017). In nations such as France, Germany, and England and Wales, more effective implementation was possible, when compared to peripheral EU states, due to sufficient administrative and financial capabilities working alongside enforcement achieved by the Commission (Jordan *et al*., 1998; Aubin & Varone, 2004; Pahl-Wostl, 2015; Marek, Baun, & Dabrowski, 2017).

The top-down perspective fails to provide a balanced understanding of policy implementation, and it has been criticised by those who argue that politicians, senior officials, and high-level governing agents actually have a minor role in daily policy practices (Houston, 1998; Birkland, 2015). In this case, it is instead claimed that lower-level officials and the public are of greater importance in the policy implementation process (Elmore, 1985; Ham & Hill, 1993; Grin, 2008; Lipsky, 2010; Brodkin, 2016). This interpretation contrasts with top-down perspectives, in turn suggesting that implementation is more effectively understood by considering the actions of relevant individuals or groups that are involved in or affected by the everyday intricacies of decision-making and policy implementation (Hill & Hupe, 2009; Sabatier, 2014).

3.2.3 The bottom-up perspective

The bottom-up perspective focuses on how problems can be tackled from the view of individuals that are responsible for implementing policy (Sabatier, 1986; Bogason, 2000; Sapru, 2004). It has emerged in direct response to the top-down perspective and offers an alternative understanding of policy implementation by considering the importance of lower-level

governing actors or 'ground / street-level bureaucrats' [as defined by bottom-up advocates] (Lipsky, 1978; Houston, 1998; Greenawalt, 2016; Weimer & Vining, 2017). This differs from a top-down understanding by shifting focus onto individuals that are deemed responsible for enacting policy, rather than the high-level bureaucrats or politicians that often do not have everyday control over policy implementation (Wilson, Petersen & Holl, 1999; Raadschelders, 2003; Birkland, 2015; Bähr, 2016). The bottom-up perspective also relates to the mandatory approach based on characteristics of regulation [with a focus on ground-level control] and interactions between actors that are based on coercion in the form of governance by government (Wurzel *et al*., 2013). In the context of mandatory approaches, the bottom-up perspective develops the view of policy implementation alongside the top-down perspective to consider all levels of the administrative structure.

In terms of water policy, the bottom-up perspective has been used to explain and interpret a range of aspects related to implementation and management. These have involved; the governing of integrated water management (Serra-Llobet, Conrad, & Schaefer, 2016); water service practices and forms of governance (Conca, 2006); the integrative benefits of sustainable water management and the protection of livelihoods (Mabiza, 2013); organisation in relation to flood risk adaptation and drainage (Kuks, 2009); as well as responses to scarcity (Griffin, 2011) and the vulnerability of the water sector to climate change (Brown *et al*., 2012).

A key aspect of the bottom-up perspective has emerged through the notion of individual discretion, which is understood to have importance in relation to the everyday actions and experiences of street-level bureaucrats (Lipsky, 1978; Dunleavy, 1981; Brodkin, 2016). Individual discretion and judgement is often applied by governing actors or implementers for the formation and prioritisation of different policy aims and objectives, thus enabling those responsible for ground-level implementation to shape policy in a suitable manner (Ham & Hill, 1993; Jordan, 1995; Hill & Hupe, 2014). However, individual discretion can also facilitate the manipulation of policy to satisfy the interests of certain individuals or groups that are responsible for implementation. This shares similarities with the top-down perspective, although in this case discretion is instead attributed to high-level bureaucrats that have the power to shape and influence policy objectives according to individual or group interests (Hogwood & Gunn, 1984; Grin, 2008; Evans, 2011; Azhoni *et al*., 2018). This concept also gives insight into the potential characteristics of actors that operate within mandatory approaches and how they attempt to implement regulation and command-and-control policies.

For water policy, individual discretion has been evident regarding the implementation of the EU Bathing Water Directive (76/160) and the Water Framework Directive (2000/60/EC). In this case, implementation processes have been influenced by the decisions of lower-level [local] governing officials. Firstly, for the Bathing Water Directive, water quality standards were influenced by decisions relating to the design and location of waste system projects, as a result shaping both the implementation process and ground level objectives (Jordan *et al*., 1998). Secondly, for the Water Framework Directive, stakeholder involvement and the application of integrated management were influenced by discretion. Actors or groups exhibited control in procedures, with outcomes being variable through discretion and administrative capacity or political choice (Howarth, 2009; Watson, 2014; Voulvoulis *et al*., 2017). Furthermore, by identifying the concept of discretion and its presence in the policy process, street-level bureaucrats often alter policy content (Gouldson and Murphy, 1998). In this case, discretion emerges as a key element that facilitates an understanding of why policy implementation can fail (Hudson & Lowe, 2004; Yandle, 2001; Evans, 2011). Discretion also highlights the important role played by certain actors in policy, such as experts or managers, and the ability they have in shaping implementation or translating policy at ground-level. This is noted in the case of integrated water resources management and the application of EU policy (Watson, 2014) as well as surface-water pollution control (Hunter & Waterman, 2016).

Ultimately, the bottom-up perspective fails to provide a balanced understanding of policy implementation, as successful implementation has been dependent on sufficient financial resources and the commitment of high-level senior officials (Birkland, 2015; Bähr, 2016; Weimer & Vining, 2017). Therefore, a focus on understanding the role and actions of street-level bureaucrats becomes problematic as the importance of other actors and their influences on the policy-making process are not recognised (Houston, 1998; Meyers & Vorsanger, 2003). Although exponents of the bottom-up perspective argue that successful implementation relies on officials at ground-level, this understanding still fails to explain how relevant policy is formed prior to reaching the point at which these street-level bureaucrats can have an influence (Vinzant & Crothers, 1998; Weimer & Vining, 2017). These aspects emphasise an uncertain basis of investigation, which suggests bottom-up analysis merely seeks to understand the behaviour and interactions of specific governing agents rather than comprehending the full extent of policy implementation (Sabatier, 2014).

3.2.4 Bargaining and bureaucratic negotiation

The bargaining and negotiation perspective attempts to fill the gap between top-down and bottom-up perspectives by offering a view that appreciates the importance of both concepts and their relationship (Anderson, 2015; Birkland, 2015). In this case, policy implementation and decision-making are considered complex processes that rely upon the interactions and exchanges between governing actors at a variety of positions (Barrett & Fudge, 1981; Schucht, 2001). For example, bargaining and negotiation occurs between actors at the top and bottom of the policy process, or more specifically between politicians, senior officials, elites, and the street-level bureaucrats or lower-level officials (Turner, 1997; Anderson, 2015). In this case, the perspective offers insight into the implementation of policy and regulation, with this related to mandatory approaches through characteristics such as dependent relationships as well as a rule-based and procedural style of negotiation (Powell, 1990; Keast, 2016).

The policy-action continuum

The bargaining and negotiation perspective suggests that decision-making and policy implementation is best understood in terms of a policy-action continuum, which establishes a rational sequence of policy-making based on stages (Barrett and Fudge, 1981; Sapru, 2004; Arnscheidt, 2009; Wurzel *et al*., 2013). These include; the initial passing of statute law; policy decisions of implementing organisations and governing actors; the compliance of target groups in accordance with the original decision; the intended and unintended impacts of a given decision; the perceived impacts of this decision; as well as any necessary adjustments of statute (Hill, 2005; Hill & Hupe, 2014).

In terms of water policy, bargaining and negotiation [as well as a continuum understanding] has been evident regarding the implementation of policies such as the EU Water Framework Directive and the Bathing Water Directive within the context of member states (Chave, 2001; Wurzel, 2002; Jordan, 2005). More specifically, for the Water Framework Directive, factors such as policy scope, implementation timing, and the extent of corrective action have been influenced through intergovernmental bargaining in the Council of Ministers and negotiations between the Environmental Commission and governing authorities and actors (Borzel, 2005; Voulvoulis *et al*., 2017). The requirements of policy implementation have also resulted in use of bargaining and negotiation at national levels. This has been noted between authorities, communities, and separately administered regions, when managing issues caused by; high financial costs of implementation; a lack of expertise; and a demanding timeframe for the

achievement of full implementation (Birol, Koundouri, & Remoundou, 2011). Bargaining and negotiation at these different points of the continuum can reflect characteristics of the mandatory approach, namely; a primary focus on implementing regulation, which is a key component of the approach; and also, mechanisms such as bureaucracy and legal authority.

3.2.5 Power approaches

Through the discussion on bargaining, it becomes apparent that a key part of policy and decision-making involves the interactions and motivations of governing agents. As a result, when understanding who controls the policy process and why they act in a certain way it is also possible to draw from power approaches such as elitism and technocracy. These relate back to the mandatory approach through characteristics such as hierarchy, a basis of authority, and the idea of command, which are argued to be relevant (Rigby, 1990; Bradach & Eccles, 1991).

Power approaches view decision-making and policy implementation as processes that are shaped and determined by power constructs, including; class, wealth, bureaucratic arrangement, professional status, and technical knowledge (Parsons, 1995; King, 2011). In terms of bureaucracy, the most relevant power approaches involve the constructs of elitism and technocracy (Johari, 1982; Peters, 2010; Thompson, 2013). These place an importance on expertise and the control of knowledge to gain authority, while also sharing similarities with the top-down perspective due to the prioritisation of higher-level governing officials (see Barsoux & Lawrence, 1997; Birch, 2007; Peters, 2015; Clemons & McBeth, 2017).

Elitism

Elitism can be defined as a concept that focuses on the different ways power is concentrated or directed (Lasswell & Kaplan, 1950; Lasswell, 1965; Yadav, Bigsby & MacDonald, 2016). Elitist models of understanding suggest that power within the policy and decision-making process is centralised and controlled by certain groups or individuals [defined as ‘elites’], which can ultimately shape and determine a given decision outcome or policy direction (Schumpeter, 1974; Parsons, 1995; Birkland, 2015).

The elitist understanding can be related to the mandatory approach as it highlights the importance of a hierarchal organisational structure and the apparent need for expert knowledge (Parry, 2005; Holzinger *et al*., 2009). This view also reflects the top-down perspective, by suggesting that high-level [or ‘elite’] actors and senior officials that sit at the top hold the most

prominent role in problem-solving (Parsons, 1995; Kersey, 2016). This understanding is further developed through claims that decision outcomes can often be influenced by high-level actors to help them achieve personal or group interests (Parry, 2005; Kersey, 2016). For example, these may involve; financial gains; increased control and authority; or the protection of electoral status to maintain political legitimacy (Dye, Zeigler & Schubert, 2012).

Elitism has been evident in terms of water policy through the federal management of irrigation practices and the development of water infrastructure in the United States (Parsons & Matthews, 1990; Gonzalez, 2001). In this case, high-level [elite] governing agents were found to have extensively influenced decision-making and water management (Kann, 1986; Gonzalez, 2001). For example, legal agreements were defined and implemented by central government and local authorities that resulted in the allocation of more water for human consumption than certain river and groundwater sources could feasibly supply. This was noted in the case of the Colorado River system, with urban areas and the agricultural sector being given priority for water by those at the highest levels of government (Miller & Spoolman, 2009; Pulwarty, 2011).

Technocracy

The concept of technocracy offers an alternative understanding of control and organisation for decision-making that focuses on the key role of technical experts in the policy process (Fischer, 1990; Burris, 1993; Söderbaum, 2009). The concept has emerged from the development of transforming bureaucratic structures, and places greater importance on experts and scientific knowledge (Muttalib, 1980; Bucchi, 2009; Lentsch & Weingart, 2009). Technocracy is an evolved concept of rationalisation that integrates a range of previously conceived aspects of structural control and power, namely; bureaucracy and hierarchy, technical control, and professionalism (Parsons, 1995; Evans, 2007; Radaelli, 2017). Indeed, technocracy also reflects certain characteristics of the mandatory approach, namely; hierarchy, regulation by experts, formal procedures, a focus on dependent relationships, as well as decision-making in a vertical and top-down format (Wurzel *et al*., 2013; Keast, 2016).

The technocratic understanding is founded on two key elements that explain decision-making through the perceived relationship between experts, political decision-makers, and the public (Lentsch & Weingart, 2009). Firstly, technocrats consider that both political decision-makers and the public represent a level of scientific knowledge that is severely limited, and thus the need for their expert knowledge to guide policy and decision-making becomes apparent

(Fischer, 1990). Secondly, advocates of technocracy claim that governing actors or politicians and the public are often influenced by irrational fears and misinformation when forming decisions (Bucchi, 2009). Thus, it is argued that experts should have the greatest responsibility and authority in decision-making, as they can provide the highest level of scientific rationality and offer a response based on research and scientific evidence (see Fischer, 1990; Evans, 2007; Peters, 2010; Webler, Tuler & Dietz, 2011; Radaelli, 2017).

The concept of technocracy is evident in relation to water policy through the United Nations Water division. This authority consists of an array of working groups that include experts focusing on research requirements, such as; scarcity, quality and wastewater, sanitation, transboundary management, and responses to climate change (UN Water, 2015). The experts are responsible for monitoring and publishing reports, as well as informing and guiding policy, with core definitions, necessary actions, and targets defined (Hendry, 2015). This is a practical representation of technocracy based on the way technical experts are positioned at the top of problem-solving, while important characteristics of the mandatory approach are also present, such as bureaucracy, hierarchy, and top-down constructs.

3.3 Voluntary approaches

The voluntary approach encompasses the concepts and understandings that have been the basis of inclusive responses to socio-environmental problems, particularly those based on pluralism, networks, communities, and participation (Wurzel *et al*., 2013; Hill & Hupe, 2014). It has been broadly defined through the concept of community and governance based on networks, while being dependent on less formal and more egalitarian and cooperative approaches (Thompson, 1991). In terms of environmental problem-solving, it can be generally defined as an approach based on cooperation, suasive policy, information and communication, and consensus building between different stakeholders (Segerson & Miceli, 1999; OECD, 2003; Halpern, 2010).

The voluntary approach is argued to represent certain characteristics, such as; suasive policy instrument types; content based on information and appeals; as well as a relationship of interaction between governing actors and those being governed based on societal self-regulation and governance without government (Bevir, 2012; Wurzel *et al*., 2013). The approach has also been defined through a network mode of governance, which is based on a range of aspects. For example; a service focus on the social good; a setting of community; decision-making in a more

widely scoped and horizontal format; a focus on interdependent relationships; an interest-based and inclusive negotiation style with a long-term focus; as well as tools and mechanisms of integration focused on social exchange, relationships, mutuality, reciprocity, and a common vision or purpose (Taylor, 1982; Powell, 1990; Colebatch & Larmour, 1993; Keast, 2016). Furthermore, the main characteristics of the voluntary approach, namely network and community, have also been described through specific modes of organisation and compliance. These include; the idea of a moral foundation (Etzioni, 1961); the dynamic of persuasion (Lindblom, 1977); the notion of custom (Rigby, 1990); the feeling of love (Boulding, 1990); as well as a concept and basis of trust (Bradach & Eccles, 1991). Notably, these conceptualisations highlight how the voluntary approach can be defined, what it aims to do, and the constructs associated with it. However, an understanding of how and why actors behave in a certain way, and how these actors can be distinguished, remains an underdeveloped area in terms of water problems and small, Mediterranean, and peripheral EU state experiences. It is in this context that Dryzek's (2013) rationalities can be useful.

The following sections consider different understandings and perspectives that have been central to the voluntary approach. Firstly, the concept of pluralism is explored, with this being a basis of more inclusive responses, diversity, and different groups having power to apply pressure. Secondly, policy networks and communities are considered and offer an interpretation of relationships and interactions between governing agents. They attempt to illustrate who controls policy-making and why these individuals or groups act in a certain way, for example as a result of network dynamics and the influences or agendas of a given group.

3.3.1 Pluralism

Pluralism focuses attention on the way power is distributed within society, assuming that policy is the outcome of competition between ideas and interests (Roelofs, 2003; Clemons & McBeth, 2017). It has been defined as a system of interest representation that involves the organisation of multiple groups, structured in a non-hierarchy format, based on voluntary and self-determined categories (Hill & Varone, 2017). Participation in the policy process is open to all individuals and groups, and as a result it is suggested that power is equally distributed within society, with decision-making not being dominated, controlled, or primarily shaped by any single actor group (Schlosberg, 2006; Lassman, 2011).

Proponents of pluralism have suggested that the policy process can be driven by public demand and opinion, with this being a consequence of widely distributed power and a highly organised political system (Dahl, 1961; Polsby, 1963; Hill & Varone, 2017). The state is considered to adopt a neutral role when responding to the interests or demands of non-state groups and policy actors (Blowers, 1984; Ham & Hill, 1993). It is further argued that within a democratic socio-political context, power and control can become equally distributed if no single interest group takes command and influences decision-making [contrasting the expected dynamic generated by mandatory approaches and constructs such as elitism] (Dahl, 1961; Lassman, 2011). For the pluralist view, interest groups also include government agencies that compete alongside other groups to exert pressure on and influence state responses (Clemons & McBeth, 2017).

Pluralism further contrasts with the mandatory approaches of top-down and elitist understandings, by considering participation in the policy and decision-making process to be open to all groups or individuals, and as such it should be an inclusive process that involves the public (Haas, 1992; Lassman, 2011; Dye *et al*., 2012). This reflects the disparity between mandatory approaches and concepts of bureaucracy, and voluntary approaches and pluralism (Haas, 1992; Dye *et al*., 2012). In this case, mandatory approaches consider problem-solving through government officials, hierarchal management, and the concentration of expert knowledge, while voluntary approaches and pluralism instead consider this through networks and communities that encourage public and stakeholder involvement in decisions and the inclusive formulation of policy (OECD, 2003; Hill & Varone, 2017).

3.3.2 Policy networks and communities

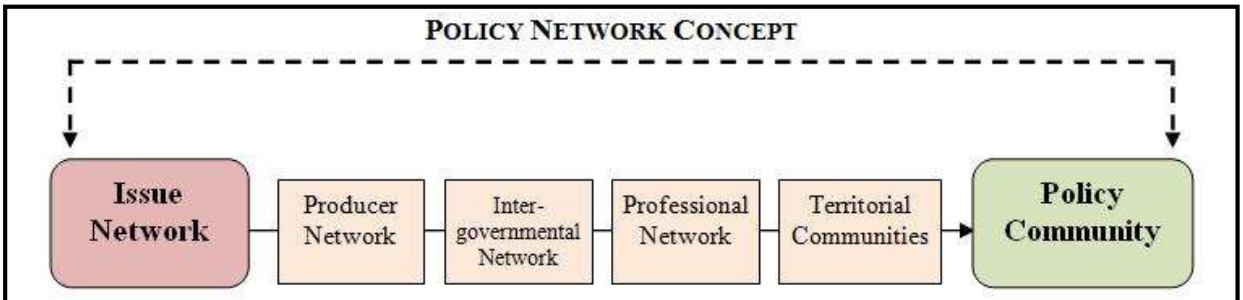
Policy networks and communities are primarily concerned with the relationships, interactions, and informal aspects of the policy-making process (Goverde & Tatenhove, 2000; Knoke & Kostiuchenko, 2018). They respond to the incomplete understandings of policy actor interaction by concepts such as bargaining and negotiation, while attempting to specify where in the policy process interactions take place (Rhodes & Marsh, 1992; Brouwer, 2015; Metz, 2017). The networks and communities reflect characteristics of the voluntary approach based on relationships of interaction and concepts of self-regulation (Bevir, 2012; Wurzel *et al*., 2013).

Policy networks endeavour to formulate an understanding of decision-making that is based on the different views of actors and organisations (Smith, 1993; Goverde & Tatenhove, 2000). It is argued that the interactions between actors exist as a fundamental part of policy design and

implementation (Rhodes, 1988, Rhodes & Marsh, 1992; Howlett & Ramesh, 2003; Rhodes, 2017). As a result, networks act as mechanisms for transferring information, allowing extensive communication, and facilitating an exchange of resources between policy actors (Knoke & Kuklinski, 1991; Thatcher, 1998; Marsh & Smith, 2000; Knoke & Kostiuchenko, 2018).

Networks can be viewed as systems that are variable in structure according to the integration of their individual parts, for example individual policy actors or specific departments within an organisation (Rhodes, 1985; Brouwer, 2015; Metz, 2017). The extent of integration is considered to be dependent on factors that give networks their structure, such as; the type of resources actors try to control; the extent to which a given policy network is isolated from other networks or the public; as well as how permanent or constrained membership can be in practice (Rhodes, 1985; Knoke & Kostiuchenko, 2018). Further supporting the idea of integration, other research has argued that policy networks vary in accordance with five dimensions. These have included; network member interests; the membership process and its perceived importance; network actor interdependence; the extent of network isolation; and the variable distribution of resources between members (Wilks and Wright, 1987; John, 1998; Howlett & Ramesh, 2003; Metz, 2017). Based on these, Rhodes (1988; 2017) has developed an expanded concept of integration involving network types positioned along a spectrum of understanding (figure 3.1). These have been defined as; issue, producer, intergovernmental, professional, territorial, and policy community networks (Rhodes & Marsh, 1992; Peterson, 1995; Rhodes, 1997; Miller & Demir, 2006; Rhodes, 2017; Knoke & Kostiuchenko, 2018).

Figure 3.1: The policy network concept according to Rhodes



(Source: Rhodes, 1988; Rhodes & Marsh, 1992; Parsons, 1995; Peterson, 1995; Rhodes, 2017)

According to the definitions proposed by Rhodes (1988; 2017), community networks are located at one end of the spectrum and involve close relationships between a small group of policy actors, while issue networks are at the other end of the spectrum and represent changeable interactions that involve weaker relationships between numerous policy actors

(Marsh & Rhodes, 1992; Hudson & Lowe, 2009). In relation to voluntary approaches, the policy networks and communities develop understanding of the way more interactive decision-making can occur and how groups form as part of these processes. For example, a range of characteristics associated with voluntary approaches are represented by the different networks, namely; widely scoped relationships in the case of issue networks; interest-based and inclusive negotiation styles in relation to producer networks; interdependence and integration in the case of intergovernmental networks; a service focus on the social good and policy implementation for professional networks; and stable relationships alongside a common purpose in terms of territorial communities (Powell, 1990; Bevir, 2012; Wurzel *et al*., 2013; Keast, 2016).

Policy network characteristics

Considering networks more widely, it is argued that a specific type of network can define a range of characteristics that influence decision-making (Hudson & Lowe, 2009; Rhodes, 2017). For example, networks can; define the role and behaviour of policy actors; prioritise key issues as part of an agenda; attach different levels of importance to certain interests or actors; and ultimately help to encourage public accountability in policy-making while diminishing the role of government (Rhodes, 1997; Löffler, 2009; Brouwer, 2015). As a result, network types can be related to the mandatory, voluntary, and economic approaches as well as policy outcomes based on the characteristics they encourage (Bressers, Huitema, & Kuks, 1995; Metz, 2017). Firstly, networks with limited interrelatedness and commitment [issue networks] encourage governance positioned more towards mandatory approaches, direct regulation, and command-and-control. Secondly, networks that represent strong commitment, but weak interrelatedness, emphasise the use of economic approaches and market instruments such as subsides. Thirdly, networks with weaker commitment but strong interrelatedness focus attention on self-regulation and responsibility, which relate to voluntary approaches, inclusive decision-making, and stakeholder participation (Bressers & O'Toole, 1998; Howlett, 2004; Azhoni *et al*., 2018).

In terms of network characteristics and water policy, research has been focused on; general interpretations and comparative analysis (Bressers, O'Toole, & Richardson, 1995; Eberhard *et al*., 2017); structural perspectives and social mechanisms (Metz, 2017); governance and water resilience in response to climate change (Caniglia *et al*., 2016); local networks and regulatory enforcement (Scholz & Wang, 2006); state transformation through water policy networks and difficulties of changing hierarchical power structures (Bourblanc, 2017); as well as the dynamics of network type, policy implementation, and decision-making (Brouwer, 2015).

Specific case studies have also considered policy outcomes based on network types. For example, in the Netherlands, implementation and policy have been determined by network type in expected and patterned ways within a small EU nation (Bressers & O'Toole, 1994). In turn, water policy has predominantly been implemented through a policy community in the United Kingdom, which has generated challenges such as implementation issues, high financial costs, as well as fragmented interactions and disputed outcomes (Maloney & Richardson, 1995; Ward, 1998; Weale *et al*., 2000). Furthermore, a comparative study of water policy networks highlighted that governments often keep authority despite the use of networked approaches. In this case, implementation was found to be challenging due to the hybrid nature of water policy governance, with the need for an improved understanding of power dynamics and politics of networked governance within hierarchical systems also evident (see Eberhard *et al*., 2017).

3.4 Economic approaches

The economic approach encompasses the concepts and understandings that have been the basis of market-based responses to socio-environmental problems, particularly those focused on economic models, public choice, competition, financial incentives, and market instruments (Levačić, 1991; Hill & Hupe, 2014; Hymel, 2016). It has been broadly defined through the dynamics of economic structures and governance based on markets, while also being understood as a decentralised coordinating device that involves multiple buyers and sellers, independent action, free movement in the system, and availability of information (Colebatch & Larmour, 1993; Parsons, 1995). In terms of environmental problem-solving, it can be generally defined as an approach based on competition, incentives, allocation, as well as agreement for exchange (Levačić, 1991; Wurzel *et al*., 2013; Cubbage *et al*., 2017).

The economic approach represents certain characteristics, including; market-based policy instrument types; content focused on pricing and fiscal incentives; as well as a relationship of interaction between governing actors and those being governed based on competition and governance with government (Bevir, 2012; Wurzel *et al*., 2013). The approach has also been defined through a market-based mode of governance that is characterised by attributes such as; a service focus on the private good; a locale and context of the market and firm; decision-making in a horizontal and internal format; the presence of independent relationships; a negotiation style focused on bargaining, competition, self-interest, and the short-term; as well as mechanisms of integration based on price structures, contractual transactions, and also

supply and demand (Powell, 1990; Keast, 2016). Furthermore, the main characteristics of the economic approach have been described through certain modes of organisation and compliance. These include; the idea of a remunerative basis (Etzioni, 1961); the concept and process of exchange (Lindblom, 1977; Boulding, 1990); the notion of contract (Rigby, 1990); as well as a basis of pricing (Bradach & Eccles, 1991; Cubbage *et al*., 2017). These conceptualisations highlight how the economic approach can be defined, what it aims to do, and the constructs associated with it. However, an understanding of how and why actors behave in a certain way, and how these actors can be distinguished, remains an underdeveloped area in terms of water problems and small, Mediterranean, and peripheral EU state experiences. In this case Dryzek's (2013) rationalities can be useful to further understanding.

The following sections consider different understandings and perspectives that have been central to the economic approach. Firstly, the concept of economic institutionalism and the use of economic instruments are explored, with this being used as a model to understand interests and the role of institutions in shaping behaviour. Secondly, economic models of understanding have also been considered. These involve public choice theories that focus on understanding actor interest and the role of individuals responsible for decision-making, while considering their actions and motivational drivers. Notably, these aspects are relevant when considering conceptions of self-interest and when developing understanding of economic approaches, as they share similarities and differences with Dryzek's (2013) understanding of actor motivation.

3.4.1 Economic institutionalism

The concept of economic institutionalism focuses on the role of institutions, and those who are part of them, in shaping decisions and economic behaviour. This is positioned within the context of the market, with actors considered to be fundamentally motivated by self-interest and economic processes being embedded in social and political procedures (Spulber & Sabbaghi, 1998; Jaeger, 2017). Institutionalist models often encompass approaches that seek economic efficiency and the utilisation of market-based approaches and instruments to tackle problems and achieve policy outcomes (Merrett, 1997; Green, 2003; Dinar & Schwabe, 2017). For example, such approaches and instruments have included; marketisation and privatisation, property rights, pricing structures and charges, permits, licenses, subsidies, as well as cost recovery (Merrett, 2005; Lago *et al*., 2015; Renzetti, 2017; Wheeler *et al*., 2017).

In terms of water management and policy, previous research on economic approaches has focused on the noted tools and instruments. Firstly, marketisation and privatisation have been explored from a variety of aspects, including; theoretical understandings (Harris, 2013; Owens, 2017); tools for governance and the process of decentralisation (Rouse, 2013; Varghese, 2013; Herrera, 2017); practical applications for management (Yining, 2010; Zurita *et al*., 2015; Grafton, Horne, & Wheeler, 2016); politics, dispossession of resources, and rights issues (Ahlers, 2010; Subramaniam & Williford, 2012); as well as challenges such as management inefficiency (Bakker, 2010; Ohemeng & Grant, 2011; Robinson, 2013). For privatisation, a range of limitations have also been evident. These include; a potential weakening of the state, thus restricting capacity for social equity and decreasing participation; commercial objectives being prioritised ahead of public goods such as environmental status or cultural values; an increased cost of providing public services as a result of the need for private service providers to achieve commercial returns; as well as the idea that private sector groups never fully take on the risk of public service provision (Weizsäcker, Young & Finger, 2005; Hodge, 2018).

Secondly, water rights have been understood in relation to aspects such as; definitions and influences of right types (Jaeger, 2017); property rights, control of resources, and challenges at transboundary level (Ansink & Weikard, 2009; Seemann, 2016); as well as limited enforcement that can cause inefficient allocation or conflict (Torell & Ward, 2010). For rights, a range of limitations have been evident, such as; difficulties in enforcement and monitoring rights for example in relation to groundwater abstraction; schemes often have not accounted for social equity; as well as issues of conflict especially in the case of irrigation water rights (Caponera, 1992; Hodgson, 2006; Hendricks, 2010; Woodhouse & Muller, 2017).

Thirdly, pricing structures and charges have been explored in terms of; definitions and models (Webb, 2006; Reznik *et al*., 2016); scarcity and pricing for domestic, urban, and irrigation supply (Ohab-Yazdi & Ahmadi, 2016; Senante & Donoso, 2016); tools for demand management (Lahlou, 2005; De Fraiture & Perry, 2007); and pricing for cross-border supply (Banovec & Domadenik, 2017). The limitations of pricing structures and charges have been identified through; limited signals for the marginal costs of water; the potential for encouraging irrigation subsidies; as well as agricultural water demand being unresponsive to lower prices (AWWA, 2000; de Fraiture & Perry, 2007; Palanisami, Kakumanu & Malik, 2015).

Fourthly, permits and licenses have been considered in relation to; general application (Spulber & Sabbaghi, 1998; Borghesi, 2014); groundwater abstraction (Young & Brozović, 2016); agricultural supply (Latinopoulos & Sartzetakis, 2015); tradable effluent permits in the case of pollution management (Prabodanie, Raffensperger, & Milke, 2010); as well as licensing for allocation (Grafton & Horne, 2014). Limitations have also been evident in terms of permits and licenses, with these noted in relation to; difficulties of enforcement and monitoring, especially for groundwater; the political issues of certain officials essentially granting water rights through permits or licenses; as well as potential challenges caused by transferrable permits (Grigg, 2010; Borghesi, 2014; Jamshidi & Niksokhan, 2015; Griffin, 2016).

Fifthly, subsidies have been used for the management of scarcity and pollution, being explored with regard to; institutional processes and supply (Hoekstra, 2014; Hernández-Mora & Moral, 2015; Jaeger, 2017); direct and indirect types (Varshneya & Patel, 2007; Lago *et al*., 2015); policy outcomes in practice and comparative studies (Gomez-Lobo & Contreras, 2003; Molinos-Senante & Donoso, 2016); influences on pricing structures and market participation (Burger & Jansen, 2014); as well as resultant challenges and issues, such as undervaluation of resources, inefficient usage, or limited incentives to conserve water (Ahmad, 2017). For subsidies, limitations have been identified, such as; the potential to encourage inefficiency and greater use or abstraction; increased economic stress on smaller governments; as well as the emergence of 'free-rider' scenarios in the case of domestic supply (OECD, 2005; Bassi, Soares & Valsecchi, 2010; Wahl, 2013; Odhiambo, 2017).

Lastly, the concept of cost recovery has emerged as a method of achieving economic efficiency for water management, and has been considered in terms of; definitions involving water and wastewater services (Rouse, 2013; van den Berg, 2015); practical application through EU directives such as the Water Framework Directive (López-Gunn *et al*., 2016; Reynaud, 2016); the management of reused and reclaimed water (Molinos-Senante, Hernandez-Sancho, & Sala-Garrido, 2013); the role of the user-pays principle and recovery for urban supply services (Kanakoudis & Gonelas, 2014); the challenges of contextual variation (Berbel, Calatrava, & Garrido, 2007); as well as comparative research for tariff design (Nauges & Whittington, 2017). For cost recovery, limitations have been identified such as; inconsistent implementation; affordability issues for users; poor uptake for intermittent services; and discrepancies of cost recovery objectives involving either infrastructure development or the allocation of resources (Jaglin, 2002; Massarutto, 2007; Hall & Lobina, 2009; Jayaramu, Kumar & Rashmi, 2015).

All of these aspects reflect characteristics that relate to the economic approach. For example, the use of marketisation, privatisation, and property rights represent integration based on price structures, competition, the concept and process of exchange, and the notion of contract (Bevir, 2012; Cubbage *et al*., 2017). In turn, permits, licenses, and subsidies reflect market-based policy instruments, relationships of allocation, and content focused on pricing and fiscal incentives (Wurzel *et al*., 2013). In the context of these economic approaches, an understanding of the specifics of problem-solving, such as actor behaviour and rhetoric, has however been limited. In this case, the primary focus has been related to interpretations of bureaucrat motivation through economic models of understanding that are explored in the next section.

3.4.2 Economic models of understanding and public choice theory

Alongside economic institutionalism and market instruments, economic models of understanding through conceptions of public choice theory have been relevant when understanding decision-making and the role of policy actors. These offer a focused view on the role of bureaucrats responsible for decision-making, while considering their motivational drivers in bureaucratic and economic terms.

Public choice theory is an economic understanding of decision-making and politics that contemplates how institutional and bureaucratic organisational structures can determine incentive patterns or shape the benefits gained by individuals or groups within a given system (Parsons, 1995; Downs, 1998; Mueller, 2003; Russell, 2011). The concept attempts to better understand policy actor behaviour and suggests that individuals within institutional structures must make a choice to either act in the public interest or to gain personal benefits by satisfying individual or groups interests, which can exist in the form of career progression, financial gains, or political security (Udehn, 1996; McNutt, 2002).

Public choice theory considers government and decision-making from the perspective of bureaucrats and politicians, while assuming these actors often perform through an economic ideology that endeavours to maximise individual or group interests (Tullock, 1976; Mueller, 2003; Johnson, 2006; Miller & McTavish, 2014). The literature related to public choice theory has focused on understanding the position of relevant individuals [bureaucrats, officials, or governing agents] within decision-making and the policy process. Key work has been put

forward by a range of authors (see Tullock, 1965; Downs, 1967; Niskanen, 1971; Tullock, 1976; Dunleavy, 1991; Tullock, 2002), and has been explored in the following sections.

Interpreting decision-making through economic models

Work by Tullock (1965 & 1976) suggests that decision-making can be understood through economic models traditionally used to conceptualise the behaviour and actions of corporations, business sector individuals, and consumers. More specifically, the key element of self-interest [acting to satisfy personal goals or interests] emerges as the defining feature of public choice theory in this case (Udehn, 1996; O'Neill, 1998; Miller & McTavish, 2014). By accepting that individuals do not constantly act in the interest of the public, it is possible to form an understanding of the bureaucratic and political motives represented by government officials (Parsons, 1995; Holcombe, 2016). For example, these bureaucrats may often put forward excessive or false assurances to secure political status and gain public votes, while potentially utilising their position of power to form agreements that increase financial resources both in personal terms and in relation to their own bureaucracy or organisation (Tullock, 1976; Parsons, 1995; Russell, 2011). In a wider context, Tullock (2002) concludes that the political complexities of a liberal democratic system fail to contend with the influences of bureaucratic power, thus generating the issue of self-interest. From this, it is also claimed that to combat expected issues of self-interest and the pressures of individual motives, the use of market approaches is necessary (Parsons, 1995; Udehn, 1996; Miller & McTavish, 2014).

Organisational function, bureaucrat type, and motive drivers

Downs (1967) explores public choice theory and decision-making within bureaucratic structures by developing a conceptual model of bureaucratic behaviour. It is claimed that decision-making within the bureau is fundamentally driven by self-interest, which reflects the economic ideology and the findings of work by Tullock (1965), while officials seek to attain personal benefits in a rational way and internal bureaucratic structures serve to influence social functions (Parsons, 1995; Holcombe, 2016). The key element of self-interest is further developed by Downs, through the definition of organisational function, bureaucrat type, and motive drivers (Downs, 1967; Mueller, 2003; Miller & McTavish, 2014).

Firstly, in relation to bureaucratic and organisational function, certain 'laws' [sixteen laws as defined by Downs] are developed. These include notable examples such as; the inherent development of hierarchal authority in the absence of market structures; an apparent lack of

control regarding individual bureaucratic behaviour; as well as diminishing control and coordination due to increased organisational size or capacity (Downs, 1998; McNutt, 2002).

Secondly, five types of bureaucrat are defined. These include; 'climbers' that seek to increase their personal power, prestige, and financial income; 'conservers' which attempt to minimise organisational change; 'zealots' who force the development of certain policies; 'advocates' that seek to maximise bureaucratic resources; as well as 'statesman' who represent a certain level of public interest in order to increase personal power and satisfy individual goals (Parsons, 1995; Udehn, 1996; Poppelaars, 2009).

Thirdly, Downs (1967 & 1998) claims that the different types of bureaucrat may be subsequently driven by different motivations, which are categorised in terms of 'pure' self-interest or mixed factors (Parsons, 1995; Poppelaars, 2009). Factors of pure self-interest involve motives that compel individual decision-makers to act in a way to satisfy personal goals (Miller & McTavish, 2014). A condition of pure self-interest can involve motives such as; power, financial income, prestige, convenience, and political or job security (Downs, 1967). In turn, factors of mixed interest are noted to involve motives that may not directly benefit individual decision-makers. For instance, these can involve motives such as; personal or group loyalties, a pride in work performance or achievements, commitment to a specific policy programme, and a desire to serve the public interest (Downs, 1967; Parsons, 1995; Holcombe, 2016).

Budget-maximising

Alongside the conceptual understanding of public choice put forward by Downs (1967), which is reliant on behavioural functions and based on a theory of psychological motivation, Niskanen (1971) introduces a public choice model based on economic advantage. Whereas Downs (1967) focuses on motivations that are manifest through different types of behavioural drivers, Niskanen (1971) instead proposes a conceptualisation that interprets bureaucratic self-interest through neo-classical economic theory. More specifically, this 'budget-maximising' model assumes that policy-makers, and organisations, fundamentally pursue the maximisation of self-interest (Niskanen, 1971). These interests are represented by a desire to achieve financial gains, just as a business or corporation would seek to maximise profit within the market system (Parsons, 1995; Russell, 2011). In this case, it is argued that policy-makers attempt to maximise their budgets within the bureaucracy, and ultimately increase the size of the bureaux to maximise their own individual interests over time (Niskanen, 1971; Holcombe, 2016).

Bureau-shaping

The public choice models put forward by Downs (1967) and Niskanen (1971) share similarities by considering self-interest in terms of individualistic benefits and financial gains. In contrast to this work, Dunleavy (1986) advances the conceptual understanding of bureaucratic self-interest through a model that critiques the traditional public choice view (Parsons, 1995). The 'bureau-shaping' model by Dunleavy (1986) suggests that economic budgets, power structures, and the actor relationships between different types of bureaucrat are more complex than the representations provided by both power approaches [such as elitism or technocracy] and the forms of public choice defined by Downs (1967) and Niskanen (1971). Instead, it is argued that the concept of bureaucratic self-interest should be considered through the concept of 'shaping' (Dunleavy, 1986; Dunleavy, 1991; Holcombe, 2016).

The work on bureau-shaping draws upon privatisation experiences in the United Kingdom and United States to refute public choice models that have emphasised large financial budgets and extensive bureaucratic structures as being the primary drivers of self-interest. In the case of privatisation, it is argued that senior policy and decision-makers focused on shaping their departments and budgets to maximise their own personal interests, in a similar way to actors in the business sector (Dunleavy, 1986; Schilder, 2000; Hill, 2005; Russell, 2011).

3.5 Contrasting perspectives and challenges

The mandatory, voluntary, and economic approaches have demonstrated that governing agents and policy actors hold the ability to greatly influence the formation, development, and implementation of policy. Despite valid arguments existing for the use of these approaches when understanding decision-making or responding to problems, the previous discussion reveals a limited and partial understanding of; the role and behaviour of actors or groups; how different approaches exist and operate together; how rhetoric can influence problem-solving; and how responses are adjusted over time. Indeed, challenges for mandatory, voluntary, and economic approaches have also been evident through a range of examples.

Firstly, in the case of mandatory approaches, top-down understandings neglect to consider the role of political developments, administrative issues, and cultural changes in the policy-making process (Bowen, 2001; Ciot, 2014; Birkland, 2015). In turn, bottom-up perspectives represent challenges based on a disregard for actors and inputs generated at the top of the policy process,

as well as the idea of policy actor discretion, which implies that individuals can directly influence policy implementation (Love & Sederberg, 1987; Gouldson & Murphy, 1998; Houston, 1998; Bowen, 2001; Birkland, 2015). Furthermore, bargaining and negotiation neglects to understand how governments oversee and coordinate policy responses, while also failing to state the point at which interactions between different actors can occur during the policy process (Ham & Hill, 1993; Parsons, 1995; Ciot, 2014).

Secondly, for voluntary approaches, pluralism represents challenges in its understanding of actor motivation, behaviour, and interest, while the conceptions of given problems can also be vague (Roelofs, 2003; Connolly, 2010; Lassman, 2011). Even though policy networks often help to conceptualise interactions and changes over time through a continuum understanding, they fail to explain how networks of actors coordinate responses and what events or processes shape the behaviour of these actors (Marsh, 1998; Hill & Hupe, 2014). In essence, they fail to account for the dynamics of decision-making (Connolly, 2010; Hill & Varone, 2017).

Thirdly, in terms of economic approaches, models of understanding and public choice conceptions of self-interest have been limited when describing actor behaviour and motivation, as they tend to focus on just one dimension and the potential for acting only in the public interest is not considered (McNutt, 2002; Holcombe, 2016). For economic institutionalism and institutionalist models of understanding, challenges have been evident due to the ideas of human behaviour, values, compromises, and adaptation being neglected (Gilpin, 2001; Nee, 2005). Furthermore, although bureaucratic approaches based on economic policy instruments and structures can account for the perceived inefficiencies of traditional administrative models, by contextualising decision-making in terms of existing margins of capitalist political economies, they are also limited when considering evolving political structures, cultural changes that shape the policy process, and emerging administrative issues (Russell, 2011; Hill & Hupe, 2014; Birkland, 2015; Holcombe, 2016).

Ultimately, understanding how policy actors coordinate responses to socio-environmental problems can help to better explain responses to water management problems, particularly as policy-makers can often generate flexible definitions of ‘what’ the problem is, and ‘how’ the problem may be tackled at an organisational level (Colebatch & Larmour, 1993; Parsons, 1995; Dryzek, 2013). As the discussion has highlighted, mandatory, voluntary, and economic approaches have been limited when understanding the specifics of problem-solving,

particularly; actor roles, motives, and behaviour; the rhetoric and dynamics of responses; management practices; the evolution of responses over time; and the use of multiple concepts that can come together to offer a more inclusive conceptualisation. Indeed, the mandatory, voluntary, and economic approaches have been relatively singular in their understandings of problem-solving. Therefore, by exploring the specifics of problem-solving, such as how and why actors respond to problems in a certain way, it is possible to further develop understanding of the policy and decision-making process. This is important when understanding government responses to tangible water problems, such as scarcity, drought, and quality decline, as well as when understanding these processes in small, Mediterranean, and peripheral EU states that have a need to better manage their vulnerable water resources. Attention now turns to Dryzek's (2013) alternative understanding of problem-solving to help explore these topics and build on the mandatory, voluntary, and economic approaches.

3.6 Conceptualising environmental problem-solving responses

Dryzek (1997; 2005; 2013) identifies and explains a range of environmental discourses that are key to developing a better understanding of how societies view and respond to environmental problems. This section consists of four parts. The first considers how Dryzek's (2013) work advances theoretical understanding, while the subsequent parts explore the problem-solving rationalities of administrative rationalism, democratic pragmatism, and economic rationalism.

3.6.1 Advancing conceptual understanding

To further advance the conceptual understanding of how government has responded to water problems in Cyprus, the problem-solving rationalities (figure 3.2) put forward by Dryzek (2013) have been utilised. These have been selected as they reflect the three ways in which society coordinates responses to socio-environmental problems, namely through; mandatory approaches, based on the use of bureaucratic structures; voluntary approaches, based on the use of networks and participation that guide decision-making according to the requirements of certain groups; as well as economic approaches, based on the operation of economic systems and instruments (Frances *et al*., 1991; Birkland, 2015).

Figure 3.2: Environmental problem-solving approaches as conceptualised by Dryzek (2013)

In relation to Dryzek's (2013) rationalities, the mandatory, voluntary, and economic approaches are represented and defined through bureaucracy, democracy, and markets. These mechanisms of coordination have also been recognised by other work (see Thompson, 1991; Colebatch & Larmour, 1993; Parsons, 1995; Wurzel *et al*., 2013; Keast, 2016), and are considered by Dryzek (2013) to be fundamental modes of organisation that form the basis of problem-solving.

Although Dryzek (2013) recognises mandatory, voluntary, and economic approaches as the mechanisms of coordination, his conceptualisation is not the same as the other formulations. Instead, he focuses on how the institutions, practices, and characteristics related to a given response come together. This focuses on the specifics of problem-solving, including; actor roles, motives, and behaviour; management practices; rhetoric in decision-making; the evolution of responses; and the use of multiple concepts. Dryzek's (2013) understanding considers four important elements, namely; how basic entities are recognised or constructed; the assumptions made by agents regarding natural relationships; the variable motives and roles of policy-making actors; as well as how metaphors and rhetorical devices are utilised to justify certain policy directions, positions, or agendas (Dryzek, 2013). These elements are important, as each response generates a definition of what the problem actually is. Therefore, it becomes necessary to contemplate the justification for a given approach to better understand the behaviour of policy-makers and comprehend why policy is implemented in a certain way within a specific context (Lowe & Ward, 1998; Dryzek, 2013).

How Dryzek's understanding is different

The problem-solving rationalities put forward by Dryzek (2013) also offer three unique aspects of interpretation that help to focus on the specifics of problem-solving, and which further differentiate his formulation from other previous models of understanding such as top-down perspectives, pluralism, and public choice theory that have been singular in their interpretation. These aspects include; the use of a discourse interpretation; a more detailed understanding of how government decisions are made based on actor roles, motives, and behaviour; as well as the concept of evolutionary responses that develop in a successive format.

Firstly, the inherent structure of Dryzek's (2013) framework is designed for discourse interpretation. Dryzek (2013) uses this model of investigation to effectively focus attention on the behaviour of policy actors. As a result, this gives the potential to generate constructive insights into the understanding and analysis of both the decision-making process as a whole, as

well as associated problem-solving responses (Darnton, Elster-Jones, Lucas & Brooks, 2004; Gelcich, Edwards-Jones, Kaiser & Watson, 2005; Paltridge, 2012).

Secondly, by recognising actor behaviour, it is possible to highlight the different way in which problem-solving approaches are discussed by Dryzek (2013). The rationalities are further distinguished from other models through a subtler interpretation of how and why decisions are made. For example, in the case of self-interest maximisation, Dryzek (2013) proposes that policy actors or public servants can [and do] act in the interest of the public. This argument establishes a shift away from public choice theory conceptualisations, which instead consider self-interest maximisation, through financial gains, career development, increasing power, or gaining votes, to be the primary driver of decisions and actions (Downs, 1967; Niskanen, 1971; Tullock, 1976). In this case, Dryzek's (2013) view contrasts work put forward by public choice theorists (see Downs, 1967; Niskanen, 1971; Dunleavy, 1986; Boyne, 1998; Russell, 2011).

Thirdly, the problem-solving rationalities are also understood as being evolutionary in character. It is argued that responses change over time, as governments attempt to correct the failures of preceding policy outcomes. Dryzek (2013) claims that administrative rationalism emerges as the prevailing government response to socio-environmental problems. Democratic pragmatism then emerges in an attempt to remedy the perceived challenges of administrative policy approaches (Dryzek, 2013). Subsequently, economic rationalism then emerges due to advances in political life that seek to account for the challenges of both bureaucratic and democratic governance responses (Dryzek, 2013). Notably, the idea of policy development and continual improvement also partly reflects the concept of incrementalism. This is defined as a method of policy making that encourages successive change over time to modify a response according to emerging political influences or contextual variables (Hayes, 2001; Dye, 2002).

The evolutionary order, which suggests a given problem-solving response is superseded by an alternative that acts as a corrective tool for the challenges of the previous response, is central to Dryzek's (2013) conceptualisation. However, other findings contrast with this view. For example, policy-making in terms of mandatory approaches and bureaucracy has been understood to exist as a response to the failure of market systems, while the emergence of economic approaches has also been seen to develop as a result of the limitations of mandatory approaches and bureaucratic decision-making (Thompson, 1991; Meuleman, 2008; Hill & Hupe, 2014). In turn, voluntary approaches and associated responses of networks and

community have been argued to emerge due to the failures of both mandatory and economic approaches (Taylor, 1982; 1987). Notably, in ideological terms, there is a lack of agreement regarding which organisational approaches should be embraced by government and how these should be adjusted if a pre-selected approach fails (Colebatch & Larmour, 1993; Hill, 2005). Based on the alternative views regarding the correct order of problem-solving responses, it becomes apparent that the significance and accuracy of Dryzek's (2013) rationalities must be examined within relevant contexts. By considering how evolution occurs and highlighting potential influences that cause this evolution in practice, it is possible to advance understanding on the shaping of problem-solving.

Lastly, the problem-solving rationalities gain further relevance in terms of the wider research due to the distinguishing features of institutional practices, tools, and devices (Meuleman, 2008; Dryzek, 2013). These help to determine the presence of a given rationality in terms of policy and implementation, which exist as key elements of governance and decision-making. Based on how policy actor behaviour is interpreted by Dryzek (2013), each of the responses can be individually distinguished and differentiated from other theoretical constructs, such as public choice theory, elitism, economic institutionalism, or pluralism (Dahl, 1961; Downs, 1967; Niskanen, 1971; Cawson, 1986; Dunleavy, 1991; Russell, 2011; Holcombe, 2016; Kersey, 2016). This is useful when attempting to understand policy-making and the behaviour of bureaucrats, politicians, and decision-makers.

In the following sections, a comparison of the similarities and disparities between Dryzek's (2013) framework and the other understandings considered in the context of mandatory, voluntary, and economic approaches are explored.

3.6.2 Administrative rationalism

Administrative rationalism emerges as the first pillar of Dryzek's (2013) framework, and it is proposed that organisational responses founded on bureaucratic structures compel this response to develop. Administrative rationalism is bound by the structural status quo of liberal capitalism, while the importance of experts in the decision-making process is also highlighted. This emphasises a social relationship that is dependent on hierarchy rather than democratic equality or market-based competition (Dryzek, 2013). As a result, administrative rationalism fundamentally reflects and builds on the mandatory approach.

According to Dryzek (2013), as environmental issues have gained importance as part of political agendas, administrative responses have traditionally been applied and often assumed to be the most effective response despite limited comparison with alternative approaches. Administrative rationalism can be identified through the presence of specific institutions, practices, methodologies, and policies. However, the most distinctive feature of this understanding, which separates it from other mandatory approaches to problem-solving such as top-down or elitist perspectives, occurs due to the way bureaucratic and expert behaviour is interpreted and explained. In this case, Dryzek (2013) argues that key policy actors and experts are motivated to act in the public interest, rather than according to self-interests. This provides an alternative explanation of policy actor behaviour, which also contrasts other concepts such as public choice theory that have emphasised the maximisation of individual or group interests (Downs, 1967; Niskanen, 1971; Dunleavy, 1986; Russell, 2011; Holcombe, 2016).

Administrative rationalism fundamentally reflects the mandatory approach and concept of bureaucracy. In this case, it is claimed that the most effective way to tackle socio-environmental issues is through a form of hierarchal organisation, which seeks to separate individuals and experts into sub-groups that can address specific problems (Simon, 1981; Parsons, 1995; Howlett & Ramesh, 2003). Based on this understanding of bureaucracy Dryzek (2013) proposes that administrative rationalism can be highlighted and analysed through the existence of inherent institutions and practices that are used to organise actors within bureaucratic systems. These include; professional resource-management bureaucracies; pollution control agencies; regulatory policy instruments; environmental impact assessment; expert advisory commissions; as well as rationalistic policy analysis techniques (Dryzek, 2013). Notably, the institutions and practices are not unique to the concept of administrative rationalism, and although they are necessary in terms of analysis and to facilitate identification of the rationality, they only act as indicators of existence if performance reflects theoretical or expected intent.

Institutions and practices

The institutions and practices identified by Dryzek (2013) can also be linked back to mandatory approaches. Firstly, professional resource-management bureaucracies emerge when threats of resource exploitation are tackled in a scientific and rational way by prioritising the role of experts; with this reflecting a hierarchal structure that relates to characteristics of the mandatory approach (Beetham, 1991; Deal, 2003; Wurzel *et al*., 2013; Keast, 2016). Secondly, pollution control agencies are formed to monitor and control pollution using standards and guidelines,

while claiming authority based on scientific and professional expertise, which is indicative of hierarchal forms of organisation and mandatory approaches such as technocracy (Sterner, 2003; Dryzek, 2013). Thirdly, regulatory policy instruments are developed by experts to control specific activities relating to the environment. From a top-down perspective, they are considered to gain a regulatory standing when they are applied by politicians, while implementation by actors at ground-level can be related to a bottom-up perspective (Stookes, 2009; Keast, 2016). Fourthly, Environmental Impact Assessment [EIA] involves a systematic assessment of environmental damage that is likely to occur because of major development projects (Gilpin, 1995; Wood, 2003; Noble, 2015; Morrison-Saunders, 2018). This reflects forms of negotiation and influences decision-making in agencies by encouraging actors to acknowledge environmental values (Lawrence, 2003). It has also been evident in some Mediterranean and peripheral EU nations (see Quinteiro *et al*., 2015; Pereira *et al*., 2017). Fifthly, expert advisory commissions are established to guide and advise central government regarding the actions required when tackling environmental problems (Dryzek, 2013). They exist and operate as independent agencies that provide expert advice and scrutinise the government's policy direction, while in terms of mandatory approaches they reflect technocracy and dependent relationships (Everest, 1993; Lentsch & Weingart, 2009; Carlarne, 2010). Lastly, rationalistic policy analysis techniques are used to identify potential policy outcomes and involve techniques such as cost-benefit analysis, risk analysis, and computer modelling (Dryzek, 2013). These highlight the importance of experts, as the techniques are often complex and technical causing them to be inaccessible for non-experts such as the public (Dryzek, 2013; Birkland, 2015). This represents a form of decision-making that is founded on hierarchy and justified through expert knowledge, which subsequently reflects mandatory approaches through technocracy, vertical relationships, and top-down perspectives (Spicker, 2006; Miller, 2009).

Key characteristics of administrative rationalism

Administrative rationalism is differentiated from other approaches because of the role of specific institutions and practices (Dryzek, 2013). The most significant function of these defined institutions and practices involves how they are justified by Dryzek (2013) and used to link a given rationality with the behaviour of policy actors. This explanation contrasts with previous attempts to understand and conceptualise behaviour, which has been considered to be primarily driven and motivated by the maximisation of self-interest (Downs, 1967; Niskanen, 1971; Dunleavy, 1986; Van Haute & Deschouwer, 2018). As a result, Dryzek (2013) proposes

an alternative view of bureaucratic behaviour, contextualised through administrative rationalism, which instead suggests that governing agents can [and do] act in the public interest.

In contrast to the different forms of public choice theory (see Downs, 1967; Niskanen, 1971; Dunleavy, 1986), administrative rationalism offers an alternative way of interpreting the behaviour and motivations of policy actors. The most significant contrasting feature involves a move away from self-interest as the primary driver of bureaucratic decision-making, as government and policy actors are considered to be motivated by acting in the public interest (Dryzek, 2013). For administrative rationalism, environmental problems are viewed as technical issues and require a response that involves appropriate organisational action and scientific expertise (Meuleman, 2008; Dryzek, 2013). As an institutional construct, administrative rationalism has been more prominent in certain settings. For example, Dryzek (2013) highlights its existence in Germany and France, while in the United Kingdom a generalist approach has diluted its influence and potential to become the most prominent institutional style (Howes, 2005).

If administrative rationalism exists in a given setting, a range of actions and practices would be expected. Firstly, government would be likely to view an environmental problem as a technical issue, which necessitates scientific analysis by experts to define the problem, ascertain its severity, and recommend the best possible solution (Dryzek, 2013). Secondly, legal investigations would be expected as part of identifying the responsibilities of different individuals or groups that are charged with tackling problems. This would also establish liability regarding the costs of environmentally harmful actions, for instance the remediation and management of groundwater pollution (Dryzek, 2013). Thirdly, effective organisational problem-solving is likely to be apparent if administrative rationalism exists. This would ensure appropriate policy implementation, while enabling legal investigations and the attachment of liability to occur more efficiently. Lastly, it is also expected that decision-makers responsible for forming and implementing environmental policy would seek to reassure the public to validate their position and policy decisions (Dryzek, 2013).

In terms of environmental policy, administrative rationalism has been embraced by national governments in a range of cases (see Raina & Sangar, 2002; Bailey & Rupp, 2004; Howes, 2005; Dryzek, 2013; Lo & Francesch-Huidobro, 2018). Water policy has signalled the existence of administrative rationalism as it has often been focused on experts that manage the

formation, development, and implementation of policy (Maloney & Richardson, 1994; Rüdig & Kraemer, 1994; Gutiérrez, 2010). For example, the formation and implementation of water policy in the United Kingdom has been found to be controlled and shaped through mandatory approaches and a policy network made up of professionals and industry experts (Maloney and Richardson, 1995). These have helped to guide water management while determining the necessary measures to be implemented for the appropriate protection of public interests.

Different governments have often represented contrasting behaviour in the context of administrative rationalism. In terms of legal investigations and the attribution of responsibility for environmental issues, EU member states have been shown to experience differing rates and styles of policy directive interpretation and implementation (see Lowe & Ward, 1998; Weale *et al*., 2000; Voulvoulis *et al*., 2017). In turn, the administrative structures used to investigate and guide practices, associated with policy implementation, often differ in form and function. For example, water quality reports produced by member states are published on an annual basis and have been used to reassure the public and show that appropriate management is taking place (Weale *et al*., 2000). Administrative structures and practices however are shown to differ greatly as only a small number of member state governments produce the reports. This demonstrates that bureaucratic responses can be inconsistent in practice because of a variety of influencing factors, such as; prevailing political ideologies; inherent institutional structures and functions; as well as the shaping role of individuals responsible for decision-making, which are further influenced by knowledge, positionality, socio-contextual factors, and politics (see Peters, 2010; Meier & Morton, 2015).

The concept of differing behaviour in administrative rationalism is further illustrated in terms of how experts have been inclined to manage environmental problems using technical knowledge (Dryzek, 2013). For example, experts in the United Kingdom have preferred the existence of ‘cause and effect’ relationships that encourage scientific certainty before a policy or response is developed and implemented (Lowe & Ward, 1998; Connelly & Smith, 2003; Jones & Gomes, 2014). This contrasts with use of the precautionary principle evident in nations such as the Netherlands and Germany, which instead suggests lack of scientific evidence should not inhibit action or environmental protection (Wilkinson, 2002). This also claims preventative measures should still be used despite a limited understanding of a given environmental issue (Burchell & Lightfoot, 2001; Stookes, 2009). Notably, these different approaches can shape how a problem is perceived by actors, thus influencing how problem-solving materialises in practice.

3.6.3 Democratic pragmatism

Dryzek (2013) defines his second problem-solving response as democratic pragmatism, and this also acknowledges liberal capitalism as the given context. Whereas administrative rationalism prioritises the experts in terms of problem-solving and decision-making, democratic pragmatism instead emphasises the role of the citizen (Dryzek, 2013). The understanding considers better interaction, participation, and communication between governing officials and the public, which can increase and broaden the debate regarding environmental issues. This viewpoint argues that by including the public and other stakeholders in decision-making, it is possible to increase engagement, encourage commitment to environmental protection, and enhance the authority and validity of policy decisions. The opening-up of decision-making through democratic pragmatism reflects the voluntary approach.

It is argued that a shift away from decision-making driven by officials and experts, towards a more democratic process that encourages public involvement, is necessary to help tackle environmental problems more effectively and efficiently (see Mason, 1999; Bocking, 2004; Barrow, 2006; Crabbé & Leroy, 2008; Kronsell & Bäckstrand, 2010). According to Dryzek (2013), the presence of democratic pragmatism can be established through the identification of key devices, while the explanation and justification of policy-maker actions in this setting emerges as the most significant variable when determining the existence of this response.

A remedy for the challenges of administrative rationalism

Democratic pragmatism emerges as an alternative response that attempts to rectify challenges generated by the institutions, practices, and behaviours associated with administrative rationalism (Dryzek, 2013). In the context of water management, the application of administrative rationalism can only be validated if outcomes such as sufficient water availability and quality are achieved (Dryzek, 2013). However, the performance and ability of the administrative state to deliver these outcomes has been disputed because of implementation deficits in practice (Udehn, 1996; Dryzek, 2013).

In response to the management challenges associated with administrative rationalism and bureaucratic structures, it is argued that more interactive and cooperative problem-solving is required to tackle environmental problems (Dryzek, 2013). This emphasises a move away from mandatory approaches, the administrative state, experts, and top-down perspectives represented by administrative rationalism, as being the focus of decision-making, towards an approach of

democratic pragmatism that is more pluralist in character and recognises the importance of the citizen. Indeed, a realisation also emerges noting that technical knowledge should not be centralised and held exclusively by experts within bureaucratic structures (Kronsell & Bäckstrand, 2010). It is argued that a more flexible decision-making process, which involves the public, can facilitate problem-solving that is more receptive to the requirements of society (Dryzek, 1997; Simmons, 2007). Ultimately, Dryzek (2013) suggests that the modification of administrative function and practice is necessary for problem-solving, to ensure public support which must exist to give government decisions both legitimacy and authority.

Pluralism and democratic pragmatism

Democratic pragmatism recognises that a wide range of actors, including elected governing officials, scientific experts, non-governmental organisations, pressure groups, and the public, can facilitate change through decision-making. This shares similarities with the voluntary approach and the concept of pluralism (Parsons, 1995; Cunningham, 2002; Conti & Gupta, 2014). As a construct, pluralism focuses attention on the way power is distributed within society and assumes that policy is the outcome of competition between ideas and interests (Roelofs, 2003). It is suggested that power is equally distributed within society, with the policy process not being dominated by any single actor group (Schlosberg, 2006; Lassman, 2011).

Pluralism is limited when characterising the role of government as a neutral actor that mediates the competing interests of different groups (Smith, 1990). In this case, pluralism does not account for the fact that governing officials hold personal aims and objectives (Olson, 1965; Connolly, 2010). These can often influence the role of government and shape the policy process, while government may also form or sponsor groups to gain more control (Howlett & Ramesh, 2003; Lassman, 2011). In terms of democratic pragmatism, the concept of government and actor behaviour is understood in a different way. Dryzek (2013) recognises that governing agents and policy actors can seek to maximise their own personal self-interests, however at certain points during the decision-making process these actors can be motivated by public interest. For democratic pragmatism, the public interest is not defined by the experts as presumed by administrative rationalism, but instead, control falls to multiple actor groups and involves a deliberative process with extensive dialogue and communication (Dryzek, 2013).

Devices and practices

Based on the importance of public support when legitimising decisions, Dryzek (2013) identifies a range of devices and practices that are essential to democratic pragmatism. These include; public consultation; alternative dispute resolution; policy dialogue; lay citizen deliberation; public enquires; and right-to-know legislation. These devices and practices can be linked back to voluntary approaches.

Firstly, public consultation endeavours to facilitate greater engagement between governing actors and the public by offering citizens the chance to express their opinion about a project [or issue] that is expected to impact the environment (Martin, 2009; Hildingsson 2010; Norton & Hughes, 2018). In this case, consultation reflects consensus-building and relationships of interaction that relate to the voluntary approach. Secondly, alternative dispute resolution [ADR] involves a process of bringing together interested actor groups under the support and mediation of an independent third party (Fiadjoe, 2004; Fisher & Sablan, 2018; Kumar, 2018). This relates to aspects such as social exchange and interaction that reflect voluntary approaches. Thirdly, policy dialogue is a device that involves discussion between all actor groups interested in a problem and attempts to help develop an agreement that can produce recommendations, with this outcome potentially being used by government to aid the policy process. This reflects more widely-scoped decision-making in terms of the voluntary approach. Fourthly, lay citizen deliberation endeavours to integrate non-administrative interest groups within decision-making (Dryzek, 2013). In this case, participants are brought together to deliberate issues or topics, ultimately helping to contribute towards the development of policy recommendations (Agnew & Woodhouse, 2011; Dryzek & Pickering, 2017). This represents the voluntary approach through horizontal interaction. Fifthly, public enquiry is deemed to be applicable for specific project proposals and attempts to encourage engagement in problem-solving (Dryzek, 2013). Public enquires have been used to contribute towards policy recommendations regarding environmentally harmful projects (Torgerson, 2003; Berger, 2010; Norton & Hughes, 2018); while the device reflects appeals and interdependence that relate to the voluntary approach. Lastly, right-to-know legislation aims to give the public the ability to use relevant information to challenge expert decisions and apply pressure on government, with a view to influencing decision-making (Birkinshaw, 2010; Dryzek, 2013). The perceived right to information and a feeling of participation underpins democratic pragmatism, which subsequently reflects characteristics of information and communication associated with the voluntary approach.

Key characteristics of democratic pragmatism

The devices explained indicate the ongoing inclusion of democratic pragmatism within the administrative state. However, as Dryzek (2013) suggests, democratic pragmatism does not only involve the implementation of specific devices, reforms, and practices, but it can also be considered as an entirely unique viewpoint or direction to government and governance.

In terms of decision-making and environmental policy, democratic pragmatism is characterised as an 'orientation to governing' which involves all aspects of government and decision-making, and not just the use of devices (Dryzek, 2005: 108). As a result, it is argued that democratic pragmatism can exist in a variety of contexts through different interactions, such as; committee meetings; legislative debate; public addresses; legal disputes; rule-making; as well as policy implementation and enforcement. These interactions reflect aspects of the voluntary approach, while also involving a range of processes, such as; lobbying; advising; informing; deceiving; image-building; and questioning (Dryzek, 2013). In this case, governance becomes more about the informal and unseen interactions or relationships, which can be characterised as political dynamics, rather than the constitutional outcomes, formal responsibilities, and processes that materialise in plain sight (Torfing, Peters, Pierre, & Sørensen, 2012; Dryzek, 2013).

The presence of democratic pragmatism is identifiable as a result of the devices, reforms, practices, and behavioural indicators that characterise the response. For example, in relation to water policy, privatisation during the 1980s in England and Wales was greatly assisted through an increased number of actors becoming involved in networks within the water industry (Maloney & Richardson, 1994; Richardson, 1994). However, while at face value this process could be deemed to offer benefits because of greater inclusion and engagement of non-administrative actors, from a more sceptical viewpoint the opening-up of the policy process could be considered to be an action by government to legitimise decision-making, thus enhancing the control, authority, and power held by experts and professionals (Maloney & Richardson, 1994; Richardson, 1994; Turle, 2005; Wolf, 2011). Ultimately, governments have, at times, embraced voluntary approaches to aid and legitimise policy and decision-making. These actions may be argued to operate as merely tools to secure public support and maximise government interests, rather than attempts to truly act in the public interest through more inclusive methods (Schmalz-Bruns, 2002; Heinelt, 2012).

3.6.4 Economic rationalism

The third problem-solving response defined by Dryzek (2013) is economic rationalism, and this also acknowledges liberal capitalism as a given context. The response argues that environmental problems can be solved by a policy and decision-making process that accepts and embraces economic principles (Wright, 2002; Dryzek, 2013). In this case, the environment is managed by contextualising it in terms of economic markets, while encouraging the development and implementation of market-based instruments (Ashford & Hall, 2011; Hackett, 2011; Dryzek, 2013). Fundamentally this reflects the economic approach as well as forms of economic institutionalism and economic models of understanding based on public choice theory. It is argued that administrative rationalism and democratic pragmatism do not effectively tackle the cause of environmental problems, which are a result of conflicting economic and environmental values. Therefore, in response to the challenges of both rationalities, governments focus attention on economic political constructs (Dryzek, 2013).

Economic rationalism has adopted a variety of guises in real-world politics, such as market liberalism, classical liberalism, neo-liberalism, and free-market conservatism (Dryzek, 1997; Wright, 2002; Hackett, 2011; Hasselman & Stoker, 2017; Pusey, 2018). For Dryzek (2013), although the actors and interest groups relevant to economic rationalism, namely consumers and producers, tend to focus on the maximisation of material self-interests, it is also argued that they hold a key role when tackling environmental problems. A notable difference from other understandings and rationalities emerges through the perceived role and function of government in the market system. In this case, the use of economic principles to solve socio-environmental problems relies on the rise of markets in managing public demands and contemporary life, while the idea of governments being viewed as economic actors also emerges (Dryzek, 2013). Thus, it is claimed that the public interest can be achieved by government through ensuring market systems are appropriately regulated (Hackett, 2011; Dryzek, 2013).

Private property rights and quasi-market tools

Economic rationalism is characterised by two ideals. Firstly, at the very extreme end of the spectrum, it is suggested that all aspects of the natural environment should be strictly managed by market systems (Dryzek, 2013; Nevile, 2016). This ideology is based on the concept of private property rights, which seeks to attach ownership and categorise environmental goods or services within a given economic system (Hajer, 1995; Mol, 1996; Dryzek, 2013; Tietenberg & Lewis, 2016). Fundamentally, this compels the pricing of all environmental goods, including

water, while the creation of these types of market system operate based on the premise that individuals [and corporations operating as singular entities] tend to care more for privately owned goods when compared with commonly owned goods (Dryzek, 2013). This also relates to the tragedy of the commons theory (see Campbell & Corley, 2015). The creation of property right markets advocated by economic rationalists encourages a more careful approach to resource management, as the exploitation and mismanagement of these resources would in turn jeopardise the pursuit of economic interests (Pearce, Markandya, & Barbier, 1989; Jacobs, 1991; Panayotou, 2016; Tietenberg & Lewis, 2016).

The second and less extreme ideal of economic rationalism suggests that governments should form managed markets, or if this is not possible the use of quasi-market incentives should be encouraged (Wright, 2002; Dryzek, 2013). This emerges if the hard-line position of private property rights cannot be feasibly established and enforced. According to Dryzek (2013), the most common form of a government managed market involves the allocation of pollution rights, which functions through the identification of a pollution level deemed appropriate for a given setting [such as a watershed that determines the maximum level of pollution allowed]. The allowance of pollution for a defined environment or situation is then divided into units, which are sold to the individual or group that are willing to bid the highest, and after this process is complete polluters can trade rights relative to their needs (Pearce *et al*., 1989; Jacobs, 1991; Connelly & Smith, 2003; Dryzek, 2013). As a result, a structured market managed by government emerges through which polluters seek to abide by government-specified pollution levels in the most cost-effective way, as exemplified by carbon emissions trading (Grubb & Neuhoff, 2006; Skjærseth & Wettestad, 2008; Tietenberg & Lewis, 2016).

Alongside the concept of rights, quasi-market tools such as green taxes and trade quotas have also emerged as important techniques for reducing pollution. These reflect the market-based instruments identified as part of economic approaches and economic institutionalism. Tradable quotas have been established to more effectively manage common resources, for instance to protect fisheries and mitigate the effects of depletion and exploitation (Dryzek, 2013; Le Floc'h, 2015). In turn, quasi-market incentives are more widely adopted to reduce and control pollution, often taking the form of standards, charges, or green taxes (Dryzek, 2013). Economic rationalists argue that a regime of green taxes can encourage more efficient consumption and a reduction in polluting waste products, as polluter discretion for abatement is encouraged, with the view that the polluter will always seek the most cost-effective option for compliance

(Dryzek, 2013). Prominent examples of green taxes have been evident in the United Kingdom, which as a nation and government has been accepting of [and committed to] market values for environmental problem-solving and pollution control (Dresner, Jackson, & Gilbert, 2006; Dryzek, 2013). Examples include; the Landfill Tax introduced in 1996 to reduce solid waste destined for landfills; and the Value Added Taxes applied to varying types of fuel. These have been justified, in political terms, based on their ability to control consumption through the application of a financial penalty [taxation], which encourages reduced consumption as a result of high usage [or ongoing activity] becoming less cost-effective (Jacobs, 1991; Mitchell & Simmons, 1994; Tietenberg & Lewis, 2016).

Functions of economic rationalism

The reasons why a policy has been adopted or implemented in a particular way can be understood by observing the behaviour of actors involved in problem-solving (Birkland, 2015). In theoretical terms, the integration of economic principles within problem-solving attempts to enable consumers and producers to maximise self-interest, which in turn allows environmental issues to be addressed to avoid any potentially negative financial repercussions (Meuleman, 2008; Anderson, 2010; Hackett, 2011; Nevile, 2016). The development and implementation of economic principles are deemed necessary to achieve environmental objectives with minimal financial cost and socio-political opposition (Clifton, Comin & Fuentes, 2006; Dryzek, 2013).

In terms of the role and behaviour of policy actors, economic rationalism partly reflects administrative rationalism as well as economic institutionalism and economic models of understanding. In this case, experts are the most important actor group in problem-solving, which is achieved through the creation and regulation of market-based structures (Dryzek, 2013). It is also argued that the design and application of market principles and economic instruments is necessary and often dependent on the existing political economy (Maloney & Richardson, 1995; Petrella, 2001; Holland, 2005). Economic rationalism also considers the use of market instruments to be vital, thus reflecting economic institutionalism, while governing actors are deemed to be primarily driven by self-interest, which reflects models of public choice theory that focus on bureau-shaping and budget-maximising (Holcombe, 2016).

Advocates of economic rationalism also attempt to justify the application of market principles by highlighting both the advantages of the response and the ineffectiveness of other responses, namely those based on mandatory approaches and bureaucratic administration as well as

voluntary approaches and networks (Dryzek, 2013). More specifically, economic rationalists [and proponents of applying market-based principles to solve socio-environmental problems] label direct government action as a process that is inefficient, convoluted, and very costly in financial terms (Dryzek, 2013; Wright, 2002; Nevile, 2016). For example, it is argued that the implementation of strict pollution control measures by government can prevent or restrict the ability of producers utilising other lower cost solutions (Dryzek, 2013). As a result, this type of government action is perceived to generate unwarranted economic costs for business and society, thus becoming an option that is neither cost-effective nor efficient (Nelson, 1993; Haigh, 1999; Wright, 2002; Dryzek, 2013).

Expected characteristics

In terms of understanding the extent to which governments have embraced economic principles, there is evidence to suggest that this has occurred to varying degrees, especially in the case of water policy. In relation to the privatisation of water services in England and Wales, it was believed that the process would enable the water industry to operate within the confines of a business model and allow appropriate management to occur at minimum financial cost (Maloney & Richardson, 1995; Hassan, 1998; Dore, Kushner & Zumer, 2004; Parker, 2012; Rouse, 2017). Advocates of privatisation argued that water services would be self-funded by charging the consumer the full costs associated with water and sewage services, while these costs would also seek to include the expenditure necessary to meet environmental quality standards [or internalising the externalities of water service provision] (Maloney & Richardson, 1995; Ward, 1998; Parker, 2012; Bakker, 2013; Rouse, 2017). In contrast, attempts to integrate economic principles and privatise water services in France have generated different results (Nelson, 2015; Lieberherr, Viard & Herzberg, 2016; McDonald, 2018). In this case, water and sewage services have remained publicly owned but fundamentally operated by private sector companies, with an inherent polluter-pays ideology underpinning this approach (Dore *et al*., 2004; Staddon, 2010; Frérot, 2011). Therefore, despite the differing extent to which governments have adopted economic principles and privatisation to address environmental problems, these approaches have been evident in terms of resource management and problem-solving. Indeed, the application and function of privatisation remains dependent on institutional structures (Kickeri, Nellis & Shirley, 1994; Frérot, 2011).

It is apparent that economic rationalism has been embraced in certain cases to overcome the limitations of administrative rationalism and democratic pragmatism. The response endeavours

to address environmental problems through the application of economic principles, which fundamentally involve the allocation of private property rights and quasi-market incentives. This reflects the economic approach as well as economic institutionalism and models of understanding such as public choice theory. As a problem-solving response, economic rationalism is variable in application and function, while its presence and role are often dependent on the arrangement of political forces and relationships.

3.7 Conclusion

Government problem-solving responses have been broadly categorised in terms of mandatory, voluntary, and economic approaches. The problem-solving responses of administrative rationalism, democratic pragmatism, and economic rationalism, as conceptualised by Dryzek (2013), have sought to build on these by offering a unique understanding on; how governments respond to socio-environmental issues; different actor roles, motives, and behaviours that exist in practice; as well as how problem-solving responses evolve (Dryzek, 2013).

The discussion has highlighted that the problem-solving rationalities can be differentiated in terms of the institutional practices and operational devices that help determine the role of policy actors. More importantly, it is the way in which actor behaviour is interpreted that distinguishes Dryzek's (2013) rationalities from other explanations of behaviour, such as the understandings considered as part of mandatory, voluntary, and economic approaches, including; top-down and bottom-up perspectives, elitism, technocracy, corporatism, bargaining and negotiation, policy networks, pluralism, economic institutionalism, as well as public choice theory (see Downs, 1967; Niskanen, 1971; Dunleavy, 1985; Cawson, 1986; Parsons, 1995; Russell, 2011; Birkland, 2015; Holcombe, 2016; Kersey, 2016; Radaelli, 2017; Knoke & Kostiuchenko, 2018).

The problem-solving rationalities defined by Dryzek (2013) are further distinguished from other approaches based on a more detailed explanation of behaviour, which draws on multiple theories rather than the more singular and detached theories put forward previously. It is apparent that each of the rationalities makes use of other conceptual theories to better explain behaviour. Administrative rationalism prioritises the expert and draws upon the idea of technocracy as being central to problem-solving, while also reflecting top-down concepts as well as some aspects of public choice theory to contrast the perceived role and behaviour of officials regarding the pursuit of self-interest. Democratic pragmatism uses notions of policy

networks and the concept of pluralism to explain the expansive policy dialogue process that occurs as part of decision-making to engage and include non-administrative interest groups such as citizens. Economic rationalism shares similarities with economic institutionalism and corporatism regarding the integration of market principles in problem-solving, while also drawing upon public choice theory understandings to argue that self-interest is an inherent driver within economic systems and is necessary to help resolve socio-environmental problems.

Ultimately, administrative rationalism, democratic pragmatism, and economic rationalism have the potential to build on and develop the understanding of mandatory, voluntary, and economic approaches. This is achieved by focusing on the specifics of problem-solving through aspects such as; the explanation of actor motives and behaviour; indicative management constructs and practices; rhetoric; metaphorical devices that describe processes or relationships; and the evolutionary character of problem-solving. This offers a unique interpretation, as previous understandings have failed to emphasise the importance of explaining differences in the roles, interactions, and behaviours of policy actors. A summary and comparison of the approaches and perspectives considered in this chapter has been provided in appendix 1. In this case, an analysis of strengths, weaknesses, opportunities, and threats for all the perspectives considered has not been carried-out, as the aspects of ‘opportunities’ and ‘threats’ were not deemed relevant and thus this type of analysis was not warranted. Nevertheless, strengths and limitations associated with the different approaches and perspectives have been recognised in the comparison within appendix 1 to provide balance.

Chapter 4: Research Methodology

4.1 Chapter overview

This chapter discusses the methods used to achieve the aims and objectives of the thesis and has been separated into six sections. The first section provides an overview of the adopted methodological approach and offers justification for this selection, while further explaining the relevance and importance of a Cypriot setting. The second section focuses on the methods used to select potential interviewees, with reasons for selection also given, as well as the need for secondary data as part of a triangulation process. The third section considers the development of the interview process, while outlining the questions and topics asked of the interviewees. The fourth section details the process of data collection and the method through which the interview was implemented. The fifth section outlines the key techniques used to analyse primary data from the interviews and other information gained from secondary sources, while also highlighting the applicability analysis used to compare the theoretical expectations of the rationalities with findings in Cyprus. Finally, the last section provides a conclusion which summarises the key points of the chapter.

4.2 Design

This research has employed a qualitative case study approach involving primary interviews and the analysis of data from secondary sources. An investigation of government responses to water management problems in Cyprus was conducted by carrying out semi-structured interviews with key actors and groups responsible for water management. These interviews facilitated an analysis of the underlying roles, motives, experiences, and behaviour of policy actors to ascertain the applicability of Dryzek's (2013) problem-solving rationalities. Secondary sources of information from a Cypriot context, such as parliamentary proceedings, government and departmental reports, water board reports, newspaper media, and information circulated by non-governmental organisations, were also consulted to aid the analysis and provide a sufficient level of supporting evidence for the primary interview data.

4.2.1 Justifying the primary data collection approach

It is widely considered that the two key approaches for data collection and analysis involve either qualitative or quantitative research methods (Blaxter, Hughes, & Tight, 2010; Yin, 2011).

The suitability of an approach is based on how appropriate it is for specific research requirements, or how well suited it is for data collection (Bell, 2005; Walliman, 2011).

In relation to water policy research, quantitative methods can be utilised to analyse the responses given by a large group of individuals regarding a more restricted and defined set of issues or parameters (Sadovnik, 2007; Packer, 2011). For example, this has been represented through the understanding of; public perspectives on water policy in terms of participatory decision-making (Larson *et al*., 2009); assessment of attitudes and participation for water resource management (Larson & Lach, 2008); influences on public perception of drinking water quality (Doria, 2010); water pricing policy and agricultural demand (Aidam, 2015); as well as the assessment of sustainability and impacts of desalination (Lior, 2017). This allows the identification, comparison, and evaluation of general trends, for example within a data set, which can ultimately offer a representation of wider patterns in a socio-economic or political setting (Yanow, 2007). In contrast, qualitative approaches can be used to gain more detailed information, such as opinion about a given topic, from a smaller group of respondents regarding a specific issue (Bell, 2005; Bryman, 2012). For water policy, a range of qualitative research examples have been evident, including analysis of; adaptive management and water reform (Hasselman, 2017); recycled water and regulatory incentives (Watson, Mukheibir, & Mitchell, 2017); public opinion of water quality policies (Rissman, Kohl, & Wardropper, 2017); public authority management of water governance (Kirschke *et al*., 2017); as well as integration and policy implementation considered through interviews that question certain regimes and the mechanisms used to facilitate adaptive governance (Rouillard *et al*., 2013).

Information gained through the qualitative approach can enable an in-depth level of understanding based on a more open, detailed, and flexible data collection format. This is due to the method facilitating an exploratory understanding because of a less restrictive methodological approach, and the fact that characteristics associated with different responses are less determined in advance (Bryman, 2012). In this case, an interviewer [or researcher] is afforded more flexibility when performing an interview and may follow any leads or topical directions that are provided by respondents regarding certain questions and their answers (Bell, 2005; Miller & Glassner, 2011; Yin, 2011). For instance, a respondent could potentially give a reason or rationale for acting in a particular manner that was not previously considered by the researcher and thus may require further investigation. As a result, the researcher can decide to clarify or expand upon the importance of this answer, by exploring the decision in more detail

and potentially 'mining' for more information on this point (Singleton, Straits, & Straits, 1993; Patton, 2002). This process is vital when seeking to develop original insights on issues about which a great deal may not be known. Indeed, original insights are argued to be a prerequisite of worthwhile research, alongside important aspects such as theoretical and methodological robustness as well as trustworthiness and reliability (Ozga, 2008; Romesburg, 2009; Denscombe 2010; Robson & McCartan, 2016).

The approach for this study

The thesis has adopted a qualitative approach to data collection. It utilised a semi-structured interview approach to identify and explore the roles, experiences, motives, behaviour, and perspectives of actors involved in the management of water in Cyprus. Through this approach it was possible to obtain information to help understand and conceptualise the complex and often flexible roles of key actors within the problem-solving and decision-making process. For example, a range of important questions were answered such as; how and why governments act in the manner they do; how decision makers influence and shape the policy process as a whole; how proposed policy responses and resultant outcomes compare; as well as how problem-solving responses have evolved.

In the context of policy research, qualitative methods such as the semi-structured interviews used for data collection in this thesis have been deemed to be useful and appropriate. This has been noted in terms of; comparing the transposition and implementation of EU drinking water policy in different cases (Jenkins, 2007); application when exploring collaborative water policy making (Connick & Innes, 2003); as well as understanding public perception of drinking water (Jones *et al*., 2007). Qualitative methods enable researchers to gain unique knowledge about policy dynamics, while the strength of the method becomes evident based on its ability to provide detailed explanations that appreciate contextual setting and reveal how and why different policy outcomes may occur (Strauss & Corbin, 1990; Hoepfl, 1997; Sadovnik, 2007; Yin, 2011; Susskind & Schulman, 2013).

The qualitative approach is also particularly appropriate when respondents or interviewees hold multiple perspectives and realities, as it can afford the opportunity to explore such complex differences (Fine 1994; Babbie, 2013). This is highly relevant in terms of this study, as interviewees often hold different perspectives regarding policy formation, development, and implementation, with contrasting realities also existing based on the fundamental understanding

and definition of a given problem (Frensch & Funke, 1995). Notably, if the researcher excludes the potential for varied responses and does not seek confirmation of different ideas, the understanding of rationalities can become restricted in subsequent analysis. This can prevent the emergence of generalities that serve to further knowledge within the area of environmental and water policy, political theory, as well as problem-solving and decision-making.

4.2.2 Justifying other methodological approaches

A combination of methodological approaches has been utilised for this study in addition to the primary qualitative approach. In particular, a grounded theory approach has been used based on the potential for developing theory as a consequence of data analysis, while the research is also argued to be deductive and exploratory in nature.

A grounded theory approach

A grounded theory approach is relevant as by utilising deductive reasoning, the researcher seeks to test the applicability and potential utility of Dryzek's (2013) rationalities [a theoretical perspective in itself] (Glaser & Strauss, 1967; Oktay, 2012; Bryant, 2017). Thus, although a starting framework is in place [essentially to test the existence and applicability of the rationalities], this process, and the analysis of interview data [alongside triangulation with other data] ultimately has the potential to generate an alternative theoretical viewpoint (Glaser, 1998; Oktay, 2012; Corbin & Strauss, 2015). The approach is argued to be adaptable and pragmatic, while also being suitable based on its ability to consider relationships between concepts, or to form and develop integrated theoretical constructs that are developed from empirical data [for example gained from the interviews and the triangulation of secondary sources] (Glaser, 1998; Denscombe, 2010; Simmons, 2011; Bryant, 2017).

The grounded theory approach offers a range of advantages that are relevant for this thesis. Firstly, it is suited to small scale research as it can be constructed by an individual researcher, while also being adaptable to allow the use of different qualitative data collection methods (Bryant, 2017). Secondly, it provides a recognised rationale for qualitative research (Denscombe, 2010). Thirdly, it makes use of a systematic method of analysing data based on categorisation and coding of data, thus offering a clear direction and method of analysis (Robson & McCartan, 2016; Bryant, 2017). Lastly, the approach fundamentally encourages the development of theory, and is well suited to exploratory research and investigating new topics, due to an inherent flexibility for sample inclusion and data analysis (Seale, 1999; Oktay, 2012).

Furthermore, the grounded theory approach also suggests that all data is relevant, which serves to validate and encourage the use of different data types, again highlighting the applicability of this approach in the context of this research (Glaser, 1998). This contributes to a more robust analysis that is strengthened by triangulation, in which qualitative interview data is supported [or challenged] by other secondary sources through the cross-referencing and cross-validation of relevant themes (Denscombe, 2007). In practice, these themes relate to the characteristics associated with Dryzek's (2013) rationalities, as actor roles, motives, behaviour, relationships, rhetoric, and metaphorical devices emerge through different data types. The inclusive use of these different data types, alongside comparison and cross-referencing of sources, ultimately helps to build a better understanding of problem-solving.

A deductive approach

Research themes used to generate questions and identify the existence [or non-existence] of the problem-solving rationalities were developed using the key themes resulting from Dryzek's (2013) discourse analysis. This is indicative of a deductive approach, based on the idea that the three forms of government coordination focused on mandatory [bureaucracy], voluntary [democratic], and economic [market] approaches fundamentally exist, while the nature of these responses is reflected by Dryzek's (2013) rationalities and these general rules hold true in terms of political theory and as a prerequisite of the rationalities.

The deductive approach further emerges as a relevant methodological construct as the existence of certain key themes or characteristics and theoretical components are apparent in the case study setting, and the subsequent existence of a given attributed rationality is also true (Crowther & Lancaster, 2008; Ruane, 2016). The existence of the components attributed to a rationality directly represents the presence of the associated rationality in some form, thus inferring that a deductive construct is evident as defined premises [characteristics associated with a given response] are linked to conclusions [the real-world existence of the associated rationality] (Ruane, 2016). For example, through deduction, the existence of components such as expert advisory committees or rationalistic policy analysis techniques [cost-benefit analysis] implies that administrative rationalism has been evident to some extent in practice. This deduction is also true for democratic pragmatism and economic rationalism if the existence of associated characteristics is identified.

An exploratory approach

An exploratory approach is also deemed relevant for this study. As the existence and feasibility of Dryzek's (2013) rationalities are tested, new themes were found to emerge as a result, which in turn lead to insights and alternative perspectives (McNabb, 2010; Robson & McCartan, 2016). This exploratory approach ties in with the concept of grounded theory, which is fundamentally an approach dedicated to generating alternative understandings in relation to a given topic area (Ruane, 2016; Bryant, 2017).

4.2.3 Justifying a case study approach

This thesis utilises a case study approach to investigate the applicability of Dryzek's (2013) problem-solving rationalities and to analyse how government in Cyprus has sought to tackle water management problems related to scarcity and quality.

Understanding how government in Cyprus is responding to water management problems is affected by the need to focus upon a single national context, to secure a manageable research project with respect to data collection and analysis. This focus, as with case studies in general, offers a more detailed level of information that can be used to highlight how the convergence of different variables within a given situation can produce an outcome (Robson, 2002; Robson & McCartan, 2016). The purpose of the case study is to allow the researcher to analyse phenomena in a specific setting to gain a deeper level of understanding, rather than a broader and more superficial overview of general trends or patterns (Yin, 2008; Babbie, 2013; Robson & McCartan, 2016). As Hancock (1998) argues, case studies generally offer a 'richness and depth of information' that often cannot be obtained through other data collection techniques. This allows the analysis of a convoluted system of variables [such as the characteristics of a rationality] that come together to form a coherent outcome (Babbie, 2013; Bryant, 2017).

Although it is acknowledged that the use and general contextualisation of the results obtained from single policy research can be potentially limited, because of issues such as a lack of objectivity, limited sample size, and associated expectancy effects that can shape results (Gerring, 2006; Jackson, 2009), it does not diminish the importance and capacity of the case study method, which is also understood to hold strong meaning in reality (George & Bennett, 2004; Blaxter *et al*., 2010). The purpose and main strength of a case study is its ability to develop a deeper level of understanding, rather than merely a broader but more superficial analysis of overall trends or patterns in relation to a given system or process (Yin, 2008;

Woodside, 2010). Therefore, to achieve this level of depth, the study must be narrowed while accounting for the often-limited resources attributed to a single study (Simons, 2009). In terms of water management, case studies have been used to explore a range of aspects. For example, these include; urban water supply decision-making (Abrishamchi, Ebrahimian, Tajrishi, & Marino, 2005); addressing scarcity (Xie *et al*., 2009); privatisation challenges (Bakker, 2000; Bayliss, 2003); surface water quality improvements (Choe, Whittington, & Lauria, 1996); water demand analysis (Zhou, McMahon, Walton, & Lewis, 2000); attitudes towards water markets (Tisdell & Ward, 2011); as well as water pricing in relation to influences on conservation (Qdais & Nassay, 2001) and irrigation schemes (Expósito & Berbel, 2017). Furthermore, in terms of small, Mediterranean, and peripheral EU states, case studies have been evident when exploring; water demand (Morote & Hernandez, 2016); groundwater pollution (Miglietta *et al*., 2017); management of quantity and quality (Khoo, 2009; Gikas, 2017); as well as regulation of quality through EU directives (Golfinopoulos *et al*., 2016).

Ultimately, this thesis and type of research required a case study approach, as a high level of detail is necessary to investigate and understand complex responses that exist within a given socio-economic and political setting. Without a narrow focus, the meaning of the research can become diluted, and thus, its value can diminish if a generalised and broader position is adopted (Hancock, 1998; McNabb, 2010; Woodside, 2010; Corbin & Strauss, 2015; Ruane, 2016).

4.2.4 The Republic of Cyprus as a case study focus

The purpose of the study is to contribute towards a better understanding of government responses to water management problems in the context of a given socio-economic and political setting. The thesis advances knowledge in this area by understanding how government in Cyprus is responding to water problems, such as scarcity and quality, by drawing upon and subsequently assessing the applicability of Dryzek's (2013) problem-solving rationalities.

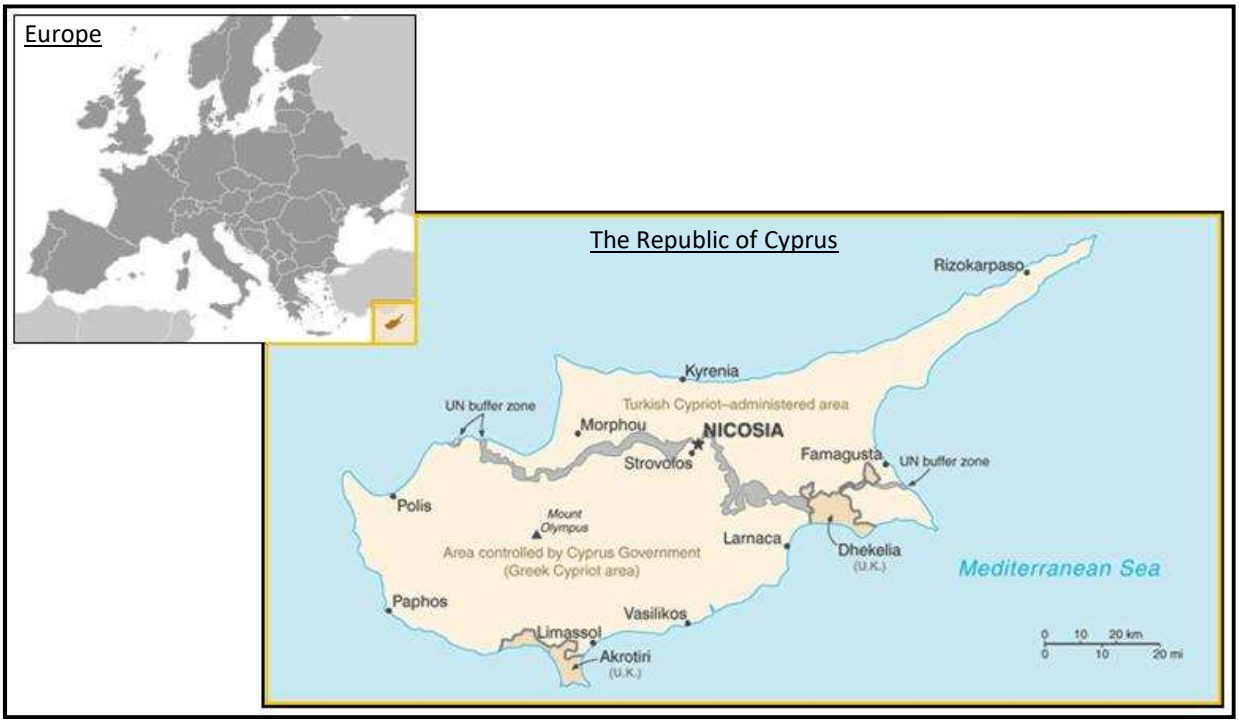
A unique and relevant case study

The Republic of Cyprus has been selected as it offers a unique and relevant case study setting. As previously noted in chapter one, a Cypriot case study can be broadly justified based on a range of aspects. Firstly, the need for research because of underdeveloped knowledge for Cyprus and other Mediterranean and peripheral EU nations in terms of understanding government responses to water problems. Secondly, the need for research based on understanding decision-making and the role of governing agents regarding water management

problems, in a country [and wider region] that experiences stresses on both availability and quality. Thirdly, the need for research to better comprehend government responses to water problems, based on the intensifying threats these issues pose to environmental ecosystems, agricultural subsistence, and socio-economic development in Cyprus and other small, Mediterranean, and peripheral EU states.

Figure 4.1 illustrates the geographical location of Cyprus, which is an island situated in the Mediterranean basin and often argued to be part of Europe [noted through EU member status], the Mediterranean, and the Middle East (see Faustmann, 2009; CIA, 2013). The island contains two different administered regions, and in the context of this thesis it is only the internationally recognised southern area of the island, officially defined as the Republic of Cyprus and the area under government control, that is to be investigated (Iacovides, 2011a). This has been selected based on a range of factors, namely; access to information; available data on water; EU member status when considering the implementation of legislation; as well as compliance with the theoretical parameters of Dryzek's (2013) rationalities.

Figure 4.1: Geographical location of the Republic of Cyprus (CIA, 2013)



From a perspective of research relevance, Cyprus is a nation that has limited water resources that must be managed carefully in terms of multiple pressures such as; population growth, climate change, and the increasing demands of the domestic sector, agricultural activities, and

the tourism industry (see Charalambous, Bruggeman, & Lange, 2011; Iacovides, 2011a; Sofroniou & Bishop, 2014; Naukkarinen, 2015). These water management challenges present different problems that government must manage and respond to, thus an opportunity emerges to consider the applicability of Dryzek's (2013) problem-solving rationalities in practice. The profile of Cyprus and the evident water management problems are summarised in figure 4.2.

Figure 4.2: The Republic of Cyprus - profile and summary of water resources
(Aletraris, 2010; Iacovides, 2011b; CIA, 2013; Sofroniou & Bishop, 2014)

COUNTRY PROFILE

Description
- Area under government control: 5,800km^2 [Total area: 9,250km^2]
- Semi-arid temperate Mediterranean climate with hot dry summers and cool winters
- Gained EU accession in 2004

Location
Mediterranean; Europe; Middle East

Population
1,155,403 [estimated]

Economy
- Dominated by service sector;
  Tourism
  Financial services
- Agriculture

WATER RESOURCES AND MANAGEMENT

Types
- Surface water
- Groundwater
- Desalination
- Recycled water
- Springs

Infrastructure
- Water plants / works
- Pipelines / conveyors
- Dams / Reservoirs
- Treatment plants
- Desalination plants

Water Balance
- Usable balance of water = 370Mm^3
- Surface water = 235Mm^3
- Groundwater = 135Mm^3

Demand
- Agriculture = 182Mm^3 (68%)
- Domestic = 68Mm^3 (26%)
- Environment = 13Mm^3 (5%)
- Industry = 3Mm^3 (1%)

Management Issues
Quantity
- Increasing demands
- Limited resources
- Mainly dependent on rainfall
- Drop in precipitation in 1970s
- Major threat from drought
- Non-licensed boreholes
- Over pumping of aquifers
- Groundwater is main resource

Quality
- Groundwater / aquifer deterioration
- Saline intrusion of coastal aquifers

1. Point Source Pressures:
- Municipal wastewater
- Livestock waste
- Industrial waste
- Solid waste disposal sites
- Mining and quarrying
- Aquaculture and desalination

2. Diffuse Source Pressures:
- Agricultural activities
- Livestock waste
- Rainwater runoff
- Municipal wastewater
- Areas where no sewerage networks or treatment facilities exist

From a methodological perspective, Cyprus also exhibits the features required by Dryzek's (2013) framework when considering evidence of the rationalities, namely; status as a liberal democratic society and a capitalist political economy (Faustmann, 2009; Ker-Lindsay & Faustmann, 2011; Koundouri & Birol, 2011). The structural setting of liberal capitalism is a

prerequisite for Dryzek's (2013) framework. This also reflects the mandatory, voluntary, and economic approaches, which are claimed to be defining mechanisms of coordination because of their prevalence in liberal democratic governance systems and capitalist political economies (Mitchell, 1991; Wurzel *et al*., 2013). Administrative rationalism, democratic pragmatism, and economic rationalism operate within the structural and contextual parameters of liberal capitalism, with the presence of this system enabling the rationalities to exist (Dryzek, 2013). This is important, as the liberal capitalist democratic system has been the most prevalent structural setting in contemporary industrial societies, which have been committed to growth in terms of goods, services, and material wellbeing (Dryzek, 2013). In Cyprus, the presence of a structure centred on liberal capitalism is observed to be the governance system and political economy in place (Jansen & Akkerman, 2014; Welz, 2015). This provides the necessary context for the rationalities to potentially exist, and thus for this study to investigate their applicability in practice when understanding responses to water problems.

Ultimately, the case study offers the opportunity to address underdeveloped areas of research and contribute to empirical evidence by; investigating the applicability of Dryzek's (2013) framework in a new and unique context; developing knowledge of problem-solving, water policy, as well as the role and behaviour of governing agents in a small, Mediterranean, and peripheral EU nation; as well as developing the understanding of decision-making in a setting that involves the management of shared water resources. The lessons learnt in Cyprus, through the application of Dryzek's (2013) understanding, in relation to water problems, management, and EU status, are pertinent for the wider region and give the study relevance.

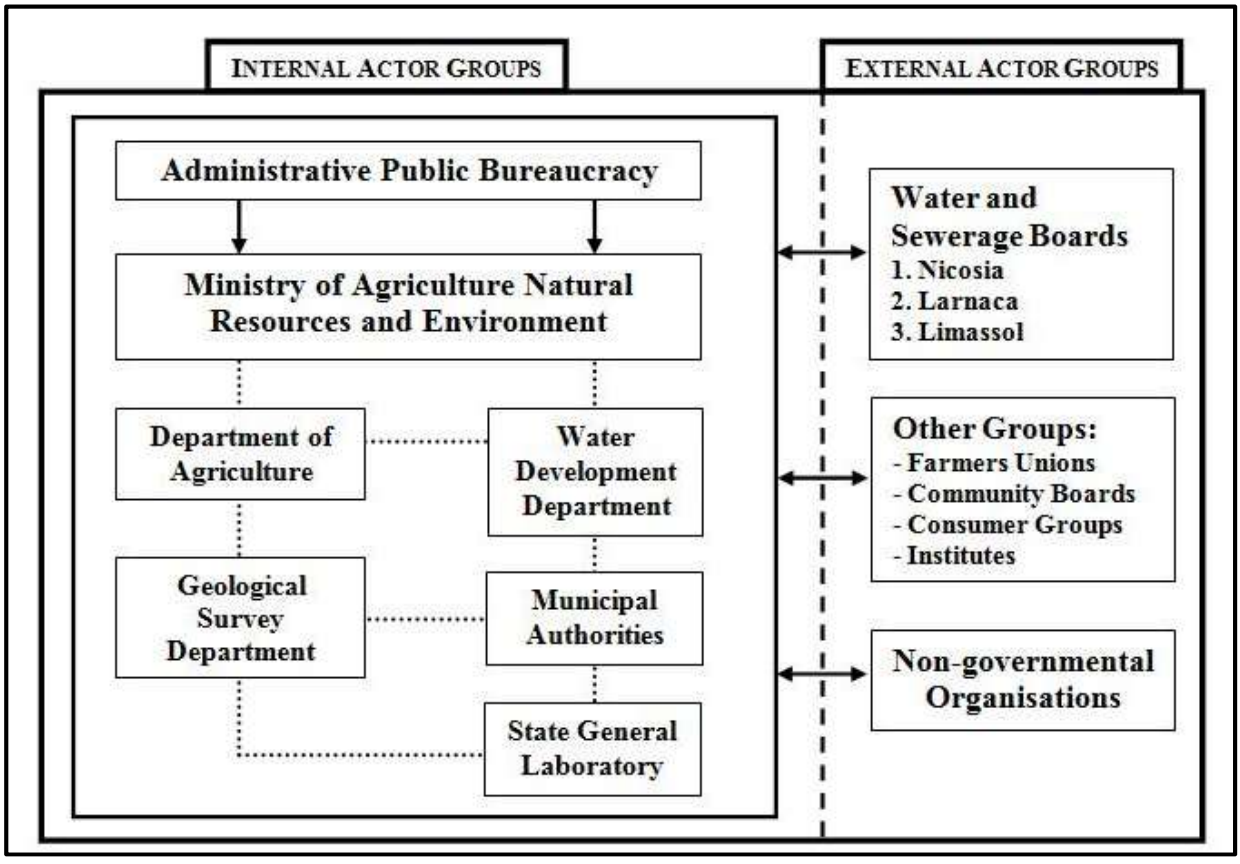
4.3 The interview basis and structure

The following section considers the basis and structure of the semi-structured interviews used for primary data collection. A range of aspects are explained, namely; interviewee selection and type; sampling techniques used; as well as the triangulation process and the importance of secondary data. It must also be noted that for the interviews there was a need to gain risk assessment and ethics approval as part of protocol for studies involving human subjects. This was achieved and was valid for the full duration of the interview phase of the study. The relevant ethics approval number was LS1/7/12P.

4.3.1 Interviewee selection

In Cyprus, interviews were conducted with individuals [both active and retired] from the actor groups highlighted in figure 4.3. These consist of the main internal and external actor groups involved in decision-making, problem-solving, and management responses to water problems in Cyprus. Internal actor groups have been defined as those who act as a part of the administrative bureaucracy and government ministries, departments, or authorities, while the external actor groups involve those who are not directly linked with government but act alongside [or in opposition to] the administrative bureaucracy when dealing with water problems. In practice, the actor groups included; administrative public bureaucracies and state civil services; ministerial bodies or agencies such as the Ministry of Agriculture, Natural Resources, and Environment [MANRE] or the Water Development Department [WDD]; the Department of Agriculture [DofA]; the Environment Department; the Geological Survey Department [GSD]; the state General Laboratory; as well as other authorities and providers at municipal level. In addition, individuals from water and sewerage boards, non-governmental organisations, research institutions, other relevant groups such as farmer unions, as well as retired officials that are deemed to be relevant by Dryzek (2013), were also interviewed to provide views from those external to administrative management systems and government.

Figure 4.3: Key actors in the context of water management in Cyprus



All the groups highlighted were selected as they represented the actor types associated with [and expected to exist in terms of] Dryzek's (2013) problem-solving rationalities. Firstly; civil servants, experts, and managers in the case of administrative rationalism, with these actors positioned in government ministries such as the MANRE, departments such as the WDD, municipal authorities such as district offices, as well as town water boards. Secondly; citizens and other stakeholders in the case of democratic pragmatism, with these actors represented through non-governmental organisations, unions, and community boards. Thirdly; government officials in the case of economic rationalism, with these actors situated within government ministries and departments, municipal authorities, and water boards. Actor types interviewed from all these groups included; ministers; directors of government departments; senior civil servants; experts within government departments, water boards, and non-governmental bodies; managers in government departments, water boards, municipal authorities, and district offices; politicians; institutional experts; as well as community and pressure group representatives.

The individual actors chosen for interview were identified and selected through a range of sources, namely; the organisational structures associated with relevant government agencies and departments; articles from professional publications; academic research literature; as well as direct contact and liaison with individuals responsible for decision-making. This multi-dimensional approach was adopted for three main reasons. Firstly, to limit the potential for bias in the interview process; secondly, to minimise the risk of being restricted by the development of an unsuitable interview network held by previous research; and thirdly, to reduce the potential impact of disruptive or unhelpful interviewees (Robson, 2002; King & Horrocks, 2010; Rubin & Rubin, 2011; Robson & McCartan, 2016).

A key aim in the formation and development of interview networks and selection was to ensure that interviewees could cover a period sufficient for gaining an understanding of the dynamics of policy development and implementation, as well as when analysing the evolution of problem-solving. For this study, a period from 1960 [when Cyprus gained independence] onwards until 2014 [ten years after EU accession] was selected, with the historical water management setting during this period also recognised in terms of management. Firstly, this has been relevant in terms of policy research, based on the need for a suitable timeframe to allow policy outcomes to emerge. For example, a sufficient period offers the opportunity to observe a ten to twenty-year timeframe [approximately], which is argued to be the minimum period necessary to allow the intended and unintended consequences of policy to fully emerge

(Sabatier, 1986; Schneider, 1991; Colebatch, 2009). Secondly, a suitable period was also relevant in terms of Dryzek's (2013) rationalities. In this case a sufficient timeframe was deemed necessary to interpret the evolutionary format of problem-solving and to consider if real-world responses follow the timeline and format expected by the framework.

Alongside a sufficient period for the justification for policy analysis and the evolution of problem-solving; the chosen date range signals a more settled political time period in Cyprus [after the Turkish invasion of 1974 and subsequent socio-political issues] and the existence of a more stable liberal democracy as also required by Dryzek's (2013) framework. The period also encompasses notable points of governance change in Cyprus, such as accession to the EU in 2004, as well as the implementation of EU water legislation, such as the WFD (2000/60/EC) (Ker-Lindsay & Faustmann, 2009; Mirbagheri, 2010; Iacovides, 2011a). Ultimately, it was vital to interview a range of individuals [both past and present as well as active and retired] and gain secondary data covering a sufficient timeframe, to allow for a thorough understanding of water management and changing problem-solving responses.

4.3.2 Sampling

A purposive and snowball [or chain] sampling technique was used in terms of the twenty semi-structured interviews. This allowed for new information and perspectives relating to problem-solving and decision-making to be gathered, while also enabling the development of an interview network that was not linked to previous research (Arksey & Knight, 1999; Rubin & Babbie, 2010; Robson & McCartan, 2016). The technique was employed at first contact, with the relevant individuals of each key actor group, and was imperative for the development and expansion of the interview sample (Seidman, 2013; Robson & McCartan, 2016).

The purposive and snowball sampling technique was well suited in the context of Cyprus because of the relatively closed nature of the community and the characteristics of the political culture which favoured networking and contact recommendations (Seidman, 2006; Yin, 2011). Although a numerical sample limit for interviews was not defined at the start of the research, it was identified that additional interviews would be curtailed when new information was not forthcoming. In this case, the point at which the emergence of new information had failed to occur was identified when the repetition of themes and regularities became apparent in the interviewee descriptions of processes, activities, and events (Guba, 1978; Robson & McCartan, 2016). Establishing boundaries for network closure is a tried and tested research method,

especially in the case of interviews, with this offering a sufficient level of rigour despite concerns relating to the reliability and strength of findings that are gained from a small sample size (Minichiello, Aroni, Alexander, & Timewell, 1995; Baxter & Eyles, 1997; Patton, 2002; Seidman, 2006; Robson & McCartan, 2016). Indeed, Rubin and Rubin (2011) consider this concept of 'network closure' by suggesting that interviewees should be added to the survey sample until additional interviewees fail to contribute new information to what has already been found. At this point of closure through repetition [or saturation], the sampling process can be concluded (Laumann, Marsden, & Prensky, 1992; Patton, 2002; Engel & Schutt, 2014).

4.3.3 Triangulation and the importance of secondary data

By targeting individuals within a diverse range of actor groups it was possible to gain different perspectives on the approaches used by government when responding to water management problems. This allowed a deeper understanding of the existence [or absence] of characteristics associated with Dryzek's (2013) rationalities. These findings could then be compared with secondary sources to formulate a more detailed representation of problem-solving in Cyprus.

The method of primary data collection and comparison with other sources is defined as triangulation and provides an enhanced level of credibility and reliability for research findings (Patton, 2002; Flick, 2004; Robson & McCartan, 2016). Insights involving different perspectives and experiences that are guided by triangulation can help to reveal any inconsistencies in data, while potentially generating new questions that must be answered if our understanding is to be advanced (Denzin, 1989; Flick, 2009; Bazeley, 2017).

The triangulation of information enabled the enrichment of interview findings based on the identification of themes within the data. A range of secondary sources were used, including; government legislation; reports published by government ministries and departments, water and sewerage boards, non-governmental organisations, and EU institutions; parliamentary proceedings; the official government journal [defined as the 'gazette']; expert advisory board reports; public consultation reports; statistical data from the Cypriot government and the EU; privately commissioned research; as well as journal articles. In addition to these sources, newspaper media, particularly the Cyprus Mail, Cyprus Weekly, Phileleftheros, and Financial Mirror, were consulted for articles relating to management, governance, and EU legislation in terms of water, highlighted issues of scarcity and quality, as well as representations and rhetoric of water problems and responses. These were selected due to representing; the most widely

circulated English and Greek-language newspapers [Cyprus Mail and Phileleftheros]; the most popular weekly newspaper [Cyprus Weekly]; and the leading business and financial newspaper [Financial Mirror] (Vassiliadou, 2007; Whitten-Woodring & Van Belle, 2014).

By utilising the vast array of secondary sources alongside the interview data, the process of triangulation could be extended to provide a more robust set of findings (Hoggart, Lees, & Davies, 2002; Patton, 2002; Robson & McCartan, 2016). This process helped to form a more complete research picture by allowing the information gained from interviews to be confirmed [or refuted], while also enabling the researcher to explore any gaps in these responses (Denzin, 1989; Arksey & Knight, 1999; Flick, 2017). As Hodder (2000) states, other sources of information, such as written texts, are useful when seeking to gain other layers of information that may not be provided, either intentionally or unintentionally, through interviews.

It must also be noted that caution is necessary when using information from different sources (Denscombe, 2007; Flick, 2009; Bazeley, 2017). This is based on recognising that this information can be the result of individual assumptions, instead of different aspects of the same experience or event (Rubin & Babbie, 2010; Flick, 2017). To counter the potential for findings to be questioned because of their reliability, secondary information and the triangulation process is important in the context of this study to increase confidence in the overall results; while also limiting the negative aspects of 'intrinsic bias' that emerge as a result of singular methods, observations, or theoretical constructs, which are very much a part of this research (Denzin, 1989; Denscombe, 2007; Bazeley, 2017).

4.4 The interview process

A semi-structured interview method was adopted to provide flexibility during the data collection process (Galletta, 2013; Creswell, 2014). A general interview format was used to enable the interviewing of representatives from key actor groups (figure 4.4). This allowed exploration of the roles, attitudes, behaviour, and experiences of these actors, as well as gaining a better understanding of institutional responses regarding the approaches adopted by government when tackling water problems. All conducted interviews were started with a standard set of questions that were designed to put the interviewee at ease and identify specific responsibilities and roles in relation to decision-making and water management (King & Horrocks, 2010; Bell, 2017). Subsequent questions sought to gain information relating to the

experiences, perspectives, and behaviour of actors, with a view to establishing the presence of characteristics associated with each of the problem-solving rationalities.

Figure 4.4: Interview schedule - questions used to guide interviews

1. Please could you provide a brief summary of your career and different responsibilities within *[relevant government department / organisation / NGO etc]*
2. How do the responsibilities you have described relate to *water management / scarcity / quality / policy* in Cyprus – and more specifically in terms of the WFD?
3. What do you see as the most important objectives of *Cypriot government / the Water Development Department in responding to the issues of water scarcity and quality?*
4. What do you see as the most important objectives of the WFD?
5. What problems or conflicts have emerged due to *past and present government policy responses to water management / scarcity and quality?*
6. What problems or conflict has transposition of the WFD given rise to?
7. What factors or issues have influenced *government responses to water scarcity / implementation of policy / WFD?*
8. What factors or issues have influenced the transposition of the WFD?
9. What parameters of *water policy / management* have been problematic? And why have these been problematic?
10. What parameters of the WFD have been problematic? And why have they proven to be?
11. In your opinion, what are the most important entities / bodies / concepts that are recognisable in relation to the management of water scarcity and quality?
12. In your opinion, what are the most apparent or prominent structural features of water management / policy / management of scarcity and quality [E.g. the state is most important? - Experts and managers have most control? - Interactive political relationships with citizens involved? - Competition is most important with a management hierarchy based on expertise?]
13. In your opinion, who have been the key actors (individuals and/or organisations) responsible for the formation, development, and implementation of policy in Cyprus? And the management of scarcity / quality? [E.g. experts, managers, citizens, or politicians?]
14. In your opinion who have been the key actors (individuals and/or organisations) responsible for the transposition/implementation of the WFD?
15. In your opinion, what are the primary motives of these actors? [E.g. motives: public interest, a mixture of self-interest and multi-faceted public interest, or self-interest alone?
16. How have these key actors interacted with each other over time? Have there been any notable changes in how these actors have interacted with each other?
17. How has [organisation/department they are/were from] responded to *water scarcity and issues of quality on the island?* Have there been any notable changes in this response over time?
18. How has [organisation/department they are/were from] responded to the WFD? And have there been any notable changes in this response over time?
19. What factors or issues have affected the response of [organisation/department they were/are from] to *the formation, development, and implementation of policy in response to water scarcity and quality?* – And transposition of the WFD?
20. What factors or issues do you think have influenced how central government [and the water development department] has responded to *the formation, development, and implementation of water policy?*
21. What factors or issues do you think have influenced how government [and the water development department] has responded to the development & transposition of the WFD
22. In your opinion, do you think the political agenda of central government [and the MANRE / WDD] has impacted upon the formation, development, and implementation of water policy? – And upon the development and transposition of the WFD? – If so, in what way?
23. In your opinion, what has been the dominant form of governance style in the case of water policy in general – and more specifically in relation to scarcity and quality [e.g. regulation, a market approach, or a network/community approach]?
24. In your opinion, how effective have regulatory approaches been in managing water scarcity and quality issues? How could these be improved?
25. In your opinion, how effective have market-based approaches been in managing water scarcity and quality issues? How could these be improved?
26. In your opinion, how effective have community-based approaches been in managing water scarcity and quality issues? How could these be improved?
27. Do you think the WFD has had a beneficial impact upon water policy in terms of scarcity and quality?
28. What else do you think has had an impact on *water policy/management of scarcity and quality* in Cyprus?
29. In your opinion, what would improve the current situation in Cyprus with regard to the management of *water resources / scarcity and quality*?
30. Can you recommend anybody that you believe may be pertinent for me to interview in connection with my research?

The interview was administered using a face-to-face technique, which allowed each specific interview to be shaped in an appropriate way based on the information being provided [or not provided in some cases] (Galletta, 2013). Carrying out the interviews in person had distinct advantages, namely; being more personal in style allowing the interviewer and interviewee to gain trust in each other and build rapport; enabling the questioning process to be developed and expanded according to given responses; as well as affording a chance to consider interviewee reactions to specific topics through aspects such as facial expression, body language, and other gestures (Kitchin & Tate, 2000; Bell, 2017).

The semi-structured interview process allowed information to be obtained in relation to situations and topics that are not easily accessible (Robson & McCartan, 2016). The technique enabled the exploration of perceptions, attitudes, and values that together form underlying decisions, which may not be gained through other qualitative methods [such as single track observational approaches for instance] (Kitchin & Tate, 2000; Mason, 2002). The interview method is particularly effective and suitable in the context of policy analysis, where flexible components often exist, such as variable perceptions, attitudes, values, and factors such as socio-cultural constructs and politics that serve to influence decision-making (Robinson, 1998). This is particularly relevant in the case of exploring Dryzek's (2013) rationalities, due to the potential for these components to exist in practice through the characteristics associated with different types of problem-solving. The semi-structured interview method also facilitated the potential for a greater understanding of these components and characteristics, by allowing interviewers to probe, query, explore, and develop on given responses during data collection. This affords an opportunity for the discussion and further expansion of topics between the interviewer and respondent (Hitchcock & Hughes, 1995; Galletta, 2013; Bell, 2017).

The semi-structured approach is also particularly effective and appropriate in relation to policy studies as it avoids the limitations of strict and highly structured interviews. In many cases these strict interview formats do not permit the development of spontaneous questions that can be used to reply and build on unanticipated responses, or follow-up specific topics made relevant by the interviewee (Arksey & Knight, 1999; Ducros & Watson, 2002; Robson & McCartan, 2016). Therefore, a key advantage of the semi-structured interview process was the ability to provide freedom and flexibility, while also appreciating the complexity and variability of responses. This served to suitably frame the interview and prevent [or greatly minimise] the collection of untargeted, unwanted, or random data (Hoepfl, 1997; Fontana & Frey, 2000;

Robson & McCartan, 2016). Flexibility was vital when questioning interviewees on topics that highlighted the existence of characteristics associated with the problem-solving rationalities. For example, when discussing aspects of water management such as the application of EU legislation or desalination projects, the interviewer could shape the discussion towards exploring public consultation, which emerges as a characteristic of democratic pragmatism.

It is also important to note that several brief meetings and communications with individuals responsible for water management were also deemed necessary to identify appropriate individuals in a Cypriot context. This helped to validate key actors highlighted in the wider literature pertaining to water management in Cyprus. These meetings were particularly helpful when identifying unknown or retired individuals who were not apparent in the context of existing research [which was underdeveloped].

4.5 Data collection

Primary data were collected through the semi-structured interviews, thus providing a qualitative descriptive data type (Field, 2009; Robson & McCartan, 2016). The interviews [a total of twenty] were performed over a period of ten months, from December 2012 to September 2013, while they were often carried-out at offices or places of work in a range of towns that were relevant to the location of the given respondent. The interviews varied in length, ranging from the shortest at 43 minutes to the longest at 159 minutes, while they also averaged around 91 minutes (see appendix 2 for full details regarding the interviews). All raw data was recorded on a survey data log, with each interview being recorded using a speech audio recorder as well as detailed hand-written notes. Transcripts were subsequently produced for each interview. The combination of both audio recording and extensive hand-written notes was preferred as this helped to facilitate a more efficient and effective data collection [and interview] process (Seidman, 2013). Written notes were used to compliment all recorded material, for instance providing information regarding body language, facial expression, and important gestures, as well as being used to document key points and reports or items shown.

All the techniques used as part of the interviews were implemented to develop a relationship between the interviewer and interviewee, and thus facilitated a relaxed setting in which all required data could be extracted as part of the collection process (Bell, 2017). In the case of audio recording, this afforded the interviewer a freer and more relaxed role in the interview,

which in turn meant that the focus was not on note-taking but instead on developing the interview, building rapport, and asking appropriate follow-up questions to initial responses from the interviewees. Without the distraction of constant note-taking throughout the interview, the interviewer could be fully attentive to the interviewee, with many respondents commenting that a more relaxed atmosphere was created as a result. This created a feeling of a more open discussion rather than an interview under pressure, which further helped the interviewer to gain trust and encourage interviewee openness (Seidman, 2013). Although varied opinion on the audio recording of detailed interviews is noted (see Weiss, 1994; Patton, 2002), authors such as Briggs (1986) and Seidman (2013) argue that to accurately portray the words of interviewees, audio recording [if feasible] should always be used.

For the primary interviews, a purposive and snowball sampling technique was used to collect data. Twenty interviews were completed, and this was deemed a suitable benchmark when attempting to obtain a good representation of all key actor groups. However, this measure remained flexible based on the snowball technique, which dictated the need for new information or signalled if interview network closure had taken place and thus a sufficient number of interviews had been completed (Arksey & Knight, 1999; Patton, 2002; Rubin & Babbie, 2010; Yin, 2011; Robson & McCartan, 2016).

All secondary data relating to water management problems were collected from appropriate sources to represent topics such as; the water scarcity and quality issues in Cyprus; the implementation of EU legislation; the representation of topics in the parliamentary proceedings, government journal, and newspaper media; as well as the evidence of characteristics associated with Dryzek's (2013) rationalities. Various methods were used to gain a range of data types. For example, in the case of legislation, policy, parliamentary proceedings, and the government journal, data was collected both in terms of written notes as well as digital content via government archives [online and office-based]. In turn, secondary data sources consisting of newspaper media were collected via online databases and hard-copies in Cyprus. Finally, all secondary data was collected, ordered, and categorised [in a similar format to the primary interview data] within the context of the pre-defined research themes, with coded data being accumulated and categorised accordingly. These data were used to contextualise the primary interview data in terms of water scarcity, quality, and characteristics associated with each of Dryzek's (2013) rationalities.

4.5.1 Contacting the interviewees

To gain the trust, confidence, and support of prospective interviewees, an introductory letter/email was sent to all desired actor groups and potential respondents. This first point of contact was used to explain the thesis, achieved by providing an abstract, while also detailing the importance of the research and how the given respondent had been selected for potential interview (see figure 4.5 for introductory letter/email example). This letter/email varied according to the organisation, background, role, and actor group type of each prospective interviewee. The privacy and confidentiality of the interview was also reiterated, with potential respondents being invited to make contact and ask any questions pertaining to the research topic and the interview procedure. When an initial response failed as a result of the introductory letter/email, a subsequent letter/email was sent, or a telephone call was made to further explain the research and ease any concerns raised by the potential interviewee.

Figure 4.5: Example of introductory letter / email sent to potential interviewees

Dear ** *name of potential interviewee* **

I am currently undertaking doctoral level research at the University of Hertfordshire investigating government responses to the issues of water scarcity and quality. In particular, I am attempting to better understand how government in the Republic of Cyprus is responding to these issues, while also considering the applicability of an alternative conceptual understanding in this setting.

To help better understand and improve the policy and decision-making process [which is the foundation of a collective government response to the issues at hand], I will be interviewing people in Cyprus who have knowledge of government procedures, water management, or currently have [or have had] some level of involvement or responsibility for decision-making with regard to water management and the policy process. Therefore, it was with interest that I learnt of your role as ** *role* ** within ** *Department/Organisation* ** - and as recommended by ** *relevant name / contact* **
[*If the individual was recommended by another interviewee – this was also noted at this point]*

I would be honoured if you could spare some time to discuss the topic and subsequently be interviewed for my research. Please note that all discussions and interviews with regard to my research are treated as confidential with comments being made completely anonymous in the main text of the final write up of my research.

You will also find attached an abstract to my thesis, which will hopefully contextualise my research for you. If you are able to be of assistance in my research efforts I would be happy for you to suggest a date and location to meet, which will of course involve me travelling to Cyprus in the near future. Please do not hesitate to contact me at any time to discuss my research further.

I look forward to hearing from you soon and thank you for your time.

Yours sincerely,

Alexis Pericli
Postgraduate Research Student

The importance of undertaking a pilot study has been highlighted by a range of authors (see Arksey & Knight, 1999; Patton, 2002; Seidman, 2013; Robson & McCartan, 2016). As a result, a set of pilot interviews were performed to assess a range of interview characteristics, including; question suitability; interview timing; required follow-up topics or questions; and necessary adaptations to the interview format. An initial review of these preliminary results was undertaken to reflect on how the interview had progressed. Some key concerns emerged as a result of this evaluation, based on the fact that some respondents did not represent a suitable level of expertise and knowledge with regard to certain topics. Thus, the 'snowball' method was vital in identifying actors with appropriate knowledge, expertise, and experience on certain topics. It was also understood that the forced change in interviewee work and time demands, resulting from agreeing to meet and be interviewed, would have an influence on the time allocation given to perform the interview. This issue was mitigated by ensuring questions were prioritised or reorganised to gain the most out of each interview. This practice was deemed appropriate to further ensure that the respondent felt as comfortable as possible during the interview process (Flick, 2009; Bell, 2017).

The importance of researcher background

In terms of data collection, interview techniques, and contacting potential interviewees, the ethnicity and social identity of the researcher played an important role.

Firstly, in terms of contacting potential interviewees and arranging a mutually agreed meeting time, the process was often aided by an understanding of the Greek language and being more aware of socio-cultural norms when conversing via email and crucially via telephone [often in Greek]. In numerous cases, despite the introductory email being sent to the potential interviewee in English, an initial reply was given in Greek before subsequent communication took place in English. Therefore, without these language skills, the arrangement of interviews with certain key individuals would have been difficult or in some cases impossible.

Secondly, in relation to interview techniques, the use of the Greek language and knowledge of common social practices was important when first meeting with interviewees. This enabled the researcher to make the interviewee feel more comfortable, develop rapport, while also creating a relaxed atmosphere through wider conversation and the adherence of accepted norms that are necessary to avoid the possibility of offending the interviewee.

Thirdly, in terms of data collection and carrying-out the interview, the researcher's Greek-Cypriot heritage and knowledge of the Greek language was important. For example, the secondary data often required translation, as many sources of data were obtained in Greek with no English versions available. In turn, when undertaking the interviews, Greek language was used to converse with interviewees at certain points to translate specific words, phrases, concepts, definitions, events, or to generally clarify meaning. Ultimately, the Greek-Cypriot background and knowledge of language held by the researcher was useful in gaining access to senior actors and developing a suitable interview network.

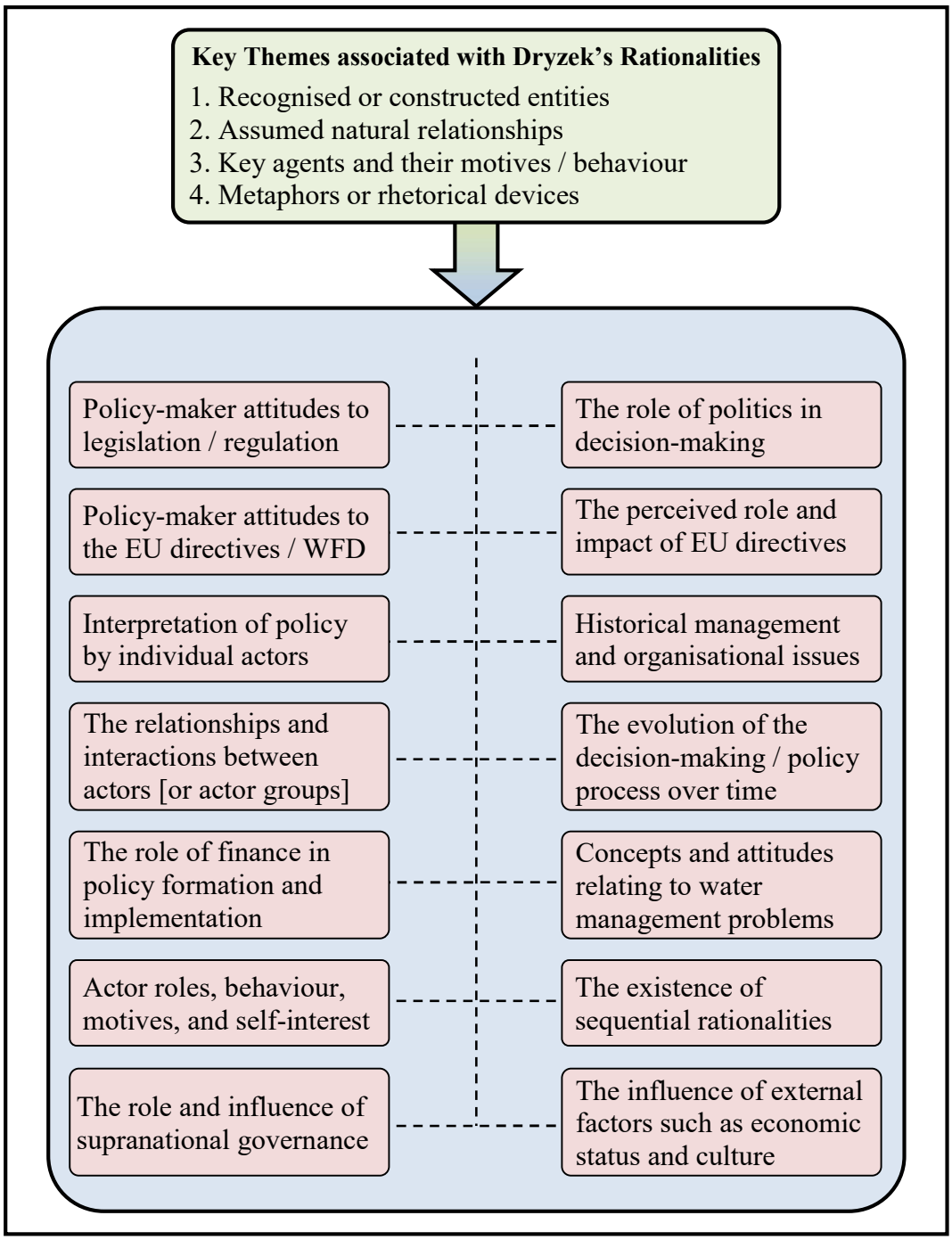
4.6 Data analysis

To test the applicability of Dryzek's (2013) rationalities, data were generated and analysed in relation to key themes that enabled the researcher to better understand government responses to water management problems. Research themes formed the basis of the interviews and were developed as a result of the discourse analysis themes and characteristics associated with Dryzek's (2013) rationalities. These involved; the administrative response of government; the main policy actors and their roles in tackling water scarcity and quality issues; the organisational and political factors that have influenced responses; the views, attitudes, experiences, and behaviour of actors involved in policy development and application; the extent to which policy goals have been achieved; as well as how policy and problem-solving responses have evolved and changed over time.

The primary data gained from interviews were accumulated in the form of detailed transcripts, with quotes and illustrative points being extracted for use within the thesis discussion. The interview and secondary data were evaluated using a content analysis that was pre-defined according to key research themes and content variables. For instance, these included; policy-maker attitudes to legislation; the interpretation of policy by individual actors; the perceived role and impact of EU legislation; the role of finance in policy formation and implementation; historical management and organisational issues; relationships and interactions between actors [or groups]; the evolution of the policy and decision-making process over time; concepts and attitudes relating to water problems, in particular scarcity and quality; evidence of sequential rationalities; the understanding of actor roles, behaviour, and self-interest; the role and influence of supranational governance; the importance of factors such as economic status and culture; as well as the role of politics in decision-making. Figure 4.6 outlines the key themes

associated with Dryzek's (2013) discourse analysis and rationalities, while the research themes developed as a result of expanding this knowledge, through exploratory and interpretative themes applied in terms of the data collection process, are also shown.

Figure 4.6: General research themes for data analysis (adapted from Dryzek, 2013)



The use of codes and categories reflected a core attribute of data analysis in terms of a grounded theory approach (Denscombe, 2010). The pre-defined themes were formed in a deductive way based on the discourse analysis themes identified and used by Dryzek's (2013) rationalities, with the pre-defined themes further expanded and developed through an interpretative and exploratory approach. The themes outlined by Dryzek's (2013) rationalities included; the recognised or constructed entities that are central to each response; the assumptions made within a given rationality regarding natural relationships; the key agents and their motives and behaviour that influence decision-making; as well as important metaphors or rhetorical devices used as part of a given response, which dictate the overall message and potentially influence those who oppose certain responses (Dryzek, 2013).

Although a range of guidance and advice exists in relation to the transformation of qualitative data [gained from interviews] into real-world findings, this process is not bound by a rigid set of rules and remains somewhat flexible (Robinson, 1998; Patton, 2002; Seidman, 2013; Robson & McCartan, 2016; Bell, 2017). Therefore, for this study, an interpretative, exploratory, and deductive approach was used to develop general research themes, thus making it possible to identify patterns and associations within the data. A deductive approach is relevant based on the presence of themes associated with Dryzek's (2013) rationalities and discourse analysis, which act as a starting point for assessing the existence and potential utility of the rationalities. Furthermore, interpretative and exploratory approaches were used to identify and account for emerging themes that became apparent during the data collection process and as a result of primary and secondary data findings.

Content analysis

A content analysis was undertaken to assess and highlight the research themes represented within the primary interview data and secondary forms of data. This process sought to organise and collate important material relating to pre-defined themes, with a view to identifying salient interview quotes and highlighting links between interviewee comments and the representation of topics by secondary sources (Seidman, 2013; Neuendorf, 2017). The content analysis technique offered a variety of advantages that were particularly relevant in the context of this research, such as; unobtrusiveness; being generally inexpensive to conduct; enabling a vast amount of data to be dealt with; as well as allowing the 'mining' of these data within a variety of sources according to pre-defined themes (Potter, 1996; Royse, 2008; Adler & Clark, 2011; Robson & McCartan, 2016).

The content analysis procedure involved the selective reduction of text and sound which was categorised to identify pre-defined words or phrases deemed to be indicative of the research themes [shown in figure 4.6], and generally in terms of topics such as; water policy and legislation; water management problems such as scarcity and quality; as well as EU governance influences (Weber, 1990; Krippendorff, 2013; Neuendorf, 2017). The aim of the analysis was to produce a measured count of the research theme categories and consider the representation of these by other relevant sources (Krippendorff & Bock, 2008; Adler & Clark, 2011). This form of analysis provided a qualitative summary of meaning (Potter, 1996), and aided the triangulation process to increase the robustness and integrity of the data (Flick, 2017).

The analysis of the interviews and other secondary sources was conducted using conventional methods and procedures, namely an integrative model (Weber, 1990; Krippendorff & Bock, 2008; Royse, 2008; Krippendorff, 2013; Neuendorf, 2017). Initially, all text was coded by the primary coder [researcher] in accordance with the general research themes and content variables that were pre-defined [by the researcher]. Each of the themes were highlighted within the given source and cumulated to provide an outcome of the characteristics of each source. This process was then performed and checked by a secondary coder [researcher's assistant] to verify the given outcome.

Applicability analysis

An applicability analysis was developed and performed to give a detailed comparison between the theoretical expectations of Dryzek's (2013) rationalities and the practical findings in Cyprus. This is shown in full within appendix 6, while being summarised in chapter nine as part of the thesis findings and conclusion. The analysis involved a direct comparison of expected characteristics and their existence or non-existence in Cyprus, with a scoring system used to evaluate the applicability of given categories. Ultimately, the applicability analysis underpins the discussion chapters that highlight the findings in Cyprus, while the technique also shares some similarities with the concept of multi-criteria analysis, which has been used to evaluate different variables and support decision-making (Belton & Stewart, 2002; Mateo, 2012). In this case, similarities include bringing different aspects together and comparing multiple attributes.

The importance of anonymity

As part of the data analysis process a system of anonymity was employed to comply with the confidential nature of the research, as agreed with all interviewees, and maintain the anonymity

of the individual actors. Specific respondents and attributed statements have only been indicated through the given individual's respondent number - for example listed as 'Respondent 1' [for comments/quotes] or 'Respondent 2, pers. comm., 2013' [for in text references]. This technique has been applied so that the comments given by an individual, used in the analysis and discussion sections, cannot be related or attributed to specific interviewees (listed in appendix 2), thus ensuring complete anonymity and maintaining the integrity of the researcher. This also complies with the ethics protocol of the study.

4.7 Conclusion

This chapter has outlined the methodology used to explore the applicability of Dryzek's (2013) rationalities and investigate government responses to water problems in Cyprus. This has been carried out through the selection of a case study focused on Cyprus, which represents a small, Mediterranean, and peripheral EU nation. An approach based on grounded theory, with deductive and exploratory elements, has been applied to this research, while a qualitative semi-structured interview was selected as the most appropriate method for data collection to offer insights into the specifics of problem-solving through actor behaviour.

The chapters following this methodology seek to improve understanding of government responses to water problems in Cyprus, as generated through the collection, analysis, and representation of primary interview data and secondary resources. This discussion is formulated and expressed using the research themes identified in figure 4.6, which have been expanded and developed from the discourse analysis themes within Dryzek's (2013) rationalities. As a result, the discussion has been separated into five chapters, with the research themes and discourse format being a part of these. Chapter five sets the scene by considering the historical management of water problems in Cyprus and associated organisational issues that have shaped government responses. Then, chapter six, chapter seven, and chapter eight explore the existence of administrative rationalism, democratic pragmatism, and economic rationalism in practice, through evidence of characteristics associated with each of the rationalities. In turn, chapter nine builds on this discussion by considering the applicability of the rationalities and recognising important emerging themes that have been generated by the research.

Chapter 5: Water Management in Cyprus

5.1 Chapter overview

This chapter seeks to develop understanding of how government in Cyprus has managed water and how responses have changed over time. This is explored in three sections following a format of; identifying the water management problems in Cyprus; considering the approaches used by government when responding to these problems and how these have evolved over time during phases of management; as well as highlighting the organisational structures of the water sector that have helped to facilitate the identified responses.

The first section explores the water problems observed in Cyprus. These have been categorised in terms of availability and quality, which reflect the main categories of water management as identified in chapter two. In Cyprus, a range of inherent and imposed problems have been evident according to the findings, namely; scarcity; the threat of drought; groundwater over-consumption; illegal boreholes; and quality issues such as saline intrusion of coastal aquifers.

The second section considers the approaches used by government when managing and tackling water management problems. In this case, water management responses [since independence in 1960] can be viewed in terms of three key phases based on the findings. These phases are separated according to important periods that form a timeline. The first phase [from 1960 to 1990] involves the management responses after independence and focuses on the expansion of supply through the development of infrastructure and the emergence of demand management specifically through metering. This phase has been selected as it allows for a sufficient period before and after the 1974 occupation [14 years from 1960 to 1974 and 16 years from 1974 to 1990] to analyse management changes and policy development, while also giving a suitable period after occupation for the socio-political situation to stabilise. The second phase [from 1990 to 2004] considers the period during which government sought to further develop demand management, while applying alternative infrastructure technologies such as desalination and water recycling. The third phase [from 2004 to 2014] focuses on approaches that have involved a mix of supply and demand management, and have included; the development of water-saving campaigns; tackling long-term issues such as drought, groundwater over-abstraction, and illegal boreholes; as well as adjusting to changes that have resulted from EU accession such as the development and use of participatory approaches and more integrated water management.

The third section outlines the organisational structure of the water sector in Cyprus and identifies the key responsibilities of management. This identifies the different departments, bodies, and actor groups that have been responsible for the provision of services. Three levels of organisation and responsibility are discussed, namely; policy; executive; and consumer levels. These have been defined by government according to the groups involved at each level.

5.2 Water management problems

Water management problems in Cyprus have reflected the key aspects of availability and quality as considered in chapter two. In terms of availability, a range of problems have been identified, namely; limited resources and scarcity; the major threat of drought; a dependence on rainfall and groundwater; a stepped drop in precipitation in the 1970s; as well as unlicensed boreholes and the over-pumping of aquifers. In terms of quality, problems have been highlighted such as; groundwater deterioration; saline intrusion of coastal aquifers; as well as point-source and diffuse pollution pressures caused by municipal wastewater, industrial and livestock waste, mining, rainwater runoff, desalination, and agricultural activities. These problems have been noted in Cyprus by previous research (see Demetriou & Georgiou, 2004; Aletraris, 2010; Iacovides, 2011b; Sofroniou & Bishop, 2014), while also being highlighted in small, Mediterranean, and peripheral EU nations, for example in the case of; scarcity in the Mediterranean and EU (Holst-Warhaft, 2016; Garrote, Iglesias, & Granados, 2018), drought issues in Italy (Di Matteo *et al*., 2017), groundwater over-abstraction and agricultural water management in Malta (Hallett *et al*., 2017), as well as point, non-point, and groundwater pollution issues in Greece (Stamatis *et al*., 2011; Gikas, 2017).

More specifically, Cyprus is argued to have limited water resources that must be managed carefully in terms of existing and emerging pressures, such as population growth, climate change, and the increasing demands of agricultural, domestic, and tourism sectors (Iacovides, 2011a; Sofroniou & Bishop, 2014; Naukkarinen, 2015). Research on water problems, policy, and management has focused on a range of topics. These include; agricultural water use and associated impacts; water scarcity; groundwater and drought management; the analysis of supply infrastructure; the feasibility of desalination; water ecosystem management; consumer attitudes and demand; water pricing and subsidies; potential impacts of climate change; as well as the implementation of EU legislation (see Charalambous *et al*., 2001; Iacovides, 2011a; Koundouri & Birol, 2011; Socratous, 2011a; Tsiourtis, 2001; Demetriou & Georgiou, 2004;

Stedman, 2012; Polycarpou & Zachariadis, 2013; Sofroniou & Bishop, 2014; Kossida *et al*., 2015; Loucaides & Koutsakos, 2015; Zachariadis, 2016; Hoffmann, 2018).

The water management problems facing Cyprus can be further separated in terms of inherent and imposed issues, which sit within the categories of availability and quality. In this case, it is argued that the different water management problems can be categorised. This has been achieved through the definition of issues argued to be 'inherent' to the given setting based on variables that cannot be realistically changed, and issues that are deemed to be 'imposed' due to having an existence that is changeable but dependent on human activities and behaviour. For example, inherent issues exist such as an arid/semi-arid climate, geographical location, and the spatial separation of supply and demand (Iacovides, 2011a). These variables cannot be feasibly changed or controlled, and thus they are inherent based on their permanent existence (Pereira, Cordery & Iacovides, 2009). In turn, imposed issues are evident and include variables such as; increasing domestic and agricultural demand; the overuse of groundwater; a decline in water quality; a limited supply capacity; as well as the increasing burden of irrigation for agriculture (Iacovides, 2011b). These are dependent on human practices and thus remain changeable.

5.2.1 Water scarcity and quality

Water problems in Cyprus have been fundamentally based on availability and quality. Water scarcity [availability] is considered an inherent problem and vulnerability as a result of factors such as limited precipitation inputs, drought, and spatial disparity between supply and demand (Iacovides, 2011a). Although geographical location is a key variable that is inherent, scarcity remains a complex management problem that may be intensified or diminished as a result of many other variables, such as human behaviour, demand, and a limited supply system capacity; thus, it is not merely dependent on location (Pereira *et al*., 2009; Cook, 2017).

Water quality is deemed to be an issue of less concern in Cyprus based on a more limited history of polluting activities such as high intensity agriculture or heavy industry (Iacovides, 2011b). There is an interpretation regarding semi-arid countries that questions whether water quality can be considered a problem, because of the often over-dominant issue of scarcity (Seth, 2003; Karousakis & Koundouri, 2006; UNESCO, 2009). This is evident in Cyprus, as when quality is compared directly with scarcity, it is typically deemed to be a secondary issue. Nevertheless, with increasing pressures on water resources, quality has emerged as an important challenge based on aspects such as groundwater exploitation, quality decline resulting from the

saline intrusion of coastal aquifers, as well as the concept of quality-scarcity (Pereira *et al*., 2009; Cech, 2010; Iacovides, 2011a; Gregor, 2013; Boyd, 2015).

The problem of drought

Many respondents claimed that Cyprus had often experienced drought alongside the long-term situation of scarcity. This agreed with research based on historical annual rainfall data [gained between 1916 and 1974], showing that dry years [390-470mm of annual rainfall] and very dry years [390mm of annual rainfall or less] were expected once every four or five years (Iacovides, 2011a). Since a stepped drop in rainfall, observed during the late 1970s, more frequent and long-lasting droughts have adversely impacted water resources primarily in terms of acute scarcity (WDD, 2009; Myronidis *et al*., 2018).

All respondents identified the management problems posed by drought events. These were understood in terms of social, economic, and environmental impacts. Social impacts were noted through negative implications for both public health and quality of life (Respondent 16, pers. comm., 2013). Economic impacts were highlighted through the emerging financial costs of management and the effects of drought on general practices and the economy (Respondent 8, pers. comm., 2013; Hoffmann, 2018). Environmental impacts were considered in terms of; limited quantities of available water for ecosystem requirements; as well as the over-abstraction of groundwater that exacerbated the problem of saline intrusion in coastal aquifers (WDD, 2009; Iacovides, 2011a; Sofroniou & Bishop, 2014; Papadaskalopoulou *et al*., 2015a).

Groundwater scarcity and quality issues

Groundwater was noted as the primary resource for agriculture and a significant component of domestic water supply (table 5.1). It has been an over-exploited resource and constitutes approximately 48% of the demand value for overall water use, thus causing protection of groundwater to emerge as a vital aspect of water management for government and the economy because of the requirements for agricultural, domestic, and services sectors (Iacovides, 2011a). Alongside changes in weather, climate, and infrastructure, user activities were noted to have affected groundwater. For example, increased demand by the tourism industry has had an adverse effect on consumption, while the agricultural sector has been responsible for pollution outputs as well as the abstraction of large quantities of groundwater that have exceeded the amount required for natural aquifer recharge and sustainable usage (Demetriou & Georgiou, 2004; Respondent 9, pers. comm., 2013).

Table 5.1: Water demand by sector and sources of supply (Iacovides, 2011b)

Sector / Total	Surface Water		Groundwater		Springs		Desalination		Total	
	Million m^3	(%)	Million m^3	(%)	Million m^3	(%)	Million m^3	(%)	Million m^3	(%)
Agriculture	82	45	100	55	-	-	-	-	182	68
Domestic	15	22	16	24	4	6	33	48	68	26
Industry	-	-	3	100	-	-	-	-	3	1
Environment	5	42	8	58	-	-	-	-	13	5
TOTAL	102		127		4		33		266	100
Percent (%)	38		48		1		13		100	

Many respondents identified groundwater over-abstraction as a major problem in Cyprus. This was related to unlicensed [illegal] boreholes as well as more generally to scarcity and quality issues (Respondent 1, pers. comm., 2013). It was argued that groundwater over-abstraction had become more prominent as the WDD sought to gain greater control of boreholes by monitoring all types of abstraction through a permit and license scheme. The scheme was first developed through the Wells Law (Cap. 351) in 1961, however enforcement was very limited thus causing the law to be further developed in 2002 and more strongly enforced since 2010 because of the Integrated Water Management Law [79(I)/2010] (Georgiou & Dörflinger, 2002; Demetriou & Georgiou, 2004; Respondent 3, pers. comm., 2013; Sofroniou & Bishop, 2014).

The unlicensed abstraction of groundwater has had a significant impact on both water scarcity and quality (Sofroniou & Bishop, 2014). In terms of scarcity, ongoing unmonitored abstraction has led to substantial overuse and exploitation of resources (FAO, 1997; WDD, 2002; Iacovides, 2011a; Respondent 14, pers. comm., 2013). In terms of quality, long-term exploitation and over-abstraction has led to the saline intrusion of coastal aquifers, thus causing a decline in quality that is difficult to remediate (FAO, 1997; Iacovides, 2011c; Milnes, 2011; Respondent 6, pers. comm., 2013). The following quote recognises the significance of this issue, the extent of over-abstraction, as well as the challenges caused by a decrease in quantity and a decline in quality because of saline intrusion.

> *"The groundwater resources of Cyprus are over-pumped every year by 40% over the allowable safe yield. This results in a continuous decline of the groundwater level, the depletion of reserves and the rapid and continuous expansion of the areas of the aquifer that are destroyed by sea intrusion."* (Efthimiou, 2003)

Furthermore, it was also argued that water quality issues in Cyprus have emerged primarily in terms of groundwater, with a decline in quality occurring as a result of point-source and diffuse pollution pressures, as well as the increasing problem of saline intrusion in coastal aquifers

(Demetriou & Georgiou, 2004; INECO, 2009; Respondent 14, pers. comm., 2013; Sofroniou & Bishop, 2014). Inadequate precipitation inputs and seasonal river flows have meant that surface-water pollution has been limited and less of an issue for government (Respondent 14, pers. comm., 2013). This does not suggest that controls for surface-water pollution problems have not been undertaken, indeed they have for the control of agricultural outputs (WDD, 2013). However, the prioritisation of groundwater as an important supply input has caused the resource to experience greater pressure, while becoming a focus in terms of water management (Iacovides, 2011a; Papadaskalopoulou *et al*., 2015b). As noted by the following comment, the type of serious water pollution observed in other European nations, which has been associated with surface-waters and often caused by heavy industry, has not been experienced in Cyprus.

> *"We don't have serious river pollution such as other northern European nations.... what we have here is seawater intrusion and groundwater problems. That is our big issue. Some pollution problems arise from the use of nitrates in agriculture [pig farms and use of fertilizers] ...so okay nitrates are there.... but these can be managed....and you cannot compare any of these to the scarcity problem."* (Respondent 1)

The quality-scarcity issue

The concept of quality-scarcity was identified by respondents and related to groundwater. This has involved a decline in water quality that has in turn caused a decrease in quantity, thus invoking greater scarcity (INECO, 2009). The problem develops in a cyclic format, with a greater ongoing decline in quality further driving a decrease in the availability of good quality water, and thus causing a greater risk of increased scarcity (Zeng, Liu, & Savenije, 2013).

In Cyprus, it was argued that scarcity, over-abstraction, increased demand, and more frequent drought events have reduced the replenishment of groundwater, while the widespread construction of reservoirs also impacted the recharge of downstream aquifers (INECO, 2009; Respondent 10, pers. comm., 2013). These variables, alongside changes in usage patterns, have led to the decline of groundwater resources both in terms of quantity and quality. In turn, this has led to the depletion of inland aquifers, the deterioration of large coastal aquifers, and ultimately the issue of quality-scarcity (Respondent 1, pers. comm., 2013). The following comment highlights the concept of quality-scarcity in Cyprus by noting that sea-water intrusion in coastal aquifers has instigated a greater risk of scarcity due to an ongoing decline in quality, which in turn has reduced the amount of good quality groundwater available for supply or environmental requirements.

> *"Over-exploitation of our groundwater aquifers....and for coastal aquifers the seawater intrusion.....which actually can cause more scarcity because of lower quality. For this.... the more salinity you have the less good quality and usable water you have in the aquifer....so it is like slowly poisoning and polluting it by changing the natural balance...[...]...so for quality.... the main issue is groundwater."* (Respondent 6)

5.3 Water management responses

As discussed in chapter two, water resources in general have often been managed through approaches based on availability and quality (Gleick, 2000; Biswas, 2008; Anisfield, 2010). Water management in Cyprus can be fundamentally categorised according to these two aspects, and a timeline of activity is used to reflect how water problems relating to scarcity, drought, and groundwater quality have been tackled. The timeline has been distinguished in terms of three broad phases, which have emerged in succession and have been separated according to important time periods, namely; phase one from 1960 to 1990; phase two from 1990 to 2004; and phase three from 2004 to 2014. This interpretation is also useful when understanding how responses evolve, and ultimately when considering Dryzek's (2013) understanding of how the problem-solving rationalities change over time [explored in chapter nine].

5.3.1 Phase one of water management [1960-1990]

The first phase of management from 1960 to 1990 involved the responses that emerged soon after independence. This was primarily focused on the expansion of supply through the development of infrastructure, particularly dams and reservoirs, as well as the emergence of demand management approaches through metering (Hoffmann, 2018). As noted, the period was selected as it allows for sufficient time before and after the 1974 occupation, while also giving a suitable period after occupation for the socio-political situation to stabilise.

The expansion of supply

Many respondents claimed that the expansion of supply had been a long-standing objective of government, with the legacy of this approach evident through the vast number of dams and reservoirs that have been built on the island (Respondent 1, pers. comm., 2013). This was validated by previous research, as Cyprus has had one of the highest levels of dam development relative to land area (see Stefanou & Kyrou, 2006; Koundouri & Birol, 2011).

After gaining independence in 1960, the newly formed government [a centre group led by president Makarios] sought to develop water supply infrastructure such as dams, reservoirs,

pipelines, and conveyance facilities [see figure 5.1 and figure 5.2]. This aimed to encourage socio-economic development and address the problems of scarcity, supply shortages, and interval drought periods (Christophorou, 2009; WDD, 2009; Iacovides, 2011a). Water meters were also introduced during this phase as part of infrastructure development based on plans formed by the British who ruled prior to 1960 (Respondent 1, pers. comm., 2013). This represented an approach of supply and demand management in tandem. The existence and procedure of supply management after independence was typified by the following comment.

> *"The Republic was formed in 1960 and the first priority was to gather water....to build dams and reservoirs to have enough quantity.... [...]...From the 1960s to early 1990s the focus was on supply approaches.... pipes, dams and these things."* (Respondent 5)

Figure 5.1: Map showing the dams of Cyprus alongside photographs of the two largest capacity dams/reservoirs - the Kouris [115,000,000m^3] and Asprokremmos [52,375,000m^3] (Kyrou, 2005; WDD, 2009; WDD, 2015)

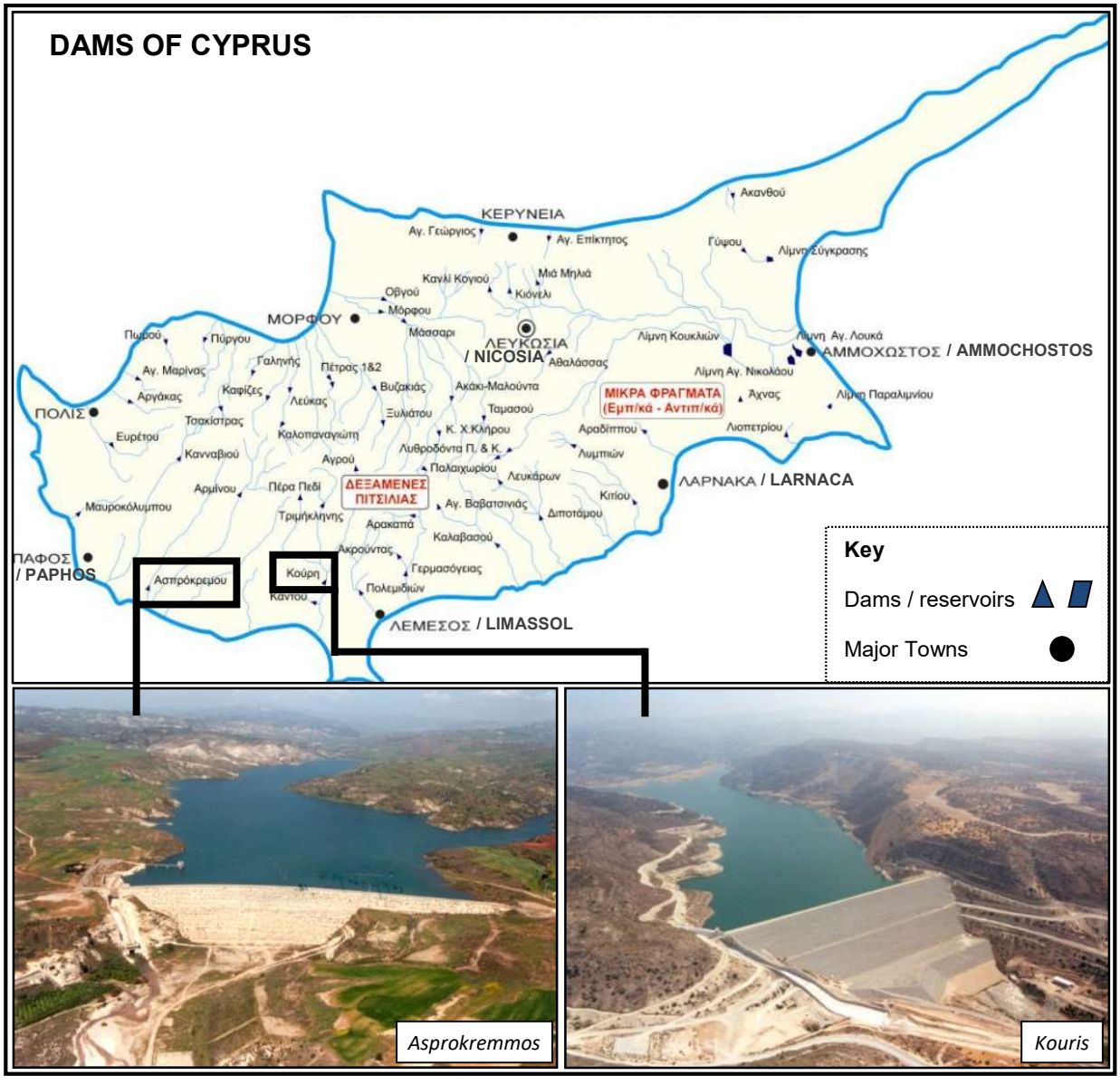
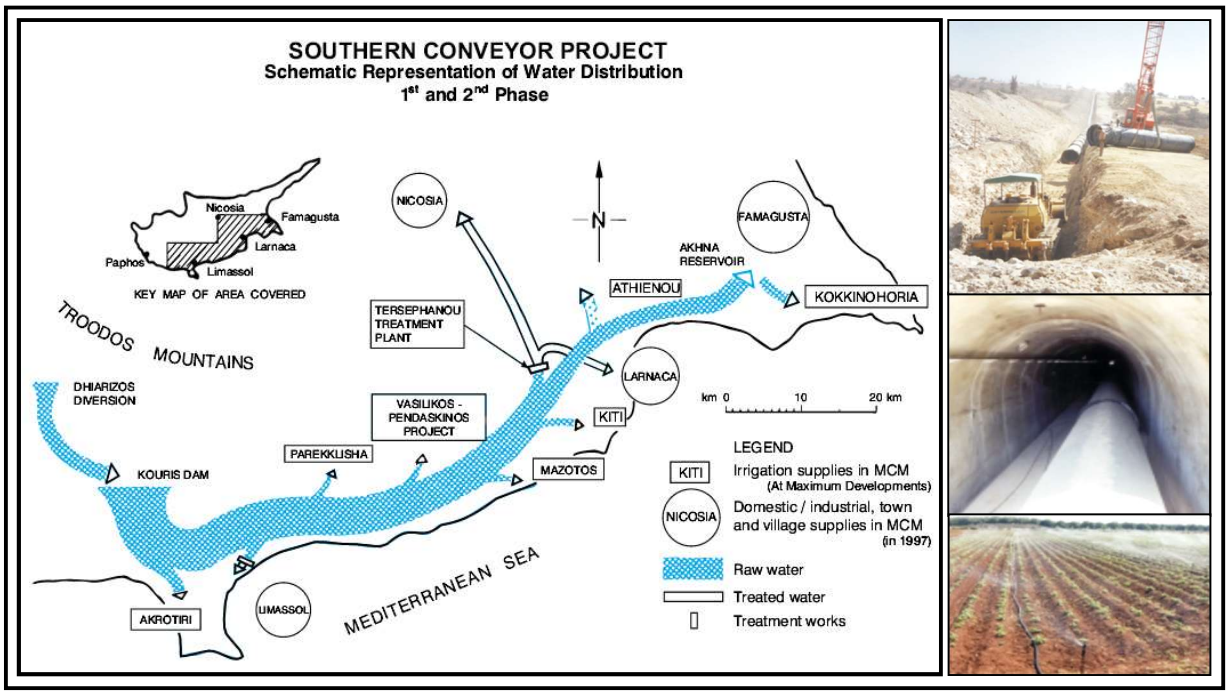


Figure 5.2: The southern conveyor water transfer and distribution project; Phase I [1984-1994] involved main dam and conveyor construction, plus the development of irrigation systems. Phase II [1988-2002] involved the construction of diversions, water treatment plants, and further expansion of irrigation systems (WDD, 2000)



During the first phase of management, the government rhetoric used offered an insight into the administrative response during this period. The campaign of 'not a drop of water to the sea' was made prevalent, through booklets and media, and was linked directly to the extensive construction of dams and reservoirs (WDD, 2009; Respondent 1, pers. comm., 2013; Sofroniou & Bishop, 2014). This slogan represented a philosophy of trying to maximise the capture of run-off and gaining as much water as possible from rainfall to store in the dams/reservoirs, thus literally not allowing a drop to reach the sea (IBP, 2012). As illustrated by the following quote, maximising supply capacity was the primary objective for government and the WDD during the period after independence, with this based on the collection and storage of water gained during seasonal rainfall periods (Respondent 7, pers. comm., 2013).

> *"In the past we tried to construct many dams and reservoirs. The policy we had then was 'no drop of water to the sea'.... that was the philosophy....to take advantage of seasonal rainfall. This was the main axis of policy for the WDD....and it represented the idea of really maximising the supply component...."* (Respondent 3)

The majority of respondents suggested that although dam/reservoir construction was beneficial for increasing supply capacity, the actual size, number, and in some cases location of these had been problematic (Respondent 8, pers. comm., 2013). The development of the dams/reservoirs was argued to have been optimistic, with respondents suggesting these were far too widespread

and over-sized relative to rainfall inputs observed at the time (Respondent 18, pers. comm., 2013). The dams/reservoirs [and the 'not a drop to the sea' policy] were subsequently claimed to have failed when attempting to solve the scarcity issue, as ongoing scarcity was still a major issue and primary management challenge (Iacovides, 2011b; Hoffmann, 2018), while these approaches have also been unsuccessful in stopping the exploitation of groundwater especially by the agricultural sector (Sofroniou & Bishop, 2014; Papadaskalopoulou *et al*., 2015a).

The perceived limitations of the dam/reservoir expansion programme have also been closely linked to decreases in precipitation, which were observed since the 1970s (Donta & Lange, 2008; Iacovides, 2011a; Respondent 1, pers. comm., 2013). A stepped reduction had meant that many of the reservoirs were built with an expected capacity much greater than the quantities of water received (Respondent 8, pers. comm., 2013). As a result, the changes in precipitation inputs meant that the reservoirs have been less effective than originally anticipated, while the exploitation of groundwater has continued partly because of these limitations and the insufficient water supply relative to demand (Respondent 12, pers. comm., 2013).

A disparity between scarcity and quality

The focus on supply expansion also meant that issues related to water quality were poorly represented during the first management phase (Iacovides, 2011a; Respondent 1, pers. comm., 2013). A disparity between scarcity and quality was identified as an important aspect of management by respondents. It was argued that despite the importance of both issues, scarcity has been the primary concern for government, while the need for a response to water quality issues had emerged since the recognition of groundwater quality decline, the completion of water treatment plants, and EU accession (WDD 2002; Respondent 13, pers. comm., 2013; Respondent 20, pers. comm., 2013; EuroStat, 2016). In this case, three factors were argued to have contributed to the disparity between scarcity and quality.

Firstly, the need to establish sufficient availability for socio-economic development has historically been the primary water problem for government, with this being intensified by socio-political changes caused by occupation of the northern region (Brouma & Ezel, 2011; Iacovides, 2011a; Respondent 8, pers. comm., 2013). In this case, a complex socio-political setting exists because the administration of the island has been divided, and political issues influenced the management of shared resources (Faustmann, 2009). This relates to the dispute between the Republic of Cyprus and Turkey regarding the occupied northern region of the

island, which resulted from Turkish invasion in 1974 (Ker-Lindsay & Faustmann, 2011). According to many respondents, these dynamics have had a bearing on water problems, namely in terms of; increased demand in the southern region; changes in population density, water usage patterns, and agricultural land use; as well as the limited management of scarcity and pollution in the occupied northern region, which has impacted shared and cross-border groundwater resources (Respondent 2, pers. comm., 2013; Respondent 17, pers. comm., 2013).

Secondly, the public, political, and management focus on scarcity has increased as a consequence of drought events, which have greatly affected domestic supply and impacted the economy through water shortages for agriculture and industry (Koundouri, Birol, & Ezel, 2011; Respondent 8, pers. comm., 2013; Sofroniou & Bishop, 2014).

Thirdly, issues specifically related to water quality have been limited due to a lack of heavily polluting industries or agricultural activities (Respondent 14, pers. comm., 2013). As a result, the management of this type of pollution has been less of a focus (Charalambous *et al*., 2011; Sofroniou & Bishop, 2014). For example, the following comment highlights how government has primarily dealt with the issue of scarcity, which contrasts with the response of central and northern European countries that have instead needed to focus on quality (Albiac, Mema, & Calvo, 2009; Tanik, 2010).

> *"In the modern and northern European countries....their basic problem is quality and water pollution....heavy metals and all sorts of things....[....].....In Cyprus we don't have such issues really. Our problem is the quantity which is very well known.....our scarcity issue is much more serious."* (Respondent 1)

5.3.2 Phase two of water management [1990-2004]

The second phase of management from 1990 to 2004 considers the period during which the government sought to develop demand management and further expand supply approaches, to respond to ongoing scarcity and emerging water quality issues. This has involved a range of approaches. Firstly, the development of demand management through; water-saving measures, public awareness campaigns, further expansion of metering, subsidies, and also drought rationing. Secondly, the development and expansion of existing infrastructure for supply, namely dams and conveyance facilities, as well as the application of improved irrigation systems focused on greater efficiency. Thirdly, the implementation and use of alternative infrastructure technologies, such as desalination and wastewater reuse/recycling. These approaches are explored in the following sections.

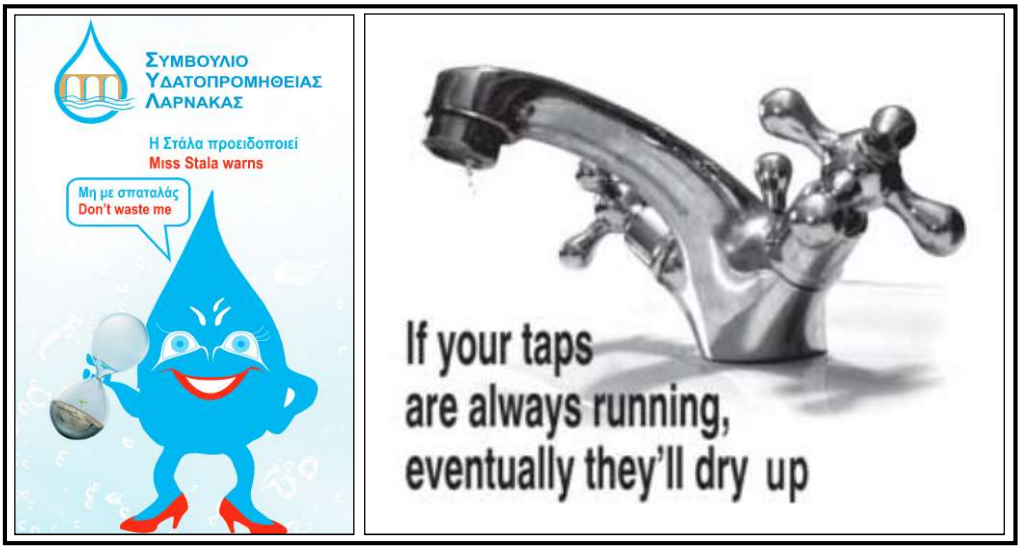
The development of demand management approaches

As noted in chapter two, demand management often emerges as a response to the limitations of supply-based management (Gleick, 2000). In Cyprus, this process has been evident during a period in which the WDD, and associated service providers such as the water boards, consciously sought to develop demand-side techniques (Respondent 13, pers. comm., 2013). This follows on from initial metering efforts during phase one of management, and has involved water-saving measures, public awareness campaigns, further expansion of metering, subsidies for saving water, and rationing in times of drought (Aletraris, 2010; Sofroniou & Bishop, 2014; Kossida *et al*., 2015). According to respondents, these techniques have been applied to reduce demand for water and ease the issue of scarcity (Respondent 18, pers. comm., 2013). As typified by the following comment, a shift in approach and policy was observed from a focus mainly on supply expansion towards one that was based on demand-side management.

> *"In the past our policy was to satisfy demand through increasing and expanding supply. In other words.... demand was increasing so we tried to find more water to satisfy that growing demand. But then.... our policy changed and we tried to minimise demand by using more efficient ways..... for example water saving measures."* (Respondent 6)

Demand management techniques have been evident through a range of examples, notably the use of different awareness campaigns by the WDD and the town water boards [see figure 5.3]. These have been communicated through events, leaflets, posters, and advertisements, which have sought to offer general advice on more efficient practices and encourage greater education in schools and more widely within communities and municipalities (WDD 2002; LWB, 2015). This also represents a sign of democratisation, in which public participation, education, and the integration of methods at community level have been evident when trying to manage demand.

Figure 5.3: Water-saving awareness campaigns (WDD, 2002; LWB, 2015)



Alongside the use of water-saving measures and awareness campaigns, the expansion and development of water metering for both residential users and the agricultural sector [the two highest water-consuming sectors in Cyprus] has been a key component of the demand-side response (Respondent 6, pers. comm., 2013). It has been claimed that metering enabled the WDD and water boards to more effectively monitor usage, manage unaccounted water losses resulting from leakage within the distribution network, and mitigate increasing demands (Aletraris, 2010; Respondent 7, per. comm., 2013). Although metering was evident during phase one of management, the following comment exemplifies the further development and expansion of the method as part of a response to the limitations of supply-side responses.

> *"When we realised that building dams was not enough.... then we looked into the issue of economising water.... metering etc.....and I have to say that in this respect we have done a lot of work and that is one of our success stories. It has developed over time from initial metering schemes to widespread application"* (Respondent 1)

Domestic subsidies were also applied as part of the development of demand management approaches. These focused on preserving good quality potable water and included subsidies for; the installation of water recirculation systems; the development of boreholes for garden water usage; the connection of boreholes with toilet cisterns; as well as residential grey-water recycling systems (Charalambous *et al*., 2011; Kossida *et al*., 2015). In particular, respondents noted that the development of domestic boreholes for household water supply occurred despite growing concerns of aquifer depletion, quality decline caused by sea-water intrusion, and the effects of drought conditions (Respondent 1, pers. comm., 2013; Respondent 14, pers. comm., 2013). As shown by the following quote, subsidies were used by government and the WDD to reduce demand for good quality potable water and encourage household users to develop and gain water from localised boreholes. However, this further exacerbated the issue of groundwater over-abstraction, while the idea also opposed the rhetoric communicated by the WDD, which claimed that groundwater depletion and saline intrusion remained serious problems that were worsened by using boreholes.

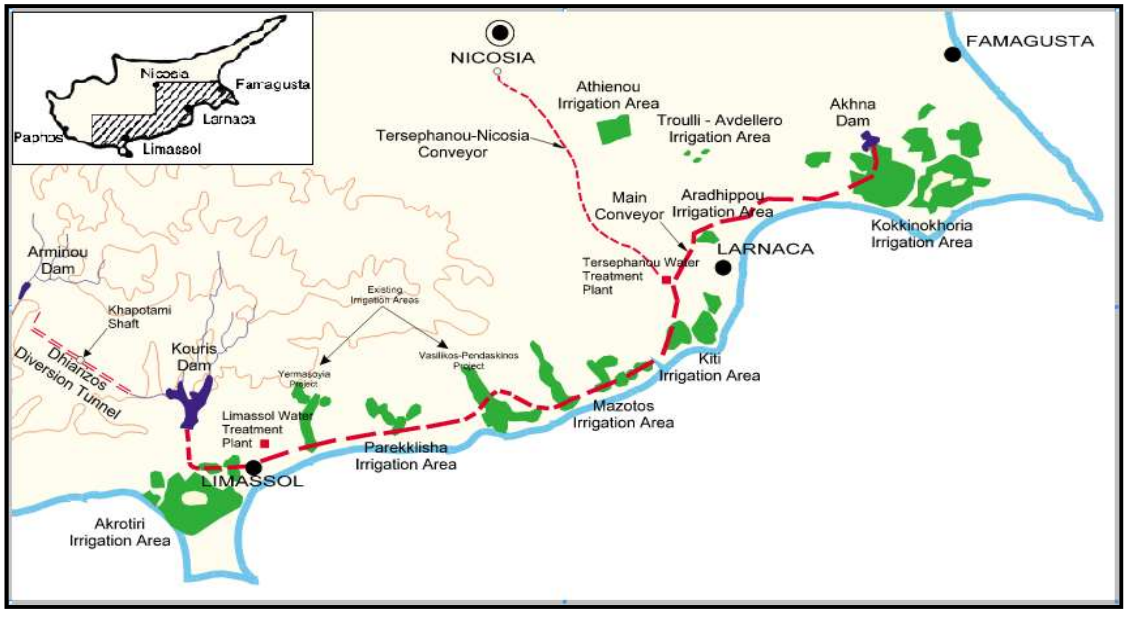
> *"The Water Development Department defended its decision to increase subsidies for drilling boreholes despite the drought, arguing that using borehole water to supply gardens, swimming pools and toilets saved valuable drinking water. Paradoxically, however, the Department confirmed that the drying up of underground water reserves and the dangerous infiltration of sea water remained a grave reality in Cyprus and that the problem was exacerbated by boreholes."* (Hassapi, 2009)

The development of existing infrastructure and improved irrigation systems

As the problem of scarcity was not solved after the first phase of management the government sought to expand on previous supply-side responses. In this case, respondents noted that in addition to demand-side responses, the government turned to the development of existing infrastructure to further increase supply capacity and manage increasing demand for agricultural activities, residential use, and a growing tourism industry (Respondent 3, pers. comm., 2013). This was evident through the ongoing construction and development of dams/reservoirs, treatment plants, and conveyance facilities (Aletraris, 2010; Iacovides, 2011a).

The need for improved irrigation systems also became evident based on the large and increasing demand for water generated by the agricultural sector and the expansion of irrigated crops (Respondent 4, pers. comm., 2013). According to some respondents, the greater pressures for water caused by agricultural demand could be attributed to the arrival of many farmers from the north after the Turkish invasion and subsequent partition of the island in 1974 (Respondent 1, pers. comm., 2013; Respondent 3, pers. comm., 2013). Furthermore, it was argued that improvements in irrigation systems were facilitated by the southern conveyor project [figure 5.4]. This was the first major inter-basin distribution system implemented to transfer water from the western dams and reservoirs of the Troodos region to the eastern Kokkinohoria area of the island (Respondent 17, pers. comm., 2013). The southern conveyor provided more water for residential usage in the capital city of Nicosia and other large urban areas such as Limassol and Larnaca, while also distributing water to the primary agricultural and irrigation areas (Hunt, 2004; Iacovides, 2011a; Respondent 6, pers. comm., 2013 Smith, 2014).

Figure 5.4: The southern conveyor network and irrigation areas (WDD, 2000)



The development of alternative infrastructure technologies

Alongside demand management approaches and the development of both existing infrastructure and irrigation systems, respondents argued that the government and WDD had also utilised non-conventional water resources in response to ongoing scarcity and continuous drought years (Respondent 13, pers. comm., 2013). Alternative infrastructure technologies were developed, with wastewater reuse/recycling and sea water desalination both emerging as important management techniques from the mid-1990s onwards (Hunt, 2004; Iacovides, 2011a).

Firstly, wastewater reuse/recycling was introduced in 1995. The scheme was based on compliance with the EU urban wastewater directive (91/271/EEC) and focused on the [eventual] widespread acceptance of recycled water within the agricultural sector (Papaiacovou, 2001; Papaiacovou & Papatheodoulou, 2013). According to respondents, the reuse of treated wastewater generated a range of benefits and challenges in Cyprus. Benefits included; water savings that have allowed reallocation and usage for needs in other sectors; a positive contribution to the water balance; as well as improvements in quality and the protection of the environment through compliance with the EU urban wastewater directive (Respondent 3, pers. comm., 2013; Respondent 10, pers. comm., 2013). In turn, challenges have also been apparent, particularly; the need for appropriate application in the water system; high financial costs; and the need to gain acceptance by politicians and users (Respondent 18, pers. comm., 2013). The following comment identifies the uses of recycled wastewater, including the perceived benefits for irrigation supply, aquifer recharge, and freshwater re-allocation for domestic usage.

> *"We are trying to use and develop the treated water, which is a very reliable supply of water.... which can be used for agriculture....[....].... and already we use it either for direct irrigation or for recharging aquifers. This is good quality water, and that is our focus. If we can use that amount of water, we can substitute our fresh water, which we can instead give to the cities for domestic supply"* (Respondent 1)

Secondly, sea water desalination was introduced in 1997, initially through the operation of the Dhekelia plant that was constructed to supply the area of Famagusta as well as partly serving the needs of both Nicosia and Larnaca (Respondent 10, pers. comm., 2013). The approach has been a direct government response to water shortages and drought events that occurred during the 1990s, which negatively affected the domestic and tourism sectors (Tsiourtis, 2001; WDD, 2002; Iacovides, 2011a; Papadaskalopoulou *et al*., 2015a). As noted by the following comment, respondents argued that policy encouraging the use of desalination became evident in response to water shortages, drought, climate change, tourism demand, and lifestyle changes.

> *"The previous years we had water cuts for potable water....so we changed our policy and said we have to build some more desalination plants because the standard of living in Cyprus is higher....and we don't want our people to have water cuts. And there is the constant water issue with tourism as well.... always needing enough."* (Respondent 3)

5.3.3 Phase three of water management [2004 to 2014]

The third phase of management from 2004 to 2014 focuses on approaches and changes that have been observed since accession to the EU in 2004 [with a ten-year period to account for potential outcomes of policy]. These aspects are explored in the following sections, and have included; the continued development of water-saving and awareness campaigns, which have highlighted the ongoing use of demand-side approaches; the response to the issue of drought; changes in management relating to the long-term issue of groundwater abstraction and illegal boreholes; as well as changes in management that have resulted from EU accession and the influence of legislation such as the WFD (2000/60/EC).

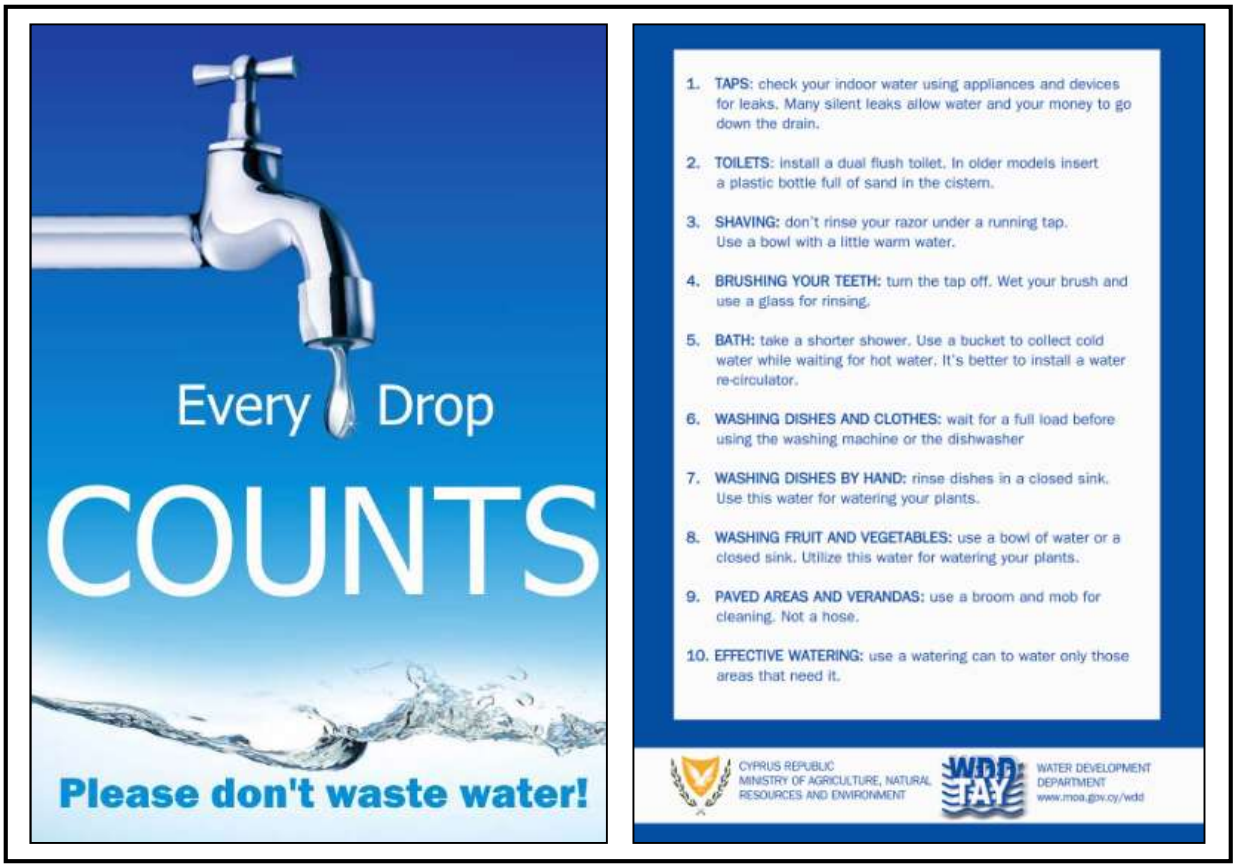
The continued development of water-saving and awareness campaigns

Evidence of water-saving and awareness campaigns in this phase of management has highlighted the ongoing development and use of demand-side approaches. The government rhetoric for water management shifted from the idea of 'not a drop to the sea', which was indicative of an approach based on increasing supply and collecting as much water as possible, instead towards a rhetoric and philosophy focused on saving water and managing demand (Respondent 7, pers. comm., 2013). A notable awareness campaign was implemented in 2008 and again in 2011 by the WDD and MANRE, with the aim of improving the efficiency of residential usage, generating a water consciousness, and offering water-saving education and advice (WDD, 2011a; Respondent 1, pers. comm., 2013). This campaign, illustrated in figure 5.5, adopted the slogan 'Water: drops of life - every drop counts' (WDD, 2008; WDD, 2011a).

Respondents argued that water-saving campaigns have been generally successful when increasing awareness and perception regarding the challenges of water scarcity (Respondent 1, pers. comm., 2013; Respondent 3, pers. comm., 2013). It was also noted that campaigns, such as the 'every drop counts' programme, emerged more strongly in response to drought events, while these periods had often seen water scarcity come to the forefront of discussion in society, media, and politics (Evripidou, 2008; Cyprus Mail, 2009a). The following comment highlights the increase in these campaigns, specifically in response to drought events.

"The public awareness campaigns for water saving had an effect. They increased the level of awareness and sensitivity. They had an impact especially from 2008 during the drought period.....[...]....they had to be done as part of the response to the severe drought we had at that time....." (Respondent 8)

Figure 5.5: The 'every drop counts' water-saving campaign (WDD, 2008; WDD, 2011a)



Despite the perceived advantages of water-saving and awareness campaigns, the potential limitations of these responses have been documented by the media (Cyprus Mail, 2009c). This often contradicted the publicly communicated claims of success made by some respondents positioned within government departments (Respondent 2, pers. comm., 2013; Sofroniou & Bishop, 2014). For example, the next quote highlights the perceived failure of attempts to save water through awareness campaigns. In this case, short-term campaigns adopted by government became more obvious during the drought period and were widely criticised.

"Despite having to deal with an extremely serious water crisis, the government has been as short-sighted as its predecessors with regard to saving water. It ran advertising campaigns urging people not to waste water for a just couple of months last year and then stopped them, as if it had had cultivated a water-saving conscience in everyone!" (Cyprus Mail; 14th February 2009b)

Responding to the issue of drought

The threat of drought has been an ongoing problem in Cyprus and it has had a significant influence on water management. Since independence, different responses and policy agendas have been set according to the experience of drought at any given time. This was noted in terms of; supply expansion [‘not a drop to the sea’], through which scarcity and drought encouraged the need to maximise supply capacity; demand management that sought to reduce consumption and control water during drought periods; as well as the development of desalination and water reuse, which have attempted to ‘avoid the vagaries and influences of the weather and climate’ [as described by the WDD] (WDD, 2009; Respondent 1, pers. comm., 2013; Respondent 3, pers. comm., 2013; Respondent 8, pers. comm., 2013). Regulations and supply expansion were a requirement because of drought, while the observed decline in precipitation and the greater risk of more frequent and severe droughts also caused management approaches to evolve accordingly to mitigate these challenges (Respondent 9, pers. comm., 2013).

The drought event of 2008 was considered by all respondents to be a driver for shaping changes in management. It was claimed that responses to the drought emerged in a variety of ways, and involved; the rapid implementation of costly desalination infrastructure; the expansion of supply through the development of new groundwater boreholes; drastic restrictions on water supply and usage; as well as the formation of a more comprehensive drought management plan (Pashiardis & Michaelides, 2009; MANRE, 2010; Respondent 8, pers. comm., 2013).

The drought was also interpreted by respondents to have caused changes in management, in particular; the development of drought indices and a drought management plan; the reactive decision to import potable water; as well as the construction of multiple desalination plants to supply water during emergency periods of drought (Respondent 1, pers. comm., 2013). Notably, the drought management plan emerged in response to the drought and requirements of EU legislation. This involved a number of emergency measures, such as; the widespread restriction on the supply of water to the agricultural sector; water rationing and restrictions on household supply; the expansion of desalination plants and installation of mobile desalination units; the use of new boreholes and the purchasing of water from private boreholes to augment domestic supply; the treatment of raw water from aquifers for use as potable water; the transfer of potable water from Greece via tanker; as well as the strengthening of water-saving campaigns and financial incentive schemes for saving water and achieving greater efficiency (Aletraris, 2010; Respondent 2, pers. comm., 2013; Respondent 8, pers. comm., 2013).

Furthermore, the drought was also considered by many respondents to be political and management failure, with this in agreement with other research and media sources (see Evripidou, 2008; Cyprus Mail, 2009c; INECO, 2009; Aletraris, 2010; Charalambous *et al*., 2011; Iacovides, 2011a; Sofroniou & Bishop, 2014). This was highlighted by issues associated with existing management procedures, such as the lack of a coordinated response [a drought plan], as well as emergency conditions caused by severe water shortages that prompted reactive, expensive, and problematic responses from government, particularly the importing of potable water from Greece (Respondent 2, pers. comm., 2013; Respondent 11, pers. comm., 2013). The following quote summarises the perceived failure to respond effectively at the time of the drought, which developed into a widely criticised management failure and political [even national] embarrassment (Charalambous, 2008).

> *"Now, in the face of catastrophic drought, we are scrambling from one short-term patch up to the next. And these are expensive solutions. The cost of bringing water from Greece was exorbitant, as is the cost of building temporary emergency desalination plants. For now, the cost was absorbed by the government dipping into its fiscal surplus"* (Cyprus Mail, 2009c)

The response to groundwater over-abstraction and unlicensed boreholes

Before the government took steps to address the issue of groundwater over-abstraction, through the introduction of permitting and licensing as outlined by the IWM Law (2010), groundwater abstraction through boreholes was an unrestricted process (Respondent 9, pers. comm., 2013). This has had severe implications on the quantity and quality of groundwater resources (Demetriou & Georgiou, 2004; Iacovides, 2011c; Respondent 6, pers. comm., 2013). The following quote highlights the problem of unlicensed boreholes and the lack of monitoring in place. As claimed by some respondents, the situation had facilitated users [such as farmers or landowners] to drill and operate boreholes, while over-abstracting large quantities of water without fear of punishment (Respondent 1, pers. comm., 2013). The impending EU legislation at the time necessitated a response, which led to an abstraction licensing scheme used to legalise the uncontrolled boreholes (Respondent 13, pers. comm., 2013; WDD, 2013).

> *"Many illegal and uncontrolled boreholes are allowed to operate without any consequences. As these units are illegal, authorities cannot check the amount of water they pump. There are presently many thousands of illegal boreholes operating in Cyprus and admittedly no effort has been made yet to control them. EU legislation obliges us to close them and one day we must face this problem."* (Hassapi, 2009)

As a result of the WFD (2000/60/EC) and the subsequent translation of these requirements into national law, evident through the Water Protection Management Law (2004) and the Integrated Water Management Law (2010), the WDD and government formed a borehole permitting scheme (WDD, 2013). Through the IWM Law (2010), the WDD gained extensive regulatory powers over all groundwater resources, thus allowing the enforcement of the license and permit scheme, a vastly improved system of abstraction monitoring, as well as the steady eradication of the illegal boreholes (Respondent 1, pers. comm., 2013; Respondent 3, pers. comm., 2013). All respondents claimed that this only strengthened the position of the WDD and government when managing groundwater and responding to over-abstraction issues caused by unlicensed boreholes that were often dug by farmers or other land-owners without suitable permits.

Changes in management and responses that have resulted from EU accession

Respondents argued that EU accession had encouraged management changes in terms of responses to water problems such as increased demand and ongoing scarcity. In this case, public involvement and more integrated management approaches emerged as a result.

Firstly, it was argued that public involvement and greater participation in decision-making for water management occurred in a more forceful and dynamic way since EU accession and the transposition of the WFD (Respondent 9, pers. comm., 2013). Public involvement was achieved through consultation procedures associated with the requirements of EU legislation. For example, Article 14 of the WFD encourages public consultation in terms of directive implementation as well as the production and review of river basin management plans (Gullón, 2005). The WFD was identified by all respondents as having caused greater participation and public involvement. It was widely claimed that participation, as defined and encouraged by the directive, was the first time a measured form of this approach had been carried-out based on guidelines, objectives, and formal methods (MacDonald & Makuch, 2006; Respondent 15, pers. comm., 2013). The following comment notes the importance of the WFD in forming 'proper' procedures for participation and encouraging public involvement in decision-making.

> *"For Cyprus...[...]...and our responses to water problems like demand...[..]...the implementation of the Water Framework Directive was the first time we had to deal properly with different groups. It was the first time we had proper participation and discussions and meetings with NGO's and other people.... the citizens and so on. This was to listen to their problems and proposed solutions...and to be inclusive. Previously....we just had the politicians and bureaucrats [laughs]....and they [would] decide for the people they never see and never listen to!"* (Respondent 6)

Secondly, the application of the integrated water resources management concept has been evident in Cyprus, particularly as a result of the formation and implementation of the IWM Law (Respondent 1, pers. comm., 2013). This national law contains aspects that seek to advance the objectives of more integrated management, namely; greater efficiency; equitable allocation across different socio-economic groups; and environmental sustainability to protect resources (IWM Law, 2010; Iacovides, 2011c; Socratous, 2011a; Guardiola-Claramonte *et al*., 2012). Respondents noted that the WFD encouraged a shift towards more integrated management, which had not been evident in the past and prior to EU accession (Respondent 8, pers. comm., 2013). Furthermore, the IWM Law (2010) provided the national legislation and powers to implement the WFD as well as the concept of integrated management (Respondent 1, pers. comm., 2013). The next comment exemplifies the importance of the directive, and how it compelled the application of a more integrated approach.

> *"The most important new concept has been the integrated approach. I can say the Water Framework Directive has been beneficial in this case....it is a key milestone for us along with the Integrated Water Management Law....both of these together. The WFD forced the development of our national law. This has led to the aim of implementing more integrated water management"* (Respondent 6)

An attention shift towards water quality

Most respondents claimed that the decline of groundwater aquifers, the problems of saline intrusion, as well as EU accession and the influence of the WFD helped to cause a shift in responses and policy towards the inclusion of water quality as an important management topic for government and the WDD (Respondent 6, pers. comm., 2013). During the first two phases of management, water quality was a neglected topic, and respondents claimed this was due to quality being of lesser importance when compared to scarcity and supply (Respondent 1, pers. comm., 2013). It was also argued that a disparity had been the result of polluting activities, such as heavy industry and intensive agriculture, not being evident in Cyprus, thus giving quality a secondary position on the management agenda (Iacovides, 2011a; Respondent 1, pers. comm., 2013; Sofroniou & Bishop, 2014). The following comment typifies this view, showing the position of quality as a topic that was historically less important when compared to scarcity.

> *"In Cyprus we haven't really had the heavy industry to cause major pollution.....we don't have the same issues as other countries from that type of pollution. I think that is maybe why quality has not been as important in the past....and over the years.....but that has changed...the directive [WFD] has increased attention and made us consider quality more."* (Respondent 18)

Prior to EU accession, water quality was not considered to be a management problem, as the main long-term focus of government was to ensure sufficient quantity and an appropriate response to scarcity and drought (Respondent 14, pers. comm., 2013). However, according to many respondents, the WFD served to draw attention to the management of quality, with the focus of the directive [such as article 1, article 4, article 16, and article 17] relating to ecological protection, chemical status, and addressing pollution for surface and groundwater resources (WFD, 2000). The following comment notes the increased focus on quality issues since EU accession and as a result of the directive.

> *"First we had the dams, then the desalination and proper sewage treatment, and now in terms of the WFD we have not only the 'quantity' issues....because at that time it was all we looked at....but after the EU and directive onwards we have looked at the 'quality' issues as well...they have become much more important."* (Respondent 3)

The attention shift towards the increased importance of water quality was also shown to be relevant based on European statistical data. This illustrated the development of water treatment infrastructure, which to some degree has shown the increasing awareness and importance of water quality (Eurostat, 2016). Historical investment in dam building and supply infrastructure was substantial and extensive since independence, whereas this was not the case for water treatment infrastructure (Iacovides, 2011a). However, this situation changed, notably being driven by EU accession, with greater importance and investment attributed to water quality and treatment infrastructure. For example, in 2015 there were 35 water treatment plants on the island. Approximately 17 plants were constructed from 1970 to 1997, while between 1998 and 2015 a further 18 plants were constructed (Eurostat, 2016). However, between 2000 and 2005, a time during which initial implementation of the WFD was occurring together with the process of full EU accession, approximately 16 plants were constructed (Eurostat, 2016).

Alongside increased investment and attention for treatment infrastructure, the general attention shift towards quality was also made apparent through a changing focus in government reports and research (Respondent 18, pers. comm., 2013). This was observed through the increasing amount of research published on saline intrusion and aquifer quality decline (Demetriou & Georgiou, 2004; Sofroniou & Bishop, 2014; Papadaskalopoulou *et al*., 2015b), as well as reports required for the WFD regarding quality, such as a river basin management plan (Birol, Koundouri, & Remoundou, 2011; Groom & Koundouri, 2011; MANRE, 2011). As exemplified by the next comment, a change in mindset for management was evident and driven by problems of saline intrusion, aquifer decline, and the requirements of EU legislation and the WFD.

> *"[On quality] ....It was mostly neglected because our main problem was scarcity and the aim was always to find water. To make sure the supply was good. But more recently we have faced the issue of quality. It has become much more important due to things like saline intrusion and the decline of our aquifers. So there was a change...and this was shown by the attention on the issue by the WDD and other bodies. Also since the European directives we had to look more at quality...it became a requirement. So all of these things together increased the importance of quality....it is not at the level of scarcity but it is definitely important."* (Respondent 6)

5.4 Water sector responsibilities and organisational structure

After identifying and considering the three main phases of water management evident in Cyprus, it is also important to link these with the organisational structures and responsibilities that have been associated with these phases and changes over time. Notably, this provides further detail on how the management phases have been applied, for example through national laws and EU legislation, as well as how certain groups within the organisational structure of the water sector have influenced this management.

For this discussion, responsibilities are defined as the functions, duties, and obligations that are attributed to a given actor group [such as technical departments, boards, or organisations] in relation to water management. When considering responsibility in terms of water management in Cyprus two aspects can be distinguished, namely; the responsibilities for water management defined by government and legislation; as well as the different organisational structures and responsibilities that are observed or perceived to exist, and the actors or groups these have been attributed to. In turn, these can also be related to the management phases previously identified.

5.4.1 Responsibilities defined by national water laws and legislation

In Cyprus, responsibilities for water have been fundamentally defined by the water laws formed by government. This reflects command-and-control regulation that is characteristic of the mandatory approach. A few laws were developed early after independence during the first phase of management, with these emerging as a result of the preceding laws and structures formed under British colonial rule. Between 1968 and 1990 five core water laws were passed, relating to the management topics of; irrigation; municipal water; supply systems; and sewerage (see appendix 3). These were related to the methods used during the first phase of water management, which were narrow in scope and primarily focused on supply expansion and infrastructure development. In contrast, during the period from 1990 to 2017 approximately thirty-five laws were developed, while since EU accession in 2004 twenty-seven laws have

been implemented (WDD, 2017). Notably, this increase in regulation coincides with the second and third phases of management, which involved a greater variety of management methods and the need to implement legislation as a result of supranational EU governance.

In the time preceding the laws formed since EU accession in 2004, responsibilities for water management were argued to have been somewhat fragmented. According to respondents in government, powers had been separated between different ministries and this situation was a result of management based on existing legislation as well as methods gained from remnant laws formed during colonial rule prior to independence in 1960 (Respondent 2, pers. comm., 2013; Respondent 6, pers. comm., 2013). Subsequently, in response to the challenges of fragmented management, divided authority, and European legislative influences, water policy was shaped accordingly by government to tackle ongoing water problems such as scarcity, drought, and groundwater over-abstraction. This was noted by respondents in government and those who had historically held positions in government departments and water boards (Respondent 6, pers. comm., 2013; Respondent 14, pers. comm., 2013). As a result, three key pieces of legislation were identified, namely; the Water and Soil Pollution Control Law of 2002 [WSPC Law]; the Water Protection and Management Law of 2004 [WPM Law]; and the Integrated Water Management Law of 2010 [IWM Law] (WSPC Law, 2002; WPM Law, 2004; IWM Law, 2010). The laws were noted by all respondents, especially those in government, as having re-defined authority and responsibility for water management (Respondent 1, pers. comm., 2013; Respondent 18, pers. comm., 2013).

5.4.2 The organisational structure of the water sector

Understanding the structure of the water sector in Cyprus provides context for how water problems have been tackled through the management phases discussed. The structure of the water sector relates to the previous section, as the responsibilities defined by law have shaped the setting in which government bodies, departments, and other actor groups have been able to manage water problems.

Water management, policy, and planning in Cyprus has been achieved through a range of government ministries, technical departments, semi-governmental boards, and other groups or organisations. The water laws identified in the previous section have played a role in assigning authority and defining responsibilities for actor groups that are part of the water sector. In theoretical terms, essentially what is expected according to government literature and

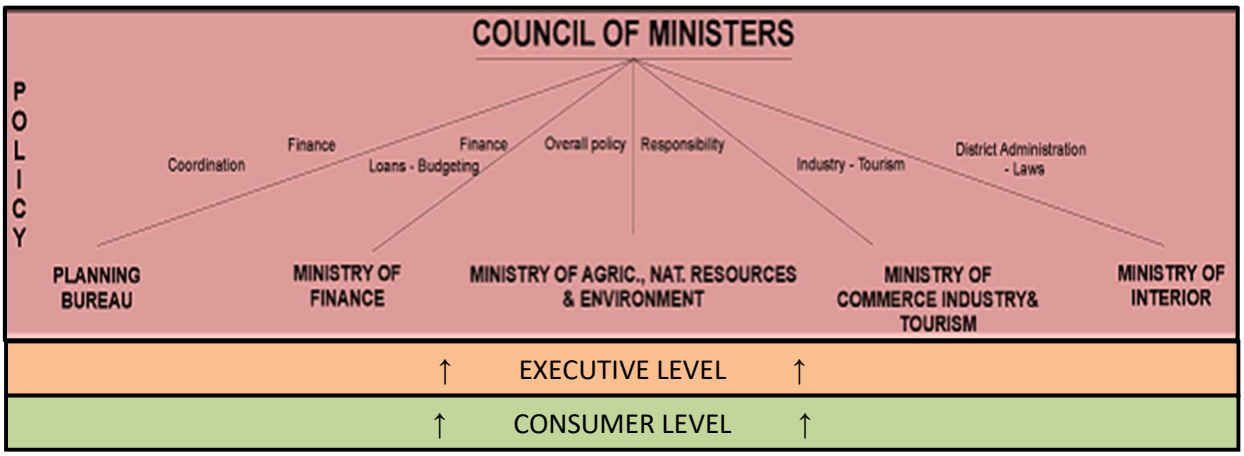
legislation [but which may not be the case in reality], this system is based on a hierarchical and vertical power structure (Iacovides, 2011c). For policy and problem-solving, greatest power and authority is afforded to the uppermost groups, while the implementation of policy is achieved by the mid-level departments and ground-level actors at the base of the hierarchy (Respondent 1, pers. comm., 2013; Respondent 6, pers. comm., 2013). Notably, this idea of hierarchy and top-down decision-making reflects characteristics associated with the mandatory approach.

According to government, the WDD, and most respondents [especially those positioned within government departments and boards], the water sector in Cyprus is structured in terms of three levels, namely; policy, executive, and consumer levels. These are considered in the following sections to understand the structure of organisation, as well as to explore the expected and perceived responsibilities of the groups involved and how these relate to the phases of management discussed earlier.

The policy level

The 'policy' level is the first and highest tier of the water management and organisational system. It includes the groups and individuals that hold the greatest power and responsibility in terms of policy and decision-making when responding to water problems. The Council of Ministers, positioned within central government and made-up of all the heads of each Ministry, has ultimate responsibility for proposed water policy, as also noted by respondents positioned [or previously positioned] in government departments (Respondent 1, pers. comm., 2013; Respondent 7, pers. comm., 2013). This council reports to the Parliament and thus influences decision-making in central government. Specific responsibilities are assigned to different ministries, which each play a role in policy-making and in helping to shape the final decisions made by the Council of Ministers [and the Parliament above this council] (Iacovides, 2011c; Respondent 13, pers. comm., 2013). Notably, this level of organisation also reflects characteristics of the mandatory approach such as a top-down structure and format of control, procedural styles of negotiation, the idea of command, and interaction based on bureaucracy and hierarchy (Wurzel *et al*., 2013; Cubbage *et al*., 2017). The groups and individuals at this level have been involved in all phases of water management, particularly during the first phase of infrastructure development and supply expansion. The policy level of organisation is highlighted in figure 5.6. Each of the ministries and their main responsibilities, which are directly linked to the Council of Ministers, are also shown.

Figure 5.6: The 'policy' level of the water sector in Cyprus (INECO, 2015)



According to the majority of respondents a hierarchy of management exists in Cyprus in the case of water. Fundamentally, it is the government [administrative state] that has the most power and responsibility, based on water resources being state owned and controlled through the WDD, while policy decisions are ultimately made by Parliament [cabinet] and the Council of Ministers (Iacovides, 2011c; Respondent 1, pers. comm., 2013; Respondent 8, pers. comm., 2013). The following quote highlights the major importance of the state, and how the system in place lends itself to this type of state-driven management.

> *"The state authorities are the most important.... they are the real force behind things. You must take into account that there are no private providers for water.... either they [providers] are the [water] boards.... or overall the WDD."* (Respondent 9)

Respondents also noted that an Advisory Committee on Water Management operated in conjunction with the Council of Ministers and the ministries (Respondent 20, pers. comm., 2013). This committee offers guidance for the overall water policy of government. For example, notable guidance topics have included; the allocation of water in terms of usage and by region or municipality; water pricing changes and cost recovery; the use of recycled water; as well as guidelines for water boards, sewerage boards, local authorities, and municipalities (IWM Law, 2010; Respondent 19, pers. comm., 2013). Subsequent recommendations are submitted to the Council of Ministers for consideration (Respondent 3, pers. comm., 2013).

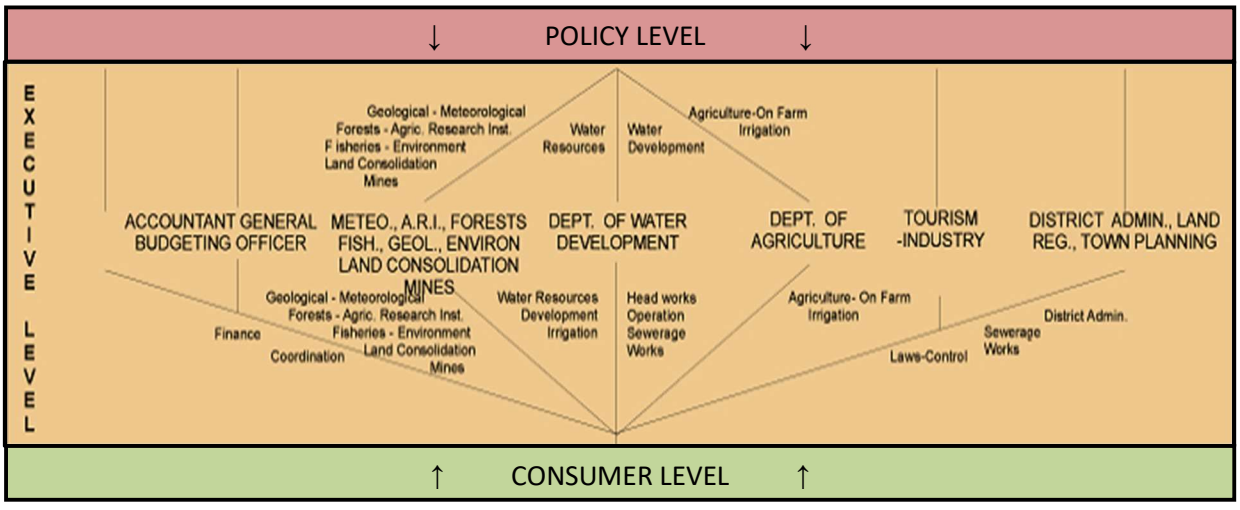
At the policy level, the ministries, groups, and individuals have been involved with all three phases of management, especially; guiding regulation in the first phase with regard to infrastructure development and supply expansion; developing water recycling and desalination in the second phase; and responding to drought in the third phase (Respondent 1, pers. comm., 2013). The influence of the groups at this level was noted to be consistent throughout the three

management phases, with government departments being particularly strong during the first and second phases that came before changes caused by supranational governance resulting from EU accession (Respondent 15, pers. comm., 2013). The government departments and groups at the policy level were also noted to have adapted over time in response to management challenges such as ongoing scarcity, drought, increased demand, and socio-political changes. For example, this was evident through the consolidation of responsibilities for the MANRE, an increase in water regulations, attempts to increase expertise through new or reformed departments, and the need to manage requirements that emerged in the third phase of management relating to water quality and public involvement in decision-making (Respondent 18, pers. comm., 2013).

The executive level

The second tier of the water management and organisational system is defined as the executive level (figure 5.7). This involves the actors and groups that operate in a technical and management capacity for the ministries at the policy level (WDD, 2014; INECO, 2015). The groups at the executive level have had different roles in terms of the identified management phases and responses to scarcity, drought, groundwater over-abstraction, and quality decline primarily because of the saline intrusion of coastal aquifers. This level of organisation reflects characteristics of; the mandatory approach through regulation and hierarchy; the economic approach through the application of market-based instruments; as well as the power approach of technocracy based on the important role of experts (Wurzel *et al*., 2013; Radaelli, 2017). The departments at this level have been involved in all phases of water management, notably in relation to the development of infrastructure for supply, groundwater monitoring and control, and developing regulations to implement EU legislation such as the WFD (Respondent 1, pers. comm., 2013; Respondent 8, pers. comm., 2013).

Figure 5.7: The 'executive' level of the water sector in Cyprus (INECO, 2015)



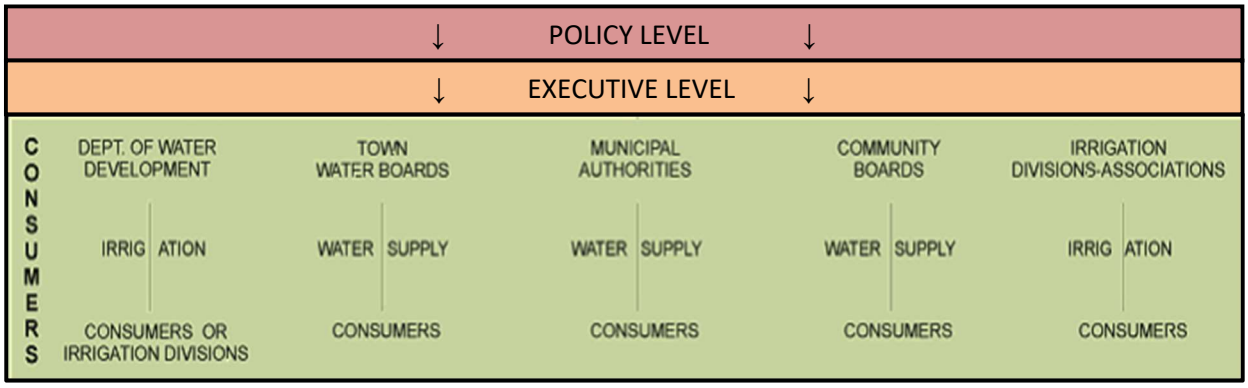
At the executive level, the departments and groups identified have been involved with all three phases of management, for example; helping to implement regulation in the first phase with regard to infrastructure development and supply expansion; attempting to manage demand through awareness campaigns and also diversifying supply through wastewater recycling and desalination in the second phase; as well as responding to drought and also monitoring and controlling groundwater in the third phase (GSD, 2012; Respondent 3, pers. comm., 2013; Respondent 14, pers. comm., 2013; DofE, 2017). Notably, during these phases, the WDD has been the central technical agency for water, bringing together expertise from other departments and groups at the executive level and having responsibilities defined by regulation [the structure, responsibilities, and divisions of the WDD are summarised in appendix 4] (WDD, 2005; Respondent 1, pers. comm., 2013; WDD, 2014). The government departments and groups at the executive level were also noted to have adapted in response to variables such as ongoing scarcity, drought, increased demand, and changes caused by EU accession and legislation. This was evident through; greater powers gained by the WDD in the second and third phases of management, and particularly after the implementation of the IWM Law; attempts to facilitate interaction between different departments; and the application of voluntary approaches such as stakeholder involvement by the WDD as a result of EU legislation (Respondent 6, pers. comm., 2013).

The consumer level

The final and lowest tier of the water management and organisational system is defined as the consumer level. This consists of the groups or actors that hold responsibility for implementation at regional, municipal, or village level, essentially influencing policy and responses to water problems on the ground (Respondent 12, pers. comm., 2013). There are five main groups that provide the link between the consumers and the higher policy and executive levels. These include; town water boards; sewerage boards; municipal authorities and community boards; irrigation associations or divisions; as well as farmer unions (Respondent 14, pers. comm., 2013). Notably, ‘consumers’ in this case have often been defined as the public and private water users that encompass groups such as residents and farmers (Respondent 8, pers. comm., 2013). This level of organisation reflects the characteristics of; bottom-up perspectives through a focus on those responsible for implementation; voluntary approaches through public consultations; and economic approaches through pricing structures and subsidies. The groups at this level have been involved in all phases of water management, with a greater role in the second and third phases being evident in terms of board and municipal authority involvement in

water-saving campaigns and the application of pricing changes and public involvement in decision-making as a result of EU accession (Respondent 5, pers. comm., 2013; Respondent 12, pers. comm., 2013). The consumer level of organisation for the water sector is shown in figure 5.8. The departments, boards, authorities, and associations are linked to the groups positioned in the executive level, while responsibilities tend to be focused on water supply or irrigation.

Figure 5.8: The 'consumer' level of the water sector in Cyprus (INECO, 2015)



At the consumer level, the departments, boards, authorities, and associations identified have been involved with all three phases of management, for example; implementing regulation, pricing, and metering in the first phase to expand supply and manage demand; attempting to manage demand in the second phase through water-saving and awareness campaigns; as well as groundwater monitoring and control in the third phase (Respondent 8, pers. comm., 2013; Respondent 17, pers. comm., 2013).

Notably, during these phases, the boards have been important in ground-level policy implementation and have provided the main link to the executive level (Respondent 7, pers. comm., 2013; NWB, 2014; NSB, 2015), while the farmer unions have played the role of pressure group (Respondent 19, pers. comm., 2013). Indeed, a range of unions exist, namely; the Cypriot Farmers Union; the Agrotiki Farmers Union; Panagrotikos Farmers Union; and the Pan-Cyprian Farmers Union (Aletraris, 2010; Charalambous & Christophorou, 2016; Ioannou, 2016; Katsourides, 2016; Protopapas, 2016;). Despite their claimed independence, each of these was found to have a strong affiliation with a specific political party, which in turn had an influence on decision-making (Respondent 1, pers. comm., 2013). For instance, the Cypriot Farmers Union was closely linked to the AKEL Party, which is a left socialist political party, while the Panagrotikos Farmers Union was affiliated with the DISY Party, which is a centre-right conservative and pro-Europeanism political party (Christophorou, 2009; Panagrotikos,

2013; AKEL, 2014; DISY, 2014). As a result, the demands and actions of a union often represented the agenda of their associated political party, while the pressures applied on government responses were also aligned with the relationships and motives reflected by party politics (Respondent 8, pers. comm., 2013). This has been translated as a major influence on responses to water problems such as scarcity, drought, demand, and groundwater over-abstraction. For example, water usage patterns have influenced regional supply balances; the adoption of irrigation networks has increased water efficiency; while the use of greywater for irrigation has helped in the reallocation of good quality potable water (Respondent 1, pers. comm., 2013; Respondent 5, pers. comm., 2013; Respondent 16, pers. comm., 2013).

The departments, boards, and groups at the consumer level also adapted over time in response to variables such as ongoing scarcity, increased demand, groundwater over-abstraction and associated quality issues, as well as changes in policy caused by EU accession. For example, this has been evident through; changes in rights as a result of the issuing of borehole permits and abstraction licenses by the WDD in the third phase of management; as well as changes in board pricing structures to account for cost recovery required by EU legislation (Respondent 7, pers. comm., 2013; Respondent 14, pers. comm., 2013).

The organisational structure and three parts of the water sector discussed in terms of policy, executive, and consumer levels are illustrated as one system in figure 5.9.

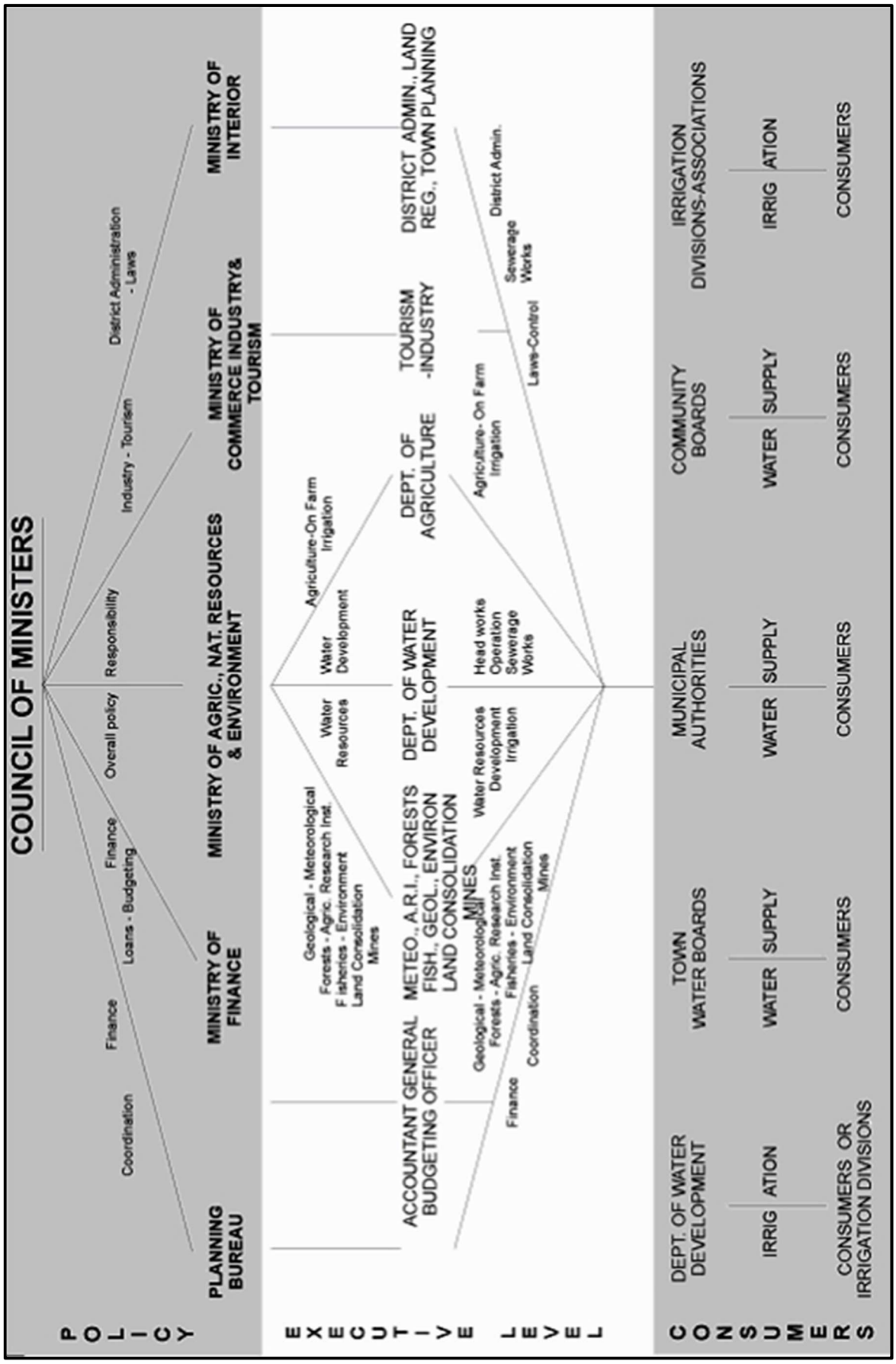


Figure 5.9: Organisational structure of water resources management in Cyprus (Iacovides, 2011c; INECO, 2015)

5.5 Conclusion

This chapter has sought to develop understanding of water management in Cyprus by exploring three areas. Firstly, by identifying water problems; secondly, by considering the management responses to these problems; and thirdly, by highlighting the responsibilities and organisational structures of the water sector and how these relate to the phases of management.

The first section has outlined the water problems observed in Cyprus, and these have been categorised in terms of availability and quality, which are the main aspects of water management noted in chapter two. A range of inherent and imposed problems were highlighted, including; scarcity; groundwater over-consumption and illegal/unlicensed boreholes; quality issues such as saline intrusion of coastal aquifers; as well as the ongoing threat of drought.

The second section has focused on management responses to water problems. This has been separated into three parts according to phases of management identified as a result of the findings. In this case, a timeline was formed that has highlighted how management responses have developed. Indeed, these findings are relevant for the discussion in subsequent chapters and when exploring Dryzek's (2013) interpretation of how problem-solving changes over time.

The first management phase from 1960 to 1990 involved the responses to water problems such as scarcity, drought, and the need for sufficient supply to facilitate socio-economic development. This phase emerged after independence, and certain responses were highlighted, including; expansion of supply infrastructure in response to scarcity and drought; the implementation of metering in response to scarcity through demand management; as well as a disparity between scarcity and quality as a result of a focus on supply-side approaches.

The second management phase from 1990 to 2004 focused on the period during which government sought to develop demand management, existing infrastructure, and alternative technologies in an attempt to respond to ongoing scarcity and emerging water quality issues. Certain management responses were highlighted in this phase, including; the development of demand-side approaches, such as the continued expansion of metering as well as use of water-saving awareness campaigns and domestic subsidies, in response to scarcity and the ongoing risk of drought; the development of existing supply infrastructure in response to scarcity; and also the development of alternative infrastructure technologies through wastewater recycling and desalination, in response to scarcity, increasing demand, and groundwater quality decline.

The third management phase from 2004 to 2014 has focused on approaches observed since accession to the EU, and responses to scarcity, severe drought events, and groundwater quality decline. Certain management responses were highlighted in this phase, including; the continued development of water-saving awareness campaigns in response to scarcity and demand; the rapid expansion of desalination, the development of groundwater resources, supply restrictions, management plans, and emergency measures such as importing water, in response to severe drought and acute scarcity; an extensive borehole permit and abstraction license scheme in response to groundwater over-consumption and illegal boreholes; changes caused by EU accession, such as greater public involvement in decisions when responding to demand and the use of integrated resources management in response to scarcity; as well as an attention shift towards quality in response to the decline of groundwater aquifers and saline intrusion.

The third and final section has considered the responsibilities and organisational structures of the water sector. In this case, the responsibilities defined by legislation have been considered, with these found to provide guiding principles relative to the phases of management. The structure of the water sector was explored according to the three organisational levels defined by the government, namely; policy, executive, and consumer levels of organisation. This helped to position the different departments, bodies, and actor groups that have been responsible for the provision of services, while also considering their role as part of responses to water problems. For example; the role of government departments such as the WDD in developing responses to scarcity through supply expansion and drought plans; the role of water boards in managing demand through metering and water-saving awareness campaigns; as well as the role of farmer unions in limiting responses by government to control groundwater over-abstraction and quality decline due to saline intrusion of coastal aquifers.

Ultimately, an understanding of water problems, phases of management, and organisational structures contributes to the discussion exploring Dryzek's (2013) rationalities in subsequent chapters. Firstly, by outlining the water problems it is possible to contextualise the responses and approaches used in terms of the problem-solving rationalities. Secondly, by identifying the phases of management it is apparent that changes in responses have occurred, and these can be related and explored in relation to Dryzek's (2013) understanding of how problem-solving changes over time. Thirdly, by considering the organisational structure and responsibilities for management in terms of responses to water problems, it is possible to highlight the actor groups and characteristics that are central to each of the problem-solving rationalities.

Chapter 6: Administrative Rationalism in Cyprus

6.1 Chapter overview

This chapter explores how government has responded to water problems by considering the evidence of administrative rationalism in Cyprus. The expected characteristics of the rationality are compared with government responses in Cyprus. The roles, motives, and behaviours of key governing agents are examined, with these being important in terms of the processes through which institutions and practices associated with a given response interact as a result of policy actor behaviour. Understanding the justifications for adopting a given approach is central to understanding the behaviour of those involved in decision-making and why policy has been implemented in a certain way (Lowe & Ward, 1998; Dryzek, 2013; Kraft, 2017; Vohnsen, 2017). This can provide insight into the way problems have been tackled by government, thus helping to develop understanding of the specifics of problem-solving while moving beyond single-theory interpretations and building on mandatory, voluntary, and economic approaches.

The main section of the chapter discusses administrative rationalism and the topics of Dryzek's (2013) discourse analysis in comparison to the findings identified in Cyprus. These topics consider; expected institutions and practices; the existence of basic entities that are recognised or constructed; assumptions about natural relationships; agents and their motives; as well as the type and role of metaphors and rhetorical devices. In this case, the existence of administrative rationalism is explored, while practical observations and the characteristics of the rationality are compared with other understandings such as public choice theory, power approaches, and the top-down perspective. The discussion is also positioned more broadly to the conceptualisation of how governments have tackled problems, namely through the mandatory approach, which is reflected in administrative rationalism.

The final section explores the practical challenges of administrative rationalism, which are discussed according to Dryzek's (2013) interpretation and their existence in Cyprus. Challenges such as implementation gaps, problem displacement, shifts in locus of control, and dispersed or limited expertise, exist as perceived and observed limitations. A conclusion also provides a link to the next chapter, which is developed through the existence of the practical management challenges, as these fit with Dryzek's (2013) understanding of other problem-solving discourses being developed as remedies for the failures of administrative rationalism.

6.2 Administrative rationalism in Cyprus

As discussed in chapter three, administrative rationalism emerges as the first of Dryzek's (2013) problem-solving rationalities. It prioritises the role and influence of the expert, while emphasising social relationships based on hierarchical structures (Dryzek, 2013). In this case, administrative rationalism broadly corresponds to the mandatory approach. As part of Dryzek's (2013) discourse analysis five themes that signal the existence of a given problem-solving rationality are considered. These are; institutions and practices; basic entities recognised or constructed; assumptions about natural relationships; agents and their motives; as well as key metaphors and rhetorical devices. The chapter is structured to reflect these themes, with relevant findings discussed in terms of the expected characteristics for these according to administrative rationalism.

6.2.1 Institutions and practices

Dryzek (2013) highlights a range of institutions and practices that signal the existence of administrative rationalism in practice. These include; professional resource-management bureaucracies; pollution control agencies; regulatory policy instruments; the use of environmental impact assessment; expert advisory commissions; top-down planning; as well as rationalistic policy analysis techniques. The following sections consider each of these in turn.

Professional resource-management bureaucracies

Professional resource-management bureaucracies are an important feature of administrative rationalism. They have emerged as national governments seek to manage natural resources and the economic activities associated with resource sectors (Dryzek, 2013). In Cyprus, the MANRE has existed as the central resource-management bureaucracy. The ministry also consisted of other resource management departments, such as; the WDD; the Department of Forests; the Geological Survey Department; the Department of Fisheries and Marine Research; as well as the Mines Service (MANRE, 2016). All of these provide evidence of professional resource-management bureaucracies existing and operating in Cyprus. Specifically, in terms of water management, the WDD is the most influential resource-management bureaucracy and consists of experts [defined as technical officers] including; civil engineers, hydrologists, geologists, topographers, chemists, irrigation engineers, sanitary engineers, as well as electrical and mechanical engineers (WDD, 2016). The presence and importance of both the MANRE and the WDD as resource-management agencies is highlighted by the following comment.

> *"The main governmental bodies for managing and controlling water resources are two in Cyprus. Overall it is the MANRE and the water development department. These are the most important and they have the most responsibilities."* (Respondent 5)

Some respondents argued that the MANRE and WDD had generally been effective when managing water. In this case, it was noted that significant progress had been made regarding groundwater management through a permit scheme, demand control, water reuse/recycling, and pricing changes, while this progress was particularly evident in the most recent third phase of management since EU accession in 2004 (Respondent 1, pers. comm., 2013; Respondent 13, pers. comm., 2013). However, many water problems such as ongoing scarcity and groundwater over-consumption have continued to pose challenges, with some respondents suggesting that the MANRE had not been so effective in managing these and when dealing with related decision-making politics (Respondent 12, pers. comm., 2013; Respondent 16, pers. comm., 2013). For example, this was highlighted in terms of difficulties in managing agricultural water demand (INECO, 2009), water waste and network inefficiency (Sofroniou & Bishop, 2014), as well as politics and the application of reactive or short-term responses (Cyprus Mail, 2009c).

Pollution control agencies

Pollution control agencies are identified as key institutions that exist as part of administrative rationalism. They provide evidence of a direct response for tackling and managing pollution issues, while their existence is argued to signal a form of authority based on scientific and professional expertise, which is indicative of administrative rationalism and mandatory approaches. In Cyprus, the existence of a pollution control agency was observed through the Department of Environment, which was a part of the MANRE. The department consists of thematic units that have been defined according to expertise, with these units being responsible for aspects such as; pollution control, urban wastewater treatment, waste management, and general inspection (DofE, 2016). In terms of water, the Department of Environment, WDD, and the State General Laboratory [department] have worked together to monitor, manage, and respond to water pollution and quality issues [see figure 6.1 for the logo evidence of these agencies]. For example, this was evident through groundwater monitoring in response to quality decline and the saline intrusion of coastal aquifers.

Figure 6.1: Logos of pollution control agencies in Cyprus (DofE, 2018; SGL, 2018; WDD, 2018)

Regulatory policy instruments

Dryzek (2013) identifies regulatory policy instruments as being central to administrative rationalism, with these policies historically being formed by government through the resource-management bureaucracies and pollution control agencies. In Cyprus, a wide range of regulations have been developed for water management, particularly in relation to protection, integrated management, pricing, and in response to the problems of scarcity, increasing demand, and groundwater quality [see appendix 3 on water legislation] (WDD, 2015). In agreement with administrative rationalism, the foundations of regulation have been formed through the main resource-management bureaucracies and pollution control agencies, specifically the MANRE and the WDD. The existence of regulation in Cyprus is typified by the following comment, and many respondents noted the vital role and influence regulation has had in shaping the government response to water problems.

> *Regulation has been the king....in the past and still now. It is the basis for all our approaches to water management....and it is needed to tackle the issues we have. I think that in a water-scarce country like Cyprus the regulatory approach is the only way out....and it has been quite successful overall."* (Respondent 1)

In relation to policy, administrative rationalism in Cyprus has been evident through the regulatory approaches centred on laws that have given the administration power and authority when managing water. These have included laws concerned with; ensuring sufficient municipal supply; managing irrigation practices; as well as establishing organisational systems that define responsibility and control (Respondent 1, pers. comm., 2013; Respondent 6, pers. comm., 2013). For example, the Water Supply (Special Measures) Law has empowered the Council of Ministers to deal with serious water scarcity, while laws such as the Water Supply (municipal and other areas) Law, the Irrigation Divisions (villages) Law, and the Irrigation Association

Law have provided regulatory powers for the structuring of management through organisational boards and regional irrigation divisions (Iacovides, 2011c; Respondent 15, pers. comm., 2013).

The IWM Law (2010) has also encouraged a shift towards more integrated management. In this sense, regulation operates through the law and certain parameters are introduced or re-defined, namely; the simplification of complicated procedures; the introduction of management tools and a permit scheme; as well as more clearly defined responsibilities (IWM Law, 2010). These changes signal the use of regulatory policy instruments and the development of administrative rationalism, which have been necessary in response to existing and emerging water problems as well as the requirements of supranational governance from the EU. Respondents recognised this based on changes to policy caused by the WFD, which influenced national policy through the IWM Law (Respondent 3, pers. comm., 2013; Respondent 8, pers. comm., 2013). The following comment highlights the importance of regulation, and how this has been primary tool and driving force for water management and policy implementation achieved by government [and by proxy, direct management by the WDD and indirect management through other technical departments]. In this case, the findings relate to Dryzek's (2013) understanding in terms of; the central role of regulation as a characteristic signalling the existence of administrative rationalism; and the realisation that bureaucracy, through regulation, forms the foundation of problem-solving. This also shares similarities with policy instrument types that are based on administrative regulations, and their perceived importance to mandatory approaches (Bevir, 2012; Wurzel *et al*., 2013).

> *"Regulation is the law....and you have to obey the law! It is the main driver for the government and the WDD....this is the result of a bureaucratic approach that we have always had, and then you take into consideration the other factors for management.....but always everything is in terms of regulation...."* (Respondent 4)

Environmental impact assessment

The technique of environmental impact assessment is highlighted by Dryzek (2013) as a signal of administrative rationalism in practice. This involves a process of systematic assessment designed to evaluate the potential [or likely] environmental damage expected to be caused by a given project. In Cyprus, the main evidence of environmental impact assessment [and strategic environmental assessment] in terms of water, was observed through its use for infrastructure projects, emerging historically in 1991 at the start of the second phase of management identified in chapter five (Andreou & Jones, 2001). Respondents noted evidence of the technique for; dams and reservoirs (Respondent 8, pers. comm., 2013); water treatment

facilities such as those developed in Nicosia (Respondent 3, pers. comm., 2013); as well as desalination plants (Respondent 14, pers. comm., 2013). These findings have been recognised by other research (Tsiourtis, 2001; IACO, 2012), while the evidence of the technique has also been validated by a strategic environmental assessment report associated with WFD implementation and in relation to river basin area (Kaimaki, 2011).

Expert advisory commissions

Expert advisory commissions are identified by Dryzek (2013) as a visible component of administrative rationalism. These are formed to bring together relevant scientific expertise and offer advice to government. According to Dryzek (2013), expert commissions have been formed in response to general or specific issues and to give advice on environmental topics, while also being validated through policy and their high level of perceived expertise.

In Cyprus, an expert advisory committee [Water Management Advisory Committee] was found to exist and operate in conjunction with the Council of Ministers and the MANRE, as well as the various ministries that have responsibilities in the water sector (IWM Law, 2010; Respondent 1, pers. comm., 2013). The committee was an outcome of the IWM Law (2010) and has the role of advising the MANRE on matters relating to water management and the formulation of water policy. This reflects the expected position of an advisory commission according to administrative rationalism, based on the committee existing between parliament and other government departments. The following quote highlights the existence of the advisory committee in Cyprus, and the influence it has had on decision-making.

> *"We are involved in a number of different advisory committees....national and local. These target certain aspects of quantity and quality....and the environment.....so a lot of money was given for research on water related issues. The main water management advisory committee plays an important role in helping provide information to the ministries and government....so it can help with decisions"* (Respondent 8)

Planning

The aspect of planning, and more specifically a form of planning structured according to the top-down perspective, is identified by Dryzek (2013) as an important component of administrative rationalism. This is based on centrally-established plans and targets that are set by government, with specific objectives to achieve these targets being defined and communicated from the top of the organisational structure towards the bottom ground-level actors and consumers (Birkland, 2011). In this case, plans and decisions are made by those

positioned at the top of the system, involving actors and groups such as parliament, ministers, and politicians. The planning characteristic described by Dryzek (2013) also reflect aspects of the mandatory approach, namely in terms of governance based on hierarchy as well as decision-making in a vertical and top-down format (Wurzel *et al*., 2013; Keast, 2016).

In Cyprus, this form of planning has been observed through planning structures and more generally through policy implementation (Respondent 14, pers. comm., 2013). Attributes such as the key role played by top-level actors, through parliament and the Council of Ministers, as well as an overall technocratic outlook based on control through technical bodies, was noted by many respondents (Respondent 6, pers. comm., 2013; Respondent 8, pers. comm., 2013). More specifically, in terms of the top-down planning identified by Dryzek (2013), the government ownership of resources and centralised control of water has facilitated this form of planning to exist and operate in Cyprus. For example, water planning has been carried-out by the MANRE and the WDD, with approval being required from the Council of Ministers which sits at the top of the organisational structure of the water sector (Iacovides, 2011c). This hierarchy of planning was identified by respondents, especially for decisions regarding water pricing and drought management (Respondent 2, pers. comm., 2013; Respondent 10, pers. comm., 2013). The existence and influence of a top-down approach to decision-making, planning, and policy implementation was typified by the following comment, as respondents highlighted the control and influence of politicians and ministers.

> *"Historically.....Cyprus has been very bureaucratic and based on a top-down format and implementation. This has not really changed....it is the ministers and politicians that have most control. Really....I would say that decision-making is still ultimately up to the politicians."* (Respondent 1)

Rationalistic policy analysis techniques

Dryzek (2013) draws attention to rationalistic policy analysis techniques as institutional practices that show the existence of administrative rationalism. In this case, the central role played by expertise legitimises this type of problem-solving. Rationalistic policy analysis techniques are mainly concerned with identifying the best possible form of policy to be applied in a given situation (Dryzek, 2013). These include a wide range of techniques, particularly; cost-benefit analysis; risk analysis; technology assessments; decision analysis; and forecasting.

In Cyprus, these analysis techniques were identified by respondents through various examples, including; cost-benefit analysis for infrastructure projects, water services, and pricing structures

(Respondent 1, pers. comm., 2013); risk analysis and assessments for management options such as water recycling and reuse (Respondent 3, pers. comm., 2013); as well as forecasting and risk analysis for understanding the effects of drought and climate change (Respondent 18, pers. comm., 2013). These findings have also been validated by other research, for example in the case of cost-benefit analysis (WDD, 2010; Sofroniou & Bishop, 2014) as well as for recycled water (Birol, Koundouri, & Kountouris, 2007). The following comment highlights the use of cost-benefit analysis and forecasting in practice. It was noted that the development of these techniques had been based on national policy, while also being influenced by EU legislation.

> *"We use things like cost-benefit....and we do forecasts and try to analyse risks. These have come from the laws and also some influences from Europe. I mean cost-benefit ratios are used for everything. For example...it is needed when you have to develop big projects.... like for treatment or desalination.... or waste-water collection systems and treatment for communities and so on. If you don't have enough money to cover everybody then you must decide what is going to be first...what is going to be second….and so on."* (Respondent 17)

6.2.2 Basic entities recognised or constructed

In terms of administrative rationalism, Dryzek (2013) has proposed that certain basic entities are recognised or constructed as part of problem-solving. These include; the importance of the administrative state; as well as the type of role held by experts and managers. As noted in chapter one and three, the structural setting of liberal capitalism is assumed to be a prerequisite for administrative rationalism, and this setting is also confirmed to exist in Cyprus.

Administrative state

The need for the control of resources, organised through the state which has existed as a fundamental grouping of people, has enabled the state to gain power and emerge as the basis of coordination in response to issues that face society (Dryzek, 2013). This has provided a foundation for the existence of administrative rationalism, which emerges as the initial response to resource management and environmental problems. The administrative state is deemed to be the most important and established basic entity in terms of administrative rationalism (Dryzek, 2013). In this case, government is the administrative state in unitary terms, while the process of governing is non-participatory and based on rational management that is guided by expertise (Dryzek, 2013). Government is considered to exist as a system of political organisation that operates with a central government having authority over and making decisions for subordinate local government offices or bodies (Dryzek, 2013; Hague, Harrop, & McCormick, 2016). This

also reflects the mandatory approach, particularly through the characteristics of hierarchy and top-down authority (Bradach & Eccles, 1991; Keast, 2016).

Administrative rationalism considers the organisation of technical expertise, in terms of a bureaucratic hierarchy and unitary government, to be central in serving the nation state. Evidence of this was observed in Cyprus regarding water. Since independence in 1960, and in the first phase of management, the government was the established and controlling entity in terms of water management and when shaping the response to problems of scarcity and quality (Respondent 1, pers. comm., 2013). The majority of respondents identified the administration as an important organisational component that helps to; distribute power, assign responsibility and authority, arrange basic relationships, as well as direct policy implementation (Respondent 1, pers. comm., 2013; Respondent 14, pers. comm., 2013). Further building on this interpretation, respondents also stressed that the state through government has been an important construct based on the socio-political and organisational structure of Cyprus. This was noted to be based on factors such as; a highly political system; a closed community and society; a distinct culture; as well as strong hierarchal levels of organisation, as identified in chapter five through policy, executive, and consumer levels (Respondent 8, pers. comm., 2013). In some cases, this has been found to be true of other Mediterranean, peripheral, and southern European countries (Magone, 2003; Sapelli, 2014).

All water resources have been controlled, developed, managed, and allocated by the state through national government, before being given to water boards, municipal authorities, district offices, and regional or village boards for distribution to users (Respondent 14, pers. comm., 2013). Water regulation has been fundamentally driven by the state through government and the bodies that sit within this, particularly the MANRE and WDD (Respondent 1, pers. comm., 2013). This is representative of a unitary government system of organisation, thus reflecting a key characteristic of administrative rationalism (Dryzek, 2013). As noted by some respondents, this has been the expected process of water service provision, although it does not account for the abstraction of groundwater that involves the allocation of water without government knowledge (Respondent 18, pers. comm., 2013). In this case, the government has had limited control on these resources, thus contrasting with the complete control expected under administrative rationalism (Dryzek, 2013). Nevertheless, the following comment typifies the vital role of the state in Cyprus, by emphasising that state control in a centralised system has been prevalent as a result of all water resources and legal rights being owned by government.

> *"Water management and organisation is still based on centralised control by the state. First of all let me say that practically all water....now and according to the law....belongs to the state and the government. Nobody has water rights anymore. We try to respect some old-fashioned water rights....we tried to be more flexible and political...but the law says that all water belongs to the government...it's as simple as that"* (Respondent 1)

The importance of the state in Cyprus was also argued to be a reflection of a colonial past. Some respondents claimed this had greatly influenced governance and management prior to independence, being noted through historical evidence of resource exploitation, a district level organisational structure for reporting to a central controlling body, as well as water laws formed that served the colonial system in place at the time, particularly for groundwater (Respondent 2, pers. comm., 2013; Respondent 14, pers. comm., 2013). The most recent form of colonial rule under the British attributed great importance to state power and control in all matters, especially water management, with this highlighted through district office authority and control (Respondent 1, pers. comm., 2013; Respondent 18, pers. comm., 2013). As a result, post-colonial Cyprus has shown evidence of the organisational structures and management practices from these past influences. The characteristics associated with colonialism and state control are reflected through a system based on; hierarchy; strong regulation; top-down perspectives of institutional and policy responses; as well as state expertise in matters exerted through government departments. This hierarchy was observed in the case of policy, executive, and consumer levels of organisation, while in practice it has also been evident in terms of decisions for regional water allocation (Respondent 10, pers. comm., 2013). Furthermore, the importance of the state as a reflection of a colonial past generates an alternative interpretation for the development of state control as the basis for problem-solving responses. This contrasts with administrative rationalism, which Dryzek (2013: pg76) notes as being 'simply taken for granted that this was how issues should be handled'. The following comment illustrates the influence of colonial rule for maintaining state control when managing water problems in Cyprus.

> *"If you look at the regulations....the colonial rule and the laws that we had in the past....everything was set up for exploiting the natural resources on the island...and that includes the water....and groundwater...for whatever activities.....[....]....So these past systems and controlling structures....like the district office powers.....have had an influence.....and are still very much a part of the structures in place"* (Respondent 2)

Experts and managers

Administrative rationalism proposes that experts and managers have a controlling role in decision-making, essentially adopting dominant positions in the state hierarchy (Dryzek, 2013). In this case, experts are defined as those that have scientific and technical expertise that are

organised into bureaucratic hierarchy and motivated by the public interest (Dryzek, 2013). Managers are defined as those that have a professional capacity to manage the response to a problem, being positioned to coordinate efforts. Dryzek (2013) emphasises the expert and manager, rather than the citizen, producer, or consumer in relation to problem-solving.

Experts and managers have played a key role in decision-making and problem-solving in Cyprus. This has been noted through examples such as expert guidance provided by the WDD to help the Council of Ministers and Parliament develop water policy; as well as in relation to managers that operate at ground-level within the water boards and municipalities or villages (Respondent 6, pers. comm., 2013; Respondent 13, pers. comm., 2013). As typified by the following comment, many respondents [including those positioned in government departments, water boards, and non-governmental organisations] recognised the role of experts and managers in responses to water problems, particularly at executive and consumer levels of organisation.

> *"So...there are the experts....and these are mostly in the government departments like the water development department or the environment department. They give the help to ministers, politicians, and the parliament for achieving effective policy....[...]...you have managers as well.....who maybe have less power but are responsible for managing water when it comes to the users....for example the water managers at the boards or in the district offices...these are still important people..."* (Respondent 20)

In Cyprus, experts were defined according to scientific or professional knowledge, specific skills, as well as roles in terms of research, policy guidance, and interaction with the advisory committee or ministers (Respondent 1, pers. comm., 2013). This also agrees with definitions of experts given by understandings such as technocracy (Parsons, 1995; Radaelli, 2017). Managers were seen to operate closer to water users, having a balance of multiple skills, working through groups, and implementing expert guidance given on different topics (Respondent 8, pers. comm., 2013; Respondent 13, pers. comm., 2013). Experts, such as hydrologists, water officers, and district engineers, were more prominently situated at the policy and executive levels of organisation, namely within the advisory commission, ministries, and technical departments that help to develop policy and give direction to the government [Council of Ministers and Parliament] on matters relating to water (Respondent 1, pers. comm., 2013; Respondent 18, pers. comm., 2013). In contrast, managers, such as board managers and district officers, played a greater role at the executive and consumer levels of organisation, for instance within water and sewerage boards, municipal authorities, irrigation divisions, and some sections of the WDD (Respondent 10, pers. comm., 2013). The following comment notes the importance of experts

and managers in Cyprus, particularly highlighting their roles in guiding policy, as well as implementing policy and managing water at ground-level.

> *"I would say the experts play a key role in Cyprus.....at the first stages they help to develop policy or guide EU policy such as the Water Framework Directive [and its implementation in Cyprus]. Experts also helped government and organisations to make the proper studies [achieve proper research]...so they are important....[....]....The managers are helping in the water boards and so on.....they are important for managing the water and activities...and at the ground level"* (Respondent 6)

The experts and managers identified in Cyprus compare favourably with the experts and managers envisaged by Dryzek (2013), based on the representation of characteristics such as; an important standing; the advocacy of rational management, noted through the existence of analysts for technical procedures; as well as policy being informed by expertise. It is worth noting, however, that a difference was also evident as respondents identified some actors as having roles as both experts and managers. In Cyprus, the dual-role status of actors was noted in the case of some experts within the MANRE and WDD, who exhibited responsibilities that were representative of both roles, as well as certain managers in water and sewerage boards who exhibited expertise or previous positions in expert roles (Respondent 2, pers. comm., 2013; Respondent 14, pers. comm., 2013). This concept was also further developed by some respondents in relation to the roles of ministers. It was argued that minsters within government often exhibited a dualistic role as both politicians and experts, with many ministers having previously held positions as experts within government departments (Respondent 1, pers. comm., 2013). The understanding of certain actors having changeable roles and motivations, as politicians, experts, or managers, has not been considered by exponents of administrative rationalism. Indeed, the findings contrast with Dryzek's (2013) interpretation, as although technical experts and managers are assumed to have a greater role in problem-solving than any other actors; they are still considered to be separate entities according to administrative rationalism. This is based on the way scientific and technical expertise is interpreted as being organised into bureaucratic hierarchy (Dryzek, 2013). The interpretations and definitions of technocracy also agree with Dryzek's (2013) view by implying that experts and managers are separate entities, based on technocrats having greatest responsibility and authority for decision-making (Parsons, 1995; Peters, 2010; Radaelli, 2017). Ultimately, the findings in Cyprus that identified changeable roles contrasted with the perceived understandings of technocracy and administrative rationalism.

6.2.3 Assumptions about natural relationships

In the context of administrative rationalism, Dryzek (2013) assumes that certain natural relationships exist and operate in problem-solving. These are recognised in terms of the dynamic relationships between; nature and human problem-solving; society and the nation state; as well as expert interaction with the nation state.

Nature and human problem-solving

The first assumed relationship represented by administrative rationalism involves the dynamic between nature and human problem-solving solving. In this case, nature is deemed to be subordinate to human activities and problem-solving responses, thus implying that problem-solving gains priority above all else (Dryzek, 2013). This interpretation partly reflects the assumption put forward by the promethean response, which recognises a hierarchy of humans above all other variables (see Murphy, 1967; Simon, 1996). Dryzek (2013) however differs by specifically identifying human problem-solving as the key variable in this case.

In Cyprus, the relationship described has been evident through historical water management approaches described in chapter five, and specifically the first and second phases of management. For instance, the vast number of dams/reservoirs constructed, the Southern Conveyor water transfer system, the exploitation of groundwater, and the expansion of desalination, provide examples that suggest nature has assumed a subordinate position in comparison to human problem-solving, which has focused on ensuring sufficient water for domestic and agricultural demand (Respondent 8, pers. comm., 2013). Notably, the extensive use of groundwater resources in response to increasing demand and the need to protect good quality potable water ultimately contributed to the issue of saline intrusion in coastal aquifers. In this case, nature was deemed subordinate to human activities and problem-solving, as the need to solve problems of increasing demand took priority over environmental protection. Some respondents positioned in the Environment Department and non-governmental organisations also highlighted evidence of this relationship as a result of extensive dam/reservoir construction used to increase supply for irrigation, despite environmental impacts such as ecosystem destruction and greenhouse gas emissions (Respondent 2, pers. comm., 2013; Respondent 9, pers. comm., 2013; Respondent 14, pers. comm., 2013). This type of relationship evident in Cyprus can also be referred to as a Malthusian narrative and a form of development, which relates to the growth of infrastructure due to impending water scarcity and potential for conflict (Hoffmann, 2018).

Society and the state

The second relationship assumed by administrative rationalism within the context of natural relationships, involves the subordination of society to the administrative state (Dryzek, 2013). In this case, the state is deemed to be the controlling force in comparison to the people, while it is noted that in this relationship the position of the state can also be potentially held by a transnational authority (Dryzek, 2013). This partly reflects the mandatory approach, through top-down and elitist perspectives, based on the existence of hierarchal management and a vertical format of authority involving groups being subordinate to those at the top of the organisational hierarchy (Parsons, 1995; Miller, 2002). Indeed, the relationship expected by administrative rationalism also reflects other characteristics of the mandatory approach, including; a state mode of governance (Powell, 1990; Keast, 2016); the potential for coercive relationships (Etzioni, 1961); and the idea of command (Rigby, 1990).

In Cyprus, evidence of society being subordinate to the state, as well as society and the state being subordinate to a supranational authority has been observed. Respondents highlighted this relationship through state control and the limited role of society [in the form of post-industrial society and an organised community or group of people] regarding decisions made for supply expansion and desalination (Respondent 9, pers. comm., 2013). Furthermore, the EU was widely claimed to be a strong influence and controlling force on state and society, through direct policy, economic requirements, and even socio-cultural influences (Sepos, 2008; Ker-Lindsay, Faustmann & Mullen, 2011; Ioannou & Kentas, 2011; Respondent 15, pers. comm., 2013). As typified by the following comment, many politicians, civil servants, and experts in Cyprus considered the public to be subordinate to the state, government, and associated technical departments when it came to decision-making.

> *"First [most important] is the state.....which works through the government really.....and then it is the departments like the WDD which provide the technical expertise. As for the public...they are not so involved...and too much freedom for public decision-making is sometimes counter-productive. There are certain situations where you would rather have the WDD decide....based on the expertise and the whole picture....[...]...Sometimes democracy is not the best form of rule [laughs]."* (Respondent 8)

Experts and the state

The third relationship assumed to exist as part of administrative rationalism involves the dynamic between experts and the state. According to Dryzek (2013), experts and managers are positioned in dominant roles within the state's hierarchy, with this position being justified through expertise, and thus are argued to control the state in terms of problem-solving. This

also reflects the power approach of technocracy, which recognises the key role of technical experts and scientific knowledge in decision-making (Burris, 1993; Parsons, 1995).

In Cyprus, although experts did have an important role, respondents from government departments, boards, and non-governmental organisations claimed that higher level actors positioned above the experts and managers, namely ministers and politicians, actually held the most power in decision-making (Iacovides, 2011c; Respondent 2, pers. comm., 2013). In this case, the ability of politicians and ministers to control the direction of government and the state was observed in terms of water pricing, irrigation water allowances, and drought responses (Respondent 3, pers. comm., 2013; Respondent 8, pers. comm., 2013). This contrasts with the expectations of administrative rationalism, which instead considers the state to be primarily controlled by the experts (Dryzek, 2013).

The findings were more closely aligned with the power approach of elitism. This assumes power within the decision-making process is centralised and controlled by certain non-expert groups or individuals [in this case the politicians] that ultimately shape and determine a given policy direction or decision outcome (Parsons, 1995; Parry, 2005). For example, although the following comment recognises the importance of experts and managers, it also highlights the key role of the non-expert politicians and the influence they have as 'gate-keepers' of decision-making. This typified the view of many respondents, who often reiterated the importance of the state and politicians in shaping decisions.

> *"The state is primary in the case of Cyprus...everything is done through the state and government. Experts and managers have some control.....but ultimately they must still get past the politicians. The politicians are the gatekeepers."* (Respondent 7)

Alongside the concept of elitism, these findings also reflected characteristics of the top-down perspective, namely through increasing authority in a vertical format within government and associated bodies, as well as recognition of the key role of high-level politicians and senior officials. In this case, many respondents noted that high-level bureaucrats and politicians had been central to decision-making and policy implementation, with this further intensifying during drought periods (Respondent 6, pers. comm., 2013; Respondent 14, pers. comm., 2013). The top-down perspective was also shown by the direction of guidance for water management following a pathway [from top to bottom] through the policy to executive and then consumer levels (Respondent 8, pers. comm., 2013; Respondent 13, pers. comm., 2013). These findings

contrasted with the expectations of administrative rationalism and technocracy, which prioritise experts in problem-solving and decision-making (Fischer, 1990; Parsons, 1995; Dryzek, 2013).

In terms of responses to water problems and the dynamic between experts and the state, policy and laws were used to give authority and define responsibilities, as also noted in chapter five. Respondents observed that water resources in Cyprus were primarily allocated by the WDD, but important decisions were made by the Council of Ministers and Parliament, which were not experts but ministers and politicians respectively (Respondent 1, pers. comm., 2013; Respondent 18, pers. comm., 2013). Furthermore, the majority of respondents identified the issue of politicians and ministers not following the advice provided by experts and managers, and this reiterated the idea that experts did not have primary control of the state. Indeed, the diminished role of the experts in terms of state control was found through a range of examples, particularly the development of the Southern Conveyor transfer project and the drought event of 2008 (Respondent 10, pers. comm., 2013; Respondent 16, pers. comm., 2013). As shown by the following comment, in relation to irrigation networks, respondents argued that certain decisions made were not based on expert guidance but rather shaped by politicians.

> *"A lot of changes happen because of political pressures. For the southern conveyor irrigation networks everybody wanted to be included....so we built a network to irrigate 9000...whilst the water available was only for 4000. So you can see the kind of problems we have. Here the decisions were not technically founded.....it was all political. The politicians changed the recommendations given from the experts and technocrats."* (Respondent 14)

The experience of drought was also interpreted by respondents to be important in terms of highlighting the dynamic between experts and the state. This was observed in terms of how the drought experience caused changes in decision-making. Many respondents identified the use of selective and top-down approaches during the drought event, which opposed the idea of experts controlling the state (Respondent 6, pers. comm., 2013; Respondent 14, pers. comm., 2013). In this case, responsibility for decision-making and drought management was allocated to the highest levels of government, with decisions subsequently communicated through the MANRE and WDD to all ground-level groups, such as the town water boards, municipal authorities, and village bodies (Respondent 8, pers. comm., 2013). As a result, in contrast to the understanding of administrative rationalism, the experts did not have control over the state as higher-level actors had the ability to make final decisions in relation to management, such as supply cuts and the importing of freshwater (Respondent 16, pers. comm., 2013). The following comment exemplifies how the highest levels of government [Parliament, politicians, and the Council of

Ministers] often exhibited the greatest power and control during the drought. This contrasted with administrative rationalism, based on the limited control and influence exerted by experts who are expected to be dominant and have control according to Dryzek's (2013) interpretation.

> *"When the problem was very intense during the drought period.....the decisions were all coming from the top of the government....this being above the experts like in the WDD. In those times they [highest level actors] have the ultimate power and control.....because it was a very strange situation and there was no water to drink...it was a crisis!"* (Respondent 9)

6.2.4 Agents and their motives

Administrative rationalism attributes the variable of agency to both collective and individual actors (Dryzek, 2013). This was observed in Cyprus, as agency has been recognised through collective groups such as the government, water boards, unions, and advisory committees, while individuals such as experts, managers, ministers, and politicians were also acknowledged (Iacovides, 2011c; Respondent 14, pers. comm., 2013; Sofroniou & Bishop, 2014).

Administrative rationalism considers the government to be the primary agent, although not all individuals within government are viewed to have the equal ability to act in a given problem-solving scenario (Dryzek, 2013). This was true in Cyprus, as the government was argued to be the primary decision-making authority regarding water, while the capacity to act varied according to ministry, position, control, and relative authority. For example, respondents identified the primary authority of government through control for the direction of water management, the development of approaches through policy, and in relation to specific projects such as the Southern Conveyor transfer network and desalination plants (Respondent 3, pers. comm., 2013; Respondent 7, pers. comm., 2013). Furthermore, other respondents noted how the capacity to act for those in government was variable. For instance, those in the MANRE and WDD had greater authority and capacity to act when compared to those in other ministries such as the Ministry of Interior or municipal authorities and district offices (Respondent 6, pers. comm., 2013; Respondent 3, pers. comm., 2013).

Expert and manager types identified in Cyprus

In contrast to the expectations of administrative rationalism, decisions in Cyprus were often heavily influenced and shaped by politicians, ministers, and parliament, thus meaning that experts and managers did not have a greater capacity to act in comparison to these other agents. For example, this was highlighted by respondents in terms of water pricing policy and drought

management, as those interviewed noted that politicians delayed and changed the policy recommendations and management plans put forward by experts in the MANRE and WDD (Respondent 3, pers. comm., 2013; Respondent 3, pers. comm., 2013).

More specifically, when exploring the role of experts and their motivations, different types of expert were identified by respondents and found to exist in Cyprus. In this case, experts were found to include; those focused on departmental duties and staying within the confines of the technical department; those holding a more political role and moving between technical department and also the political arena; as well as those working directly with ground-level actor groups and moving between technical department and the ground-level. Based on the findings, these roles and characteristics have given rise to specific expert types, which can be defined as; departmental experts; political experts; and ground-level experts.

Firstly, departmental experts had a role focused on duties and operations within their department. Respondents noted that these actors exhibited motivations that favoured both the public interest as well as their department through being positioned towards validating or strengthening their group (Respondent 18, pers. comm., 2013). This reflected the idea of public interest by Dryzek (2013) and also bureau-shaping by Dunleavy (1991), based on these experts attempting to maximise policy control and benefits gained by their department. For example, these departmental experts were identified by respondents in the case of supply management and responses to drought (Respondent 8, pers. comm., 2013; Respondent 9, pers. comm., 2013).

Secondly, political experts had a more flexible role based on moving between their technical department and the political arena, where interaction with politicians, ministers, pressure groups, unions, and citizens was expected. Respondents identified political experts in the case of individuals within the WDD [and other government departments] that were fundamentally experts [as defined by Dryzek] but also had the appropriate skills and were required to liaise with other groups, such as farmer unions, operating predominantly within the political arena (Respondent 9, pers. comm., 2013; Respondent 16, pers. comm., 2013). Respondents often noted that these actors exhibited motivations based on self-interest as well as the group interests of their given department represented within the political and public arena.

Thirdly, ground-level experts were identified through individuals that were expected to liaise with municipal or village boards and district offices, essentially operating at ground-level and

helping these boards with additional expertise, guidance, and implementation (Respondent 7, pers. comm., 2013; Respondent 10, pers. comm., 2013). Some respondents noted that these actors exhibited motivations based on the public interest, while others also identified attempts to prioritise their department to maintain control of the policy implementation process and to try and direct problem-solving responses at ground level. For example, this was noted in the case of WDD representatives being permanently positioned within water boards and having an influence on the direction of board activities in relation to aspects such as demand management, pricing, and irrigation supply control (Respondent 7, pers. comm., 2013).

Notably, these expert types contrasted with Dryzek's (2013) definition of the expert, which focuses on individuals with scientific or professional expertise that are organised into bureaucratic hierarchy and motivated by the public interest to solve problems. As a result, the findings build on Dryzek's (2013) simplistic definition, as in practice experts were found to represent multiple characteristics, with these reflected through roles, behaviours, and motivations relative to their type as well as their positioning within government and in the problem-solving process. This interpretation identifies certain nuances in expert type based on their roles in practice, thus offering an additional layer to the understanding of experts as defined by administrative rationalism.

Exploring agent motives

According to administrative rationalism the motives of actors are orientated towards the interest of society, thus meaning that controlling agents such as experts and managers seek to act in the public interest (Dryzek, 2013). In Cyprus, the majority of respondents suggested that civil servants, experts, and managers often did try to act in the public interest, while exceptions to this rule were also noted when self or group-interests were the main motives. This was suggested by a range of respondents from government departments, boards, non-governmental organisations, and independent positions (Respondent 6, pers. comm., 2013; Respondent 8, pers. comm., 2013; Respondent 13, pers. comm., 2013; Respondent 18, pers. comm., 2013). As a result, these identified agents and their motives shared similarities but also differences, with administrative rationalism and Dryzek's (2013) understanding of motivation.

The desire to serve the public interest was identified in practice, and this was related to the expected agent motives embraced by administrative rationalism. If adopting Dryzek's (2013) generalised interpretation and definition of these agents, it was primarily the experts and some

managers who were perceived as having a desire to serve the public in Cyprus, particularly those positioned in the MANRE, the WDD, and water boards (Respondent 7 pers. comm., 2013). More specifically, for those in the technical departments [or departmental experts] there was found to be a true desire to serve the public, as indirect benefits and self-interests for these actors were limited. In contrast, the motives for serving the public were less clear for politicians and water board representatives, as well as political and ground-level experts. Respondents noted that these actors were aware of potentially achieving personal or group interests by satisfying the public interest, and political interaction was seen as an influencing factor (Respondent 8 pers. comm., 2013; Respondent 16 pers. comm., 2013). This adds a layer to the expectations of administrative rationalism, as by acting in the public interest many actors were aware of the positive implications this could have for their own personal or group interests, and as such they were prompted to act in this way.

A range of respondents from government departments, boards, and non-governmental organisations also claimed that individual or collective actors, such as politicians, municipal representatives, district offices, or unions, as well as some experts and managers, did not always act in the public interest (Respondent 2, pers. comm., 2013; Respondent 12, pers. comm., 2013; Respondent 18, pers. comm., 2013). This was identified through experts that sought to ensure job security, evident in departments such as the WDD and the Department of Agriculture, alongside certain managers in municipal boards and at village level that represented allegiance with political parties and sought to satisfy personal or group interests associated with these. For example, this was identified in the case of water allocation in the Paphos region during the drought of 2008, as well as irrigation network supply (Cyprus Mail, 2009d; Respondent 10, pers. comm., 2013; Respondent 16, pers. comm., 2013). Furthermore, self-interest was observed in the case of politicians attempting to secure votes, and farmer unions applying pressure on government in accordance with political agendas (Cyprus Mail, 2013; Respondent 8, pers. comm., 2013). The following quote illustrates how some experts sought to act in the public interest, even though these actions or decisions were often restricted by factors such as a lack of authority, limited control, and decision-making politics.

> *"Unfortunately, the final decision is not down to the experts. They often try to do their best, in the position they are in and with the power they have, to make correct decisions.....and in the best interests of the public. But this is not always possible....as the final decision is not down to them"* (Respondent 3)

The fact that not all agents acted in the public interest contrasts with what is proposed by Dryzek (2013) through administrative rationalism, and instead more closely related to theories of public choice and self-interest, involving; bureaucrat types and behaviour (Downs, 1967), budget-maximising (Niskanen, 1971), bureau-shaping (Dunleavy, 1986), and economic models of understanding (Tullock, 1965 & 1987). This was applicable for a range of individual and collective agents in Cyprus, namely; civil servants, experts and managers, as well as politicians, ministers, municipal offices or representatives, and farmer unions (Respondent 8, pers. comm., 2013; Respondent 16, pers. comm., 2013). Indeed, this also involved the departmental, political, and ground-level expert types. As highlighted by the following comment, despite many civil servants and experts trying to act in the public interest there were still exceptions, with self-interest in these cases being determined by factors such as a desire for votes, career promotions, financial gains, as well as collective group benefits (Cyprus Mail, 2013).

> *"Most try to...but of course not all actually serve the public....as anywhere you can find public servants that are not serving the public but they are serving their own personal or group interests. Their motives....votes or promotions maybe....well promotions come with more money....or even a benefit for a situation or group. I don't really want to expand on this topic too much. But thankfully this is not the general condition..."* (Respondent 5)

The understandings of public choice theory and human relations motivation theory assume that actors mainly perform to satisfy self or group interests (Parsons, 1995). Work by; Downs (1967) on bureaucrat types; Niskanen (1971) on budget-maximising and the pursuit of financial gains; Dunleavy (1986) on shaping departments and budgets to maximise personal interests; and Tullock (1987) on economic modes of self-interest, were found to be relevant in Cyprus. Evidence of public choice theory in practice contrasted with the view proposed by administrative rationalism, which assumes that experts and managers are primarily motivated by the public interest (Dryzek, 2013). In Cyprus, different types of public choice theory could be identified, and these are subsequently discussed.

Some aspects of the form of public choice theory developed by Downs (1967; 1993) were observed in Cyprus. These were related to laws of organisational function, bureaucrat type, and motive drivers [concepts described by Downs (1967) and noted previously in chapter three]. Firstly, the law of hierarchy was represented as a function by the MANRE and WDD, based on these being large central bodies that have required hierarchical authority for coordination (Respondent 5 pers. comm., 2013). This also reflects the format of hierarchy expected by Dryzek (2013) in the case of administrative rationalism.

Secondly, actor types were also identified in Cyprus, with some experts, managers, politicians, and others, such as municipal representatives and union members, reflecting the roles of; climbers, zealots, and conservers respectively (Downs, 1967 & 1998). Climbers were observed in the case of politicians who had been concerned with power, shown in terms of drought management and infrastructure development (Respondent 1 pers. comm., 2013), while municipal or village representatives showed this at a local level when controlling resources and allocating water (Respondent 9 pers. comm., 2013; Respondent 18 pers. comm., 2013). Zealots who pushed for certain policies were evident in the case of experts within technical departments as well as some politicians and water board representatives (Respondent 16 pers. comm., 2013), while union members often sought to align with their political party agenda and this involved advocating certain policies or schemes, especially in relation to pricing and irrigation water allocation (Respondent 8 pers. comm., 2013). Conservers were primarily represented by politicians and ministers who were concerned with minimising change (Respondent 8 pers. comm., 2013). This was noted by respondents as a result of decision-making conflict and evidence of certain politicians and board representatives attempting to minimise pricing policy changes, while also upholding the use of subsidies in the face of recommended changes from the EU (Respondent 18 pers. comm., 2013).

Furthermore, certain scenarios in Cyprus also reflected the advocate and statesmen actor types defined by Downs (1967; 1993), as well as the idea of bureau-shaping put forward by Dunleavy (1986) which considers the shaping of a given agency to maximise self-interests. This challenges Dryzek's (2013) interpretation of actors in the context of administrative rationalism, as experts and managers are deemed to be motivated by the public interest. In Cyprus, advocate actor types were identified based on loyalty and a desire to maximise the role of the department, with this observed in the case of the MANRE and WDD through demands for improved departmental expertise and greater control over policy, water allocation, and management during drought periods (Respondent 2 pers. comm., 2013). Statesmen actor types were also represented mainly by politicians as well as some experts found within the MANRE and WDD, with these scenarios appearing in the case of water allocation for both the public and farmers (Respondent 14, pers. comm., 2013). In turn, bureau-shaping was seen within the MANRE and associated departments, as well as the town boards and municipal bodies, through which shaping characteristics were identified. These were evident for; internal reorganisation of the MANRE and WDD (Respondent 1, pers. comm., 2013); the transformation of work practices partly as a result of external influences such as EU policy and economic restraints (Respondent

15, pers. comm., 2013); competition between departments, especially when responsibilities for management were redefined and rearranged giving more authority to the WDD (Respondent 8, pers. comm., 2013); as well as the transfer of functions and contracting-out of activities noted through the management of desalination plants (Respondent 6, pers. comm., 2013).

Thirdly, in the case of actor motives, public choice theory work by Downs (1967; 1998) considers these to be categorised according to pure self-interest and forms of mixed self-interest. In Cyprus, motives from both categories were identified, particularly; power and job security for pure self-interest, as well as loyalty and a desire to serve the public for mixed self-interest. The motive of power was represented by all actors and existed in the case of political dynamics and conflict observed for aspects such as water allocation, pricing, and irrigation management (Respondent 7 pers. comm., 2013). In terms of job security, this motive was represented primarily by the politicians through their populist positions, while the examples of water allocation decisions and management choices during the drought of 2008 showed how these actors favoured certain groups to try and secure votes and maintain or advance their political positions (Respondent 1 pers. comm., 2013; Respondent 13 pers. comm., 2013). In relation to loyalty, a range of actors such as experts, politicians, ministers, and most notably the farmer unions, represented this, with the motive often being manifest through departmental loyalty and political party allegiance (Cyprus Mail, 2013; Respondent 18 pers. comm., 2013). For example, respondents highlighted the issue of political allegiance represented by politicians and the farmer unions in the case of irrigation water allocation and pricing (Respondent 19 pers. comm., 2013). These findings contrast with the actor motives described by Dryzek (2013), which for administrative rationalism are based on experts and managers being motivated to act in the public interest and described as ‘entirely public spirited’ (Dryzek, 2013: pg89).

Alongside the motives considered by Downs (1967), the findings in Cyprus also represented work on motivation by Tullock (1987), who interprets a type of public choice theory suggesting that actors are driven primarily by economics and interested in maximising their self-interests. This was represented in practice both directly and indirectly. In terms of direct representation, farmer unions were noted to have sought economic gains for their sector through political pressure and by lobbying government decisions on pricing and the allocation of irrigation water (Socratous, 2011a; Respondent 3 pers. comm., 2013; Halbe *et al*., 2015). Respondents claimed that decisions in this sense were often highly political and focused on union interests and political agendas (Respondent 8 pers. comm., 2013). In turn, forms of indirect representation

were identified through regional management conflicts. Respondents noted how municipal and village representatives had actively sought to maximise regional interests and make gains for their local economies by utilising authority at this jurisdiction and organisational level to influence decisions. Evidence of this was based on decisions relating to water allocation that favoured municipal or village users, as well as the lack of enforcement and, at times, disregard for WDD guidance, especially during drought periods (Respondent 1 pers. comm., 2013). Indirectly, this benefitted these communities, as other areas had to deal with severe restrictions and intermittent supply (Respondent 10 pers. comm., 2013). Notably, Dryzek's (2013) interpretation of actor motives does not account for the role of self-interest in causing conflict between levels of government.

In the case of politicians, municipal or village representatives, and farmer unions, these actors often exhibited decision-making choices that were motivated by self-interest and influenced by politics and the potential for collective economic gains (Respondent 3, pers. comm., 2013). According to many respondents, the most common motivations of self-interest for these actors were found through attempts to ensure job security or to conform to party politics (Respondent 1, pers. comm., 2013; Respondent 13, pers. comm., 2013). This was related to the type of public choice theory put forward by Niskanen (1971), which focuses on maximising self-interest, particularly through individual and collective financial gains. The motives of politicians, municipal or village representatives, and farmer unions are subsequently explored.

Politicians, such as certain mayors, parliamentary representatives, and local or regional councillors showed signs of acting in their own interests. This was often observed through indirect actions and decisions that aimed to satisfy the demands of certain actor groups, with a view to securing votes and in turn ensuring job security or financial benefits (Respondent 1, pers. comm., 2013; Respondent 8, pers. comm., 2013). For example, satisfying the water demands of farmers or the tourism sector was cited to ensure job security or benefits for the local economy, thus allowing politicians to; gain recognition; avoid conflict; and have advantageous positions according to political allegiance (Respondent 6, pers. comm., 2013; Respondent 18, pers. comm., 2013). As highlighted by the following comment, many respondents considered self-interest to exist as a motive for actors, especially those at the policy level such as ministers and politicians. Self-interest was focused on gaining votes, ensuring job security, and providing economic benefits, with these aspects serving to shape decisions.

> *"I would say that the level above [the WDD]....the highest level actors.....they are politically driven and see things differently. They take additional aspects into account.....voting....job security....economics....and so on....they will take other factors into consideration before they take their final decision. I mean they may decide to stop the construction of a desalination plant because there is public pressure. In this case indirectly they would want to secure their seat and votes....because they may say there will be political unrest and it will be against our government so we will lose popularity.....things like that"* (Respondent 13)

In relation to municipal or village representatives [and offices], self-interest was observed through decisions that benefited groups or aligned with regional strategies. For instance, this was identified in terms of decisions made to benefit the Paphos region during the 2008 drought, with these going against the advice and guidance given by the WDD at the time (Cyprus Mail. (2009d; Respondent 11, pers. comm., 2013). In this case, self-interest emerged through gaining a financial advantage for the regional economy, satisfying the demands of local farmers, and again attempting to secure votes by satisfying the demands of the public [essentially no water restrictions during a drought period, despite island-wide restrictions] (Respondent 8, pers. comm., 2013; Respondent 16, pers. comm., 2013). Other examples of decisions at local, municipal, or regional level being motivated by self-interest were highlighted by respondents in terms of the district offices and village boards, which had the capacity to allocate financial income gained from water services to other activities or projects (Respondent 17, pers. comm., 2013). These findings are at odds with Dryzek's (2013) concept of actor motivation, as managers, such as those found at municipal or village level in Cyprus, are not expected to act according to individual or group self-interests. In reality, political allegiances and regional demands make the situation more complex than envisaged by Dryzek's (2013) interpretation.

The issue of self-interest was also highlighted by respondents in terms of other specific actor groups, namely the farmer unions and the significant influence of party politics (Respondent 7, pers. comm., 2013). For administrative rationalism, Dryzek (2013) gives a limited description of politics within the discourse and in terms of agent motives, whereas many respondents identified its important role and influence on all actors in Cyprus (Respondent 19, pers. comm., 2013). In the case of politics and agent motives, essentially all respondents identified the importance of farmer unions and their desire to satisfy their personal and collective interests (Cyprus Mail, 2010; Respondent 6, pers. comm., 2013). Each farmer union in Cyprus was affiliated with a specific political party, and it was argued that motives often aligned with the prevailing viewpoint and agenda of these parties (Charalambous & Christophorou, 2016; Ioannou, 2016; Katsourides, 2016; Protopapas, 2016). For example, motives focused on aspects such as; politics and political allegiances; collective benefits for individual farmers and specific

unions; financial gains; as well as having greater power to influence decisions (Respondent 18, pers. comm., 2013). As illustrated by the following quote, certain actors and groups closely associated with political parties often failed to act in the public interest.

> *"Some actors and groups have their own interests. I mean the different unions and local representatives are affiliated with different parties....and these guys along with many politicians are laikistis [populist]. Their decision-making is not in the interest of the public...instead they focus on their own interests such as politics, financial gains, control or status. I also want to say that for agriculture....it is carrying a lot more weight [politically] than its size and contribution [as a sector] to the economy"* (Respondent 1)

6.2.5 Key metaphors and rhetorical devices

According to administrative rationalism, the main metaphor and rhetorical device assumed to exist involves the concept of a unitary administrative mind, which guides and navigates the state in all aspects of problem-solving (Dryzek, 2013). Although this is a difficult concept to identify in tangible terms, the findings of this study supported the interpretation that this administrative mind existed in Cyprus based on the role and control of the state, which operated through government and administrative bodies that have long held authority for water management and problem-solving (Respondent 3, pers. comm., 2013; Respondent 18, pers. comm., 2013). Indeed, this has been the case since independence, as the government has sought to guide problem-solving in specific directions according to the perceived water problems, with responses to these identified through the management phases discussed in chapter five. For example, respondents highlighted the period of supply expansion, which was deemed necessary when responding to the ongoing issues of scarcity and more frequent and severe droughts (Respondent 1, pers. comm., 2013; Respondent 9, pers. comm., 2013). Indeed, as another layer to this metaphor, this period of expansion was interpreted through a Malthusian narrative and form of development that links infrastructure growth to water scarcity and potential for conflict (Hoffmann, 2018). The following comment highlights the idea of an administrative mind controlling the state, based on characteristics of government such as authority, reasoning, knowledge, and state guidance, when responding to water problems.

> *"The guiding force in Cyprus is from a central command. It is like a captain of a ship.....the government is guiding everything.....mostly for the good but sometimes not when we have mistakes [laughs]. With this.....you have one body that controls, that gives direction on all water matters for the state, and that enforces. Of course there are many other influences.....but overall the government tries to influence to move along a good path for water management"* (Respondent 8)

The presence of an administrative mind was interpreted to have been made weaker because of reduced control and authority held by the state and government in matters related to water. This was evident in the third phase of water management and according to many respondents it occurred as a result of the increasing influence of the EU in terms of new concepts, management approaches, and legislation (Respondent 12, pers. comm., 2013). For example, through approaches such as stakeholder participation, integrated management, cost recovery pricing, and specific legislation such as the WFD, it was noted that some power and control had been taken away from national government (Agathocleous, 2010; Ioannou & Kentas, 2011; Mullen, 2011; Respondent 6, pers. comm., 2013; Respondent 15, pers. comm., 2013).

As a result of this weakening, and the control and authority exerted by high-level actors such as politicians, an argument was made for an alternative understanding of metaphors and rhetorical devices associated with administrative rationalism in Cyprus. In this case, the existence and understanding of a 'political or supranational mind' that seeks to control an 'administrative body' could be developed, accounting for the wider influences of politics and supranational governance that have altered the characteristics associated with the administrative mind described by Dryzek (2013). For example, according to some respondents, the characteristics of reasoning, perceived knowledge, unquestionable authority, power, and state guidance were seen to be variable in Cyprus because of the influences of politics and EU governance (Respondent 1, pers. comm., 2013; Respondent 15, pers. comm., 2013). The following quote highlights the influence of politicians regarding decision-making, as well as the role EU governance has had in shaping approaches to water management and problem-solving.

> *"Politicians can have the power to change or make decisions at the final moment.....because they will approve it in the end so they can change things or adjust it to their own agenda or policies. They often guide things...but are at mercy to the EU still...[....]...Also I could say through the EU we have observed a shift in approaches and doing things.....membership to the EU has forced things to change quickly...and it has since guided our ways"* (Respondent 6)

6.2.6 Practical challenges of administrative rationalism

An important aspect of Dryzek's (2013) understanding relates to how problem-solving responses change over time. In this case, practical challenges are expected and act as drivers of change while also signalling the existence of discourses. These challenges are explored in the following section as they provide a link to the next chapter, while being understood by Dryzek

(2013) to encourage the development of other problem-solving rationalities, namely democratic pragmatism and economic rationalism that are explored in chapter seven and eight respectively.

Dryzek (2013) considers five management challenges to be expected outcomes of administrative rationalism. These include; implementation deficits related to issues of policy compliance; problem displacement; questions related to locus of control, governance, and decentralisation; dispersed or limited expertise; as well as political factors that serve to confuse organisational structures and procedures. According to Dryzek (2013), the challenges are perceived to be limitations that provide reasons for the emergence of other problem-solving approaches and rationalities, which follow on from administrative rationalism. As a result, it is argued that subsequent approaches and rationalities have been developed to remedy these failures, and so they are an important part of the evolutionary process of problem-solving.

In the following sections, the management challenges highlighted by Dryzek (2013) have been explored within the context of Cyprus. These challenges have been identified by respondents in terms of practical management. The findings further point towards the existence of administrative rationalism in Cyprus, while validating the idea that these challenges encourage the emergence of other approaches, namely democratic pragmatism and economic rationalism. Notably, the issue of politics has been analysed in chapter nine, as this was found to be a key emerging theme of the study and has had limited representation in Dryzek's (2013) rationalities.

Implementation gaps or deficits

In theoretical terms, the issue of an implementation gap emerges when a given regulation, policy, or law is passed but actual implementation is severely limited at ground-level (Weale, 1992; Lenschow, 2005; Dickinson, 2011). This gap involves the difference between declared policies [intentions] and actual practices [execution], and may occur due to a variety of organisational factors. These have often been considered from top-down and bottom-up perspectives, as well as in terms of contextual factors (Milio, 2010; Wu, Ramesh, Howlett, & Fritzen, 2017). For example, a top-down perspective recognises problematic aspects such as; policy clarity and articulation; communication; as well as the standards enforced during implementation (Lane, 2005; Dickinson, 2011). In contrast, a bottom-up perspective considers the view of implementation from ground-level actors and draws attention to aspects including; policy ambiguity; limited financial and operational resources; as well as time constraints (Lane, 2005; Wu *et al*., 2017). Furthermore, contextual factors relate to the wider setting in which

implementation occurs and involve influences such as; political stability; the extent of political support for a given policy; the transparency or openness of the policy process; and the extent to which the public sector is decentralised (Wu *et al*., 2017).

In Cyprus, implementation gaps were observed for national and international levels, involving national policy such as the IWM Law (2010) as well as international EU directives such as the WFD (2000/60/EC). Firstly, in terms of national water policy, a gap was observed where departments, boards, or municipalities had failed to fully implement policy as expected and formed by the Council of Ministers, Parliament, and central government (Respondent 2, pers. comm., 2013). Some respondents identified this in relation to objectives and outcomes for; allocation; groundwater and illegal boreholes; infrastructure expansion; as well as pricing and cost recovery (Respondent 7, pers. comm., 2013; Respondent 15, pers. comm., 2013; Respondent 19, pers. comm., 2013). Respondents also claimed that these gaps were caused by factors such as; economic constraints; a lack of expertise; political pressures; variable management by boards and municipal or village authorities at local level; as well as social barriers to change, especially in villages (Respondent 14, pers. comm., 2013). The following comment notes how a gap has existed for water laws due to non-implementation.

> *"It is usual that we issue a regulation or law.....you see what the law says....but you don't implement it...[...]..Another failure of the system is implementing the laws that we have....the environmental laws including water are notorious for non-implementation. What is produced in the laws is not always what actually happens"* (Respondent 2)

Secondly, an implementation gap was also highlighted for international policy, caused by government and associated departments being limited in their attempts to fully implement EU water policy, and namely the WFD (2000/60/EC). Respondents identified this in terms of difficulties when implementing full cost recovery and attempting to reduce the use of subsidies, as well as in the case of restrictions on financial ability or limited expertise for the application of more integrated water resources management (Respondent 5, pers. comm., 2013; Respondent 15, pers. comm., 2013). Most respondents also highlighted factors that have encouraged non-compliance. For example, these included; a lack of cohesion and poor fit between EU policy and national governments or institutions; EU-level limitations; as well as domestic constraints (Respondent 8, pers. comm., 2013; Respondent 15, pers. comm., 2013). Notably, domestic constraints were based on a range of variables, such as; political pressures; culture and the understanding of a given problem; socio-cultural differences with regard to the acceptance of EU policies; the desire to minimise or avoid costs; economic ability; communication or

language translation issues; as well as the limited availability of resources or expertise (Respondent 10, pers. comm., 2013; Respondent 15, pers. comm., 2013). The following comment identifies the implementation gaps that were argued to have occurred because of difficulties in meeting certain aspects of EU policy.

> *"Sometimes a gap for implementation can happen. For European policy the economics are very different and the culture is very different in Cyprus.....but the directive is one and the legal obligation is the same for all.....so this is somewhat unfair....there needs to be more flexibility.....[...].....At the moment there are difficulties with water pricing policy and also the groundwater permitting....there is a gap between the requirements and the outcomes so far"* (Respondent 18)

Problem displacement

Problem displacement is acknowledged as a potential challenge of administrative rationalism, with this relating to complex problems that can result in less coordinated disaggregation of topics and subsequent interactions that dilute a response. This can cause the unintended shift of a problem from one management area to another, for example; an air pollution problem being solved that in turn causes a water pollution issue (Dryzek, 2013).

In Cyprus, the fragmented organisational system was argued to have generated many interactions, being highlighted by respondents in government departments (Respondent 1, pers. comm., 2013), non-governmental bodies (Respondent 8, pers. comm., 2013), boards (Respondent 7, pers. comm., 2013), and by other research (Iacovides, 2011c). These interactions were found to have encouraged a less coordinated disaggregation of water problems, in turn causing problem displacement. In practice, displacement was highlighted through two examples. Firstly, the problem of insufficient supply was responded to using groundwater, thus helping to mitigate scarcity. However, the overuse of groundwater in turn led to the depletion of this resource and the subsequent problems of saline intrusion in coastal aquifers and quality-scarcity (Respondent 6, pers. comm., 2013; Respondent 14, pers. comm., 2013). Secondly, changes in water prices were applied to respond to over-consumption, manage scarcity, and help satisfy demand management objectives. However, this also led to the over-use of groundwater and the development of illegal boreholes, which have contributed to the problems of groundwater over-abstraction and saline intrusion of coastal aquifers (Respondent 7, pers. comm., 2013; Respondent 16, pers. comm., 2013).

Locus of control

Dryzek (2013) identifies locus of control as a challenge for administrative rationalism. This emerges through a potential shift from government to governance, which is based on change from a centralised to decentralised organisational and management system (Dryzek, 2013). By developing a more open and decentralised structure, administrative control is diminished, and the likelihood of an implementation gap increases (Dryzek, 2013). Too much openness and extensive decentralisation can also signal a shift towards democratic pragmatism, and thus a weakening of administrative rationalism.

Respondents identified a shift in locus of control through a process of decentralisation as well as a subsequent move back towards a more centralised structure. These shifts were argued to have occurred during the second and third phases of water management, with ongoing changes still happening. Many respondents noted that prior to independence a centralised system had been prevalent in Cyprus. This was based on responsibility for water and management being primarily held by central government (Respondent 13, pers. comm., 2013; Respondent 14, pers. comm., 2013). However, after independence, decentralisation occurred, with this being evident as a result of greater responsibility and control being given to municipalities, district offices, and villages (Respondent 3, pers. comm., 2013). The following comment typifies the apparent shift from a centralised to a decentralised system. The perceived failure of decentralisation was also mentioned in some cases, for example, due to; disjointed implementation; poor regulation and enforcement of policy; disregard for WDD recommendations; and strong political influences on decisions in smaller municipalities or villages (Respondent 7, pers. comm., 2013; Respondent 11, pers. comm., 2013; Respondent 18, pers. comm., 2013).

> *"Our experience in Cyprus is that from a central command type of control structure they went to a decentralised command system that did not really work out....and they have been bringing it back to a more central command structure again...[...]...They [government] realised that things the way they were did not work. For years the idea was that you needed to decentralise management and take authority away from the government and give it to the municipalities. But in the municipalities…everybody knows everybody…so nobody enforces the law [laughs]. This is a problem!"* (Respondent 8)

The notion of moving back towards a centralised system was also claimed by many respondents to be an evident organisational shift. This was based on decisions made by government, during the second and third phases of water management, towards; creating a single water entity; implementing integrated forms of management through central government, the MANRE, and the WDD; as well as proposed operational changes that would see the merging of water and

sewerage boards into larger more centralised entities (Respondent 13, pers. comm., 2013; Respondent 18, pers. comm., 2013).

Dispersed or limited expertise

Dryzek (2013) considers dispersed or limited expertise to be a challenge for administrative rationalism. It is assumed that problems often have a complexity that opposes the centralised approach of bureaucratic hierarchy, as no individual experts can have enough knowledge about all aspects of a given issue (Dryzek, 2013). As a result, the hierarchy of expertise represented in administrative rationalism has difficulties in bringing together all required information, and so, knowledge can be dispersed (Dryzek, 2013).

In Cyprus, respondents argued that technical expertise was found to be variable in some cases, and thus the influence on problem-solving was noted to be inconsistent or changeable depending on topic area, availability of knowledge, or economic resources (Respondent 8, pers. comm., 2013; Respondent 16, pers. comm., 2013). For example, limited expertise was highlighted by respondents in the case of; monitoring and collecting data; water recycling; desalination; and the application of integrated resources management (Respondent 1, pers. comm., 2013; Respondent 13, pers. comm., 2013). The following comment typifies this situation, as many respondents highlighted the need for experts in correct positions when tackling problems such as drought and the saline intrusion of coastal aquifers.

> *"We need better experts and scientists in the right places. Well maybe not better [laughs] but definitely experts in the right situations and places.....so it is better when we implement laws or tackle management problems like the droughts or groundwater issues. I think we are improving though. One of our challenges is that everybody thinks the higher you are the wiser you are. This is not necessarily true..."* (Respondent 6)

The issue of limited expertise was represented by the actors identified as having a role in Cyprus, namely; experts in government departments; politicians and ministers; as well as managers in boards and municipal or village authorities. Firstly, limited expertise represented by government experts emerged as a result of the requirements of EU legislation. This was noted in the case of the WFD, as greater expertise was required when implementing new concepts [for Cyprus] such as; integrated resources management; alternative approaches such as structured consultation (Respondent 15, pers. comm., 2013); and when improving data collection, monitoring, and analysis techniques (Respondent 6, pers. comm., 2013). As

highlighted by the following comment, respondents argued that certain areas of expertise required improvement because of the demands of EU policy.

> *"On some of the new areas and measures of the WFD it is more a technocratic thing....a difference in outlook maybe and need for improvement. For some factors such as data collection and analysis etc...I couldn't say we have the strongest situation in terms of the expertise and knowledge. That is why sometimes the government experts may get help with these things."* (Respondent 9)

Secondly, politicians and ministers exhibited severely limited expertise despite having an important role in the final outcomes of decision-making. This was identified by respondents in terms of; water allocation and supply control (Respondent 3, pers. comm., 2013); drought management (Respondent 8, pers. comm., 2013; Respondent 19, pers. comm., 2013); as well as the acceptance of new concepts or alternative approaches required by EU policy (Respondent 15, pers. comm., 2013). The next comment typifies this lack of expertise through poor decision-making and outcomes associated with responses to the drought of 2008. In this case, management choices were widely criticised, and controversial decisions made by government were noted to conflict with the recommendations of technical departments (Respondent 7, pers. comm., 2013; Respondent 12, pers. comm., 2013).

> *"I would say that not all politicians or ministers know the water sector well. When I say politicians I'm talking about the representatives of the parliament.....most of our politicians don't have a clue about the discussion going on now....[....].....For ministers....they come in and stay a couple of years and they try to impose their own policies...[...]... But lots of mistakes have been made because some of the ministers don't understand the water issue.....or how the whole system works. I would say that in 2008 when we had to import water from Greece some of the political decisions were definitely not the right ones.....and the results were clear"* (Respondent 1)

Thirdly, certain managers and ground-level actors also exhibited a lack of expertise despite guidance from technical departments, while still having significant authority for decisions at local level and when shaping policy implementation (Respondent 8, pers. comm., 2013). Respondents identified this primarily in terms of water allocation, demand management, and control of groundwater over-abstraction (Respondent 14, pers. comm., 2013). The following comment reiterates how managers influenced the development and implementation of regulation despite their lack of expertise, while this was also related to the control of water in an attempt to satisfy personal or group interests.

> *"It's not always so good to regulate by law....a regulation made or implemented by politicians is not always technical or based on expertise.....[....].....I mean it doesn't*

> *make sense to have a person elected in a village who is the president of the local community to decide not to have water rates.....to sell freely all the water to the people in his village who vote for him. They have no expertise in terms of water or understanding the issues.....they don't care about the leakage and to them water is votes. This can be a major problem*." (Respondent 12)

6.3 Conclusion

The analysis undertaken in this chapter has established that water management and responses to problems in Cyprus have been greatly influenced by administrative rationalism. Many expected characteristics in terms of Dryzek's (2013) discourse analysis topics were identified in practice. Firstly, institutions and practices were evident through; the MANRE, WDD, and Department of Environment; extensive use of regulations; environmental impact assessment, cost-benefit analysis, and risk assessment primarily used for infrastructure projects; an expert advisory commission; as well as top-down formats of planning based on most power at the policy level and filtering down to executive and consumer levels. Secondly, basic entities were evident, such as; the administrative state being central to water management, with all resources owned by the state and managed through government and technical departments; as well as experts and managers having an important role. Thirdly, natural relationships were evident, and involved; nature being subordinate to human activities and problem-solving; people being subordinate to the state; while other understandings based on mandatory approaches were applicable, particularly the top-down perspective and power approaches such as elitism and technocracy. Fourthly, agency and motivations were highlighted, and included; collective and individual actors recognised through groups such as the government departments, boards, farmer unions, and the advisory committee, as well as individuals such as experts, managers, ministers, or politicians; while many civil servants, experts, and managers were noted to be acting in the public interest [or at least trying] thus reflecting Dryzek's (2013) understanding of actor motivation and comparing favourably to the expectations of administrative rationalism. Finally, in terms of metaphors and rhetorical devices, the concept of a unitary administrative mind and the idea of the state being guided in all aspects of problem-solving was evident. This was based on the dominant role and control of government and administrative bodies, which had long held authority for water management.

Differences and additional layers of understanding that build on Dryzek's (2013) understanding of administrative rationalism also emerged as a result of the findings. For example, these included; more detailed actor definitions through departmental, political, and ground-level

types; the role of experts and managers not being as prominent or controlling in practice, with higher-level actors such as politicians and ministers actually having the most power for decision-making and when controlling the direction of the state; as well as different motivations being evident for actors. More specifically, a range of individual and collective actors in Cyprus, including civil servants, experts, managers, politicians, farmer unions, municipal authorities, and village groups, were found to be driven by individual or group interests rather than the public interest. This contrasted with Dryzek's (2013) understanding of actor motivation, and more closely resembled forms of public choice theory that interpret self-interest as a primary motivation, according to; economic models of understanding (Tullock, 1965 & 1987); organisational function, bureaucrat type, and motive drivers (Downs, 1967); budget-maximising (Niskanen, 1971); or institutional roles and bureau-shaping (Dunleavy, 1986).

Practical management challenges were also identified in Cyprus, and these signalled the existence of the rationalities. The five challenges expected by Dryzek (2013) were evident, namely; policy implementation deficits; problem displacement issues; questions related to locus of control, governance, and decentralisation; limited expertise; as well as political factors that served to confuse organisational structures and procedures. Furthermore, the findings in this chapter also relate back to objectives one, three, and four noted in chapter one. In this case, the understanding of the mandatory approach has been advanced through the interpretation of administrative rationalism in Cyprus; empirical understanding has been developed through the documented experiences in Cyprus; while actor roles, behaviours, and motivations have been examined and developed, for example through the emergence of different expert sub-types.

6.3.1 A link to other responses

The characteristics of administrative rationalism identified in Cyprus relate to the mandatory approach discussed in chapter three and the phases of water management highlighted in chapter five. In the case of the mandatory approach, certain aspects were reflected by the form of administrative rationalism evident in Cyprus. These included; control of resources by the state through national government; hierarchy observed through the importance of government departments in managing water and the application of rationalistic policy analysis techniques; dependent relationships between policy and executive levels of organisation, for instance between the MANRE, WDD, and pollution control agencies; as well as vertical and top-down decision-making evident through planning and regulations. Notably, these aspects and the form of administrative rationalism identified in Cyprus also linked to all three phases of water

management identified in Cyprus. For example, supply expansion through infrastructure development, top-down regulation, and the development of water recycling and desalination during the first and second phases is indicative of the central role of the administrative state as well as nature being subordinate to problem-solving. Furthermore, regulations such as the IWM Law alongside decisions on drought made by parliament and the Council of Ministers that emerged during the third phase of management relate to the development of an advisory committee as well as top-down administrative control in problem-solving.

As a result of the findings in this chapter it is possible to argue that in many cases administrative rationalism has been evident in Cyprus. This is based on the existence of characteristics associated with the discourses that are identified by Dryzek (2013) as being central to this type of problem-solving. However, in some cases, the real-world structures, actions, and relationships found in Cyprus also contrasted with the expected characteristics and constructs of administrative rationalism. This was shown by; evidence of alternative roles and motives for actors; not all agents acting in the public interest, and experts and managers not always being motivated by the public interest; not all assumed natural relationships being represented in practice; as well as experts not controlling the state and government. Therefore, the outcomes of the discourse were not fully reflected in practice.

Practical management challenges associated with administrative rationalism were evident in Cyprus. These were expected and necessary according to Dryzek's (2013) interpretation, being particularly important as they are assumed to provide the reason for the development of other rationalities such as democratic pragmatism and economic rationalism. This is also true for the progression from mandatory to voluntary and economic approaches. Ultimately, it is the challenges associated with a given rationality that are expected to prompt the development of other approaches. For Dryzek (2013: pg98), looking to democratic pragmatism and economic rationalism is important as they "are presented by their adherents as containing effective remedies for the contemporary ills of administrative rationalism." Based on these findings it is possible to move on and discuss the applicability of democratic pragmatism in Cyprus. This is the second problem-solving rationality put forward by Dryzek (2013), and it is assumed to emerge as a response to the practical challenges and limitations of administrative rationalism, in particular; implementation gaps and issues of centralisation.

Chapter 7: Democratic Pragmatism in Cyprus

7.1 Chapter overview

This chapter explores how government has responded to water problems of scarcity and quality by considering the evidence of democratic pragmatism in Cyprus. Dryzek (2013) considers democratic pragmatism to be an alternative problem-solving discourse that emerges as a remedy to the failures of administrative rationalism, particularly implementation gaps and centralisation. The expected characteristics of the rationality are compared with real-world government responses. The roles, behaviours, and motivations of key governing agents are also examined, with these being important in terms of the processes in which institutions, approaches, and practices associated with a response interact because of actor behaviour. Understanding the behaviour of those involved in decision-making and the justifications for adopting an approach can provide insight into the way problems have been tackled (Dryzek, 2013; Kraft, 2017). In turn, this can develop understanding of the specifics of problem-solving while moving beyond single-theory interpretations and conceptions of mandatory, voluntary, and economic approaches.

The main section of the chapter discusses democratic pragmatism and the key topics of Dryzek's (2013) discourse analysis in comparison to the findings identified in Cyprus. These topics consider; expected approaches and practices; the existence of basic entities that are recognised or constructed; assumptions about natural relationships; agents and their motives; as well as metaphors and rhetorical devices. In this case, the existence of democratic pragmatism is explored, while practical observations and the characteristics of the rationality are compared with other understandings such as pluralism, policy networks, and the bottom-up perspective. The discussion is also positioned more broadly to the conceptualisation of how governments have tackled problems, namely through the voluntary approach, which is reflected in democratic pragmatism.

The final section explores the practical challenges of democratic pragmatism, which are discussed according to Dryzek's (2013) interpretation and their existence in Cyprus. Challenges such as the existence and influence of political power, conceptions of reasoned debate and public interest, as well as the privileged position of business and its influence on public opinion, exist as perceived and observed limitations. These are important for the evolution of problem-

solving, and Dryzek (2013) notes how economic rationalism emerges as a remedy to the challenges of democratic pragmatism [and also administrative rationalism]. A conclusion also provides a link to the next chapter, which is developed through the existence of the practical challenges, as these fit with Dryzek's (2013) understanding of other problem-solving discourses emerging as remedies for the potential failures of preceding responses.

7.2 Democratic pragmatism in Cyprus

Democratic pragmatism is the second problem-solving discourse conceptualised by Dryzek (2013), with this emerging as a response to the challenges of administrative rationalism discussed in chapter six, particularly implementation gaps and issues of centralisation. In contrast to administrative rationalism, which prioritises the expert in problem-solving, democratic pragmatism instead emphasises the role of the citizen (Dryzek, 2013). Furthermore, in this case, democracy is understood "not as a set of institutions, but rather as a way of approaching problems." (Dryzek, 2013: pg99). This shares similarities with the voluntary approach which considers problem-solving to be focused on; relationships of interaction, policy networks, and inclusive decision-making open to all groups or individuals (Keast, 2016).

Democratic pragmatism is bound by the institutional structure of a liberal capitalist democracy. It moves away from the idea of a controlling administrative state with experts and a top-down perspective being central to problem-solving, towards an inclusive approach that is more bottom-up in character and recognises the importance of ground-level actors and the public (Dryzek, 2013). In this case, government oversees problem-solving, however government and governance is defined in terms of multiple decision processes that often attribute a key role to the citizen. Dryzek (2013) also argues that by including citizens in decision-making it is possible to; increase engagement with the issues at hand, encourage commitment to environmental protection, as well as enhance the authority and validity of policy decisions. Notably, by involving the citizen in decisions and embracing pluralism, there is an attempt to address implementation gaps and centralisation issues that have been evident as the management challenges and failings of administrative rationalism (Dryzek, 2013).

Democratic pragmatism reflects the voluntary approach through aspects such as; pluralism being part of decision-making; interaction between governing actors and those being governed; governance without government; the concept of participation; tools and mechanisms of

integration; as well as dynamics of persuasion (Lindblom, 1977; Bevir, 2012; Wurzel *et al*., 2013; Keast, 2016). As part of Dryzek's (2013) discourse analysis, he considers five themes that signal the existence of the rationality. These are defined as; approaches and practices; basic entities recognised or constructed; assumptions about natural relationships; agents and their motives; as well as key metaphors and rhetorical devices. The chapter is structured to reflect these themes, with the findings in Cyprus discussed in terms of these expected characteristics.

7.2.1 Approaches and practices

According to Dryzek (2013), democratic pragmatism should utilise and show evidence of certain approaches and operational practices. These are explored in the following sections and include; public consultation; alternative dispute resolution; policy dialogue; lay citizen deliberation; public inquiries; as well as right-to-know legislation (Dryzek, 2013).

Public consultation

Dryzek (2013) considers consultation to be a primary tool of democratic pragmatism, as it attempts to legitimise decisions through involvement of the public in decision-making. The technique is assumed to occur independently or as part of specific impact statements and procedures such as environmental impact assessment (Lawrence, 2003; Dryzek, 2013; Norton & Hughes, 2018). It has been part of developments by government to make the administrative process more responsive and flexible (Fiorino, 2004), in this case evolving because of challenges associated with administrative rationalism such as implementation gaps and issues of centralisation (Dryzek, 2013).

In Cyprus, public consultation has been evident through independent procedures and as part of specific techniques such as environmental impact assessment, which have encouraged stakeholder involvement in decisions. Respondents claimed the technique [in a more structured form] occurred mainly as a result of EU legislation and article 14 of the WFD (Respondent 15, pers. comm., 2013). Therefore, although consultation was observed in Cyprus, it did not occur for the reasons expected by democratic pragmatism, such as efforts by national government to develop inclusive processes or provide opportunities for public comment as part of assessment procedures (Dryzek, 2013). Instead, many respondents noted that changes in policy resulting from supranational [EU] influences helped to drive changes in behaviour, which resulted in the adoption and implementation of more structured consultation procedures (Respondent 8, pers. comm., 2013). This relates to work by Jordan (1995) on EU policy implementation, which

considers the process of evolution and policy enforcement to occur through bargaining and negotiation. In this case, the influence of the EU is recognised, as found in Cyprus, while implementation gaps for public consultation, as identified by some respondents (Respondent 9, pers. comm., 2013; Respondent 17, pers. comm., 2013), can be expected when maintaining the balance between governmental and supranational elements (Jordan, 1999; Beierle, 2010).

More specifically, change was found to be driven from outside the nation state, while the relationship between the EU and individual nations shared similarities with [and was comparable to] the dynamics of federal systems, as found in the United States and Australia. In this case, Dryzek (2013) recognises central government control delegated through federal components, and this relates to the EU and member state dynamics interpreted by respondents, which were based on the format of control being delegated from supranational to national level. Notably, this comparison is also considered in work by Verdun (2016), which suggests the EU supranational level can be compared to the federal level in Canada [with EU member states being comparable to Canadian provinces and territories]. The following comment notes the emergence of public involvement, participation, and structured consultation in Cyprus resulting from the influence of the EU, while procedures prior to accession were widely claimed to have been severely limited in extent and effectiveness (Respondent 9, pers. comm., 2013).

> *"I would say public consultation, interaction, and participation in the decision-making has been through the WDD and water boards....and I would say it has been more prominent after 2004.....which is when Cyprus joined the EU.....[…]....That is basically when the voice of the people was introduced into the system in a more organised way. Before this....the procedures were quite poor and not organised in an efficient way.....or they didn't even exist [laughs]."* (Respondent 8)

The majority of respondents identified public consultation as being limited prior to EU accession, with the technique becoming more prominent due to the implementation of EU legislation. For example, this has included the WFD (2000/60/EC); as well as directives on; strategic environmental assessment (2001/42/EC); public participation in environmental decision-making (2003/35/EC); and environmental impact assessment (2011/92/EC), which have encouraged the use of participatory approaches (MacDonald & Makuch, 2006; Van Hooydonk, 2006; Respondent 15, pers. comm., 2013). As shown by the following comment, EU legislation, and particularly the WFD, was recognised as the catalyst for the expansion of consultation in Cyprus, to facilitate greater involvement of the public and non-governmental organisations. Previously, these groups had often been overlooked in terms of decision-making.

> *"The WFD expanded things...the people responded well as they were given the opportunity to express their opinion...whereas before these systems were closed with only the leaders of the farmer groups or certain stakeholders being involved. Now it was widely used for the public and NGOs which were very active and happy with the procedure because otherwise they didn't have the chance to express their views. We had some measures coming from those organisations...this made them very happy. These were only soft measures...but it allows us to build on it and progress."* (Respondent 3)

Dryzek (2013) suggests that criticisms of the public consultation technique can emerge based on aspects such as; uninformed participants; misrepresentative activists; the influence of special interests; framing of the consultation by policy makers; as well as the technique having a limited effect on policy (Smith, 2009). Some of these concerns were observed in Cyprus. For example, respondents highlighted issues such as; counter-productive discussions; limited public and stakeholder knowledge; and problems arising from actors seeking to satisfy individual or group interests (Respondent 9, pers. comm., 2013; Respondent 18, pers. comm., 2013). Notably, some respondents claimed that consultations were still seen as a formality that had to be carried-out by government, actually having a very limited influence on the final outcome of decisions (Respondent 8, pers. comm., 2013; Respondent 13, pers. comm., 2013). Therefore, even if consultation is seen in practice it does not mean it has an effect. Dryzek (2013) briefly considers this by noting that the technique can have a limited effect on policy, and this is also related to the idea of consultation being vulnerable to policy-maker framing (Smith, 2009). As highlighted by the following quote, respondents noted how consultations were done as a matter of course, being shaped by policy-makers, and remained limited in terms of final outcome.

> *"There is a big argument as to how much attention they [government departments] pay to the approach.....whether they do the consultations as a matter of just doing it or if they really pay attention and alter their policies accordingly. The answer is usually they don't pay attention and they very rarely alter their policies.....[....]....When the government departments do consultations the end result [in terms of decisions and policy] is not influenced much by what was discussed. They do it because they have to do it....usually just as a procedure.....for show."* (Respondent 2)

Despite the perceived challenges of consultation, the technique provided practical evidence of democratic pragmatism regarding water-related projects in Cyprus. Consultation was carried out by government and the MANRE, with consultations on water being the responsibility of the WDD since the formation of the department (Respondent 3, pers. comm., 2013). Prior to EU accession and the development of more structured procedures, consultation had taken the form of interaction between government and certain stakeholder groups such as farmers, industrial users, and hotel owners (Respondent 15, pers. comm., 2013). These interactions occurred through organised discussions, panel and group meetings, debates, as well as industry forums

(Respondent 14, pers. comm., 2013). Respondents noted that these were often limited in extent and small in scale, while conflict often occurred, particularly in the case of discussions between farmer unions and government departments regarding water allocation and pricing (Respondent 1, pers. comm., 2013; Respondent 16, pers. comm., 2013). The following quote highlights conflict generated during consultations, while the issues of water allocation, pricing, and groundwater regulation emerged relative to different sectors and user groups. The potential issue of conflict was not represented as part of consultation and democratic pragmatism (Dryzek, 2013), whereas other work (OECD, 2001; Norton & Hughes, 2018) recognises some of the risks identified in Cyprus, particularly lack of engagement, negativity, resistance to change, and political motives. In this case, Dryzek's (2013) description of consultation is simplistic, and does not account for the socio-cultural setting in which these voluntary approaches and associated participatory techniques operate.

> *"The number one conflict that we had....and they were very heated debates....was in the public consultations when we were looking at the pricing of water. And in the past the allocation [of water] in terms of how much goes to farming and how much goes to the population. I know that there are a lot of discussions and a lot of arguments with the farmers when the government is trying to regulate the boreholes"* (Respondent 2)

Alternative dispute resolution

The practice of alternative dispute resolution builds on the technique of consultation by providing a more formal procedure with defined roles for non-governmental actors that take part (Dryzek, 2013). Indeed, it is often utilised in legalistic systems to avoid a legal impasse and attempts to bring together disputing actor groups to resolve issues under the authority and guidance of a neutral third party, such as a professional mediator (Dzurik, 2003).

In Cyprus, little evidence was found for the existence of alternative dispute resolution. According to respondents, the closest examples of this type of mediation were related to joint projects in Nicosia regarding water supply and sanitation, as well as shared water treatment facilities (Respondent 8, pers. comm., 2013; Respondent 18, pers. comm., 2013). These caused conflicting groups to come together to produce a decision and infrastructure outcome (Priscoli & Wolf, 2009; Respondent 3, pers. comm., 2013; Respondent 10, pers. comm., 2013).

Policy dialogue

Although case or site-specific mediation through alternative dispute resolution has had limited use in Cyprus, a similar practice defined as policy dialogue was more apparent and used in

certain cases for water. Policy dialogue seeks to provide a more flexible style of mediation based on discussions that include relevant actors.

In Cyprus, policy dialogue has involved actors such as experts in government departments, board representatives, municipal or village officials, environmental non-governmental organisations, industry representatives, farmer unions, as well as community groups (Respondent 8, pers. comm., 2013; Respondent 16, pers. comm., 2013). This process was noted through dialogue between the WDD, boards, and municipal or village authorities regarding water allocation, as well as discussions and mediation between the WDD and farmer unions relating to irrigation water allocation and pricing (Respondent 7, pers. comm., 2013; Respondent 19, pers. comm., 2013). Specific cases of a policy dialogue style of mediation were identified in relation to the projects of; desalination plant construction and discussions regarding project locations; the Southern Conveyor water transfer system and irrigation networks; as well as water treatment and sewerage infrastructure shared by both Greek-Cypriot and Turkish-Cypriot communities in Nicosia (Respondent 3, pers. comm., 2013; Respondent 4, pers. comm., 2013; Respondent 10, pers. comm., 2013). Some examples relating to forms of dialogue, such as improved supply security through transfer systems or desalination, and the reuse of treated effluent, have been recognised by other research (see Brouma & Ezel, 2011; Blair, Rossmiller, Abu-Awwad, & Meserlian, 2012; Zikos, Sorman, & Lau, 2015).

Furthermore, respondents also noted how dialogue and discussions were developed as a result of EU accession based on greater awareness and use of participatory approaches that have emerged through EU legislation (Respondent 15, pers. comm., 2013). This highlights the potential for alternative problem-solving approaches to develop because of influences such as supranational governance, subsequently contrasting with Dryzek's (2013) understanding of evolution as a result of certain failures of other problem-solving discourses.

Lay citizen deliberation

Lay citizen deliberation focuses on the inclusion and the role played by lay citizens in decision-making, rather than supporters of certain groups [defined as partisans by Dryzek, and essentially actors that are focused on representing and arguing for the interests of their group] such as developers, environmentalists, farmers, or government experts (Dryzek, 2013). Lay citizen deliberation is a softer form of participation that is centred on ordinary citizens and

utilises situations, such as; discussions, consensus conferences, planning cells, as well as town meetings (Hendriks, 2011; Dryzek, 2013).

In Cyprus, types of lay citizen deliberation were observed mainly through village meetings, municipal and town planning talks, as well as community discussions. These were found to be related to topics such as water allocation, infrastructure projects, irrigation networks, distribution, and pricing (Respondent 10, pers. comm., 2013; Respondent 17, pers. comm., 2013). The following comment illustrates the presence of discussions with citizens, and the inclusion of these actors in decision-making, in relation to the development of proposed infrastructure based on a specific irrigation project.

> *"For example with a big irrigation scheme.....during that time we had meetings with the locals and discussed many things.....like who will be involved in the project.....who will not be.....how much water would be allocated.....how much the price would be.....we discussed these things and the normal people were included and involved in the initial decisions."* (Respondent 3)

Public inquiries

Public inquiries signal the existence of democratic pragmatism and encourage arguments to be put forward by both advocates and opponents of a given project (Meadowcroft, 2004; Dryzek, 2013). Although the practice is noted to share similarities with environmental impact assessment, based on their formation as part of project proposals, inquiries are also assumed to enable a more visible forum for discussion (Dryzek, 2013). According to Carter (2007), public inquiries are useful democratic mechanisms, especially when projects are controversial or cause significant conflict between competing interest groups and different actors.

In Cyprus, little evidence was found for the existence of public inquiries in terms of water management and responses to scarcity and quality issues. The lack of this practice also illustrated the weaker presence of democratic pragmatism and the more limited use of voluntary approaches involving participation, when compared to mandatory approaches based on centralised top-down control. Indeed, despite the evidence of similar techniques such as environmental [and strategic] impact assessment, some respondents noted that the full use of practices characteristic of democratic pragmatism, such as inquiries, were severely lacking. These were only evident in the case of water supply in villages as well as infrastructure projects focused on desalination (Respondent 8, pers. comm., 2013; Respondent 12, pers. comm., 2013).

Right-to-know legislation

Right-to-know legislation is developed by government and encourages public access to relevant information. This process can often be enabled by freedom of information laws (Dryzek, 2013). Specifically, in terms of environmental problem-solving, right-to-know legislation focuses on the need for actors, in particular industry groups, to disclose information regarding the impact [or potential impact] of activities (Dryzek, 2013). For instance, in terms of water this can involve; declared risks to resources; an accessible registry of pollutants; activities of certain sectors regarding quality; and documented levels of compliance by polluters (Harding, 1998; Ashford & Caldart, 2008; Stauffer, 2013).

Right-to-know legislation was severely limited in Cyprus, as a law ensuring public access to information was not evident. In practice, access to specific information regarding water was limited for the public, with the government only providing some information through reports, articles, and gazette journals or proceedings (Respondent 2, pers. comm., 2013; Respondent 16, pers. comm., 2013). Indeed, access to this information only emerged more prominently in the third phase of water management. Furthermore, requests for environmental information could also be filed by individuals to specific governmental departments, and for water these were primarily directed to the WDD. However, the level, amount, and type of information disclosed was noted by respondents to be highly variable and inconsistent (Respondent 6, pers. comm., 2013; Respondent 8, pers. comm., 2013; Respondent 20, pers. comm., 2013).

7.2.2 Basic entities recognised or constructed

Dryzek (2013) assumes that two basic entities are recognised or constructed as part of democratic pragmatism. These are; the structural setting of liberal capitalism [which is a given for all three rationalities]; as well as the construct of the citizen, which is a distinguishing characteristic of the rationality and is subsequently explored.

Citizens as basic entities

The conceptualisation of government and the role of governance according to democratic pragmatism are very different from the discourses of administrative rationalism and economic rationalism. In this case, government provides a framework and setting for a form of governance based on interaction. This definition only partly reflects the voluntary approach, which agrees that governance is based on networks and a relationship of interaction between governing actors and those being governed, but also considers the idea of governance without

government (Bevir, 2012; Wurzel *et al*., 2013). Thus, democratic pragmatism builds on the voluntary approach by recognising the framing role of government in terms of governance.

For democratic pragmatism, governance does not focus on large single entities that have full control and authority over decisions, but instead the network replaces the hierarchy, any central locus of authority is downplayed, and responses are considered in terms of multiple decision-making processes that are made-up of and directed by many different actors with a primary focus on citizens (Castells, 1996; Dryzek, 2013). As a result, the idea of *Homo-civicus* [power and organisation with the citizens, through public debate and being capable of taking into account the public good] is assumed to be the most important variable in decision-making, while *Homo-bureaucratis* [power and organisation with the bureaucracy] that is presumed to be at the heart of administrative rationalism hardly features as a part of the discourse (Dryzek, 1995; Cruikshank, 1999; Dryzek; 2013). This understanding reflects the voluntary approach, through aspects such as decision-making in a more horizontal format, pluralism through the involvement of multiple actors, as well as the organisation of multiple groups structured in a non-hierarchy format (Hill & Varone, 2017). More specifically, democratic pragmatism also reflects policy networks and communities as a result of a focus on relationships, interactions, and the informal aspects of policy-making (Goverde & Tatenhove, 2000).

In Cyprus, it was found that citizens did not play a major role in decision-making. This contrasted with the expectations of democratic pragmatism and the idea that *Homo-civicus* is the main underlying force that drives government, governance, and problem-solving. Despite evidence of certain practices that have signalled the existence of democratic pragmatism, such as public consultation and some forms of deliberation, it has been highlighted previously that these provided very limited involvement for citizens. For example, respondents noted that citizens and relevant actors were often not a part of certain decisions, especially relating to; the construction of dams/reservoirs; as well as the pricing and allocation of water for specific uses such as irrigation or the tourism industry (Respondent 8, pers. comm., 2013; Respondent 13, pers. comm., 2013; Respondent 14, pers. comm., 2013). The following quote illustrates the emergence of public participation in Cyprus, but also notes the weak influence of this, as many respondents suggested the citizens were not truly involved in decisions.

> *"Regulation has been dominant and still is. But things have also changed.....with public participation and these sorts of methods. It is an influence on things.....but it still is not very powerful.....the government still decides matters anyway. It is sometimes even just*

> *for show I think. Also...the effectiveness of these is attributed to the experiences of the time....the problem is that people have short memories [laughs]."* (Respondent 7)

7.2.3 Assumptions about natural relationships

Dryzek (2013) argues that certain natural relationships exist as part of democratic pragmatism. He identifies these through dynamic characteristics and relationships, namely; equality among citizens; as well as interactive political relationships that involve a combination of competition and cooperation (Dryzek, 2013).

Equality among citizens and actors

Democratic pragmatism contrasts with the other problem-solving rationalities, the mandatory approach, and perspectives such as elitism and technocracy, as it fundamentally recognises the role of the citizen, while particularly emphasising equality among citizens and actors in problem-solving. According to Dryzek (2013), all actors, such as experts, elected officials, politicians, civil servants, pressure group representatives, and citizens [public], are assumed to have the right to exert political pressure. The concept of equality through multiple actor groups and individuals being involved in decision-making, as proposed by democratic pragmatism, also reflects other understandings such as pluralism and policy networks and communities. This is based on certain characteristics being recognised, namely; participation in decision-making being open to all groups or individuals; the features of networks, community, and interdependence; as well as a focus on relationships and interactions in policy-making (Roelofs, 2003; Keast, 2016; Hill & Varone, 2017).

Pluralism focuses on the way in which power is distributed (Parsons, 1995; Lassman, 2011; Clemons & McBeth, 2017). The understanding considers power to be shared among a variety of groups and recognises participation in decision-making to be open to all groups and individuals, thus relating to democratic pragmatism through the idea of inclusive decision-making (Smith, 1990; Connolly, 2010). Indeed, pluralism further reflects the discourse when explaining the development of policy dialogue, the involvement of various groups, and the behaviour of policy actors, which are considered to appreciate the idea of citizenship and also act in the public interest at key points in the problem-solving process (Dryzek, 2013). In turn, the policy networks and communities perspective is concerned with the relationships, interactions, and informal aspects of decision-making (Rhodes, 1988; Metz, 2017). This responds to theoretical limitations involving the incomplete conceptualisations of actor interactions as well as the failure to specify where in the policy process these interactions take place (Rhodes & Marsh,

1992; Brouwer, 2015). In contrast to top-down and bottom-up perspectives, policy networks also recognise the existence and significance of different policy actors and levels of decision-making (Goverde & Tatenhove, 2000). This understanding shares similarities with democratic pragmatism based on the presumed inclusive nature of problem-solving and the importance of all actors. Furthermore, this builds on the voluntary approach by developing understanding of the framing role of government in decision-making that is inclusive and involves a variety of actor groups and individuals.

In Cyprus, a certain level of equality was highlighted by the major actor groups such as farmer unions, politicians, and elected officials, which debate alongside scientists, experts, and the public, while exerting pressure on the decision-making process (Respondent 1, pers. comm., 2013; Respondent 13, pers. comm., 2013). The relationships, interactions, and informal aspects of policy-making, which are central to pluralist and network understandings, have been evident in some cases. For example, respondents noted the role of networks in terms of bi-communal water treatment projects and irrigation water allocation involving government, the WDD, and farmer unions (Respondent 6, pers. comm., 2013; Respondent 19, pers. comm., 2013).

The situation of equality in Cyprus was observed as being more uneven in practice, with the roles and influences of actor groups varying in their intensity. Respondents noted that evidence of inconsistent and varying equality was often dependent on the problem or topic being discussed and the actors involved at any given time. For example, in relation to irrigation water allocation and pricing, the farmer unions, municipal authorities, and village boards were involved in decisions as well as applying pressure on government, while in the case of domestic water allocation and pricing the public and consumer groups had a minimal role and influence (Respondent 6, pers. comm., 2013; Respondent 17, pers. comm., 2013). The following quote highlights the variable influences on decision-making, particularly the weaker role of the citizen [public], and in contrast the stronger role of politicians and farmer unions [pressure groups].

> *"The citizens have not been so relevant in the past.....but are becoming more relevant....especially as public participation is becoming more and more important in all the decisions being taken. Integrating the normal citizen in decision-making....basically the general public....has been more effective after entering into Europe. But nonetheless....I think these are some way from having the influences of the government, politicians, and the farmers unions for example...which are strong"* (Respondent 14)

It was also noted that although there was evidence of different actors having the opportunity to exert pressure on decision-making, the citizens [public] that are deemed to be central to

democratic pragmatism had a less prominent role in Cyprus [but still a role nonetheless] (Respondent 8, pers. comm., 2013). This did not represent the expected role and influence of citizens, as assumed by democratic pragmatism, which suggests they are central to problem-solving just as experts are deemed central to administrative rationalism (Dryzek, 2013). Notably, some respondents identified the important role of high-level actors such as politicians or ministers, which instead had a greater influence on decisions. This reflects the concept of elitism based on the ability of high-level individuals or groups to shape problem-solving. For example, this was observed through changes made by high-level politicians to decisions on drought responses, despite guidance and recommendations from technical departments such as the WDD (Respondent 9, pers. comm., 2013; Respondent 18, pers. comm., 2013).

Interactive political relationships

Alongside the idea of greater equality, the political relationships that exist as part of democratic pragmatism are more complex and interactive when compared to those observed in other discourses, particularly administrative rationalism (Dryzek, 2013). As a result, democratic pragmatism expects decision-making interactions to involve a mixture of cooperation and competition, with cooperative problem-solving occurring as well as conflict taking place between different actors that hold competing interests (Dryzek, 2013). This partly reflects the voluntary approach through pluralist understandings that recognise participation and interaction (Hill & Varone, 2017), while also contrasting with mandatory approaches and concepts such as elitism and technocracy that consider interactions to be limited and decision-making to be primarily shaped by select groups (Kersey, 2016; Radaelli, 2017).

In Cyprus, both the aspects of cooperative problem-solving as well as conflict resulting from competing interests were evident, thus reflecting the expectations of democratic pragmatism. For cooperative problem-solving, consultations and community discussions that involved various stakeholders were observed (Respondent 15, pers. comm., 2013). In turn, conflict was evident through examples including; delayed decisions and disagreements between government bodies, water boards, district offices, and farmer unions, especially relating to water pricing; conflict between government, water boards, farmer unions, and municipalities with regard to water allocation, in particular for changes and restrictions during drought periods; as well as regional conflict between town water boards, municipalities, and community or village boards in relation to drought management and restrictions on water usage (Iacovides, 2011b; Respondent 4, pers. comm., 2013; Respondent 7, pers. comm., 2013; Respondent 16, pers.

comm., 2013; Stedman, 2012; Hoffmann, 2018). The following quote illustrates how relationships have become more interactive over time, particularly since EU accession, while also highlighting the issue of conflict in decision-making. The topics of water allocation, availability, and pricing were noted to be constant and ongoing points of conflict in Cyprus

> *"Interaction was less in the past but it is there all the time now....experts report to the politicians plus you have others involving themselves like the boards, the farmers, and the people. Things also improved after going into the EU....it encouraged more interaction....[....]....There is always conflict....some will want yes…others no....because of their own interests. So I think one has to move forward with the least damaging solutions....[...]...Basically the problems and the conflicts that emerged in the past and are in existence now are in two categories. One is the availability of the source for each sector and the allocation.....and the second is price."* (Respondent 13)

7.2.4 Agents and their motives

Democratic pragmatism assumes that agency in problem-solving is for all, and many different individual or collective actors are recognised, such as; citizens, experts, politicians, government agencies, unions, non-governmental organisations, as well as community or environmental groups (Dryzek, 2013). In this case, the citizen [which has a definition focused on the public and lay citizens] is considered to have a central role in decision-making. Furthermore, Dryzek (2013) interprets actor motives to be based on self-interests, while at key points in decision-making these actors can be motivated by the public interest (Williams & Matheny, 1995; de-Shalit, 2000; Dryzek, 2013).

Agency

In Cyprus, many agents were observed to exist and operate as part of problem-solving and decision-making. These included; government bodies; experts; civil servants; politicians; boards; municipal and community representatives; as well as farmer unions and other non-governmental organisations (Respondent 6, pers. comm., 2013; Respondent 14, pers. comm., 2013). However, in contrast to the expectations of democratic pragmatism, agents were often observed to have varying roles and extent of influence, thus implying that in reality agency was complex, changeable, and not always for everyone. This was noted in terms of irrigation water allocation and groundwater control, as politicians and unions had a greater role and influence on decisions when compared to the public (Respondent 1, pers. comm., 2013).

In terms of agency, responsibility for participation, consultation, and dialogue, were primarily attributed to the WDD, while other government departments were also involved in management

processes based on the given project or topic being considered. For example, stakeholder consultation for irrigation projects was managed by the WDD and the Department of Agriculture, while consultation for the environmental impact assessment of infrastructure, or associated projects such as desalination plants, were managed by the Environment Department alongside the WDD (Respondent 5, pers. comm., 2013; Respondent 9, pers. comm., 2013).

Citizens in Cyprus were often not central to decision-making, while the importance and inclusion of the public was primarily seen to have become more prominent through joining the EU and as a result of the implementation of legislation such as the WFD (Respondent 7, pers. comm., 2013). For example, article 14 of the WFD (2000/60/EC) encouraged public involvement and the inclusion of all users in decision-making, while other legislation such as public participation in environmental decision-making (2003/35/EC) also caused the implementation of participatory approaches. In the context of democratic pragmatism, this once again raises an issue, as the potential importance of supranational [EU] governance is poorly recognised as part of the discourse, while national administrative practices are also shown to be severely limited in their capacity to include all actors in decision-making.

Motivation

The motivation of actors is an important aspect of Dryzek's (2013) rationalities, and democratic pragmatism develops understanding of voluntary approaches by considering the specifics of problem-solving through these motives as they signal potential reasons for a given response. In terms of agent motives in Cyprus, respondents claimed that there was evidence of certain individuals and groups pursuing self-interests, as well as those acting in the public interest. This agrees with the expectations of democratic pragmatism, namely that motives for both public and self-interest exist and operate (Dryzek, 2013). For example, these two variables were observed in Cyprus through experts [such as those in the WDD] trying to act in the public interest, alongside politicians, elected officials, and high level decision-makers that were noted to act according to their own [individual or group] interests (Respondent 6, pers. comm., 2013; Respondent 8, pers. comm., 2013). As typified by the following comment, it was assumed that certain actors could exhibit either public or self-interest to varying degrees. Politicians and farmer unions were found to pursue self [or group] interests to a greater extent when compared to civil servants or experts (Respondent 1, pers. comm., 2013). This self-interest involved aspects such as; gaining public votes, representing political allegiance, ensuring job security, as well as seeking individual or collective and direct or indirect financial benefits.

> *"It is the experts that are acting more for the public....and the politicians that are for self-interests. But still there is a mixture of public and self-interests between and even within different groups. More or less things are in the public interest.....but also we can find self-interests as well.....with individuals maybe acting to secure their job....or climb in their career....or for say politicians to secure public votes and so their position."* (Respondent 15)

The majority of respondents suggested that to varying degrees all agents in Cyprus exhibited forms of self-interest. For instance, this was evident for; politicians and ministers in terms of water allocation and job security; experts in the case of serving their departments; managers when securing positions in boards or district offices; district, municipal, or village representatives when securing positions and ensuring socio-economic benefits for a given area; as well as farmer unions when aligning with political agendas and increasing irrigation water allocation for economic benefits (Respondent 8, pers. comm., 2013; Respondent 14, pers. comm., 2013). The idea that actors could be motivated by the public-interest at key moments in decision-making was difficult to quantify in practice. Nevertheless, certain agents, namely politicians and farmer unions, had more power to shape decisions through the use of politics, often causing decisions to be driven by self-interest (Respondent 15, pers. comm., 2013; Respondent 17, pers. comm., 2013). At key moments in decision-making it was these powerful agents who had the greatest influence on proceedings. This was acknowledged by respondents through the two examples of drought events and water pricing.

Firstly, in terms of the management problems associated with the drought of 2008, many respondents claimed that politicians and high-level actors had shaped decisions made at key moments. For example, it was noted that these actors had ignored the warnings given by experts in technical departments [primarily from the WDD] with regard to; water allocation and management issues caused by the excessive distribution of water for agriculture; the impending drought and the problems with implementing measures to avoid an emergency situation; as well as the management issues associated with the drought response, namely the political embarrassment of importing water and the problems resulting from this decision and procedure (Respondent 10, pers. comm., 2013; Respondent 12, pers. comm., 2013; Respondent 18, pers. comm., 2013). The following quote highlights the influence of certain actors on decision-making, namely the pressure applied by farmer unions on politicians.

> *"The water shortage is an island-wide problem and should be dealt with as such....[...]....past experience has shown that the government is incapable of exercising effective control once the irrigation taps have been turned on. Farmers apply pressure through the political parties for more water and invariably get their way. The main*

> *reason for the acute shortage of the last year, apart from the low rainfall, was generosity with which water was given for irrigation."* (Cyprus Mail, 2009a)

Secondly, in terms of water pricing, respondents highlighted the pressures applied by different actors that had delayed and hampered decision-making. This was related to pricing changes required to adhere to the WFD guidance on full cost recovery. During the period of policy development and parliamentary discussions on pricing, changes were initially withdrawn and delayed for two years [although this was later reduced] because of pressure from politicians, farmer unions, industry, and consumer groups (Respondent 7, pers. comm., 2013; Respondent 11, pers. comm., 2013). The parliamentary representatives and politicians sought to delay considerable price increases to appease certain groups that exert strong influence in terms of politics, such as the farmer unions, while also securing votes and serving political party agendas (Respondent 12, pers. comm., 2013). The following comment notes how decisions were delayed or adjusted by the parliament, politicians, or as a result of wider pressures.

> *"For the water pricing...from January 2012 the WDD was revising the charge to the boards. But by May 2013 they had done nothing.....because of the pressure from the farmers and the House of Representatives....and pressure from the political parties. This is a problem that changes decisions...[....]...Even the application for the revision of tariffs in 1992...it was only approved in 2001. So what policy are you expecting to carry-out with long delays like this? Before the tariffs were approved by the House of Representatives...every time there was a meeting of the committee responsible...there were always elections and they never approved anything...."* (Respondent 11)

These given examples have also highlighted the issue of certain groups and individuals being more powerful than others. This contrasts with the idea of equality assumed by democratic pragmatism, as the findings signalled inequality within decision-making. According to Dryzek (2013), inequality can occur due to powerful interests [individuals or groups] with large financial resources that seek to influence and manipulate decisions according to the direction of their own interests. Notably, this interpretation reflects the concepts of elitism and corporatism. Elitist models consider power within decision-making to be centralised and controlled by certain select groups or individuals, with this represented by high-level politicians and ministers in Cyprus and noted by respondents through pricing policy delays and changes (Respondent 3, pers. comm., 2013). In turn, corporatism accounts for powerful interest groups and recognises the involvement of these groups in the policy-making process (Parsons, 1995; Christiansen *et al*., 2017). This understanding contrasts with democratic pragmatism, based on the way the control of government by large interest groups is considered to exist as a system of interest representation that causes certain preferred [powerful] groups to have priority in decision-

making (Schmitter, 1974; Wiarda, 2016). In Cyprus, corporatism was observed in the case of the control and pressure exerted by powerful groups such as the farmer unions and the tourism sector in relation to water allocation, abstraction permits, and pricing (Respondent 7, pers. comm., 2013; Respondent 16, pers. comm., 2013; Respondent 19, pers. comm., 2013).

7.2.5 Key metaphors and rhetorical devices

Dryzek (2013) identifies certain key metaphors and rhetorical devices that are important to democratic pragmatism. These include; public policy as a result of forces; the idea of a thermostat scale of intervention; as well as the concept of networks through which governance and responses proceed without any central controlling actor, but instead through a combination of actors and coordinated efforts (Dryzek, 2013).

Policy as a result of forces

Democratic pragmatism considers public policy to be a result of forces acting on it. Dryzek (2013) describes these forces as the influences that act on and pull public policy in a given direction. This involves attempts to shape a given response, with the direction of policy changing according to the actor groups applying these forces.

In Cyprus, respondents identified these types of forces in the case of pressure groups or boards exerting their influence on decisions to shift policy or responses to favour their own interests. For example, forces were evident in terms of; farmer unions applying pressure on government and politicians for increased water supply allocation; as well as the pressures applied on government by municipal, community, and village boards in an attempt to keep prices as low as possible and increase allocation to benefit local users (Respondent 4, pers. comm., 2013; Respondent 6, pers. comm., 2013; Respondent 16, pers. comm., 2013). More specifically, in the case of farmer unions and the agricultural sector, despite experiencing a period of limited rainfall and impending drought, respondents noted that farmer unions applied significant pressure on government to increase their allowance of irrigation water (Respondent 9, pers. comm., 2013). As a result, policy, decisions, and political dynamics were shaped by forces applied by the unions, which ultimately resulted in an outcome that benefitted the farmers rather than the public interest of water security during the period of drought (Respondent 7, pers. comm., 2013; Respondent 18, pers. comm., 2013).

Thermostat concept

A 'thermostat' metaphor suggests that problem-solving interventions and management responses are triggered based on the extent, type, and importance of environmental problems (Dryzek, 2013). This analogy considers problem-solving interventions to occur as soon as the 'temperature' of an issue moves outside a desired range, with heating and cooling temperatures reflecting a wide range of political, economic, or environmental variables (Dryzek, 2013). This is unique to democratic pragmatism as fundamentally it is based on; multiple actor groups or individuals being involved in decision-making and having an awareness of and generating a response to variation in 'temperature'; as well as actor groups such as citizens and non-governmental organisations having the ability to put pressure on political interaction in response to an environmental problem [for example, through lobbies or protests], in turn forcing the government to react (Dryzek, 2013).

In Cyprus, evidence of this metaphor was found to have occurred during the drought of 2008, and the subsequent need to import freshwater from Greece. As a result of severe drought conditions, which affected residents and the agricultural and tourism sectors, and as a response to scarcity [thermostat heating and temperature rising], the emergency intervention of importing water was prompted because of political, media, and public pressures (Evripidou, 2008; Respondent 3, pers. comm., 2013). In this case, the thermostat increased past a given trigger or tipping point [temperature] at which political, media, and public pressure had departed from a desirable range. Thus, emergency measures were taken to mitigate the situation and ensure sufficient water provisions (Respondent 13, pers. comm., 2013). The following comment illustrates the thermostat metaphor [described as a tipping point], with interventions highlighted through the importing of freshwater and the rapid development of desalination projects at the time. These interventions occurred in response to the severe scarcity caused by the drought, and as a result of public pressure on government to ensure sufficient supply, which reflected changes in 'temperature' that forced a response.

> *"When there was drought we imported water. The price was expensive and it was a political disaster.....but what else could the government do. The tourists required all the water supply....farmers needed water as well and you couldn't take it away from them....plus at the same time you were suffocating the locals by not giving them water. The government had no choice at the time. All of the pressures from the politicians, these groups, and the public meant the government had to find water.....so it was kind of a tipping point that forced actions. These actions came to quickly building desalination plants, very strict water cuts, and the emergency importing of water."* (Respondent 18)

Networks

Democratic pragmatism considers networks to exist as a type of metaphor, particularly by actors who embrace the information society, communication, and technology (Dryzek, 2013). In this case, networked governance emerges as an important variable through which responses proceed without any central controlling actor, but instead through a combination of different actors as well as coordinated efforts and forms of decision-making (Borzel, 1998; Dryzek, 2013). This understanding can be linked to pluralism and the policy networks approach discussed in chapter three [see figure 3.1] and section 7.2.3 of this chapter.

Policy networks consider interactions between actors to exist as a fundamental part of policy design, development, and implementation, while these networks act as mechanisms for transferring information, enabling communication, and facilitating an exchange of resources between actors (Rhodes, 1988, Rhodes & Marsh, 1992; Keast, 2016; Metz, 2017). Work by authors such as Rhodes (1985; 1988; 2017) and Wilks and Wright (1987) has helped to define network types through a spectrum of understanding. These have been defined as; issue, producer, intergovernmental, professional, and territorial/policy community networks (Parsons, 1995; Howlett & Ramesh, 2003; Brouwer, 2015; Rhodes, 2017).

In terms of the network concept, Dryzek (2013) recognises relevant aspects such as; greater interaction and communication [which can be formal and informal]; a move away from strict hierarchy found in administrative rationalism; collaborative initiatives; greater equality in decision-making; as well as the potential for 'para-governmental' outcomes. There are also differences between the policy network approach and the understanding of networks in democratic pragmatism. For example, Dryzek (2013) differs by considering networks to be metaphors [rather than methods] that emphasise the information society, while also noting how these governance networks remain subordinate to the governments that establish and influence them. He also directs attention to the importance of actor roles and behaviour within these networks, noted through voluntary agreements and climate change governance, which provides a specific focus in comparison to generalities of the policy network approach (Dryzek, 2013).

In Cyprus, evidence of the type of networks interpreted by Dryzek (2013) through democratic pragmatism has been limited. The most notable example was apparent in the case of the Nicosia water treatment plant and the strategy on bi-communal cooperation for water resource management and supply. Historically, cooperation between the two communities was formally

started in the 1980s through the construction of a common sewerage system, while the new treatment plant and sustainability strategy was developed from 2010 onwards (Respondent 3, pers. comm., 2013; Respondent 17, pers. comm., 2013; UNDP Cyprus, 2014). The project exhibited a landmark use of policy networks in Cyprus, with these being utilised to improve services and solve issues relating to potable water and sewage treatment within complex and fragmented communities (Respondent 1, pers. comm., 2013; Respondent 6, pers. comm., 2013). Respondents noted how networks were experienced through interaction, communication, and trust-building between communities that were opposed because of the wider context of geographical and political division (Respondent 3, pers. comm., 2013; Respondent 10, pers. comm., 2013). This partly reflects the idea of networks, or networked governance, put forward by democratic pragmatism, although Dryzek (2013) recognises and focuses on this as a metaphor rather than the practical method observed.

More specifically, in terms of water treatment, coordination for plant operation was observed alongside the cooperation of both municipalities and the ongoing joint management of the project by the boards and communities involved (Respondent 10, pers. comm., 2013; Respondent 19, pers. comm., 2013). For potable water, cooperation between representatives of the two municipalities and communities was noted, with direct ongoing communication between boards also observed (Respondent 3, pers. comm., 2013). Indeed, supply to the bi-communal village of Pyla was claimed to be a success-story showing the effectiveness of the network approach in practice (Respondent 10, pers. comm., 2013; Respondent 18, pers. comm., 2013). According to some respondents, the framework of networks evident in Nicosia provided an alternative and much-needed form of governance, as formal pathways of management [through government] would have been essentially impossible due to the political circumstances (Respondent 14, pers. comm., 2013).

Furthermore, many respondents suggested that the Nicosia example represented characteristics that were indicative of policy networks. These were based on; interaction between public and private actors; horizontal and informal interaction; communication and trust between groups; interdependence; as well as non-hierarchical coordination and relatively stable relationships (Brouma & Ezel, 2011; Respondent 2, pers. comm., 2013; Respondent 11, pers. comm., 2013; Respondent 20, pers. comm., 2013; UNDP Cyprus, 2014). As typified by the following comment, respondents focused attention on the network approach used in relation to water supply and sewage treatment in Nicosia. It was noted that this process involved; cooperation

between many different groups; communication between actors; as well as coordinated management and decision-making.

> *"The project was the construction of a big bi-communal waste treatment plant....which is on the northern side of Nicosia.....and certainly it is interesting. It serves both communities....with a very large capacity. There has been significant cooperation on both sides for this to be achieved.....and networks have been important for there to be coordinated water management."* (Respondent 10)

Community structure and a closed system

Expanding on the idea of policy networks and communities, the interpretation and perceived existence of a 'closed system' was also highlighted by many respondents. This was used to describe the type of organisational structure prevalent in Cyprus, within which management occurred, while also relating to policy communities through aspects such as network types, relative member interests, as well as the informal procedures of policy-making (Rhodes, 1988; Hudson & Lowe, 2009; Brouwer, 2015; Metz, 2017). Some respondents further developed their interpretation by using the concept to characterise the socio-political, economic, decision-making, and community setting that was perceived to exist (Respondent 3, pers. comm., 2013). This involved the idea that the operational characteristics of society, decision-making, and the governance system as a whole, were complex, limited in scale, and influenced within a closed setting by factors such as; socio-economic and political relationships; bureaucracy [defined as a convoluted procedural construct]; community dynamics; and specific cultural norms (Respondent 9, pers. comm., 2013; Respondent 12, pers. comm., 2013). As a result, respondents suggested that decision-making and the capabilities of certain actors were restricted based on these underlying features of a more closed system.

In accordance with other research, the 'closed' interpretation can be related to the theoretical understanding of a closed system perspective, which focuses on the internal dynamics and design of organisations (Daft, 2007; Jones, 2013). In essence, a closed system is considered to be independent from its external environment, while remaining autonomous, stable, predictable, and efficient (Clark, 2000; Thompson, 2003; Daft, 2007).

Although a truly closed system did not exist in Cyprus, certain characteristics were identified and represented a system that was more closed in nature. The variables of management, leadership, and organisation can exhibit closed system characteristics. In Cyprus these were apparent for responses to water problems of scarcity, groundwater over-abstraction, and quality

decline. For example, the variables were particularly evident as a result of; an emphasis on internal operations and rationalistic approaches; the desire of politicians to limit change and maintain a given political environment; the use of hierarchal operational structures; as well as the presence of barriers for certain actors or groups in decision-making, namely experts in the political arena and citizens more generally (Hassard, 1995; Daft, 2007; Respondent 5, pers. comm., 2013; Respondent 11, pers. comm., 2013; Respondent 17, pers. comm., 2013). Evidence of these characteristics contrasted with democratic pragmatism, and ideas of interaction and a horizontal format of decision-making. Instead, the more closed system and networks of problem-solving reflected administrative rationalism, through internalised procedures and hierarchy. The following quote highlights the obstructions caused by a small community and restricted socio-political setting, based on a more closed system that limits the implementation of decisions. This adds another layer of understanding as a result of social and community structures and their influences on problem-solving. Dryzek's (2013) rationalities have been limited in describing aspects such as culture and systems that are more closed in nature, as evidence of these have been poorly represented in the discourses.

> **[When asked if any aspects of decision-making have been problematic - 'as you have stated there are many recommendations from the experts....but when it comes down to the actual decision-making there is a block or barrier?']**
> *"Yes.....certain ideas are not implemented.....it [the issue] is the politics and the politicians. Everything ends....at the end of the day...with the politicians...unfortunately. Okay....we are a small country and this probably happens in other countries as well.....but I would say it is more distinct in our case based on the very small community and such a closed structure that we have...[...]...This causes many restrictions and also barriers for many groups for getting involved...."* (Respondent 11)

7.2.6 Practical challenges of democratic pragmatism

An important aspect of Dryzek's (2013) understanding relates to how problem-solving responses change over time. In this case, practical challenges are expected and act as drivers of change while also signalling the existence of discourses. These challenges are explored in the following section, as they provide a link to the next chapter, being understood by Dryzek (2013) to encourage the development of other problem-solving rationalities and responses, namely economic rationalism in chapter eight.

Dryzek (2013) considers four practical management challenges to be expected outcomes of democratic pragmatism. These include; the existence and influence of political power; the influence of business on public opinion; the privileged position of business in terms of decision-

making; as well as the variable conceptions of reasoned debate and public interest (Dryzek, 2013). According to Dryzek's (2013) interpretation, these are perceived to be limitations that provide reasons for the emergence of other problem-solving rationalities and approaches. As a result, it is argued that subsequent approaches have been developed to remedy these failures, and so they are an important part of the evolutionary process of problem-solving.

The existence and influence of political power

Dryzek (2013) argues that the main challenge of democratic pragmatism occurs because of the existence and influence of political power within decision-making. In this case, individuals or groups with significant financial resources and powerful interests seek to influence the outcomes of policy discussions and decisions (Dryzek, 2013). This also partly reflects other understandings such as elitism, based on control held by select groups; as well as economic institutionalism based on market approaches and self-interest being embedded in political procedures (Parry, 2005; Kersey, 2016; Jaeger, 2017).

In Cyprus, the existence of political power was observed as a result of the role and influences of powerful actor groups, in particular the farmers unions and the tourism sector. For example, many respondents suggested that certain decisions, especially those relating to water allocation, pricing, and drought restrictions, were delayed or changed because of the political power held by these groups (Respondent 7, pers. comm., 2013; Respondent 13, pers. comm., 2013). Some respondents also argued that these powerful groups were closely aligned with political parties, and thus their allegiances, agendas, and interests tended to reflect the objectives of these groups (Respondent 14, pers. comm., 2013). The following comment highlights the influence certain actor groups had on the decision-making process because of their political power and desire to shape decisions or policy outcomes according to their interests.

> *"You must understand that we are a small community and a small country.....and many decisions are being influenced by pressures from different groups.....[...]....Some groups are more powerful than others when it comes to water. I mean this was shown with the agricultural and tourism sectors with their water allocation.....and the water pricing changes.....and also for restrictions during the drought. These groups can apply pressure and influence decisions.....and this is usually because of politics and them looking to shape things to suit their interests...."* (Respondent 1)

The influence of business on public opinion

According to Dryzek's (2013) interpretation of democratic pragmatism, public opinion should have a major influence on policy and decision-making. However, it is understood that business

can generate a potential challenge by influencing discussions, consultations, or dialogue, thus shaping public opinion (Dryzek, 2013).

In Cyprus, evidence of business influences on public opinion was somewhat limited. Respondents argued that businesses seemed to focus their efforts on influencing government and politicians directly more so than the public, as found in the case of water allocation and pricing (Respondent 11, pers. comm., 2013; Respondent 18, pers. comm., 2013). This focus was also related to the limited power held by the public in terms of decision-making, which meant that influencing them was less important for powerful actor groups due to their diminished role (Respondent 8, pers. comm., 2013). Alternatively, many respondents noted that it was actor groups such as the farmer unions, tourism sector, and the media, rather than the business sector, which had the greater influence on decision-making (Respondent 9, pers. comm., 2013; Respondent 13, pers. comm., 2013). This was also the case when it came to influencing the public. For example, actor groups achieved this by exploiting party politics and political allegiances, which were found to have a major role in the more closed community structure evident in Cyprus (Respondent 8, pers. comm., 2013; Respondent 19, pers. comm., 2013). The role and influence of politics is explored further in chapter nine.

The privileged position of business

Dryzek (2013) also identifies the privileged position of business as being a challenge for democratic pragmatism. In this case, the structural setting of a capitalist market is argued to encourage the prioritisation of business, as this actor group is able to influence policy-making because of their central role in the economy (Dryzek, 2013).

In Cyprus, the privileged position of business was less apparent regarding water. However, some respondents noted the existence of this issue through certain businesses, particularly those in the tourism sector such as hotels and leisure activity businesses like golf clubs/courses (Respondent 7, pers. comm., 2013; Respondent 8, pers. comm., 2013). These groups, alongside the farmer unions, were observed by respondents as being able to shape decisions by forcing delays of policy change for water pricing, as well as influencing allocation in general and gaining exemptions from usage restrictions, even during severe drought periods (Respondent 9, pers. comm., 2013; Respondent 14, pers. comm., 2013).

Conceptions of reasoned debate and public interest

Dryzek's (2013) understanding of democratic pragmatism assumes that citizens are central to decision-making, while a natural relationship exists based on equality for citizens and all actors. Reasoned debate is expected to be a key component of decision-making and this context. However, Dryzek (2013) also notes that in practice, the idea of equality and reasoned debate can be distorted by the influence of power, as well as government needing to satisfy the interests of other powerful actors, often to ensure economic confidence. In Cyprus, this was observed by respondents based on the limited existence of equality and public debate in practice, while certain actor groups with political power, such as the farmer unions, were identified as having the ability to greatly influence debate (Respondent 1, pers. comm., 2013; Respondent 13, pers. comm., 2013; Respondent 18, pers. comm., 2013).

Theoretically, democratic pragmatism suggests that views on policy come from many actor groups, with these often representing the public interest (Dryzek, 2013). However, in practice, Dryzek (2013) also recognises that conceptions of public interest can vary, and some of these represent the true public interest while others may not. This involves both individual and collective views of how to define public interest, and these ideas can also vary greatly in reality. For instance, the idea of public interest can be related to different conceptions that focus on characteristics such as economic efficiency, social equity and equality, or environmental protection (Dryzek, 2013). In Cyprus, different conceptions of public interest were evident in certain cases. Firstly, government actors, such as some experts and managers, observed public interest as ensuring sufficient supply for all users and doing so using the most efficient available methods (Respondent 1, pers. comm., 2013; Respondent 6, pers. comm., 2013). Secondly, water board actors considered public interest as providing water to customers at a reasonable price and operating in a cost-effective way for their board (Respondent 7, pers. comm., 2013; Respondent 11, pers. comm., 2013). Lastly, farmer union actors viewed public interest in terms of allocating sufficient water to the important sectors of the economy, with the most relevant of these being the agricultural sector (Respondent 16, pers. comm., 2013).

7.3 Conclusion

The analysis undertaken in this chapter has established that water management and responses to problems in Cyprus have been influenced by democratic pragmatism. Many expected characteristics in terms of Dryzek's (2013) discourse analysis topics were identified in practice.

Firstly, approaches and practices were evident through; public consultation as part of specific techniques such as environmental impact assessment; forms of mediation for management of supply and shared treatment facilities; policy dialogue used for infrastructure projects such as transfer systems, irrigation networks, and desalination plants; as well as lay citizen deliberations for village and municipal meetings relating to allocation and pricing. Secondly, basic entities were found to partly exist through; citizens playing a role in decision-making, especially since EU accession and the development of legislation to encourage public involvement. Thirdly, natural relationships were evident through; equality based on the influences of different agents such as farmer unions and politicians, which debated alongside scientists, experts, and the public, while exerting pressure on the decision-making process. Fourthly, a range of agents were evident such as government bodies, experts, politicians, boards, municipal and community representatives, citizens, as well as farmer unions and other non-governmental organisations. In this case, agent motives involved multiple conceptions of public interest, as there was evidence of certain individuals and groups pursuing self-interests as well as those acting in the public interest. Finally, metaphors and rhetorical devices were evident through; forces acting on policy in the case of pressure groups exerting their influence on decision-making and shifting responses to favour specific interests; the thermostat metaphor occurring for events such as the drought of 2008; as well as the network metaphor partly evident in the case of water treatment and a strategy on bi-communal cooperation for supply and management.

Differences and additional layers of understanding that build on Dryzek's (2013) understanding of democratic pragmatism also emerged as a result of the findings. For example, these included; the limited evidence of certain approaches and practices such as alternative dispute resolution, public inquiries, and right-to-know legislation; relationships being more uneven in practice, with the roles and influences of actor groups varying in their intensity as a result of factors such as political dynamics and economic importance [both explored further in chapter nine]; as well as a role for citizens that was less prominent than expected by democratic pragmatism. More specifically, citizens did not adopt the central role in problem-solving and this was found to be a result of; the existence of more powerful actor groups such as politicians, experts, and farmer unions; the limited use of consultation as a method of involving citizens; as well as the existence of a highly political and closed community structure. Indeed, the prominent role and control of more powerful actors involved high-level politicians that reflected elitist concepts, as well as powerful interest groups like farmer unions and the tourist sector that represented

corporatism. Agents were often found to have varying roles and levels of influence, thus implying that agency was more complex, changeable, and not always for everyone.

Practical management challenges were also identified in Cyprus, and these signalled the existence of the rationalities. The four challenges expected by Dryzek (2013) were evident, namely; the existence and influence of political power [discussed further within chapter nine in terms of politics]; the influence of business on public opinion, which was partly evident due to the diminished role of the public in decision-making; the privileged position of business, which was more strongly reflected by other groups such as the farmer unions and tourism sector; as well as variable conceptions of reasoned debate and public interest. Furthermore, the findings in this chapter also relate back to objectives one, three, and four noted in chapter one. In this case, the understanding of the voluntary approach has been advanced through the interpretation of democratic pragmatism; empirical understanding has been developed through the findings in Cyprus, with a focus on dynamics of public participation; while actor roles, behaviours, and motivations have been developed, for example through different conceptions of public interest.

7.3.1 A link to other responses

The characteristics of democratic pragmatism identified in Cyprus relate to the voluntary approach discussed in chapter three and the phases of water management highlighted in chapter five. In the case of the voluntary approach, certain aspects were reflected by the form of democratic pragmatism evident in Cyprus. Firstly, relationships based on interaction were evident through cooperative problem-solving that involved consultations and community discussions, especially at municipal and village level, as well as conflict in terms of delayed decisions and disagreements between government bodies, water boards, and farmer unions. Secondly, interest-based negotiation was evident through motives for both public and self-interest, as well as the thermostat analogy. Thirdly, a horizontal format of decision-making was noted through the integration of stakeholders in decision-making, especially after EU accession, and also the presence of networks in the case of bi-communal water supply and treatment projects. Furthermore, these aspects and the form of democratic pragmatism identified in Cyprus also reflected characteristics of the second and third phase of water management. For example, the continued development of water-saving awareness campaigns alongside public consultation relates to the recognition of citizens as having a more important role in decision-making when compared to the first phase of management. This was likewise noted in the case of a concerted effort for greater stakeholder participation and more formal public involvement

in decisions as a result of EU accession and the transposition of the WFD. In turn, the drought event of 2008 also reflected the thermostat analogy described by democratic pragmatism, as changes in management [during and after the event] were the result of pressure being applied on government for a more effective response to this issue.

As a result of the findings in this chapter, it is possible to argue that in many cases democratic pragmatism has been evident in Cyprus. This is based on the existence of techniques and characteristics associated with the discourse that are identified by Dryzek (2013) as being central to this type of problem-solving, including; consultation, interaction, pluralism, and policy networks. However, in many cases, the approaches, practices, and relationships found in Cyprus also contrasted with the expectations of democratic pragmatism. This was true in the case of natural relationships, agency, and motives, with concepts such as elitism, corporatism, and public choice being reflected instead.

Democratic pragmatism was more variable and less independent in practice, as shown by a reliance on administrative rationalism based on the need for regulation to manage associated techniques and procedures. More specifically, the findings in Cyprus contrasted with democratic pragmatism because of; poorly represented approaches and practices, such as limited forms of dispute resolution, public inquiries, and right-to-know legislation; the less prominent role of *Homo-civicus* and the citizen in decision-making; the existence of inequality, with citizens having less of a role in decisions when compared to politicians, boards, unions, and municipal or village authorities; as well as agency being complex, variable, and not always for everyone in practice.

Practical management challenges associated with democratic pragmatism were also evident in Cyprus. These were expected and necessary according to Dryzek's (2013) interpretation, being particularly important as they are assumed to provide the reason for the development of economic rationalism. Based on these findings it is possible to move on and consider the existence of economic rationalism. This is the third problem-solving rationality put forward by Dryzek (2013) and is assumed to emerge as a response to the practical challenges and limitations of both administrative rationalism, as a result of implementation gaps and issues of centralisation, as well as democratic pragmatism, due to the influence of business [or other groups], political power, and different conceptions of public interest.

Chapter 8: Economic Rationalism in Cyprus

8.1 Chapter overview

This chapter explores how government has responded to water problems by considering the evidence of economic rationalism in Cyprus. The expected characteristics of the rationality are compared with real-world government responses in Cyprus. The roles, motives, and behaviours of key governing agents are also examined, with these being important in terms of the processes through which institutions, approaches, and practices associated with a given response interact as a result of policy actor behaviour. Understanding the justifications for adopting a given approach is central to understanding the behaviour of those involved in decision-making and why policy has been implemented in a certain way (Lowe & Ward, 1998; Dryzek, 2013; Kraft, 2017). This can provide insight into the way problems have been tackled by government, thus helping to develop understanding of the specifics of problem-solving while moving beyond single-theory interpretations and building on mandatory, voluntary, and economic approaches.

The main section of the chapter discusses economic rationalism and the topics of Dryzek's (2013) discourse analysis in comparison to the findings identified in Cyprus. These topics consider; expected approaches and practices; the existence of basic entities that are recognised or constructed; assumptions about natural relationships; agents and their motives; as well as the type and role of metaphors and rhetorical devices used. In this case, the existence of economic rationalism is explored, while practical observations and the characteristics of the rationality are compared with other understandings, such as; economic institutionalism, elitism, top-down perspectives, as well as economic models of understanding including budget-maximising and bureau-shaping. The discussion is also positioned more broadly to the conceptualisation of how governments have tackled problems, namely through the economic approach, which is reflected in economic rationalism.

The final section explores the practical challenges of economic rationalism, which are discussed according to Dryzek's (2013) interpretation and their existence in Cyprus. Challenges such as slow diffusion of economic approaches, limited institutional change, resistance of established norms, political influences, implementation gaps, as well as the limited recognition of certain agents, exist as the perceived and observed limitations of the rationality. These are important and expected to cause the evolution of problem-solving (Dryzek, 2013). A conclusion also

provides a link to the next chapter, which considers the applicability of Dryzek's (2013) framework and certain themes that have emerged as a result of the discussion and findings in Cyprus. This link is also developed through the existence of the practical management challenges, as these fit with Dryzek's (2013) understanding of evolutionary problem-solving that considers the potential for subsequent development of other responses.

8.2 Economic rationalism in Cyprus

Economic rationalism is the third and final problem-solving response to be conceptualised by Dryzek (2013). It seeks to address the challenges and failings of administrative rationalism and democratic pragmatism by tackling environmental problems through the application of economic principles. These focus on market instruments and pricing mechanisms that seek to alter the behaviour of producers and consumers by ensuring the costs associated with responding to environmental problems are accounted for (Dryzek, 2013). As a result, economic rationalism positions market economics ahead of the administration and public or stakeholder involvement, which have been the focus of administrative rationalism and democratic pragmatism respectively (Jacobs, 1995; Dryzek, 2013).

8.2.1 Markets and incentives

Dryzek (2013) highlights two main characteristics that signal the existence and operation of economic rationalism in practice. These are; privatisation; and the use of market instruments, such as private rights, pricing structures, subsidies, permits or licenses, as well as cost recovery.

Privatisation

Privatisation is deemed to be central to economic rationalism, with this involving the application of economic principles and private property rights (Dryzek, 2013). Economic principles include the use of market mechanisms, such as pricing, subsidies, taxes, or charges, while private property rights relate to the ownership of resources. Economic rationalists note that ownership is important and necessary to encourage the use of markets for environmental goods. It is through this ownership that the appropriate value of resources can be defined, thus encouraging protection and efficient use to maintain value (Dryzek, 2013). Ultimately this encourages problem-solving to protect the environmental resource that has economic value.

For economic rationalism, environmental problems such as water scarcity and pollution occur as a result of government failing to privatise resources and attach property rights or ownership to given environmental variables, such as surface or groundwater resources (Yandle, 1993; Mitchell & Simmons, 1994; Dryzek, 2013). In this case, privatisation adopts a definition that is centred on the sale of resource assets to the private sector, and the private ownership of water resources and related infrastructure (Mansfield, 2008; Bakker, 2010; Dryzek, 2013). Advocates of economic rationalism claim that this form of privatisation, through the private sector ownership of water [property or resource] rights, can in turn give the owner of these rights an incentive to protect their resource and investment, thus limiting damage such as overconsumption or pollution (Dryzek, 2013).

In Cyprus, privatisation was only partly evident in practice through public-private partnerships for water-related infrastructure, while water resources were owned by the state and providers were controlled by government (Respondent 1, pers. comm., 2013; Respondent 6, pers. comm., 2013). As a result, property rights for water in Cyprus were held by the state, and managed through government, the MANRE, and the WDD. This meant that a system of extensive privatisation, as seen in countries such as England and Wales in terms of full privatisation as well as France through widespread public-private partnership, was not evident (Feldman, 2007; Paddon, 2013; Respondent 7, pers. comm., 2013). The following quote highlights how a fully privatised system for water was not developed in Cyprus, despite failings in other approaches as made evident by; groundwater over-abstraction and aquifer quality decline; problems associated with drought; as well as evidence of challenges associated with administrative rationalism and democratic pragmatism, based on implementation gaps, lack of citizen involvement, the role of political power, and business sector influences on decision-making (Dryzek, 2013).

> *"There is not really a proper markets approach.....I mean as a full scale approach and as privatisation of the whole [water] sector. We have always had state control of water....even though there are some issues it has stayed [like this]. For example we don't have the situation with water rights where you can sell it to somebody else like a different sector in the economy. These types of things don't happen in Cyprus. And we have not got privatisation for water like the UK for instance.....as the resources are of the state."* (Respondent 1)

More specifically, privatisation in Cyprus was identified through public-private partnerships that focused on the management of water-related infrastructure and the operation of desalination plants. Respondents stated that these plants were managed by private sector companies, with the government having the right to buy the plants or renew contracts after a set

period of ten years, while also being obligated to purchase desalinated water under contract (Respondent 6, pers. comm., 2013; Respondent 9, pers. comm., 2013). The funding and development of the desalination plants in Cyprus was based on an economic model of public private participation [or public-private partnerships], which essentially involved a government service being funded and operated through a contractual partnership between the government and private sector companies (Tsiourtis, 2004; PwC, 2013). This scenario shared similarities with forms of service-specific privatisation in Australia, where involvement of the private sector had occurred through the subcontract of services by urban water utilities (see Paddon, 2013). Notably, Dryzek's (2013) interpretation of economic rationalism considers a form of extensive privatisation that focuses on property rights and ownership of these rights by private sector entities. As a result, the form of privatisation evident in Cyprus based on public-private partnerships contrasts with this understanding, and while representing a form of privatisation it was not the extensive type expected. This highlights the potential to adapt Dryzek's (2013) interpretation to be inclusive of nuanced forms of privatisation. The following comment notes the private management and operation of desalination plants in Cyprus. This partly represented the existence of economic rationalism through a type of service-specific privatisation.

> *"The desalination plants are managed by private corporations that send water to the government. They [desalination plants] sell under contract to the government. So it is a type of privatised set up.....but only for the desalination services."* (Respondent 8)

Market instruments

Even though economic rationalists argue that private property rights need to be established and enforced to effectively manage resources such as water, the difficulties and complexities of privatising are also recognised (Dryzek, 2013). As a result, economic rationalism identifies the application of market instruments as being important to problem-solving and resource management. In this case, market instruments are defined as management tools that attempt to internalise environmental costs. These take shape through; incentives; pricing structures; subsidies; trading schemes; green taxes; and pollution rights or permits (Huber, Ruitenbeek, & da Motta, 1998; Dryzek, 2013; Callan & Thomas, 2013).

Market instruments and quasi-market incentives were evident in Cyprus. In this case, the most prominent examples included; government subsidies for irrigation water, the uptake of treated wastewater, and domestic supply schemes; metering for domestic and agricultural supply; direct payments for water; as well as permits and licenses for groundwater boreholes and abstraction (Socratous, 2011b; Respondent 8, pers. comm., 2013; Respondent 19, pers. comm., 2013).

Government subsidies

According to many respondents, and recognised by other research, subsidies were primarily used by government in Cyprus to manage water resources and activities in the domestic and agricultural sectors (WDD, 2005; Kambanellas, 2007; INECO, 2009; Charalambous *et al*., 2011; Kossida, Tekidou & Mimikou, 2015). Respondents identified government subsidies as direct and indirect types based on their application. For example, direct forms were related to influences on water resources, such as pricing subsidies for irrigation water, while indirect forms were related to influences on water-using activities, the adoption of new technology, or infrastructure development (Respondent 1, pers. comm., 2013; Respondent 7, pers. comm., 2013; Respondent 14, pers. comm., 2013). This distinction has been partly reflected by Dryzek's (2013) understanding of economic rationalism through the consideration of quasi-market incentives, such as direct green taxes, in comparison to subsidised investment in technology that can indirectly influence pollution control.

Firstly, direct subsidies were evident in terms of water pricing for allocation and supply to the agricultural sector. This was primarily applied to irrigation water, thus giving agricultural sector users access to water at a price lower than the cost of production, treatment, and supply. More specifically, the WDD gained water from government facilities, including reservoirs, groundwater aquifers, or desalination plants, and sold this to farmers and the agricultural sector at a price that was less than the cost incurred by the WDD to supply this water (Respondent 4, pers. comm., 2013). According to respondents, changes and reductions in these subsidies have occurred since EU accession in 2004 (Respondent 1, pers. comm., 2013; Respondent 18, pers. comm., 2013). These changes were the result of cost recovery requirements associated with the WFD, with the process aiming to address the problem of scarcity by valuing water by its true cost [of supply]. This adds a layer of understanding to Dryzek's (2013) interpretation of problem-solving, as external requirements, in this case the economic tools of EU legislation, have shaped responses and the rationale for tackling a given problem. The following quote typifies how subsidies have existed and directly influenced the price of water used for agriculture. It was often noted that the government charged farmers much less than the actual cost of providing water.

> *"For the farmers and agriculture.....yes there is a subsidisation.....because they charge them much less than the cost to provide [the water].....but for the domestic user there is no subsidisation."* (Respondent 11)

The impact and role of direct water subsidies within the agricultural sector was further demonstrated through incentives that have been applied to tertiary treated resources supplied to farmers. In this case, a direct subsidy was applied to the price of treated water to encourage acceptance and use of this resource (Respondent 1, pers. comm., 2013). The tertiary process involved wastewater being treated by town sewerage boards to produce treated water that was subsequently purchased by the WDD (Respondent 6, pers. comm., 2013). The WDD then sold this treated water to the farmers at a low price that was much less than the cost incurred by the WDD to buy the treated water from the sewerage boards (Respondent 10, pers. comm., 2013). As a result, the WDD would buy the treated water at a higher price and sell it to the farmers at a much lower price to encourage its wider acceptance and usage in the agricultural sector. The subsidy applied in this case is explained in the comment below, which notes how the government was bearing the costs and price differences to supply the resource and ultimately preserve freshwater resources and tackle the ongoing problem of scarcity.

> *"So...with the sludge/sewage....the residents pay for this to be taken away [by sewage boards etc].....this is treated...and then the WDD buy back the tertiary treated water only, which is then resold to the farmers. Now to be clear...the WDD buy the treated water from the board at a very high price.....but sell it at a very low price....only 50cents per cubic metre....just because the WDD want to make them [the farmers] use this water and accept this water. Because...for example....ten years ago there was much resistance to using this water because the farmers didn't trust it....[...]...So it's actually a subsidy, because the WDD are bearing the costs in order to push it through..."* (Respondent 3)

Respondents also noted that prior to EU accession in 2004, the subsidies to maintain irrigation water supply were very high, with approximately 70% of cost subsidised by government. However, a decision by the Council of Ministers in 2003, in anticipation of EU membership, resulted in water tariffs being increased. This prompted a reduction in certain direct subsidies, while in contrast the price of recycled water was decreased [in effect being subsidised] to encourage acceptance and use by the farmers (Socratous, 2011b; Respondent 4, pers. comm., 2013). This sought to tackle the ongoing problem of scarcity. According to respondents, pricing changes applied in 2003 meant that domestic water was being covered at full cost, while the agricultural sector had also seen price increases (Respondent 20, pers. comm., 2013). This was recognised by other research, which noted that prices increased to 38% of full cost [implying that the water provided to the agricultural sector cost just 38% of the real cost incurred by government to supply, thus giving much cheaper water to the agricultural sector and primarily to the farmers for irrigation] (Socratous, 2011a). These findings have implications for Dryzek's (2013) interpretation of economic rationalism and specifically market incentives. This is based on; a limited understanding of the role and influence of supranational governance on subsidies,

which were found to shape the type and application of market incentives in Cyprus; as well as the potential for government to essentially bypass supranational requirements by subsidising indirectly. As a result, relationships were found to be more complex in practice, with supranational governance playing a role in economic responses and political dynamics at times having greater power than expertise.

Secondly, indirect subsidies and incentives were also evident in Cyprus, and were often used in an attempt to tackle problems of water scarcity and groundwater over-abstraction. These indirect subsidies emerged in conjunction with the management of the agricultural sector and development of infrastructure, particularly through the expansion and improvement of irrigation networks (Respondent 14, pers. comm., 2013). According to respondents, agricultural subsidies were formed and developed by government, while application was primarily carried-out by the WDD and the Department of Agriculture (Respondent 1, pers. comm., 2013). In this case, subsidies were established for; the installation and operation of more advanced and efficient irrigation networks, using low pressure and drip systems; the installation of rain water collection systems; promoting the use of treated wastewater and convincing farmers to use this resource; as well as for encouraging rural development and limiting the abandonment of villages (Respondent 1, pers. comm., 2013; Respondent 16, pers. comm., 2013; Respondent 18, pers. comm., 2013). These were found to have influenced management responses in different ways, namely; by shaping water usage and increasing efficiency; by being used to maintain infrastructure and encourage the population to stay in rural areas and communities; as well as greatly influencing the agricultural economy based on crop patterns and types used during a given growing period (Socratous, 2011a). As typified by the following quote, the government achieved widespread implementation of irrigation systems through subsidies, that were developed to reduce consumption, tackle ongoing scarcity, and respond to the decline in groundwater quality. The subsidies ensured quick application, while providing a response to scarcity and over-consumption through increased efficiency in a high water-usage sector.

> *"Advanced irrigation systems were installed by the farmers on their land....and these were financed up to 70-90% by the government. Yes it was a major subsidy...that was very apotelesmatiko [efficient/effective]. Efficient for the farmers...because they had to pay less for water....and efficient for the government as they can have better management and utilisation of water...[...]...Irrigation water is not so expensive for farmers and it is supplied at a price that is cheaper than the cost.."* (Respondent 4)

Indirect subsidies were also observed within the domestic sector. Although many respondents claimed domestic supply had not been subsidised directly in terms of price, as the government

and WDD was argued to be achieving full cost recovery, a range of indirect subsidies and incentives were still identified in practice. These included subsidies for; the installation of water recirculation systems; the development of boreholes for garden water usage; the connection of boreholes with toilet cisterns; as well as residential grey-water recycling systems (Charalambous *et al*., 2011; Respondent 2, pers. comm., 2013; Respondent 7, pers. comm., 2013). Furthermore, many respondents suggested that despite the savings in freshwater gained as a result of these schemes, the indirect subsidies were still limited in practice due to their impacts on water consumption as well as the issues they caused by encouraging further exploitation of groundwater (Respondent 10, pers. comm., 2013; Respondent 15, pers. comm., 2013). For Dryzek's (2013) interpretation of economic rationalism, different subsidy types are not recognised. This lack of detail means that certain economic influences on problem-solving can go unnoticed, as identified in the case of indirect subsidies encouraging the development of domestic boreholes that have undermined responses to groundwater over-abstraction. The following comment illustrates how indirect subsidies were applied to conserve good quality water used for drinking supply and to substitute this resource with groundwater and greywater that could be used for non-essential domestic activities.

> *"We had the subsidies to help with the conservation of water. Basically to keep this for drinking water...as it was good quality...and use the boreholes or the recycled water for other things. These were subsidies for the domestic sector...constructing boreholes and having the facility for recycling for example....[...]....But they [subsidies] gave some issues because.....overall and for groundwater...there was too much consumption and the feeling was this just added to our problems."* (Respondent 18)

Overall, evidence suggests that indirect subsidies had an influence on water-saving activities in the domestic sector. The following quote highlights the application of these incentives, which were used to increase residential water efficiency, while also drawing attention to the use of disincentives. These disincentives or penalties reflect the green taxes identified by Dryzek (2013) in terms of economic rationalism. They were applied in an attempt to reduce over-consumption, despite being found to be limited in terms of real-world enforcement.

> *"They [subsidies] have been effective to a point. The government gave incentives to save water....[...]...they were also providing disincentives....a bit like taxes....disincentives for the overuse of water by paying more....penalties for using hoses and washing cars during drought. These approaches come and go.....the incentives for recycling water and so on....those were in effect from 2004. The disincentives and the penalties...are in effect but not really enforced....only during the drought period."* (Respondent 8)

Water metering and the polluter-pays principle

Metering was found to exist as an economic tool for water management in Cyprus, with the approach based on the polluter-pays principle and driven by a preference to recover the full cost directly from the consumer (Westerlund, 2003; Baumol & Blinder, 2015). Metering is argued to be a key component of demand management, while also being considered an important economic tool in terms of more integrated water management approaches (Staddon, 2010). Metering can be considered a form of technology that facilitates the application of quasi-market incentives, such as pricing structures and charges, as well as demand control through tariff policy tools (Westerlund, 2003; Hoffman, 2010; Staddon, 2010). This reflects the polluter-pays principle, pollution abatement technology, and taxes described by Dryzek (2013) that are expected as part of economic rationalism.

In Cyprus, water used for domestic supply was metered extensively, especially in town water board jurisdictions, while management issues and less dutiful implementation was evident in villages, communities, and rural areas (Respondent 3, pers. comm., 2013; Charalambous *et al*., 2011; Sofroniou & Bishop, 2014). For example, the number of household water meters in municipalities and communities was estimated to be 223,113 [according to 2008-2009 data]; while the town water boards had extensive metering in place with a total of 206,199 household meters and 1,401 industrial meters (see Charalambous *et al*., 2011; WDD, 2011b). Comparing this data to population census data from 2011, in which the number of households in Cyprus totalled 303,242 (MoF Cystat, 2013), it was possible to estimate the extent of domestic meter coverage. As a result, the percentage of households metered was calculated to be approximately 74%. Metering for agricultural water was also prevalent, with this involving the irrigation systems and abstraction permits used to manage resources (Respondent 7, pers. comm., 2013; Respondent 18, pers. comm., 2013). The following quote highlights the extent and role of metering within domestic and agricultural sectors in Cyprus.

> *"...average water savings resulting from the installation of water meters are in the range of 10-25% of the usual consumption. Water meters are religiously installed in households in Water Boards' jurisdiction areas but not as dutifully at community water boards' jurisdiction areas, while water meters for irrigation monitoring purposes are only installed in areas that are supplied water by the Government Water Works or have boreholes that pump water from certain aquifers...."* (Charalambous *et al*., 2011)

Pollution control - groundwater permits and abstraction licenses

Permit schemes for emissions and pollution control were interpreted by Dryzek (2013) to be part of economic rationalism. This reflects the charges and marketable permits considered by

Hahn (1995), as well as the economic tools identified by respondents in Cyprus which involved the implementation of a groundwater [borehole] permitting and abstraction licensing scheme.

In Cyprus, the permit and licensing scheme was implemented to monitor and manage legal and illegal boreholes, as well as to deal with groundwater depletion and water quality issues caused by saline intrusion that had resulted from coastal aquifer over-abstraction (Respondent 4, pers. comm., 2013; Respondent 6, pers. comm., 2013). In this case, a permit was required for drilling a borehole and then a license was necessary to abstract groundwater from the given borehole (Respondent 1, pers. comm., 2013). The stricter permitting and licensing scheme was noted to be a significant emerging management response, while also showing the general policy direction of the WDD in terms of responses to groundwater problems (Zoumides & Zachariadis, 2009; WDD, 2013). This emerged in phase two and three of management [identified in chapter two], while the findings also related to; concepts and processes of exchange defined through the economic approach (Lindblom, 1977; Boulding, 1990); as well as licensing for resource allocation (Grafton & Horne, 2014). The following comment highlights evidence of the permitting and licensing scheme, which was applied through the IWM Law (2010). This signalled the existence of a market instrument, which is an expected characteristic of economic rationalism, while partly reflecting Dryzek's (2013) interpretation of quotas and permits despite the limited practical evidence of 'trading' in Cyprus.

> *"The borehole permits and pumping licensing has been important. Most of the boreholes are illegal...at least in the sense that they are allowed to pump but nobody controls how much is taken. So now the government is trying to get a hold on these. It was controlled by the municipalities before...but they wanted to bring it under government control and monitor every borehole....to have a quota on the quantities of groundwater abstracted. This has come from the IWM Law and is being done by the WDD."* (Respondent 8)

8.2.2 Basic entities recognised or constructed

Dryzek (2013) identifies certain basic entities that have a recognised or constructed existence as part of economic rationalism. These include; the structural features of markets, prices, and property rights; the role of government rather than citizens; as well as the construct of *Homo-economicus* [a term used by Dryzek (2013) to describe consumers or producers that are only concerned with their own self-interests. This also contrasts with the concepts of *Homo-bureaucratis*, based on power and organisation with the bureaucracy, and *Homo-civicus*, based on power and organisation with the citizens, which are defined for administrative rationalism and democratic pragmatism respectively].

Markets

For economic rationalism, markets provide context and the systems within which transactions can take place and property rights can be allocated. Pricing can be used to dictate these transactions, while private rights can allow markets to operate and are assumed to encourage environmental protection as a result of ownership (Dryzek, 2013). In Cyprus, the existence and use of market approaches was observed by respondents. For example, this included the use of metering, pricing, and government subsidies, as well as certain forms of privatisation.

Pricing

Prices are assumed to be a necessary tool of control for government and the market in terms of economic rationalism (Dryzek, 2013). This also has similarities with the economic approach, which has a basis of pricing and encourages mechanisms of integration that are based on price structures (Powell, 1990; Bradach & Eccles, 1991; Keast, 2016). In Cyprus, water pricing was identified by all respondents as being an important economic management tool. In many cases however pricing was also a topic of conflict both within government and between certain actor groups. For example, conflict occurred between government departments, water boards, and municipal or village authorities, while also being found to have occurred between WDD experts and farmer union representatives (Respondent 1, pers. comm., 2013; Respondent 8, pers. comm., 2013). These findings contrast with Dryzek's (2013) more simplistic understanding of market instruments such as pricing, as the idea of conflict is not recognised as an issue, being highlighted instead through the definitions of rights or the way economic rationalists conceptualise the environment.

Water prices and tariff structures in Cyprus have been the responsibility of the MANRE and WDD. These were also approved by the Council of Ministers as required by law, while new tariffs proposed by the largest town water boards of Nicosia, Larnaca, and Limassol were also required to be approved by the House of Representatives in central government (Socratous, 2011a; Respondent 7, pers. comm., 2013). Respondents claimed that the town water boards were required to follow pricing structures approved by the Council of Ministers, whereas municipal authorities had greater flexibility in setting their own tariffs (Respondent 14, pers. comm., 2013). Differences in prices existed in practice, particularly for different sectors and water types. This also caused the unit tariffs given by government to be limited when covering the costs incurred by water boards, in turn leading to the build-up of debt for the town boards as noted by some respondents and other research (Socratous, 2011a; Respondent 7, pers. comm.,

2013; Respondent 10, pers. comm., 2013; Naukkarinen, 2015). Notably, in terms of economic rationalism, the findings contrast with Dryzek's (2013) understanding of pricing, as an interpretation of different levels of government or providers being able to set prices was not forthcoming. Indeed, this complexity in economic tools is noted by work on models of pricing structures and charges (see Webb, 2006; Reznik *et al*., 2016), while the findings also draw attention to the influence and dynamics of politics.

Respondents identified three tariffs in Cyprus, for domestic, irrigation, and other water provisions, that were defined historically and set for resources supplied from government water works. These were variable according to the sector being supplied. The water tariffs[4] applied in Cyprus are shown in appendix 5. The information has been assimilated using primary interviewee data and cross-referencing this with government reports, other research, as well as secondary data. The evidence of water pricing structures and tariffs highlights an expected characteristic of economic rationalism and more specifically a market tool (Dryzek, 2013).

Firstly, the domestic price was set for potable water provided by government works to the three main town water boards, as well as the numerous municipalities, development boards, and village authorities. This water was supplied to a range of users, particularly; residents and households, industry, commercial users, and the tourism sector. The price also accounted for the averaged cost of desalinated water which had a higher supply cost (Respondent 7, pers. comm., 2013). The domestic water tariff in 2004 was set at CYP£ 0.45/m^3 or approximately €0.77/m^3, with this being the price of water as sold to water boards and other users (MANRE, 2010). The most recent domestic water tariff was defined in 2017, being set at approximately €0.82/m^3 [for water supplied from the Southern Conveyor network], while tariffs varied for other sources or supply areas [appendix 5]. As identified by respondents, the Paphos region was assigned a lower tariff for water from government works, based on regional supply, projects, and geographical location, with this being set at approximately CYP£ 0.33/m^3 or €0.56/m^3 in 2004, and subsequently set to €0.64/m^3 in 2017 (MANRE, 2010; Respondent 1, pers. comm., 2013). The water provided by boards to households, commercial, tourist, or industrial consumers, had a block tariff structure applied based on usage quantities, while prices were also further variable based on the values defined by boards or municipal providers (MANRE, 2010; Socratous, 2011a; Respondent 9, pers. comm., 2013; Respondent 12, pers. comm., 2013).

[4] In Cyprus, available data for water prices is somewhat limited, when relying on data produced by the WDD or water boards up to given years for each sector or pathway of use. Although electricity and gas utility price statistics by country are available through the Eurostat EU statistics database, this was not the case for water. Supplying data for water as part of the EU database has been voluntary for providers, thus meaning data sets are incomplete to varying degrees (Eurostat, 2016)

Secondly, irrigation water prices were initially proposed by the WDD, with this discussed and agreed on by the MANRE, while the final proposal was required to be approved by the Council of Ministers (MANRE, 2010; Socratous, 2011a). This process applied to the agricultural sector as a whole, with the price of water being set at a lower level when compared to the domestic sector. As noted by nearly all respondents, a government subsidy was found to exist for irrigation water (Respondent 4, pers. comm., 2013). The irrigation tariff for water from government works was confirmed as of 2007 and set at CYP£ 0.11/m^3 or approximately €0.19/m^3. In 2017 this price was re-defined and set at €0.17/m^3, although a range of categories were evident with various tariffs depending on specific usage type [appendix 5]. The irrigation tariff was a uniform price applicable in all regions (Socratous, 2011a; MANRE, 2010).

Thirdly, the other-uses water tariff followed a price generally between the higher domestic and lower irrigation tariffs, with this water being used for a variety of activities including; animal husbandry, some industrial uses, as well as watering of parks, sports facilities, golf courses, hotel gardens, and other green areas (Respondent 7, pers. comm., 2013). The tariffs for these activities were noted to be variable as they were often dependent on charges imposed by municipal authorities. For example, large consumers such as hotels within the tourism sector were heavily charged (Respondent 9, pers. comm., 2013; Naukkarinen, 2015).

These findings for the domestic, irrigation, and other water use tariffs reflect the concept of pricing in terms of economic rationalism based on the existence and application of market tools. However, these findings also contrast with Dryzek's (2013) interpretation as; the influence of politics; the authority to change tools at different governance levels; as well as a high level of variability have not been recognised. Furthermore, while Dryzek (2013) suggests these market tools are applied within the context of a hierarchy based on expertise; in Cyprus this was not found to be the case. Instead, hierarchy for the application of pricing was based on political authority that was found to also be variable according to regional and municipal influence.

Rights

In Cyprus, water ownership and rights were historically in the control of the state, remaining this way at the time of writing (Respondent 1, pers. comm., 2013; Respondent 6, pers. comm., 2013). Some respondents noted that very limited private water rights did exist at local level and on a more individual basis, with examples in rural areas found for groundwater and borehole

use that caused management challenges for the WDD, water boards, and municipal authorities (Respondent 12, pers. comm., 2013; Respondent 18, pers. comm., 2013). Despite these few examples, the types of extensive private rights expected by economic rationalism were not identified in practice. In this case, private sector property rights were found to be poorly established in Cyprus because the state held the rights to all water resources, through government, municipal authorities, and the WDD (Respondent 1, pers. comm., 2013). This was also validated by other research that claimed the government waterworks law attributed the property rights of almost all water, surface and groundwater, to government (Tsiourtis, 2004). These findings contrasted with Dryzek's (2013) interpretation of rights as part of economic rationalism, as well as the idea of private rights being an important characteristic of the economic approach through understandings such as competition, transactions, and self-interest (Powell, 1990; Keast, 2016); and also, the notion of contract (Rigby, 1990).

The role of government

In terms of the recognised entity of government, Dryzek (2013) considers this to be central to establishing the conditions and markets required for economic rationalism to exist. Essentially, some level of government is presumed to exist as an entity that is more than just a collection of economic individuals (Dryzek, 2013). This role of government contrasts with the idea of the citizen being central to problem-solving as assumed by democratic pragmatism. For example, Dryzek (2013: pg134) comments that 'notably missing from economic rationalism are citizens of the sort populating democratic pragmatism'. Instead, consumers that operate as part of the market and the producer-consumer dynamic are assumed to exist as part of economic rationalism, with these reflecting the economic approach through mechanisms of supply and demand, consumption, as well as the context of the market (Wurzel *et al*., 2013; Keast, 2016).

In Cyprus, the entities of government and citizen were evident. However, despite agreeing with economic rationalism regarding the importance and key role played by government, the idea that citizens did not exist or play a role in problem-solving was not true in practice (Respondent 8, pers. comm., 2013; Respondent 17, pers. comm., 2013). The citizen, as an active participant in problem-solving, is missing from economic rationalism and only represented as a consumer. This does not agree with the findings in Cyprus, as citizens were considered to have a role in problem-solving, albeit not in the most prominent format expected by democratic pragmatism.

Further expanding on the role of government, the aspect of policy was recognised as an important management tool by respondents. In Cyprus, the most important legislation, policies, and laws were interpreted by respondents as being; the WFD (2000/60/EC); the WPM Law of 2004; as well as the IWM Law of 2010 (Respondent 1, pers. comm., 2013; Respondent 3, pers. comm., 2013; Respondent 15, pers. comm., 2013). In addition to this, historical water laws had helped to shape certain economic approaches, such as general pricing, tariff structures, and the application of metering, although it was suggested that more visible influences had only been observed as a result of legislation applied since EU accession in 2004. According to respondents, national legislation such as the WPM Law (2004) and IWM Law (2010) played a role in maintaining the polluter-pays principle that was represented through metering in phase one of management, while also ensuring that the government [primarily through the WDD] still had the capacity to implement water subsidies (Respondent 1, pers. comm., 2013; Respondent 8, pers. comm., 2013). Indeed, these subsidies were viewed as being important to the successful implementation of different policies and management agendas, as they were used to encourage efficiency in both domestic and agricultural sectors (Respondent 6, pers. comm., 2013).

The economic approaches evident in Cyprus were also greatly influenced by European governance. In particular, respondents noted that the WFD had introduced and encouraged economic management concepts such as; full cost recovery of drinking water; incentivised and appropriate pricing structures; as well as the polluter-pays principle, which was represented in article 9 of the directive (Chave, 2001; Respondent 9, pers. comm., 2013; Respondent 15, pers. comm., 2013). These findings reflect Dryzek's (2013) interpretation of the role of the European Union in promoting market-type policy instruments. As exemplified by the following comment, several respondents noted how EU governance through the WFD prompted the development of an alternative pricing structure, which was based on cost recovery and the polluter-pays principle (Respondent 15, pers. comm., 2013).

> *"The directive forced the WDD to come up with more rational water pricing...[...]...The first attempts got rejected [by the politicians in parliament and the cabinet]....but the WDD called in experts to help them with the pricing policy....and they have a more reasonable proposed policy now...[...]...This has been caused by influences of European governance and legislation...and so yes it has played an important role in causing changes...especially for the ideas of user pays and cost recovery..."* (Respondent 8)

Homo-economicus

Economic rationalism recognises the constructed entity of *Homo-economicus*, which assumes that actors are driven by self-interest and seek to satisfy their own subjective goals, while

exploiting the public for personal benefit (Dryzek, 2013). This understanding is at odds with the constructed entity of *Homo-bureaucratis* associated with administrative rationalism, and *Homo-civicus* which is defined as part of democratic pragmatism (Jacobs, 1995; Dryzek, 2013). Furthermore, the *Homo-economicus* entity also reflects certain aspects of the economic approach, in particular; negotiation styles focused on self-interest (Keast, 2016); as well as economic models of understanding focused on the role of actors and self-interest, such as budget-maximising (Niskanen, 1971) and bureau-shaping (Dunleavy, 1986).

In Cyprus, the existence of *Homo-economicus* was identified in certain cases by respondents, mainly observed through government actors and politicians who acted to satisfy their own interests, for example to achieve job security, gain financial benefits through promotion, or to demonstrate political allegiance (Respondent 5, pers. comm., 2013; Respondent 18, pers. comm., 2013). Self-interest was also represented through individual or group benefits, for instance through; individual politicians seeking to gain financial benefits; or groups such as the farmer unions making decisions in agreement with their associated political parties (Respondent 8, pers. comm., 2013). The following comment highlights the idea of *Homo-economicus* and the presence of self-interest, with evidence of this mainly being related to politicians but also some experts within government and managers at municipal level.

> *"Unfortunately the politicians prefer to secure votes....help their party or organisations....and then try to achieve the people's needs....[...]...The experts try to act for the people and as best they can.....but still there are some that act to help their situations.....like having a secure position or putting their organisation to be stronger in certain decisions. It is a balance I think and there is both people acting for self-interests or to help with the public interest...."* (Respondent 19)

8.2.3 Assumptions about natural relationships

Dryzek (2013) assumes that certain natural relationships exist and operate as part of economic rationalism. These can be identified through the aspects of; competition; hierarchy based on expertise; and the subordination of nature (Dryzek, 2013).

Competition

For economic rationalism, a basic relationship of competition exists for all actors and this fits with the central theme of economic markets which encourage competitive interaction (Dryzek, 2013). Indeed, the aspect of competition is also reflected by the economic approach through a negotiation style focused on competition (Powell, 1990; Keast, 2016), as well as a relationship

of interaction between governing actors and those being governed based on competition (Bevir, 2012; Wurzel *et al*., 2013).

In Cyprus, the existence of competition in this sense was limited, as a result of the government ownership of water and prices being set by sector according to the Council of Ministers (Respondent 1, pers. comm., 2013). However, some competition was still identified in the context of water allocation, with this occurring between sectors and for actors or groups within sectors (Respondent 6, pers. comm., 2013). For example, farmer unions or actors associated with the tourism sector, such as hotel owners, often attempted to gain as much water as possible, while competing with other sectors and groups by applying pressure on government and trying to influence decisions through politics and lobbying (Respondent 9, pers. comm., 2013; Respondent 16, pers. comm., 2013). The following comment highlights the existence of competition and conflict in decision-making, particularly competition for water allocation as well as conflict within and between government, town water boards, and pressure groups.

> *"We have competition and conflict. Competition in terms of water allocation directing decisions....because there is no point in giving water to groups that don't produce or when the benefit to the community is not much. Some groups compete with each other and try to put pressure or influence decisions so they can get more water. Also we have conflict…yes in government for decisions...I mean we had a delay for years when having the changes to price...[...]...There were conflicts between government and boards...and they built up debts because they could not agree on prices....plus conflict with groups like the farmers who always want more....more water...more subsidies..."* (Respondent 6)

Hierarchy based on expertise

Economic rationalism assumes that a government hierarchy based on expertise exists in practice, as experts must be able to assign and manage property rights, while forming and implementing market tools such as pricing structures, permits, and subsidies (Dryzek, 2013). This partly reflects the concept of technocracy, which recognises the importance of technical experts in the hierarchy of decision-making (Bucchi, 2009; Radaelli, 2017).

In Cyprus, this type of hierarchy was mainly evident due to the position and influence of experts in government, and as a result the existence of economic rationalism was partly confirmed. According to respondents, the structure of the water sector was partly based on a hierarchy of technical expertise, as within this setting the experts and managers had a significant role in water management (Respondent 11, pers. comm., 2013). Many respondents however also argued that experts often did not have full decision-making control in practice, and instead it was the higher-level politicians and ministers that actually had the power to shape

final decisions (Respondent 3, pers. comm., 2013; Respondent 19, pers. comm., 2013). Therefore, while a hierarchy based on expertise did partly exist in Cyprus, the highest level of this hierarchy involved actors such as politicians and some ministers that were deemed to be non-experts (Respondent 1, pers. comm., 2013). It was these actors who influenced final decisions according to their own individual or group interests (Respondent 8, pers. comm., 2013). Notably, this reflects other theoretical understandings such as elitism and the top-down perspective, based on the power and prominent role of higher level actors, such as politicians, ministers, and senior officials that had the capacity to shape decisions, as well as the increasing authority that was found to exist in a vertical format within government (Parry, 2005; Kersey, 2016). The following comment notes the influence high-level non-expert actors had on decision-making, despite the existence of a government and hierarchy with a focus on expertise.

> *"The government is made up of experts and they have importance and help to make some decisions. They always want and try to give opinion at least....and put this in writing most of the time....but unfortunately the final decision is not down to them....so this is not the case always. There are political pressures. I give you one example....in the Kokkinohoria region when we built the southern conveyor and we were making the irrigation network....we aimed to irrigate 4000 based on the available water....but that became 9000 because of the pressures. Everybody wanted to be included. So here the decisions were not technically founded. The politicians changed the recommendations of the experts and technocrats. This is not the only example."* (Respondent 14)

By having government actors and experts that acted in the public interest as well as according to self-interests, the situation in Cyprus both agreed with and contrasted the expectations of economic rationalism. Experts were found to be either 'economic rationalists' [experts in a position of authority that were motivated to act in the public interest] or 'economic actors' [experts motivated by their own personal or group interests] (Respondent 14, pers. comm., 2013). This is significant, as it reflects Dryzek's (2013) interpretation of potential actor types in the context of economic rationalism. Indeed, according to the accepted role of the expert in terms of economic rationalism, 'economic actors' are not favoured (Dryzek, 2013).

Subordination of nature

The third assumed relationship of economic rationalism involves the dynamic between humans and nature. In this case, Dryzek (2013) considers nature to be subordinate to humans, the market, and problem-solving. As a result, economic rationalism is anthropocentric and requires suitable expertise to ensure that rights, incentives, and market instruments are developed and implemented accordingly (Dryzek, 2013).

In Cyprus, this type of relationship was argued to partly exist. Some respondents claimed this based on the extensive development of infrastructure and the exploitation of groundwater resources, where human needs had taken priority over the environment (Respondent 3, pers. comm., 2013; Respondent 8, pers. comm., 2013). Human needs for increasing amounts of water were shown to outweigh the associated environmental costs of these activities, for instance without the vast and long-term exploitation of groundwater the problem of saline intrusion could have been avoided (Respondent 1, pers. comm., 2013). Further examples of this relationship were identified by respondents, and validated by other research, particularly in the cases of; the agricultural sector growing water-intensive crops for greater economic gains; as well as the tourism sector being allowed to use unrestricted amounts of water, even during emergency drought periods, and develop golf courses that have been highly water intensive (Socratous, 2011b; Respondent 13, pers. comm., 2013; Respondent 18, pers. comm., 2013; Sofroniou & Bishop, 2014). These findings represent Dryzek's (2013) understanding of expected relationships in terms of economic rationalism, as nature was deemed to be subordinate to human needs and the economy in Cyprus.

8.2.4 Agents and their motives

Dryzek's (2013) understanding of economic rationalism argues that agency in problem-solving is primarily attributed to those who take on the role of *Homo-economicus*, essentially being motivated by self-interest. For example, this involves self-interest through financial gains, job security, or providing individual or group benefits. However, it is also conceded that to allow the problem-solving process to develop and be effective, some agents within government must be motivated by acting in the public interest, with these individuals being required to carry-out the arrangement of rights and the implementation of market instruments (Dryzek, 2013). This is somewhat paradoxical, as economic rationalism relies on the existence of administrative rationalism and the understanding that agents can and do act in the public interest.

In Cyprus, agency and motivation was not observed in the format expected by economic rationalism, instead being similar to aspects of elitism (Parry, 2005; Birkland, 2015; Kersey, 2016). For example, nearly all respondents claimed that the majority of experts generally sought to act in the public interest, while it was the politicians, ministers, and non-experts, as well as a minority of experts, managers, and civil servants, who acted according to their personal or group interests (Respondent 6, pers. comm., 2013; Respondent 13, pers. comm., 2013). This relates to the expectations of economic rationalism, which considers the majority of

agents to be motivated by self-interest, and only a few agents within government to act in the interests of the public in order to implement appropriate rights and policy. The following quote highlights the idea that government experts and civil servants primarily sought to act in the public interest, with a minority choosing to act for their own self-interests at certain times. In contrast, agents such as politicians were argued to have primarily acted to satisfy their individual or group interests, while attempting to achieve political objectives.

> *"The government experts in Cyprus....they try to serve the public. Of course not all of them completely...as the same as anywhere you will find some public servants that are satisfying their own interests.....but this is not the general condition.....this is the exception....[...]....Most of the politicians do not have a clue. It is not their role to be experts but they pretend they are....especially to the people. The actions of the politicians are for their own interests....securing votes or getting promotions.....or for the benefits of their political party."* (Respondent 5)

In terms of recognised agents, the concept of citizenship is not acknowledged as part of economic rationalism. In Cyprus, however, citizens were recognised as part of decision-making, albeit not in the primary role expected by democratic pragmatism. For example, the citizen as an agent was observed in practice, with evidence found through public consultations, water board group meetings, village board meetings, as well as public forums for interaction (Respondent 7, pers. comm., 2013; Respondent 9, pers. comm., 2013). As a result, this contrasted with the expectations of economic rationalism, reflecting Dryzek's (2013: pg136) understanding which claims that 'missing from economic rationalism is any notion of active citizenship; economic rationalism abolishes citizenship'. In reality this was not the case.

8.2.5 Key metaphors and rhetorical devices

Dryzek's (2013) interpretation of economic rationalism adopts a range of metaphors and rhetorical devices that represent techniques used to validate the approach and advance its efforts in problem-solving. These include; a mechanistic interpretation of the social world; rhetoric used to weaken other approaches; and stories used to describe governmental actions or failures.

Mechanistic interpretation of the social world

Economic rationalism considers the social world to be a machine that meets human needs and is made up of components with functions. The idea that the machine may need to be reassembled at some point is recognised, with this being achieved through the rearrangement of property rights (Dryzek, 2013). In Cyprus, two scenarios were linked to this concept, namely; the changes in pricing that were a result of cost recovery; as well as the widespread [and ongoing]

rearrangement of groundwater borehole permits and abstraction licenses (Respondent 6, pers. comm., 2013; Respondent 10, pers. comm., 2013). These situations involved changes in management, a rearrangement of organisational systems, and the changing of 'components' associated with pricing and groundwater control (Respondent 18, pers. comm., 2013).

Rhetoric used to weaken other approaches

Economic rationalism uses rhetoric that aims to weaken other approaches, and particularly administrative rationalism. In this case, regulations are defined as forms of 'command and control', thus giving a negative meaning to this response (Dryzek, 2013). Some respondents identified this rhetoric in Cyprus, mainly based on the interpretation and blame attached to government and regulation by certain actor groups such as water boards, farmer unions, and the media (Respondent 8, pers. comm., 2013; Respondent 13, pers. comm., 2013). The following quote typifies the negative attitude towards government and regulation in Cyprus, which was represented by certain groups. This relates to a style of rhetoric perpetuated by economic rationalism and signals its existence in practice.

> *"In terms of the government, policies, and also the European policy coming from outside...it is really a system of command and control. The farmers unions are trying to publicly challenge these decisions...as often they are not fair. They sometimes demonstrate against decisions....and demonstrating is by any means...by causing issues or blocking roads...so literally taking action. I mean especially with the pricing policy and the evaluation of the water costs....this is transferred to the end user because we are functioning as a free market. This is not always fair...and not everything the government does is good....that is seen from our economic crisis [laughs]..."* (Respondent 16)

The use of stories to describe governmental actions or failures

Economic rationalism is also assumed to use stories and form rhetoric to describe governmental actions (Dryzek, 2013). In this case, stories are created and defined as 'horror stories' based on the overly negative representation of government, while associated decisions and actions are deemed to give inefficient or expensive outcomes (Stroup & Shaw, 1993; Dryzek, 2013).

In Cyprus, negative stories [often found to be expressed through individual narratives, the official views of certain groups, or also media sources] were identified by respondents through a range of examples. Firstly, the drought of 2008 and regional government conflict associated with water allocation and supply restrictions (Respondent 11, pers. comm., 2013). Secondly, the self-interest of politicians being negatively portrayed in the media, and predominantly the newspaper media (Cyprus Mail, 2013; Respondent 19, pers. comm., 2013). Thirdly, negative connotations associated with water intensive activities, related to; certain crop types being

grown, a lack of supply restrictions for tourists during drought periods, and the development of water-consuming golf courses (Respondent 2, pers. comm., 2013; Respondent 13, pers. comm., 2013). The following media quote illustrates the use of negative rhetoric in relation to government policies and actions for decision-making in response to the drought of 2008, the subsequent importing of freshwater, and the general failure of politicians. This typified apportion of blame for drought management and gave an example of a 'horror' story, thus reflecting Dryzek's (2013) understanding of rhetorical devices as part of economic rationalism.

> *"All of us who are unhappy with this unprecedented state of affairs - ministers running around begging other countries for water to bring to Cyprus so that we can carry on washing in the summer months - should bear in mind that we will also be footing a huge bill for the imported water....[...]....we should not forget who is to blame for the fact that the mother of three at the refugee estate is spending all her disposable income so her kids can have water to drink and to wash."* (Charalambous, 2008)

8.2.6 Practical challenges of economic rationalism

An important aspect of Dryzek's (2013) understanding relates to how problem-solving responses evolve or change over time. In this case, practical challenges are expected and act as drivers of change while also signalling the existence of discourses in practice. These challenges are explored in the following section, as they provide a link to the next chapter, while being understood by Dryzek (2013) to encourage the development of other responses.

Dryzek (2013) considers five management challenges to be the expected outcomes of economic rationalism. These include; the multi-dimensional issue of slow diffusion, limited institutional change, and inertia; a dependence on political forces and political-economic context; an implementation gap/deficit; the limited recognition of certain agents; as well as the limited conceptualisation of government (Dryzek, 2013). According to Dryzek's (2013) interpretation, these are perceived to be limitations that provide reasons for the emergence of other alternative discourses that build on the rationalities. It is argued that subsequent understandings [beyond the scope of this study] have been developed to respond to these failures [and also the failures of the other rationalities]. As a result, they are an important part of the evolutionary process of problem-solving beyond the rationalities and towards concepts such as sustainable development, ecological modernisation, and green radicalism or politics (Dryzek, 2013).

In the following sections, the management challenges highlighted by Dryzek (2013) have been explored within the context of Cyprus. These challenges have been identified by respondents in

terms of practical management. Thus, the findings point towards the existence and operation of economic rationalism in Cyprus, while validating the potential for evolutionary progression.

Slow diffusion, limited institutional change, and inertia

Dryzek (2013) identifies challenges for the relationship between economic rationalism and regulatory approaches. In this case, three important management variables are highlighted, namely; the slow diffusion of economic rationalism in practice; limited institutional change that has restricted the response; as well as the limited progress of economic rationalism as a result of inertia and the resistance of established norms (Dryzek, 2013).

Firstly, the diffusion of economic rationalism is considered to be a slow process, while regulatory instruments that are rooted in administrative rationalism have still dominated policy and decision-making (Dryzek, 2013). This was partly evident in Cyprus, based on the limited use of market mechanisms, as well as the past and ongoing dominance of regulation. However, the implementation of market instruments such as pricing changes, cost recovery, and groundwater permits occurred more quickly over a period since EU accession in 2004. These were found to be driven by EU legislation and drought events, while being evident in the third phase of management (Respondent 1, pers. comm., 2013). In this case, respondents also noted that important characteristics associated with economic rationalism, such as private water rights and extensive privatisation, were limited in Cyprus, while more visible techniques of pricing, subsidies, and service-specific privatisation had often been slower to emerge when compared to regulatory instruments (Respondent 8, pers. comm., 2013; Respondent 14, pers. comm., 2013). Indeed, many respondents argued that major changes in water pricing had only occurred as a result of EU accession and the need for cost recovery in accordance with the WFD (Respondent 3, pers. comm., 2013; Respondent 15, pers. comm., 2013). These findings reflect work on the use of economic instruments in water policy, considering aspects such as; supranational governance and legislation as a variable of diffusion; development according to the need to increase economic efficiency of government action; as well as reasons for slower diffusion in water policy based on uncertainty, path dependency, and transaction costs (Lago *et al*., 2015).

Secondly, Dryzek (2013) argues that the tools of economic rationalism end up being controlled and managed by regulatory policies and administrative rationalism, thus resulting in limited institutional change. Dryzek's (2013) interpretation of this dynamic was true in Cyprus, and according to respondents it was represented by the need for and use of regulations when

administering market instruments such as subsidies, pricing, groundwater permits, and abstraction licenses (Respondent 1, pers. comm., 2013; Respondent 17, pers. comm., 2013). The majority of respondents claimed that subsidies and pricing changes for cost recovery were reliant on regulatory frameworks for implementation and enforcement (Respondent 2, pers. comm., 2013; Respondent 8, pers. comm., 2013). This reflected Dryzek's (2013) understanding that presumes administrative rationalism comes before economic rationalism, and that it is needed for economic rationalism to develop as a remedy to challenges. Indeed, these findings were also related to work on the weakness of institutional capacity, and the need for institutional change, through expertise, monitoring, and tax or penalty collection, when implementing economic instruments (da Motta, 2004). As shown by the following quote, some respondents identified the slow application of market instruments, while many others noted the dominance of regulation and how it was often a guiding force for other methods or approaches.

> *"Regulation has been dominant....water resources are considered to be a state issue. More recently there has been community approaches using public consultation and participation....mainly since the EU. The market-based approaches are not so evident....only really subsidies are obvious....and these type of methods have usually been slower to come to the action let's say [laughs]. So I think it is true that all the other approaches still need regulation...so that has been the dominant way"* (Respondent 9)

Thirdly, Dryzek (2013) also suggests that the limited progress of economic rationalism can be partly attributed to inaction and the tendency for decision-making to suffer from bureaucratic inertia. This situation is perceived to exist alongside the resistance of established norms (Dryzek, 2013). In this case, approaches, decision-making procedures, and structures within government can be inclined to remain unchanged, with the resistance of established norms being assumed by Dryzek (2013) to exist as a result of some actors seeking to maintain a given form of decision-making. In Cyprus, evidence of inertia and a resistance to change was identified by many respondents, especially in relation to pricing and subsidies for irrigation water (Respondent 8, pers. comm., 2013). Inertia was evident through variables such as; a small community and somewhat closed system of decision-making; limited change within government departments; politicians being less open to change; as well as organisational structures, primarily at municipal, district, and village level, that were focused on regulation and based on laws formed prior to independence (Respondent 2, pers. comm., 2013; Respondent 10, pers. comm., 2013; Respondent 18, pers. comm., 2013). Resistance to change was noted to be a challenge based on the attitudes and actions of politicians, ministers, municipal representatives, and some experts and managers. This was evident through delays and conflict in decisions on pricing as well as the ongoing use and validation of subsidies

despite the need to establish full cost recovery as a requirement of the WFD (Respondent 15, pers. comm., 2013; Respondent 20, pers. comm., 2013).

The findings on diffusion, institutional change, and a resistance of established norms also relate to work on policy development, influences on economic instruments, and design variability that can encourage or hinder implementation of these instruments. For example, a range of variables are considered in this case, including; the need for suitable baseline conditions such as economic and institutional capabilities; the role of politics and the need to reach political agreement; the vital role of monitoring and enforcement; time taken for integration into fiscal policy; uncertainty; as well as path dependency of administrative structures (OECD, 1997; Panayotou, 1998; da Motta, 2004; UNEP, 2004; Krozer, 2008; Lago *et al*., 2015).

Dependence on political forces and political-economic context

Dryzek (2013) notes the challenges of; politics; the dependence on and arrangement of political forces; and the wider political-economic setting. These involve the variable dynamic between politics, individual or group actors and their influence on the decision-making process, as well as contextual factors. The role and influence of politics is further explored in chapter nine, as it is identified to be an emerging theme that is not fully accounted for by the rationalities.

Firstly, in terms of a dependence on political forces, respondents suggested that market instruments had limitations in Cyprus based on their capacity to be manipulated or shaped by internal and external politics as well as strong pressure groups (Respondent 3, pers. comm., 2013; Respondent 8, pers. comm., 2013). This was identified through the influence of politicians on decisions relating to water allocation, as well as political pressure applied by the agricultural and tourism sector with regard to pricing and allocation (Respondent 7, pers. comm., 2013). Many respondents noted that politics and the dynamics of political allegiance operated in this case, essentially acting as a policy bypass and helping certain groups, such as high-level politicians, municipal or village councillors, and the farmer unions, to greatly influence implementation, decisions, and management (Respondent 1, pers. comm., 2013; Respondent 18, pers. comm., 2013; Conca, & Weinthal, 2018).

Secondly, in terms of the political-economic setting, respondents claimed this dynamic was apparent in Cyprus through market instruments, such as subsidies and pricing, which were often limited by the structures they relied on (Respondent 8, pers. comm., 2013). This was observed

as a result of the economic crisis [2012-2013]. As illustrated by the following comment, a range of characteristics associated with economic rationalism were impacted in this case. For example, this meant that; the uptake of subsidies became more limited; pricing changes were more difficult to pass and implement in these conditions; while financial resources available to government departments, water boards, and municipal or village authorities were also greatly impacted through reductions (Respondent 10, pers. comm., 2013; Respondent 17, pers. comm., 2013). Water management issues associated with the economic crisis were also highlighted by the reduced uptake of domestic water subsidies (Sofroniou & Bishop, 2014).

> ***[When asked about the impact of the economic crisis on water management]*** *"Oh definitely....if there is no money many aspects are affected. I mean projects which were planned.....they are now mostly delayed or postponed....and some completely scrapped. The subsidies struggle....changing things like pricing becomes even harder....and of course the positions of departments is weaker....having to deal with more....with less. It is to do with priorities and there is a cost-benefit ratio for everything. If you don't have enough money to cover everybody....then you must decide which factor is going to be first....and second...and so on...in terms of time and money. So the surrounding situations have an effect on things..."* (Respondent 6)

Thirdly, expanding on the idea of political forces and setting, respondents noted how the violation of boundaries and authority were not accounted for by economic approaches and associated market-based instruments (Respondent 14, pers. comm., 2013). In Cyprus, this was considered through fragmented management, which caused variable implementation processes and control. For example, controlling borehole permits and monitoring groundwater abstraction in areas under village or community jurisdiction was difficult (Respondent 19, pers. comm., 2013). Without strict regulation, given by administrative rationalism, as well as an understanding of different levels of authority, the market instruments used were found to be severely limited (Respondent 9, pers. comm., 2013; Respondent 17, pers. comm., 2013). Furthermore, political context was also noted to be complex and difficult in the case of water resources management and pollution control in the occupied northern region of the island. In this case, lack of authority, control, and regulation posed major challenges for management in general and also the implementation of economic tools such as pricing, metering, penalties, or permits and licenses (Respondent 3, pers. comm., 2013).

These findings also reflect work on policy formation and the role of politics [discussed further as an emerging theme in chapter nine]. The idea of economic instruments being manipulated or shaped by political forces and pressure groups, as well as the political-economic setting causing market instruments to be limited by the structures they rely on, relates to certain aspects of

comparative policy analysis, public choice, and elitism (Lester, 1995; Heinelt, 2007; Birkland, 2015). Historic-geographic conditions serve to shape socio-economic structures and political setting, thus promoting or inhibiting aspects of environmental policy (Hofferbert, 1974; Kraft, 2017). Indeed, socio-economic composition, in terms of relationships within government or between government and other bodies or groups, can encourage or restrict the capacity for pressure groups to exert their influence on decisions (Ethridge & Handelman, 2015). This is also closely related to the idea of mass political behaviour, which considers how public opinion, interest groups, and political parties may [or may not] put pressure on institutions or elites to promote or inhibit given policies (Kamieniecki, 1995; Miller, 2001). In Cyprus, this is a relevant variable that has been observed through political party influences on actors and groups, especially in the case of water pricing and groundwater control, as well as the intertwined relationship between farmer unions and political parties that ultimately exert their power and influence on decision-making procedures (Respondent 8, pers. comm., 2013; Respondent 17, pers. comm., 2013). In terms of Dryzek's (2013) interpretation of economic rationalism, politics is understood through liberal and communitarian views with features expected such as conflict and resolution, sets of individuals or groups, as well as individuals in pursuit of the common good or public interest (Ethridge & Handelman, 2015; Bhat, 2017). However, politics is also represented as a simplistic and underdeveloped theme, with limited understanding of how it influences agents and their motives or behaviour as a component of problem-solving.

Implementation gap or deficit

An implementation gap between theory and practice can often be evident for economic rationalism (Dryzek, 2013). This challenge can arise due to the influence of a prevailing socio-political context, as well as the control exerted by administrative rationalism, mandatory approaches, and regulations at policy-making and implementation levels (Dryzek, 2013). This is also comparable to the implementation gap suffered by administrative rationalism.

In Cyprus, respondents noted that the expected outcomes of market-based mechanisms did not always fully materialise in practice. An implementation gap was identified through two examples. Firstly, in terms of groundwater and borehole permitting, despite a scheme being in place illegal boreholes and over-abstraction were still major issues (Respondent 8, pers. comm., 2013; Sofroniou & Bishop, 2014). The absence of strict monitoring and regulation to enforce permitting also meant that the economic approach was severely limited in practice (Respondent 3, pers. comm., 2013; Respondent 9, pers. comm., 2013). Secondly, in terms of domestic water

subsidies, despite encouragement for uptake the wider economic issues experienced by the public, such as the financial crisis, had limited the effectiveness of these schemes (Respondent 12, pers. comm., 2013). This gap was also recognised by other research and particularly in terms of the subsidies for water conservation (Sofroniou & Bishop, 2014; Kossida *et al*., 2015).

In the case of Dryzek's (2013) interpretation of economic rationalism, these findings can be linked to the theoretical expectations for agents and motives, as *Homo-economicus* consumers and producers are assumed to exist while citizens are not (Dryzek, 2013). Economic incentives alone however are claimed to be limited when attempting to change the attitudes and behaviour of society, and the citizens that form this group, which as basic components are not recognised by economic rationalism. It has been argued that many different variables converge to form a given behaviour, and so incentives often rely on other socio-demographic and contextual factors (Steg & Vlek, 2009; Jenkins & Pericli, 2014). For example, these can involve; education; political affiliation; physical infrastructure; appropriate services; receptivity based on concerns; as well as availability of technology (Gilg & Barr, 2006; Steg & Vlek, 2009; Ward *et al*., 2011; Jenkins & Pericli, 2014). As a result, an implementation gap is to be expected if key components for the application of incentives are not recognised by the discourse; namely in this case, the citizen and the concept of citizenship that are important for changing behaviour as part of economic approaches (Kollmuss & Agyeman, 2002; Barr, 2007).

Recognition of agents

A major challenge of economic rationalism emerges as a result of the agents and motives that are recognised (Dryzek, 2013). In this case, agents are defined as being *Homo-economicus* consumers and producers, while citizens are not recognised or considered to be part of problem-solving (Dryzek, 2013). This was an issue, as in reality individuals often have more complex motivations and roles of agency. For example, in contrast to economic rationalism, individuals often exhibit both consumer and citizen preferences (Sagoff, 2008). In Cyprus, this was observed by respondents based on citizens being recognised as part of decision-making. Even though the role of the citizen in decision-making was found to be quite limited, it was apparent nonetheless through consultations, public forums, and discussions on drought, water saving measures, and pricing (Respondent 3, pers. comm., 2013; Respondent 8, pers. comm., 2013). Some respondents also identified the emergence of the citizen as being a result of European legislation [Aarhus convention of 1998] and particularly article 14 of the WFD, which has focused on encouraging public consultation and stakeholder involvement as part of decision-

making in relation to basin management plans (Howarth, 2009; Respondent 15, pers. comm., 2013; Voulvoulis *et al*., 2017).

Conceptualisation of government

The final challenge associated with economic rationalism involves the ambiguous way government is conceptualised (Dryzek, 2013). In this case, a conflicting definition emerges. Government is seen as being made up of actors driven by self-interest and a desire for financial gain, while at the same time actors that are motivated by the public interest are needed to apply market mechanisms in policy and institutional practices (Dryzek, 2013). In Cyprus, this was identified by respondents through market instruments such as pricing, metering tariffs, and subsidies, which fundamentally relied on regulatory frameworks to define and control their application (Respondent 14, pers. comm., 2013; Respondent 18, pers. comm., 2013). As typified by the following quote, some respondents noted the way economic approaches had often been dependent on regulation and the administration when it came to developing and implementing policies to define market instruments and facilitate their use in practice.

> *"The economic methods are good.....but they always still need the regulation. Things like the indirect subsidies and new pricings.....they need regulations to work properly.....and the government departments to control them. Also now.....it's fair to say they [regulatory, democratic, and economic approaches] all need each other....it is a balance."* (Respondent 18)

8.3 Conclusion

The analysis undertaken in this chapter has established that responses to water management problems in Cyprus have been influenced by economic rationalism. Many expected characteristics in terms of Dryzek's (2013) discourse analysis topics were identified in practice. Firstly, market tools and incentives were evident through; a form of privatisation in terms of public-private partnerships focused on the management and operation of desalination plants; extensive use of pricing, metering, and subsidies found for both domestic and agricultural sectors; as well as a groundwater permitting and abstraction licensing scheme to tackle overconsumption and quality issues caused by saline intrusion of coastal aquifers. Secondly, basic entities were evident, such as; pricing applied to control water consumption, with this gaining further importance as a result of EU governance, the WFD, and the application of cost recovery; as well as the importance and role of government in applying market instruments. Thirdly, natural relationships were evident and involved; competition in terms of water

allocation, occurring and existing between sectors and for actors and groups within sectors; a hierarchy partly based on technical expertise; as well as the subordination of nature based on the extensive development of infrastructure and the exploitation of resources, particularly noted in the case of groundwater over-abstraction and saline intrusion, the production of water-intensive crops, and the tourism sector being allocated unrestricted amounts of water to sustain growth. Fourthly, agency and motivations were highlighted, and involved; a range of actors including politicians, ministers, non-experts, municipal representatives, board and union members, as well as a minority of experts taking on the role of *Homo-economicus* and being motivated by personal or group interests; as well as agents within government being motivated by the public interest to arrange rights and implement the market mechanisms. Finally, metaphors and rhetorical devices were evident through; mechanistic interpretation based on changes in pricing due to the need to implement cost recovery and the rearrangement of groundwater borehole and abstraction licensing; negative connotations and blame attached to government and regulation by actor groups such as the town water boards, farmer unions, and media, especially in relation to management failures associated with drought; as well as the use of negative stories regarding poor drought management, regional government conflict, self-interests of politicians, and the water intensive activities of the agricultural and tourism sectors.

Differences and additional layers of understanding that build on Dryzek's (2013) understanding of economic rationalism also emerged as a result of the findings. For example, these included; private property rights not being well established, as the state, through government, municipal authorities, and the WDD, held rights to all water resources; the citizen existing and having a role in decision-making, and also being found to be more than just a consumer; limited competition because of state and government ownership of water, and prices being set by sector according to the Council of Ministers; as well as alternative forms of agency and motivation, with *Homo-economicus* being less prominent than expected and higher-level politicians and ministers having the most power to shape final decisions, thus reflecting elitist concepts.

Practical management challenges were also identified in Cyprus, and these signalled the existence of the rationalities. The five challenges expected by Dryzek (2013) were evident, namely; the issue of slow diffusion, limited institutional change, and inertia; a dependence on political forces and political-economic context [discussed further in chapter nine through the concept of politics]; implementation gaps; the limited recognition of certain agents, such as the citizen; as well as the limited conceptualisation of government. Furthermore, the findings in this

chapter also relate back to objectives one, three, and four noted in chapter one. In this case, the understanding of the economic approach has been advanced through the interpretation of economic rationalism; empirical understanding has been developed through the findings in Cyprus, with the reflection of elitist concepts and forms of more nuanced privatisation; while actor roles, behaviours, and motivations have been examined and developed, for example through mixed motivations and the recognition of citizenship in decision-making.

8.3.1 A link to other responses and building on the findings

The characteristics of economic rationalism identified in Cyprus relate to the economic approach discussed in chapter three and the phases of water management highlighted in chapter five. In the case of the economic approach, certain aspects were reflected by the form of economic rationalism evident in Cyprus. These included; market-based instruments such as government subsidies for irrigation water, metering for domestic and agricultural supply, and permits for groundwater; pricing structures controlled by the MANRE, WDD, and water boards; the idea of competition evident through forms of privatisation involving public-private partnerships for water-related infrastructure and the operation of desalination plants; as well as horizontal and internal decision-making evident through interactions between government departments and water boards. Notably, these aspects and the form of economic rationalism identified in Cyprus also linked to the three phases of water management identified in Cyprus. For example, supply expansion, pricing, and metering developed during the first and second phases reflect the subordination of nature as well as the role of government in establishing the conditions for economic approaches. In turn, the development of desalination plants during the second phase reflects a form of privatisation, while the use of direct and indirect subsidies for agricultural and domestic supply relates to market instruments and incentives. Furthermore, a change in pricing structures and the idea of full cost recovery that emerged during the third phase as a result of EU accession relates to market instruments and greater integration of economic principles in decision-making.

As a result of the findings in this chapter it is possible to argue that in many cases economic rationalism has been evident in Cyprus. This is based on the existence of characteristics associated with the discourse that are identified by Dryzek (2013) as being central to this type of problem-solving, namely market instruments and mechanisms. In some cases however, the approaches, practices, and relationships found in Cyprus also contrasted with the expected characteristics and constructs of economic rationalism. This was shown by; the lack of an

extensive system of privatisation; poorly established private property rights for water; limited recognition of the citizen as an agent with motives or the concept of citizenship; as well as agency and motivation not being observed in the format expected, as the majority [rather than the minority] of experts and civil servants sought to act in the public interest, instead of extensively representing the *Homo-economicus* construct. Therefore, the outcomes of the discourse were not fully reflected in practice.

Developing understanding

Practical management challenges associated with economic rationalism [as well as the other rationalities] were evident in Cyprus. These were expected and necessary according to Dryzek's (2013) interpretation, being particularly important as they are assumed to provide the reason for the development of other discourses beyond the three rationalities. For example, in this case Dryzek (2013) highlights sustainable development, ecological modernisation, and green radicalism as subsequent alternatives. Ultimately, it is the challenges associated with a given rationality that are expected to prompt the development of other approaches and discourses. This is also true for progression and change between mandatory, voluntary, and economic approaches. The following quote from Dryzek (2013) draws attention to the evolutionary nature of problem-solving and how challenges [difficulties] act as drivers of change.

> *"Partisans of each one of these three discourses often make their case through reference to the deficiencies of the other two, while remaining within the basic parameters of problem-solving within the political-economic status quo of liberal capitalism. But the manifest difficulties of all three discourses lead others to be a bit more creative in looking for alternatives."* (Dryzek, 2013: pg 144)

The findings of this chapter as well as those of chapter six and seven are relevant and have wider significance when understanding problem-solving. This is a result of characteristics observed in practice, evidence of expected challenges that drive and validate alternative responses, as well as new empirical findings from the work in Cyprus. As a result, having applied all three of Dryzek's (2013) problem-solving rationalities and explored their existence in Cyprus through the three discussion chapters, it is possible to move on and consider how the study findings can be used to further understanding of problem-solving in Cyprus. The next chapter aims to achieve this by; summarising the overall applicability of the rationalities; recognising the existence, role, and influence of emerging themes found in Cyprus; as well as ultimately developing insights through the outcomes of the study that seek to further understanding of government problem-solving responses.

Chapter 9: Conclusions

9.1 Chapter overview

This chapter concludes the thesis by reflecting on the findings and recognising key outcomes. The chapter consists of three sections. The first section considers the overall applicability of Dryzek's (2013) rationalities in Cyprus as well as how the rationalities and findings link back to mandatory, voluntary, and economic approaches. The second section explores the existence, role, and influence of certain emerging themes, which in the context of Cyprus were found in relation to responses to water problems such as scarcity, drought, groundwater over-abstraction, and quality decline. The final section summarises and considers the findings of the prior discussion and the study as a whole. In this case, the relative applicability of the rationalities, their practical limitations, as well as the emerging themes found in Cyprus help to form a unique interpretation that is relevant in terms of a small, Mediterranean, and peripheral EU nation perspective through Cyprus. Furthermore, a final conclusion reflects on the outcomes and key points of the thesis, while also offering scope for further research.

9.2 Applicability of the problem-solving rationalities in Cyprus

As the previous chapters have demonstrated, each of Dryzek's (2013) rationalities were identified in Cyprus, however, there were also differences between the expected characteristics of the rationalities when compared to the practical findings. For example, this involved; the existence or non-existence of certain methods, tools, constructs, or practices; differences in some natural relationships; and differences in actor type, role, behaviour, and motivation. As a result, the findings have been used to consider the applicability of the rationalities in Cyprus, with this defined according to the existence or non-existence of characteristics associated with each of the rationalities. An applicability analysis was developed, as noted in chapter four, with this summarised in the following sections, table 9.1, and given in full within appendix 6.

9.2.1 Administrative rationalism

Administrative rationalism had a good level of applicability in Cyprus [see appendix 6 for a full comparison and table 9.1 for a summary of applicability]. This was highlighted through the strong practical representation of variables, such as; institutions and practices, which were deemed by Dryzek (2013) to include management bureaucracies, rationalistic analysis, top-

down planning, and the use of regulatory instruments; as well as the presence of constructs and relationships, such as society being subordinate to the state and this administrative state being the main controlling force. Indeed, similarities between theoretical expectations and findings in Cyprus were noted as a result of; resource management agencies being evident through the MANRE and WDD; the extensive use of regulatory instruments such as the IWM Law; the application of rationalistic analysis techniques such as cost-benefit analysis for dam/reservoir, transfer, and desalination infrastructure projects; as well as nature being subordinate to problem-solving and people being subordinate to the state, noted in the case of extensive dam/reservoir development, groundwater over-abstraction used to tackle scarcity, and the limited role of the public in decision-making.

In contrast, limitations were also evident in the understanding of actor roles, behaviour, and motivation, as these did not fully reflect the expectations of administrative rationalism. For example, actor roles and behaviour in practice failed to demonstrate the dominant role and status of experts, which were expected to control the decision-making process. Indeed, the idea of departmental, political, and ground-level expert types was developed based on the findings, highlighting how motivations could be variable because of different adopted roles. In reality, it was the state, government, and highest-level politicians that had most control, while the idea of relevant actors, such as experts, managers, civil servants, and politicians, being primarily motivated by the public interest was only partly evident in practice. Furthermore, differences between theoretical expectations and practical findings in Cyprus were identified as a result of; experts not having the primary role in decision-making shown by the ability of politicians and ministers to by-pass guidance from the MANRE and WDD; experts and managers not controlling the state, as found through the control held by politicians especially for decisions made during the drought of 2008; as well as a range of actors including politicians, ministers, experts, and managers being motivated by self-interest, as identified in the case of water pricing or conceding to demands of the farmer unions and tourism sector.

Links to the mandatory approach and other understandings

Administrative rationalism reflects and builds on the mandatory approach as a result of governance based on hierarchy; regulations; content that involves government intervention in a top-down format; as well as interactions between actors that emerge based on coercion in the form of governance by government (Bevir, 2012; Wurzel *et al*., 2013). These characteristics were evident in Cyprus through a hierarchy of control for water and decisions emerging in a

top-down format; with this based on Parliament and the Council of Ministers at the top level, government authorities and experts such as those within the WDD at the second level, as well as municipal or village representatives and citizens at the lowest level. Indeed, these reflect the policy, executive, and consumer levels of organisation identified in chapter five. Notably, the insights offered by Dryzek (2013) through administrative rationalism further the understanding of mandatory approaches through aspects such as motivation based on public and self-interest, as well as the recognised importance of experts. The findings in Cyprus partly agreed with these aspects, however, motivation was observed to be more variable in realtiy, while experts were not the primary actors and their influence was found to be shaped by politicians.

In terms of the limitations of administrative rationalism and its applicability in Cyprus, a range of other theories help to better explain certain aspects of problem-solving. For example, elitism is applicable when interpreting the role and influence of high-level actors, such as certain politicians and ministers, which had the ability to shape decisions. The influences of these actors are overlooked by Dryzek's (2013) understanding of administrative rationalism, as he focuses on experts having the primary role in problem-solving, whereas in Cyprus this was not the case. In turn, public choice theory, as considered by Downs (1967; 1998) is also particularly useful when interpreting actor type and motivation, as in many cases these were closely aligned with the theories focused on explaining actions from the perspective of group and self-interest. Furthermore, variable motivations were shown by actors such as; those who sought financial income or job security, as found through municipal or village representatives; those who sought to prioritise their department or organisation, shown by some ministers and experts, village representatives, and farmer unions; those who wanted to minimise organisational change, which were often situated in government departments, boards, or municipal and village bodies; as well as those who forced certain decisions and policies, noted through politicians, experts, and managers with allegiances to political parties, sector interests, or farmer unions.

9.2.2 Democratic pragmatism

Democratic pragmatism had a more limited applicability in Cyprus [see table 9.1 and appendix 6], as a result of more differences and less of a practical application when compared to administrative rationalism and economic rationalism. In terms of the strengths of applicability, this was a result of the existence and representation of certain variables, which were expected by Dryzek's (2013) understanding, such as; the use of public consultation, policy dialogue, and networks; interactive political relationships; as well as different agents demonstrating a mix of

motivations. In terms of actor behaviour and motivations for decision-making, the different individuals and groups had acted both in the public interest and according to self-interests, which validated the expectations of democratic pragmatism. Notably, similarities with the theoretical expectations of democratic pragmatism were found in Cyprus regarding; the use of approaches and practices such as consultation and deliberation, as found in the case of environmental impact assessment; the involvement of citizens in decisions, as found at village level and through the requirements of the WFD; as well as motivation based on a mixture of self-interest and public interest, represented by those in government departments and boards.

In contrast, the weaker aspects of applicability could be attributed to practical differences. These involved; the lack of public inquiries and right-to-know legislation that resulted in reduced transparency; limited evidence of networks; limited equality in practice, with this being uneven and changeable, while also restricting the role of the citizen. Furthermore, an important difference emerged as a result of the limited representation of the *Homo-civicus* construct and the role played by the citizen in Cyprus. In this case, the role and behaviour of the citizen failed to reflect the expectations of Dryzek's (2013) interpretation, as citizens did not have the primary role in terms of problem-solving.

Links to the voluntary approach and other understandings

Democratic pragmatism reflects and builds on the voluntary approach, and in Cyprus this was central to understanding; suasive policy instrument types, such as those based on consultations for application of the WFD; as well as relationships of interaction between governing actors and those being governed, for example found through discussions at village level (Wurzel *et al*., 2013). The insights offered by Dryzek (2013) through democratic pragmatism further the understanding of voluntary approaches, particularly through the recognised central role of the citizen. The findings in Cyprus partly reflected this, and although the citizen was recognised as having a role in practice, this was not central and often secondary to other actors or groups such as politicians, experts, or farmer unions.

In terms of the limitations of democratic pragmatism and its applicability in Cyprus, other theories help to better understand certain aspects of problem-solving. Firstly, policy networks are applicable when interpreting the presence of networks, for example in the case of bi-communal water supply and treatment projects. Secondly, pluralism is useful when considering power and participation in decision-making, and this relates to power being shared by a variety

of actors and pressure groups, as similarly expected by democratic pragmatism through the concept of equality. The findings in Cyprus however contrast with pluralist approaches, as decision-making was often not open to all actors despite some level of inclusion for public and stakeholder consultations as part of EU governance and the WFD. In other cases, environmental impact assessments and consultations were bypassed by higher-level actors, as shown by the rapid development of desalination plants during drought periods and in response to acute scarcity, thus signalling the limited role and involvement of the citizen in reality.

9.2.3 Economic rationalism

Economic rationalism had a good level of applicability in Cyprus [see table 9.1 and appendix 6]. The strength of practical application was as a result of the existence of certain variables, which were deemed to be important by Dryzek (2013), including; the use of market instruments; the formation of metaphors and rhetoric when defining regulation and analysing government actions; as well as evidence of the *Homo-economicus* construct and motivations based on self-interest. For example, similarities between theoretical expectations and practical findings in Cyprus were found in relation to; the use of market instruments such as pricing, metering to manage scarcity and demand, groundwater permits to control over-abstraction, and subsidies; some evidence of privatisation through service-specific application for the management of desalination plants; and evidence of actor motivations based on self-interest, represented by politicians, ministers, some experts, farmer unions, and tourism sector groups.

In contrast, the weaker aspects of applicability in Cyprus were attributed to practical differences. These included; the lack of private property rights, as a result of state ownership and government control of water; a limited [rather than extensive] form of privatisation, with evidence of this being service-specific for desalination infrastructure; the recognition of citizens and the concept of citizenship in decision-making, evident through consultations and village discussions; as well as many experts being driven by the public interest, which is in contrast to the concept of *Homo-economicus*. In terms of actor behaviour and motivations, the format of self-interest did not fully reflect the expectations of economic rationalism, as generally it was a minority of government officials and experts that sought to satisfy individual or group interests. Thus, actors motivated by self-interest and representative of *Homo-economicus* were less prominent when compared to those motivated by the public interest. The types of actor involved in this dynamic were also relevant, as it was those with most power and control in decision-making, specifically high-level politicians and ministers, which were often motivated

by personal or group interests. Furthermore, in each of these cases the actor groups had their own definition of what the problem was, as well as different perceptions of what the public interest meant. For example, experts and managers in government departments considered the public interest as ensuring sufficient supply for users and doing so in the most efficient way; those in boards observed public interest as providing water to customers at a reasonable price and operating in the interests of their board; while farmer union representatives viewed public interest as the need to allocate water to important sectors of the economy, with the most important being perceived to be the agricultural sector.

Links to the economic approach and other understandings

Economic rationalism reflects and builds on the economic approach, and in Cyprus this was relevant when understanding the use of market-based principles and policy instrument types, as found through pricing structures, metering, permits, subsidies, and privatisation. The insights offered by Dryzek (2013) through economic rationalism develop the understanding of economic approaches particularly through the concept of motivation. This relates to self-interest being expected but also some agents acting in the public interest. The findings in Cyprus partly reflected this, although the mix of motivations based on public and self-interest were found to be more complex and variable, while also being related to given conceptions and definitions of what the public interest actually is.

In terms of the limitations of economic rationalism and applicability in Cyprus, other theories help to better understand certain aspects of problem-solving. For example, economic institutionalism is useful when explaining the role of institutions and the actors who are a part of them, while economic models of public choice theory, such as work on budget-maximising and bureau-shaping, are particularly relevant when understanding motivation (Niskanen, 1971; Dunleavy, 1986). In these cases, actors are deemed to be motivated by forms of self-interest, with this relating to different conceptions of self-interest found in Cyprus, as shown by; politicians focused on securing votes and maintaining their positions; experts seeking to strengthen their departments; as well as farmer unions acting according to group interests and political party allegiances or agendas. Furthermore, in relation to actor behaviour, evidence of self-interest and *Homo-economicus* in Cyprus compared favourably to public choice theory and human relations motivation theory. As such, the findings reflected different aspects of work by Downs (1967), Niskanen (1971), Dunleavy (1986), and Tullock (1987), based on; individual, collective, and bureaucratic forms of self-interest; as well as motive drivers such as power, job security, financial gain, securing votes, career progression, political allegiance, and collective

group or political party benefits. Ultimately, these findings advance understanding of actor motivation by highlighting the prominence of self-interest in Cyprus, while also relating this to conceptions of elitism based on the types of actors that exhibited this behaviour [primarily politicians, ministers, and non-experts]. When framing how economic approaches operate, it was evident that the findings in terms of economic rationalism developed understanding by recognising that those acting according to self-interests operated alongside those acting in the public interest.

9.2.4 Summary of applicability

The full applicability analysis of Dryzek's (2013) rationalities in Cyprus is given in appendix 6, which compares the similarities and differences between theoretical expectations and practical findings in Cyprus. A summary of the applicability analysis is shown in table 9.1. This uses a symbol and colour-coding format to highlight the applicability for given categories, namely; green and a ☑ symbol to signal good evidence of a characteristic or variable in practice and a good match with theoretical expectations; orange and a Ⓟ symbol to show a characteristic or variable being partly evident in practice, with some aspects found and other aspects being evident that disagree with the theoretical expectations; as well as red and a ☒ symbol to signal limited evidence of a characteristic or variable in practice and a lack of agreement with the theoretical expectations.

Table 9.1: A summary of the applicability of Dryzek's (2013) problem-solving rationalities

ADMINISTRATIVE RATIONALISM: Applicability based on findings in Cyprus

Institutions and practices
- Professional management bureaucracies ☑
- Pollution control agencies ☑
- Regulatory policy instruments ☑
- Environmental impact assessment ☑
- Expert advisory commissions ☑
- Planning ☑
- Rationalistic policy analysis ☑

Assumed natural relationships
- Nature subordinate to humans ☑
- People subordinate to state ☑
- Experts and managers control state ☒

Agents and their motives
- Experts and managers Ⓟ
- Motivated by public interest ☒

Basic entities recognised or constructed
- Liberal capitalism ☑
- Administrative state ☑
- Experts and managers ☑

Key metaphors and rhetorical devices
- Administrative mind Ⓟ
- Navigating and steering Ⓟ

DEMOCRATIC PRAGMATISM: Applicability based on findings in Cyprus

Approaches and practices
- Public consultation ☑
- Alternative dispute resolution ☒
- Policy dialogue ☑
- Lay citizen deliberation ☑
- Public inquiries ☒
- Right-to-know legislation ☒

Assumed natural relationships
- Equality among citizens Ⓟ
- Interactive political relationships ☑
- Mix of competition and cooperation ☑

Agents and their motives
- Many different agents but citizens central Ⓟ
- Motivation a mix of material self-interest and multiple conceptions of public interest ☑

Basic entities recognised or constructed
- Liberal capitalism ☑
- Citizens ☒

Key metaphors and rhetorical devices
- Public policy as a result of forces ☑
- Thermostat description ☑
- Network system Ⓟ

ECONOMIC RATIONALISM: Applicability based on findings in Cyprus

Markets and incentives
- Privatisation Ⓟ
- Market instruments ☑

Assumed natural relationships
- Competition Ⓟ
- Hierarchy based on expertise Ⓟ
- Subordination of nature ☑

Basic entities recognised or constructed
- Liberal capitalism ☑
- Markets, prices, and property rights Ⓟ
- Governments not citizens ☒
- *Homo-economicus* ☑

Agents and their motives
- *Homo-economicus* and self interest ☑
- Some government officials must be motivated by the public interest ☒

Key metaphors and rhetorical devices
- Mechanistic ☑
- Regulation as 'command and control' ☑
- The use of horror stories ☑

Key
☑ Good evidence and representation
Ⓟ Partial evidence and representation
☒ Limited evidence and representation

9.2.5 The utility of the rationalities

The similarities observed and the relative strength of applicability for each of the rationalities serves to validate the utility of Dryzek's (2013) framework when understanding government problem-solving in Cyprus. The difficulty of concisely framing countless multi-dimensional and transitional variables and influences cannot be overlooked, and the good strength shown by each of the rationalities when compared to a real-world system demonstrates the usefulness of Dryzek's (2013) framework.

A significant advantage of Dryzek's (2013) framework is based on the way he considers the specifics of problem-solving, through behaviour, motivation, and rhetoric, while also bringing together the complexities of problem-solving and accounting for many different variables as one whole. For example, this is evident through the integration of the top-down perspective and technocracy in terms of administrative rationalism, based on implied hierarchy and the prominent role of experts, as well as the concept of pluralism as part of democratic pragmatism, in terms of the idea of equality and various actors having power. This contrasts with other approaches used to understand decision-making and actor behaviour, such as forms of public choice theory (Downs, 1967; Niskanen, 1971; Dunleavy, 1986; Tullock, 1987; Holcombe, 2016) as well as elitism, technocracy, and also top-down or bottom-up perspectives (Sabatier, 1986; Lipsky, 2010; Kersey, 2016). These essentially consider variables in relative isolation. For example; models of public choice theory focus on bureaucratic or economic aspects of motivation, being limited in terms of considering other influences such as networks; elitism and technocracy focus on the role of specific groups; while top-down and bottom-up perspectives consider a format of decision-making or analysis, and thus have a limited understanding of other actor types, motivations, or institutional variables. Here in lies a vital difference between Dryzek's (2013) work and other understandings or perspectives of analysis, namely that the rationalities build on the mandatory, voluntary, and economic approaches, as well as the way multiple theories are used to understand problem-solving. Indeed, conceptualisation through discourse analysis and the attempt to frame multiple variables together, rather than in isolation, is more reflective of real-world behaviour, relationships, and dynamics of problem-solving.

Although similarities between Dryzek's (2013) work and the findings in Cyprus highlight the usefulness of his discourses, it is the differences that allow development of this understanding and the formation of new ideas. These differences have helped to identify certain emerging

themes that can further shape and improve understanding of problem-solving in Cyprus [and in a wider context]. These themes are subsequently explored.

9.3 Emerging themes

The findings have demonstrated that Dryzek's (2013) problem-solving rationalities have been a useful choice for furthering understanding of government responses to water problems in Cyprus. As a result of the differences between expected and observed characteristics, the rationalities have also been useful in identifying a range of emerging themes. These have been touched upon in the previous discussion chapters based on findings in Cyprus, while also being important when developing understanding of problem-solving and building on Dryzek's (2013) rationalities. The themes include; the concept of sequentiality and the evolution of problem-solving; the role and influence of supranational governance; the importance of external factors such as culture and economic status; as well as the role and influence of politics. These are explored in the following sections.

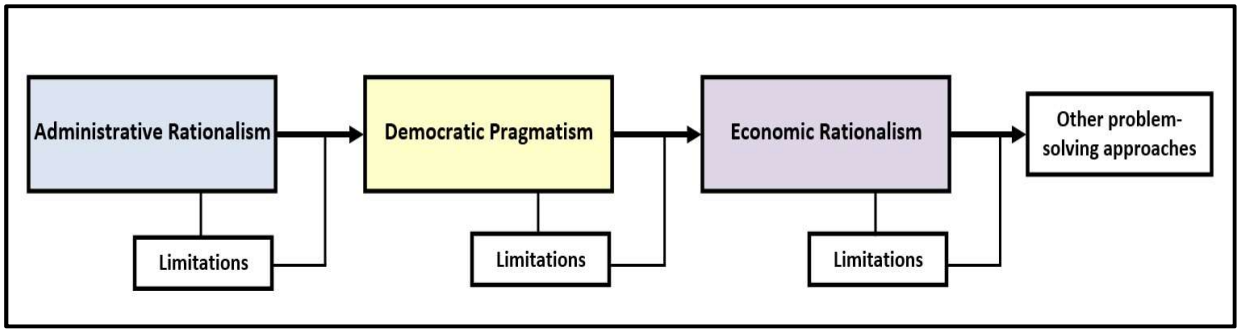
9.3.1 Sequentiality and the evolution of problem-solving

The concept of sequentiality can be defined in relation to the format of problem-solving. This considers how a response emerges and then shifts to another as part of an evolutionary process. In the case of Dryzek's (2013) framework, problem-solving responses are expected to evolve in a sequential format based on the three rationalities developing over time in a successive and structured manner. These follow a linear order with administrative rationalism emerging first; democratic pragmatism emerging second; and economic rationalism third. This is of great importance to the framework structure and the expected interpretations of actor behaviour that shift according to positionality along this timeline. For example, economic rationalism utilises the preceding model of administrative rationalism when accepting hierarchy based on expertise as well as the need for some actors to be motivated by the public interest.

In terms of the timeline of problem-solving, Dryzek (2013) suggests that administrative rationalism exists as the first government response to the onset of environmental problems. In turn, democratic pragmatism emerges as a corrective to administrative rationalism, to give a voice to citizens and address challenges such as implementation gaps, problem displacement, and issues of centralisation (Dryzek, 2013). Economic rationalism then emerges last as an answer to the challenges of both previous rationalities, such as implementation gaps, political

power, and business sector influences on decision-making (Dryzek, 2013). The sequential and linear format of problem-solving expected in theoretical terms is illustrated in figure 9.1.

Figure 9.1: The expected linear format and evolution of problem-solving



In the case of water management and problem-solving in Cyprus, the sequentiality of the rationalities was not observed to follow the evolutionary and successive format assumed by Dryzek (2013). Instead, problem-solving appeared more variable and was non-linear, as represented by the timeline illustrated in figure 9.2. In this case, after the first response of administrative rationalism, different components of democratic pragmatism and economic rationalism emerged at different rates. This was evident through the three phases of management discussed in chapter five. For example, metering and pricing were applied after independence in the 1960s, whereas structured forms of consultation were implemented after EU accession from 2004 onwards. In other cases, certain components of democratic pragmatism were evident first, such as public interaction at local-level in villages prior to economic mechanisms such as service-specific privatisation in the 1990s and pricing structures involving cost recovery after EU accession in 2004.

The characteristics and components of the rationalities were also found to emerge in a more uneven format when compared to theoretical expectations, and as a result of a diverse range of influences, including; responses to the practical challenges of regulation; changes in approach prompted by emerging socio-economic problems; organisational and policy changes resulting from EU governance; cultural adaptation and social progression; as well as natural driver events such as drought, which necessitated shifts in management and, at times, emergency responses.

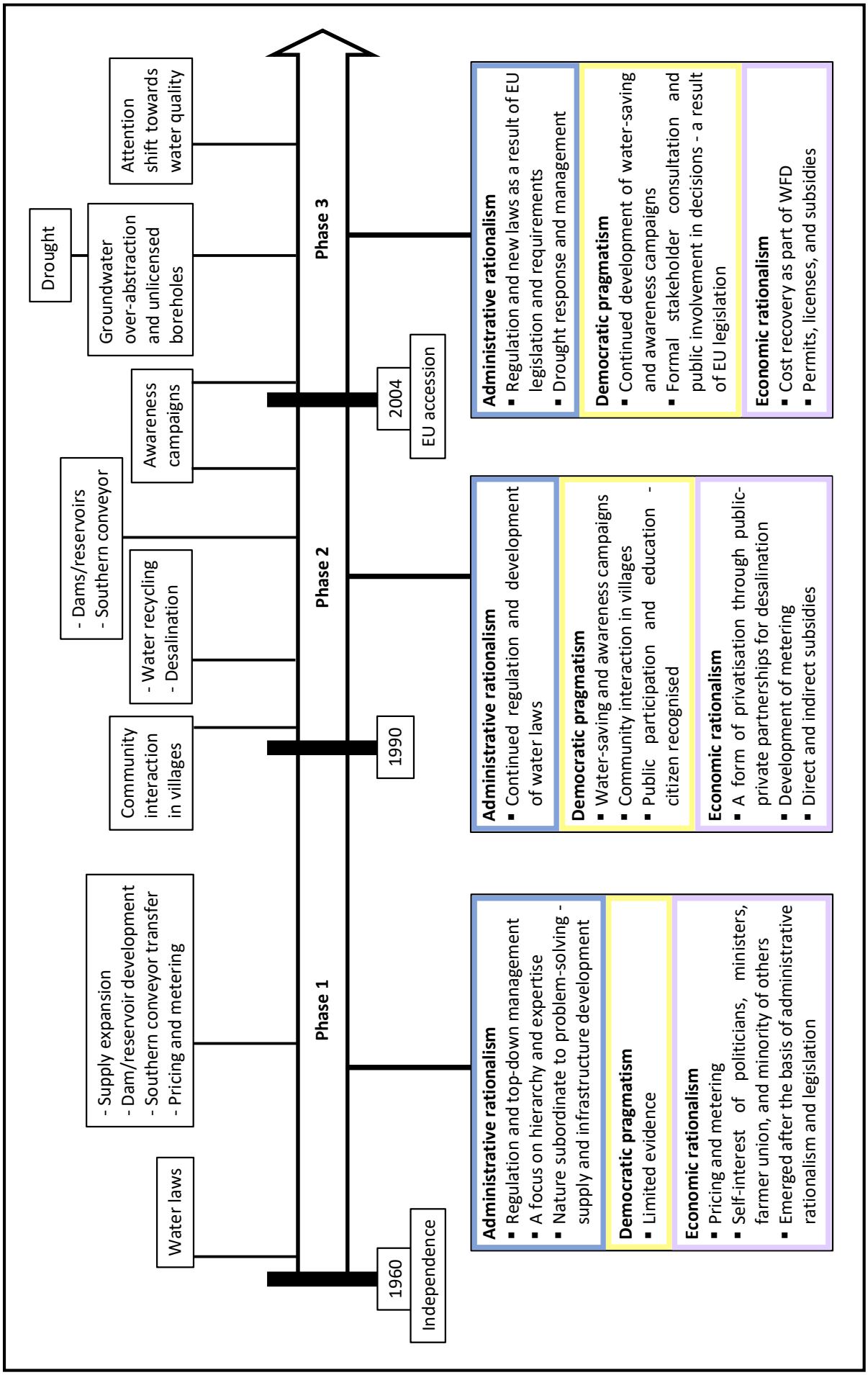
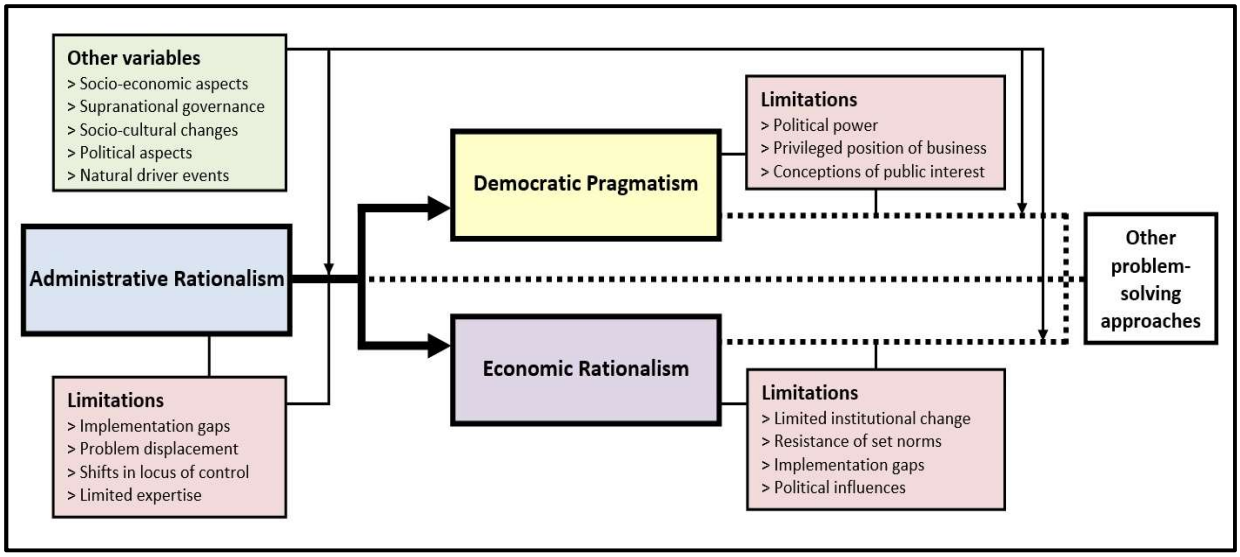


Figure 9.2 The timeline of water management and problem-solving in Cyprus

This understanding contrasts with the way Dryzek (2013) conceptualises the successive and linear development of problem-solving. It can be argued that the findings highlight the way it is possible for problem-solving rationalities to emerge, intensify, or also diminish in a variable way because of diverse influences, and not only develop as a result of the challenges or failures of preceding rationalities. The more variable format of problem-solving observed in practice as a result of the findings is conceptualised and illustrated in figure 9.3.

Figure 9.3: The observed variable format and evolution of problem-solving



The variable development of problem-solving in Cyprus was further evident through the concept of re-emergence. Aspects such as environmental impact assessment and expert advisory committees, which were expected as part of the first response of administrative rationalism, were instead evident after the emergence of characteristics associated with democratic pragmatism and economic rationalism, for example consultation, pricing, and cost recovery. In this case, the ongoing effect or re-emergence of administrative rationalism after other rationalities was apparent. This idea of re-emergence is poorly represented by Dryzek's (2013) framework, as the successive evolution of the rationalities implies a limited recognition of their ongoing influence or potential re-emergence with greater strength at a later time.

9.3.2 The role and influence of supranational governance

A notable emerging theme of the findings has involved the impact of supranational governance. In Cyprus this was related to the role and influence of EU governance on state and government, which was found to be important for decision-making and policy implementation. This emerged as a key variable, as Dryzek's (2013) framework was limited when considering this theme.

Indeed, this is despite the supranational relationship sharing similarities with state and federal relationships in countries such as the United States and Australia, which have been used as examples by Dryzek (2013) to explain the controlling role of federal agencies in relation to lower levels of government and policy implementation.

Practical existence and influence

Supranational governance was evident in Cyprus as a result of EU level governance exerting a strong influence on the state, government, and national policy. This primarily emerged in the third phase of management after Cyprus gained EU accession in 2004, with EU legislation being subsequently transposed through national laws. In practice, the role and influence of EU governance has been strong, being responsible for major changes in approaches, techniques, and forms of management. This also had an impact on which rationalities have come to be embraced. For example, with democratic pragmatism evident based on the need for formal consultation as part of the WFD, as well as economic rationalism being embraced due to the requirements of cost recovery and more extensive use of market instruments being encouraged.

In terms of approaches, changes and influences have involved; the use of the precautionary principle through the WFD; pricing structures that have been based on a reduction in subsidies and the need to establish cost recovery, with this specifically emerging through article 9 of the WFD; as well as the development of integrated water resources management concepts, which have been implemented through the IWM Law (2010). This has influenced the emergence or re-emergence of administrative rationalism for the implementation of new regulations, and also economic rationalism in terms of the application of market instruments. Notably, these findings challenge Dryzek's (2013) understanding, as the influence of supranational governance causing change partly undermines the expected format and evolution of problem-solving. Dryzek (2013) considers the development of other approaches to be a remedy to the limitations of existing rationalities. Supranational governance however was instead the driver of change in certain cases, often prompting the emergence of characteristics associated with other rationalities. For example, this was found in relation to the development of structured public consultation for river basin plans and desalination plants. In this case, formal and structured consultation did not emerge through democratic pragmatism because of the failings of administrative rationalism, but rather as a result of the requirements of EU governance and legislation. This also relates to other research on the development of approaches and techniques because of EU governance, namely; application of the polluter-pays principle (Birol *et al*.,

2011); integrated resources management (Mylopoulos & Kolokytha, 2008; Moutsopoulos & Petalas, 2018); as well as cost recovery (Socratous, 2011b; Reynaud, 2016).

In relation to the introduction of new techniques, the most notable to emerge in Cyprus as a result of EU governance and legislation included; formal procedures for public involvement in decision-making, and the use of environmental impact assessment. These reflected characteristics of both democratic pragmatism and administrative rationalism. An increased focus on public involvement emerged through article 14 of the WFD (2000/60/EC) alongside guidance given by the directive on public participation in environmental decision-making (2003/35/EC). The use of environmental impact assessment was established in Cyprus for major projects such as the construction of desalination plants and development of water treatment facilities. This emerged as a result of the influence of legislation, namely the directive on strategic environmental assessment (2001/42/EC) and the directive on environmental impact assessment (2011/92/EC). Consequently, the technique in this structured form was not developed by national government as a response to challenges of previous approaches, but as a requirement of EU legislation, thus highlighting the strength of the supranational level.

For water management in Cyprus, changes caused by supranational governance have been observed through the development of drought and river basin management plans as well as evidence of a greater focus on water pollution and groundwater. This relates to the re-emergence of administrative rationalism based on the development of regulatory policy instruments. Drought management plans were developed as a result of EU guidelines and requirements of the WFD. River basin management plans have been a result of the WFD and guidance under article 13 of the directive, while the plan is a tool of integrated management and encourages a more structured form of management according to river basin districts. Furthermore, a greater focus on water pollution and groundwater was also apparent in Cyprus predominantly as a result of EU governance. This situation emerged as the WFD attached importance to pollution control and groundwater protection as a part of integrated management.

The position of supranational governance

In terms of organisation, two interpretations have emerged that help frame a better understanding of supranational governance and its position within Cyprus and as part of problem-solving. These are based on; the subordination of the state, government, experts, and society, to supranational governance and the EU, which relates to Dryzek's (2013)

interpretation of natural relationships; as well as a reinterpretation of control and power relations through supranational governance, which contrasts with Dryzek's (2013) understanding of administrative rationalism that considers people to be subordinate to the state.

Firstly, supranational governance was found to influence the role of the state, government, experts, and society. In this case, supranational governance often controlled and directed the state and government regarding the agenda for water management and problem-solving. This was most evident based on the major influence exerted by the WFD, which resulted in changes for approaches used, management, and the formality of procedures. The WFD forced many changes in Cyprus despite resistance from certain groups such as the politicians, farmer unions, and those at municipal, village, or community levels. For example, this resistance was widely noted in relation to pricing changes, due to the need to conform to full cost recovery, with delays and conflict being associated with this process. As a result, the need to implement policy or face punishment caused the control of the state and government to be partly ceded to the supranational EU level. Consequently, the natural relationships expected by administrative rationalism can be considered to be more flexible than initially assumed by Dryzek (2013).

In terms of actor roles in Cyprus, supranational governance resulted in some power being taken away from certain politicians and high-level actors situated within government; for example, in the context of controlling national legislation or influencing decisions, while also forcing the adoption and implementation of policy. In many cases, such as for groundwater control, pricing, cost recovery, subsidies, drought management, as well as the use of integrated management; politicians, ministers, and high-level actors were limited when trying to apply pressure and influence decisions. This was because of political parties [such as DISY or AKEL] and their representatives [certain politicians and unions] seeking to avoid blame for a failure to implement policy or for potential EU punishment. Indeed, the need to implement EU policy or otherwise face punishment had reduced the strength of opposition to policy and the influence of farmer unions on political parties. This also enabled the experts within the WDD and other technical departments to more easily implement required water policies, thus avoiding obstacles of individual or group interests that were evident as a result of party politics.

Secondly, a reinterpretation of control and power relations as a result of supranational governance was also identified in Cyprus, which involved the subordination of the state to the EU. It was argued that, through influences on the state, supranational governance and control

had partly reflected a contemporary version of colonial dynamics. In this case, the experience in Cyprus was found to have replicated the setting of colonial political control, in which the state holds most importance in decision-making, with the influence of EU governance and membership serving as a proxy for colonial authority. This relates to the concept of neo-colonialism through work on; power in Europe and the dynamics of the Eurozone economic crisis (Mikelis, 2016), as well as the condition of post-coloniality in Cyprus and influences on socio-cultural behaviours (Bryant, 2006). The findings also have implications for understanding problem-solving rationalities and their operation, as the role and influence of supranational governance was found to be stronger in practice, when compared to Dryzek's (2013) interpretation. As a result, an awareness of this power, and the potential for colonial style interactions, needs to be recognised as a potential driver for certain rationalities. Furthermore, although this situation is more complex and variable when compared to traditional forms of colonial control, similar power relations were observed. Indeed, EU membership has been found to have encouraged the diminishment of the state, replacing this with a collective 'nation state' that exerts its control and authority on a given country in terms of socio-political, economic, and regulatory terms (Hansen, 2002; Magone, 2003; McCormick, 2017).

In Cyprus, the EU has fundamentally transformed politics, economics, and society (Sepos, 2008; Zoumides & Zachariadis, 2009; Ioannou & Kentas, 2011; Ker-Lindsay, Faustmann, & Mullen, 2011; Mullen, 2011). This has been observed through a range of examples in practice. First, through social changes because of; the perceived 'Europeanisation' of society, involving legal, technical, and cognitive variables; the encouragement of gender equality and public health improvements; as well as a greater awareness of environmental protection and associated activities such as protecting water resources. Second, through economic influences based on; adoption of the Euro currency [monetary union]; trade changes; tax reforms and a policy of greater competition; increased flow of workers and knowledge; sanctions imposed during the economic crisis [2012-2013]; changes in GDP and the structure of the economy, with this involving an increase in services and a decline in both agriculture and manufacturing; as well as liberalisation of capital controls and interest rates. Third, through regulatory, organisational, and management changes including; harmonisation of existing legislation with the EU acquis, followed by an influx of new legislation relating to water; the introduction of alternative approaches such as integrated resources management and greater public involvement in decision-making; as well as renewed focus on the re-centralisation of authority and powers. These examples found in Cyprus also relate to research on Europeanisation (Kassim, 2003),

social effects of membership (Ioannou & Kentas, 2011), and economic impacts of membership (Mullen, 2011). In terms of Dryzek's (2013) rationalities, the aspects identified can potentially influence; the emergence, re-emergence, or strength of a response at a given time; the format of natural relationships; the context in which actors are positioned; changes to actor motivations as a result of a wider range of influences; as well as the emergence of new metaphors or rhetorical devices associated with the EU and supranational politics.

It was also found that the Europeanisation of policy, society, and culture in Cyprus had been an important driver of behavioural change in terms of government responses and policies being implemented, as well as with regard to the acceptance of consultation by the public. The idea of Europeanisation has had multiple definitions based on different understandings. The most prominent of these have related to; an incremental process of re-orientating politics and policy-making (Ladrech, 1994; 2000); the construction, diffusion, and institutionalisation of rules and procedures alongside shared beliefs, values, and norms (Radaelli, 2003); the idea of the EU and Europe as a reference point for politics and expertise (Post, 2015); as well as changes in institutional governance and the adoption of European forms of socio-economic and political organisation (Olsen, 2002).

Networked governance

The position of supranational governance can also be specifically related to Dryzek's (2013) framework. In this case, the existence and operation of supranational governance is partly reflected through the existence of networked governance, which can be associated with the EU; as well as the description of dynamics between federal and state levels of governance in countries such as Australia and the United States. The example of federal and state governance compares favourably to the relationship between supranational and state levels identified in Cyprus, especially based on the power and authority federal or supranational levels have in shaping state level decisions. Dryzek (2013) considers this as part of administrative rationalism through pollution control, with federal agencies in the United States being noted to force the recognition and regulation of specific pollutants at state level. These findings develop Dryzek's (2013) understanding by recognising the importance of this relationship and the subordination of the state level to other higher levels of governance that can exist in different formats depending on a given setting. As a result, this has implications for the understanding of natural relationships in the context of the rationalities, as supranational governance warrants inclusion.

Whilst these examples share similarities, they have not been full representations, and therefore an analysis of the potential importance and influence of supranational governance has not been forthcoming within the context of the problem-solving rationalities. The failure to specifically consider the role and influence of supranational governance thus emerges as a limitation of the framework, particularly as significant practical implications have been identified in Cyprus.

9.3.3 The importance of culture and economic status

External factors were identified in practice and primarily involved the inherent culture of society and the economic status of a nation. These have warranted further exploration based on their strong existence, role, and influence in Cyprus, as well as their limited representation in terms of Dryzek's (2013) rationalities.

Culture

The concept of culture can be defined as a given 'way of life' that consists of the values, norms, attitudes, behaviours, and material objects represented by specific individuals or groups (Knox & Pinch, 2006; Lane & Wagschal, 2011; Côté & Levine, 2014). These variables can shape public or political decisions regarding social-environmental problems, such as water scarcity or pollution (Altman & Chemers, 1984; Anderson, 1997; Meister & Japp, 2002; Winter & Koger, 2014). In this case, culture essentially consists of the values and norms that can be associated with a group, society, or setting. These can be of major importance to politics, actor behaviour, and motives, while in turn shaping decision-making and resultant policy decisions (Tierney, 2008; Lane & Wagschal, 2011; Goldfarb, 2012; Eagleton, 2016; Lane & Ersson, 2016).

Culture and associated wider influences and concepts were found to be crucial in Cyprus, with respondents identifying aspects such as Cypriot norms, culture, and the concept of Europeanisation. However, these cultural aspects have been poorly represented by Dryzek's (2013) rationalities, thus highlighting a difference between theoretical expectations and the findings. For example, in terms of administrative rationalism, culture was poorly represented and only considered briefly for specific sub-cultures of generalism that were associated with some civil servants and their actions or behaviour in decision-making. For democratic pragmatism, some cultural aspects were noted and based on government recognising environmental counter-culture and seeking to involve the actors operating within this sub-culture into government and the problem-solving process. Nevertheless, this focuses on a specific scenario rather than wider socio-cultural influences and how they can actually affect

responses. In turn, for economic rationalism, culture was poorly represented and not recognised as an influencing factor.

In Cyprus, the inherent culture was identified as a key component of how society and government interpreted and responded to water problems. Culture was noted to have helped form the basis of awareness and understanding when attempting to tackle these problems, while also dictating relationships between groups and shaping the underlying agenda or position for decisions and their outcomes. As a result, the Cypriot culture was assumed to have a significant role and influence in shaping decision-making at all organisational and governance levels. This meant actors were affected in different ways, whether they were considered a part of government, boards, municipal authorities, village and community groups, unions, pressure groups, or the public. Notably, similar cultural nuances were demonstrated in other countries, such as Italy, regarding issues of transparency and accountability in decision-making, as well as Greece, in relation to issues of populism (Magone, 2003; Pappas, 2014; Lane & Ersson, 2016).

The observed culture in Cyprus was complex and multi-faceted, with the full extent of its influence being difficult to conceptualise. Nevertheless, the culture was found to represent four key aspects that contributed to the positionality of society in relation to water problems, influenced actor behaviour and attitudes, and shaped problem-solving and decision-making. These aspects were defined as; the concept of a Cypriot mentality; the idea of a closed system and community setting; the ongoing socio-political issue; as well as the Europeanisation of society since EU accession.

Firstly, the concept of a Cypriot mentality emerged as a key component of culture and was identified as the most effective way of describing the different characteristics of actor group positionality. In this case, the Cypriot mentality represented notable characteristics such as; a very strong reliance on personal connections; a tendency to encourage organisation and power through hierarchy and personal relationships; the pursuit of self-interest at a variety of levels; variable power relations based on societal status, perceived importance, and community standing; opposition to change, especially from drivers such as EU governance; as well as a strong sense of political and group allegiance. The Cypriot culture and mentality has also been described by other work (see Spilling & Spilling, 2000; Faustmann, 2009; Taki & Officer, 2009; Charalambous & Christophorou, 2016), with key aspects reflecting some of the study findings. For example, these have included; the pursuit of self-interest; political and group

allegiances that greatly influence decisions; and issues of power distribution in society. These findings contrast with Dryzek's (2013) rationalities, which fail to consider the importance of culture and the influence it can have on understanding or defining a given problem.

Secondly, the idea of a closed system and community setting was identified as an important component of society and culture in Cyprus. The closeness of the setting, based on tightly knit communities and the importance of personal relationships, had implications for decision-making. The closed setting had worked positively in some cases. For example, by understanding the issues at hand, key community actors, such as powerful politicians, community leaders, or respected experts, were able to effectively guide proceedings because of their standing in the community. In this case, the key actors had the ability to convince the public and other actor groups of the importance of certain water problems, such as scarcity, drought, and saline intrusion of coastal aquifers. Indeed, this dynamic also helped to avoid opposition and mitigate conflict, particularly for; management of the bi-communal water treatment project; the acceptance of water conservation as a relevant management topic; as well as the need to limit groundwater exploitation and mitigate saline intrusion in coastal aquifers.

The closed system and community setting also had an influence on the power and control of certain actors. In some cases, the closed setting meant that powerful politicians and key players in the community or specific industries had a disproportionate influence on the public, board or community members, and other actors within government. This resulted in conflict between and within groups, opposition to decisions, and the capacity for these actors or groups to influence rhetoric and decisions. For water management, this resulted in delayed decisions for pricing changes, while nurturing a setting for political conflict between actor groups with regard to the allocation and distribution of resources, groundwater abstraction, and irrigation practices.

Thirdly, the ongoing issue of socio-political unrest in Cyprus has had a major influence on culture, organisational structure, and water management. This relates to the Turkish occupation of the northern region, which has been more widely termed the 'Cyprus problem' (Dodd, 2010; Ker-Lindsay, 2011; Trimikliniotis, 2018). Whilst the complex and highly political dilemma of occupation is not the focus of this thesis, its relevance in terms of water was evident. The issue was considered to be an important underlying organisational challenge that has shaped society and culture, while also influencing how water has been allocated, controlled, and managed. For example, this was noted through influences on culture and water management as noted below.

In terms of culture, the socio-political issue has had a lasting influence on society. This was observed through; changes in the balance of society; the shifting and merging of sub-cultures; changes in identity, positionality, and power structures; shifts in demographics; the issue of divisive nationalism; as well as the backdrop of conflict and division becoming a part of the socio-cultural and ethno-national setting. For example, demographic shifts occurred through the separation of communities, while changes in balance emerged through the pressures of a greater population and demand for equivalent resources in the Southern region. These factors have also been highlighted by other research (see Bryant, 2004; Peristianis, 2006; Ker-Lindsay, 2011; Hatay & Papadakis, 2012; Trimikliniotis, 2018). As a result, this complex issue has remained a major problem for society and was widely identified as the most important underlying political problem for government in relation to all forms of decision-making [and specifically for water].

The issue of occupation also caused a significant organisational and management dilemma in terms of water, based on the government and WDD having no control on usage and management in the northern region. This was further exacerbated by the implications of increased scarcity and quality decline in the occupied region, which has become more evident in the south over time. For example, issues related to groundwater over-abstraction and saline intrusion in shared coastal aquifers located in the northern region continued unabated, while slowly affecting water resources in the south. This has greatly impacted water quality and management for government and the WDD. Indeed, despite progress through a cross-border project for a bi-communal water treatment plant in Nicosia (UNDP, 2013), information communicated to the WDD regarding water balance, [sector] usage, groundwater status, general water quality, and distribution, has been severely limited or non-existent. As a result, additional management issues have emerged based on; a lack of available expertise in the occupied northern region; poor communication; inadequate monitoring systems; and limited sharing of information due to the indeterminate political situation. The problems of pollution and severe groundwater exploitation ultimately remain as significant management issues, while the full extent of aquifer decline, saline intrusion, and pollution in the north were still not known.

Notably, Dryzek's (2013) problem-solving rationalities do not consider the transboundary nature of environmental problems, which were highlighted by water management problems associated with the occupied northern region in Cyprus. In practice, transboundary problems can have implications for the understanding of problem-solving, for example causing

difficulties when; defining natural relationships and the role of states that are affected by a shared problem; identifying actor roles and motives in multiple settings; as well as considering which rationalities exist and who has authority, power, and control to respond.

Finally, the fourth aspect that has influenced problem-solving through culture has involved the concept of Europeanisation. Supranational governance has been considered previously in this thesis in relation to implications for water management and Dryzek's (2013) rationalities, but in this case Europeanisation [or the idea of supra-nationalisation] is specifically focused on the influence of culture in Cyprus.

The concept of Europeanisation has been given multiple definitions in the wider research based on different understandings. The most prominent of these have been related to; an incremental process of re-orientating politics and policy-making (Ladrech, 1994; Radaelli, 2018); the construction, diffusion, and institutionalisation of rules and procedures alongside shared beliefs, values, and norms (Radaelli, 2003); the existence and idea of the EU and Europe as a reference point (Muller, 1995); as well as changes in institutional governance and the adoption of European forms of socio-economic and political organisation (Olsen, 2002).

In Cyprus, the socio-cultural implications of Europeanisation were identified through three main pathways. These involved; changes in technical approaches, decision-making, and politics; major economic changes; as well as increased levels of education and shifts in societal expectations. For example, changes in approaches were identified through the introduction of integrated water management approaches, while different processes of decision-making were evident through the increased importance of public involvement. Shifts in politics were based on adaptations that have accounted for a changing operational context and policy content for the supranational level. In terms of economic changes, these have been significant and most obvious as a result of monetary union [change to the Euro currency] and restrictions caused by the financial crisis. Furthermore, in relation to education and societal expectations, the knowledge and awareness of water topics had increased through interaction with other European countries and institutions. Indeed, social expectations for practices also shifted according to the sharing of new ideas and improvements in lifestyle. These pathways of Europeanisation represented in Cyprus also reflected other research, which has considered variables based on social, legislative, political, and economic changes (see Jerneck, 2000; Sepos, 2008; Leontitsis & Ladi, 2018; Radaelli, 2018).

Economic status

The economic status of a nation had a significant impact on decision-making and also affected policy responses. This was highlighted by the findings through two examples, namely; the economic status and ability of Cyprus when faced with the requirements of EU legislation and policy implementation; as well as the economic status of Cyprus within the context of wider economic forces and a financial crisis. Dryzek's (2013) rationalities have not considered the influence of economic status on problem-solving. Notably, for economic rationalism, the practical implications of economic status on natural relationships and actor behaviour have not been considered despite the perceived importance of market-based mechanisms, *Homo-economicus*, and economic instruments.

The economic ability of Cyprus was found to be a relevant factor when implementing EU policy, with financial constraints noted in many cases, especially when forming new approaches or setting up systems in accordance with the requirements of the WFD. This situation has also been pertinent for other southern European nations, such as Italy, Greece, Spain, and Portugal, based on; financial constraints, limited cooperation at municipal and local levels, financial wastage, as well as variable compliance and the idea of these nations lagging behind northern European countries (Kousis & Eder, 2001; Redclift, 2001; Magone, 2003). In this case, a given EU nation must bear the costs of implementation, and this was found to be a restriction for a country such as Cyprus that has an inherently smaller economy. For example, new technical divisions, improved expertise, and investment in monitoring systems were required in practice, and these have subsequently caused a greater financial burden for government and the WDD.

Other management dilemmas also emerged in Cyprus based on limited economic ability, with these highlighted through the perceived fit of legislation and the structure of the economy. First, a disparity between the expectation and reality of the WFD was evident as a result of a limited focus on water scarcity issues, which were deemed to be most relevant in Cyprus. This caused a prevalent assumption that financial resources were wasted in many cases because of such a strong focus on quality that was forced by the WFD. Second, the structure of the economy was also an important variable that impacted decision-making based on the influence of specific sectors on water management. This was primarily evident in terms of the agricultural sector, which had significant [disproportionate] control and influence on the economy. More specifically, this was identified through the power of farmer unions when applying pressure to maintain subsidies, increase water allocation for irrigation, or reduce water prices.

The economic status of Cyprus within the context of wider economic forces and a financial crisis was also found to be relevant. The potential for external forces to dictate the behaviour and decisions of both government and actors involved in water management was highlighted by the financial crisis in Cyprus during 2012-2013. In this case, the issue of financial restrictions for decision-makers provided another dimension to the choice of problem-solving approach being applied, and the capacity to implement a given approach and its policies. Notably, the financial crisis resulted in a range of practical management challenges in Cyprus. These involved; a reduction in available funds for the MANRE and WDD; changes in administrative structures resulting in reduced expertise in some cases; as well as certain management responses being limited or downsized as a result of financial constraints applied to environmental-based government activities or departments.

9.3.4 The role and influence of politics

The final emerging theme identified as having shaped responses to water problems in Cyprus was the role and influence of politics. Conceptually, politics is complex and holds a range of definitions based on different scenarios, settings, and organisational characteristics (Leftwich, 2015; Wiley, 2016). Some prominent definitions of politics include; dynamic ways in which groups seek to make collective decisions; activities and practices associated with forms of governance; interaction and debate between political parties and actor groups; the combination and representation of specific political values, attitudes, beliefs, and principles; the sharing of power and influences on the distribution of this power; as well as relationships within or between groups that shape political behaviour, power, and culture (Parsons, 1995; Axford & Browning, 1997; Sharma & Sharma, 2007; Birkland, 2015; Leftwich, 2015; Wiley, 2016).

These definitions can be further expanded to consider the aspects of political behaviour and political culture, which were found to be particularly relevant to problem-solving in Cyprus. Political behaviour reflects and focuses on the actions associated with politics, while also representing constructed realities of the different political values, attitudes, identities, and beliefs held by specific actors or groups (Lasswell, 1998; Munroe, 2002; Dalton & Klingemann, 2007; Goncalves-Portelinha, Staerklé, & Elcheroth, 2016). These aspects were identified in Cyprus through the different interpretations of public interest defined by certain actors. For example, experts and managers observed public interest as ensuring sufficient supply for all users and doing so using the most efficient methods; while farmer unions viewed public interest in terms of allocating sufficient water to the important sectors of the economy, with the most

relevant being the agricultural sector. In turn, political culture relates to the values, attitudes, and ideas that different actors or groups have regarding government, relative and perceived authority, personal roles and identities within politics and society, as well as the dynamics of these variables in the context of a given setting (Munroe, 2002; Goldfarb, 2012; Welch, 2013). These aspects can offer an additional layer of understanding in relation to Dryzek's (2013) rationalities and how natural relationships and actor behaviour can be conceptualised, particularly as Dryzek's (2013) recognition of the role of politics is limited.

In Cyprus, the concept of politics was identified as a significant variable that had an influence on problem-solving. According to the findings, politics was interpreted through characteristics, such as; the dynamic interaction of actors, groups, and contested identities shown in terms of different responses to drought management; the relationships between political actor groups and interaction between values, attitudes, and beliefs, noted through different views of the WDD, boards, and unions in the case of water pricing and groundwater permits; politics as a barrier to decision-making, found in terms of delays to pricing changes; as well as politics as a tool to achieve self-interests for both individuals or groups, as highlighted in the case of farmer unions applying pressure on government for increasing amounts of irrigation water.

Some of these interpretations have also been reflected by other research, particularly; the concept of political culture in Cyprus represented through fragmented or contested identities, the legacy of colonial rule, and distinct political values (Sepos, 2008; Faustmann, 2009); the major influence of party politics on society (Christophorou, 2009; Katsourides, 2016; Protopapas, 2016); the role of island communities and small town politics (Sepos, 2008; Faustmann, 2009); the influence of EU governance (Sepos, 2008; Karatas, 2011); the dynamics of the Cyprus problem (Ker-Lindsay, 2011; Hoffmann, 2018; Trimikliniotis, 2018); as well as the idea of 'clientelism', which relates to more influential actors dispensing favours such as promotions, better access to services, or exemptions from laws, to less influential actors in return for political support (Faustmann, 2009; Ioannou, 2016). As a result, politics in Cyprus was noted to involve many definitions that served to shape the political setting, primarily centred on relationships between political parties, politicians, government actors, experts, managers, and citizens, with the variable of self-interest particularly important. Thus, within the context of this work, the different definitions and constructs must be recognised when considering the role and influence of politics on problem-solving.

The role and influence of politics in Cyprus was evident at all levels of decision-making in relation to water management. Firstly, politics in the form of conflict between actors was identified regarding the development and implementation of new water pricing structures. These were based on cost recovery according to the WFD and integrated management approaches to control scarcity and demand. Secondly, politics in action during the drought of 2008, with issues of self-interest observed between politicians, government experts, pressure groups, and the public, as well as decisions taken in contrast to WDD advice. Indeed, this relates to Dryzek's (2013) rationalities and the interpretation of self-interest, however in this case politics emerges as a driver for actor motives. Thirdly, politics as a barrier for relationships, in the form of regional and municipal conflict in decisions noted between Paphos and other municipalities during the drought of 2008. Fourthly, regional and local politics that impacted the way government and the WDD could implement policies at ground-level and within the consumer level of the organisational structure. Fifthly, the politics involved between government and farmer unions, with each of these unions representing a political party and acting according to their agenda for water. Lastly, the major issue identified in relation to the manifestation of political behaviour and principles through populist approaches, which were highly influential especially at the local level in communities and villages.

Politics and the problem-solving rationalities

The findings have highlighted the importance of the role and influence of politics. This was poorly represented by the rationalities, with recognition and some analysis only forthcoming through Dryzek's (2013) analysis of democratic pragmatism. For example, as noted in relation to administrative rationalism it was claimed that "the discourse pretty much denies the existence of politics of any sort" (Dryzek, 2013; pg 89). In the case of economic rationalism, the description of politics was severely limited, even though self-interest was recognised and assumed to be a key component of political interaction. Democratic pragmatism contrasts with administrative rationalism and economic rationalism by recognising political interaction and contextualising politics within the capitalist democratic setting (Dryzek, 2013). Indeed, politics and political interaction were assumed to involve complex forms of communication, while also embracing and utilising political conflict, more flexible formal rules, and non-expert knowledge as part of problem-solving (Dryzek, 2013). For democratic pragmatism, politics was also assumed to include powerful interests exerting their influence on proceedings and attempting to skew the outcomes of debates, consultations, discussions, and decision-making procedures, towards satisfying certain individual or group interests (Speth, 2009; Dryzek, 2013). Thus, in

this case, politics has been recognised as a relevant variable with a strong influence, even though detailed analysis on how it can shape actor behaviour was not as forthcoming.

Top-down models of understanding have also been limited when considering the role, position, and influence of politics (Parsons, 1995; Dye, 2002). In terms of Dryzek's (2013) rationalities, the view that considers policy development and implementation as primarily administrative in nature [due to the basic need for administration in all rationalities] has neglected a key characteristic of the administration, namely politics, and the fact that political decisions can guide, shape, manipulate, or distort policy implementation and decision-making. This has also been noted by other research on the political aspects of decision-making (see Lasswell, 1998; Child, Elbanna, & Rodrigues, 2010; Bhat, 2017; Conca & Weinthal, 2018).

The limited recognition of politics was found to be a shortfall of the rationalities, especially when compared to the findings in Cyprus. In this case, government actors, civil servants, experts, board managers, and union representatives were aware of the issues they faced as a result of the complexities and dynamics of politics, political culture, and political behaviour. In practice, politics existed between levels of decision-making and through the behaviour of individuals and groups, with this often reflected most clearly through issues of political conflict.

Whereas Dryzek (2013) neglects the importance of politics in relation to environmental issues and problem-solving, other work has identified its role and significance for water management and policy (Mollinga, 2008; Conca & Weinthal, 2018). In this case, water is often deeply contested in terms of politics because of a wide range of interests converging to claim and influence a limited and valuable resource (Conca, 2006). Two 'axes of contestation' have been defined by Mollinga (2008), with these relating to different 'domains or levels' of water politics, and the issue-networks that encompass contested political interactions. Four 'domains' are deemed to operate along these axes, and involve politics associated with; day to day water control, national water policy, the inter-state level, and the global arena. These domains were evident in Cyprus, as reflected by the study findings, and water politics as a concept was found to be transient, dynamic, and a primary influence on management and responses to water problems. Water politics can also be defined at one end of the scale through water management and hydro-politics as an 'authoritative allocation of values' (Turton, 2002), while at the other end of the scale as water merely being intrinsically political and manifest in the contestation of usage and planning (Mollinga, 2008). Both scales were observed in Cyprus. For example,

authoritative values were defined and allocated by government and socio-cultural influences, while inherent politics for water were identified and made apparent through issues of contested usage, self-interest, and decision-making conflict (Blair *et al*., 2012; Hoffmann, 2018).

9.4 Conclusion

All three rationalities were identified in Cyprus and considered to be useful for understanding responses to water problems. Administrative rationalism had a good level of applicability, highlighted through the strong representation of characteristics including; management bureaucracies; rationalistic analysis; top-down planning; regulations; society being subordinate to the state; and the state being the main controlling force. Democratic pragmatism was more limited in Cyprus when compared to administrative rationalism and economic rationalism. The relative strength of applicability was still apparent however, as a result of the existence of characteristics such as; the use of public consultation, policy dialogue, and networks; interactive political relationships; and different agents demonstrating a mix of motivations. Economic rationalism showed a good level of applicability in Cyprus, and this strength was due to the existence of characteristics such as; the use of market instruments such as pricing, incentives, and subsidies; evidence of motivations based on self-interest; as well as the formation of metaphors and rhetoric when defining regulation and analysing government action, particularly the media representation of failed responses to the drought of 2008.

Notably, whilst each of the rationalities were evident in Cyprus, administrative rationalism and economic rationalism had a stronger presence when compared to democratic pragmatism. This contrasts with Dryzek's (2013) interpretation, as he considers economic rationalism to be the most under-developed, stating that 'the real-world achievements of administrative rationalism and democratic pragmatism remain more substantial than those of economic rationalism' (Dryzek, 2013: pg144).

Based on the empirical findings from this study and practical challenges associated with the rationalities, a range of emerging themes were identified. These were focused on differences between theoretical expectations and practical findings, as well as the topics that were not recognised by Dryzek's (2013) understanding.

Firstly, the concept of sequentiality was related to how a response emerges and then shifts to another as part of an evolutionary process. The sequentiality of the rationalities in Cyprus was not observed to follow the evolutionary, successive, and linear format assumed by Dryzek (2013). In this case, they are expected to develop over time through an order based on administrative rationalism emerging first; democratic pragmatism emerging second; and economic rationalism emerging third. In Cyprus, problem-solving appeared more variable and was not linear. After the first response of administrative rationalism, different components of democratic pragmatism and economic rationalism emerged at different times, as a result of aspects including; the failures of other rationalities; socio-economic variables; the influence of supranational governance; socio-cultural changes; and natural driver events such as drought.

Secondly, the role and influence of supranational governance was important in Cyprus, being evident as a result of EU level governance exerting a strong influence on the state, government, and national policy. This has shaped approaches, including; the use of the precautionary principle; changes in pricing structures, a reduction in subsidies, and the need to establish cost recovery; the development of integrated water management; as well as the introduction of new techniques such as formal procedures for public consultation and environmental impact assessment. In terms of the problem-solving rationalities, supranational governance has influenced the re-emergence of administrative rationalism for the implementation of new regulations post EU accession in 2004, while also reflecting economic rationalism in relation to the application of market instruments, and democratic pragmatism in the case of consultation and greater participation in decision-making. These changes also partly undermined the format and evolution of problem-solving expected by Dryzek (2013). Indeed, supranational governance was seen to be a driver of characteristics associated with rationalities that were developed at different times and in contrast to the expected linear format of problem-solving.

Thirdly, culture and economic status were identified as important factors that influenced problem-solving in Cyprus. Culture, norms, attitudes, and the concept of Europeanisation were found to be crucial in practice. Furthermore, the economic status of a nation had a significant impact on decision-making and affected policy responses. This was evident through two examples, namely; the economic status and ability of Cyprus when faced with the requirements of EU legislation and policy implementation; as well as the economic status of Cyprus within the context of wider economic forces and a financial crisis in 2012-2013. These aspects were

poorly represented by Dryzek's (2013) problem-solving rationalities, thus highlighting a difference between theoretical expectations and the findings.

Fourthly, the role and influence of politics was found to have fundamentally shaped responses to water problems in Cyprus. In this case, politics was interpreted through a range of characteristics, including; the dynamic interaction of actors, groups, and contested identities shown in terms of different responses to drought management; relationships between political actor groups and interaction between values, attitudes, and beliefs, noted through different views on pricing and groundwater permits; a barrier to decisions, noted in terms of delays to pricing changes; as well as a tool to achieve self-interest, highlighted in terms of farmer unions applying pressure on government. The concept of politics was poorly represented by Dryzek's (2013) rationalities however, with recognition and some analysis only forthcoming through democratic pragmatism. Indeed, other understandings, such as public choice theory, power approaches, and top-down or bottom-up perspectives, have also been limited when conceptualising politics in relation to actor behaviour or motivation. As a result, the role of politics needs to be recognised and explored within this context to further understanding of problem-solving responses.

The utility of the rationalities for developing an understanding of problem-solving beyond conceptions of mandatory, voluntary, and economic approaches was found through their applicability in Cyprus and the representation of certain theoretical expectations. A significant advantage of Dryzek's (2013) framework is based on the way he brings together the complexities of problem-solving and accounts for many different variables as one whole. For example, by integrating the top-down perspective and technocracy in terms of administrative rationalism or utilising the concept of pluralism and networks as part of democratic pragmatism. This contrasts with other understandings, such as forms of public choice theory, elitism, technocracy, and top-down or bottom-up perspectives, as these consider variables in relative isolation. As a result, Dryzek's (2013) conceptualisation through discourse analysis and an attempt to frame multiple variables together, rather than in isolation, has been more reflective of real-world behaviour, relationships, and dynamics of decision-making.

Ultimately, although many similarities between the theoretical expectations and practical findings serve to validate Dryzek's (2013) work, showing a good fit in Cyprus and highlighting the usefulness of his rationalities, the differences and limitations were also found and have been

an important outcome of the study. It is these differences that can allow new ideas to be formed through future research; to further build on mandatory, voluntary, and economic approaches, as well as Dryzek's (2013) understanding.

9.4.1 Outcomes of the thesis

The study has attempted to understand how government in Cyprus has responded to water problems by exploring the applicability of Dryzek's (2013) problem-solving rationalities. This has followed a format from the general to the specific, namely; building on mandatory, voluntary, and economic approaches through Dryzek's (2013) problem-solving rationalities; exploring how water problems have been managed in Cyprus; analysing the existence and applicability of Dryzek's (2013) rationalities in Cyprus and recognising practical challenges; while also identifying emerging themes that have been the result of the study findings.

The thesis has investigated problem-solving responses by developing an understanding of how government in Cyprus has tackled water problems, moving beyond simply conceptions of mandatory, voluntary, and economic approaches. This has been achieved by considering different understandings of problem-solving associated with these approaches, while building on these by utilising Dryzek's (2013) rationalities. This has sought to develop understanding based on the way Dryzek (2013) has understood the specifics of problem-solving through; actor roles, behaviour, and motivation; rhetoric; changes in problem-solving; and by bringing together different theories as part of the rationalities.

A range of outcomes emerged as a result of the study, and this highlights how the findings have met the objectives noted in chapter one. Firstly, in relation to objectives one, two and three, the research in Cyprus helped to ascertain the potential utility and applicability of Dryzek's (2013) problem-solving rationalities, with this also widening empirical understanding based on real-world case study results. In these terms, the mandatory, voluntary, and economic approaches were built-on through the rationalities, which were evident and useful in understanding responses in a more detailed way, while practical challenges were also identified and helped to develop the emerging themes. Secondly, regarding objective four, the interviews and secondary data were useful when examining the roles, behaviours, and motivations of actors in Cyprus, showing similarities and differences when compared to the rationalities and other theoretical perspectives, and thus contributing to empirical findings. Thirdly, in terms of objective one and three, the findings related to water management phases and the idea of sequentiality were useful

when exploring the changing nature of problem-solving in Cyprus, with differences signalling more variable development of approaches as well as the idea of hybridity and emergence or re-emergence over time.

9.4.2 Reflecting on the findings and key points

A first response of the mandatory approach and administrative rationalism is agreed, however in contrast, the voluntary approach and democratic rationalism as well as the economic approach and economic rationalism are assumed to subsequently emerge in more variable ways. For example, the approaches and rationalities can develop with different intensities in reply to both failures in the system and based on other multi-dimensional factors and drivers, such as socio-cultural context, politics, natural events, and supranational governance. As a result, the approaches and rationalities were found to have emerged, developed, diminished, or re-emerged over time. This format can be visualised as a tree with branches that grow at different times and rates as a result of many influences. The main branches reflect the mandatory, voluntary, and economic approaches [or administrative rationalism, democratic pragmatism, and economic rationalism], as well as political and socio-cultural constructs, which are at the core of problem-solving, while components and characteristics of these approaches exist as smaller branches that interact within the system whole.

Notably, the idea of interaction and multiple aspects also highlights the need for bringing together a range of understandings to represent and explain the complex systems that exist in reality. This links closely to the technique of considering practices through different suitable concepts that each have their place in understanding problem-solving. Indeed, this is based on mandatory, voluntary, and economic approaches, with different theories, such as elitism, technocracy, top-down or bottom-up perspectives, networks, pluralism, and public choice theory, being applicable to varying degrees when analysing features of problem-solving. Again, this highlights the relevance of Dryzek's (2013) rationalities, as he brings together different theories to explain given responses and actor behaviour.

Actors form a key part of any response. A range of actors have been recognised in practice, with the strength, importance, and ability to exert their influence varying at given times. It is recognised that Dryzek's (2013) concepts of *Homo-bureaucratis*, *Homo-civicus*, and *Homo-economicus* can and do all co-exist, while one prevailing agent and motive construct often does not occur in reality. Dominant forms at any given time can essentially vary based on context or

politics for instance. Ultimately, an understanding can be developed noting how approaches do change, but that specific approaches do not need to yield to others to have an influence. As shown by findings in Cyprus, the different approaches often need each other.

A range of underlying functions were identified and operated as part of problem-solving in Cyprus. These involved relationships and interaction; transition and evolution; as well as the concept of hybridity. Firstly, relationships and interactions within and between problem-solving approaches were deemed to be variable, while functions based on actor behaviour and motivation signalled a reality in which agents sought to act according to both self-interest and the public interest. As a result, it was important to consider the interests of all actors recognised in decision-making, as these served to influence problem-solving and components of specific responses. Secondly, the transitional nature of problem-solving was noted to be a key aspect of functionality, with a more variable and fluid interpretation proposed. In this case, approaches were assumed to be able to emerge at different times, while remaining static or exhibiting slow development, until re-emerging with certain new management tools, alternative methods, changes in system, or new technology. This was observed in Cyprus through transforming economic approaches, based on; historical use of metering in the first phase of management during the 1960s, then the emergence of subsidies, as well as subsequent changes in water pricing and cost recovery in response to EU regulations during the third phase of management from 2004 onwards. This reflects an ebb and flow characteristic associated with problem-solving, in which the extent and rate of development for approaches is variable in a given setting. Thirdly, the concept of hybridity recognises that specific approaches emerge, exist, and re-emerge at any time, while interaction between these approaches [and their components] is frequent and necessary for progress to occur. For example, this function was evident based on the need for regulation to provide structure for market-based instruments, as well as the need for voluntary approaches and greater public involvement in decisions as a part of administrative approaches when prompted by the requirements of supranational [EU] governance.

Ultimately, as a result of the hybrid nature of problem-solving, all approaches were found to need each other, and this is especially important and relevant in a modern interconnected world. In reality, each approach has a role to play. Mandatory approaches and administrative rationalism provide the basis and structure for the existence, implementation, and operation of other approaches. Voluntary approaches and democratic pragmatism provide an arena for dialogue, while encouraging integration and also being inclusive of citizens and different

stakeholders, which has become a necessary variable in contemporary decision-making. Furthermore, economic approaches and economic rationalism satisfy the inherent aspects of competition, market transactions, and pricing structures, which are vital to contemporary governance and societies based on liberal capitalist systems, as well as cultures and societies that have come to favour consumption.

9.4.3 Further research

The overarching aim of the project has been fulfilled as a result of the study objectives being met. Based on this outcome, it is possible to explore the potential scope for further research that can be continued in the future. A range of pathways have been proposed in this case, to build on the study and further develop understanding of government problem-solving.

Firstly, additional work on testing the applicability of Dryzek's (2013) problem-solving rationalities in other water-scarce nations could be useful to further expand the empirical foundation of understanding. Indeed, this can also provide a basis for comparative studies between evidence of responses in specific nations.

Secondly, there is scope for testing the applicability of Dryzek's (2013) problem-solving rationalities in other small, Mediterranean, or peripheral EU nations. The findings have shown how decision-making and power at supranational level can be variable and restricted for a small, peripheral, and southern European nation such as Cyprus. By exploring environmental problem-solving responses in these settings, for example using other cases such as Spain, Italy, Malta, or Greece, it could be possible to develop a comparative understanding of the role and influence of supranational governance with regard to problem-solving in these nations.

Thirdly, additional research could seek to test the application of Dryzek's (2013) rationalities between two different national case studies. For example, this could involve a northern EU nation and a southern EU nation, or even a European nation compared to the United States, Australia, or Japan. This type of comparative investigation could yield valuable insights into a range of aspects, including; the existence or non-existence of specific characteristics associated with administrative rationalism, democratic pragmatism, and economic rationalism; the similarities and differences in actor behaviour and motivation, plus the potential drivers of these in different settings; the influence of socio-cultural constructs, context, politics, and supranational governance [or equivalents such as federal systems]; as well as an improved

understanding of the evolution of problem-solving in different settings, and the potential reasons for similarities or differences in these cases.

Lastly, specific aspects of the findings can be focused on and developed further. Primarily, this should seek to investigate the specific role and influence of politics on problem-solving, as this was found to have limited recognition as part of the rationalities while also being a strong emerging theme according to the findings. For example, a case study [or multiple case studies] may be utilised to consider if there are common drivers or similarities in political constructs that shape mandatory, voluntary, and economic approaches. This may involve looking at the political dynamics associated with each approach in terms of relationships between political parties, politicians, government actors, and citizens, with the variable of self-interest also being investigated within this context. Furthermore, the role and influence of politics can be explored according to a range of variables found to be relevant by the findings. These include; politics in the form of conflict between actor groups; politics as a barrier or influencing factor in terms of behaviour and motives represented by actors in problem-solving; the role of national, regional, and local politics in impacting the ability of government to implement policy; the politics between government and unions or pressure groups, and how this shapes decisions on environmental problems; as well as politics through the manifestation of principles and behaviour based on strong populist approaches, which have come to the forefront of contemporary decision-making.

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APPENDIX 1: Summary and comparison of problem-solving perspectives

It is possible to summarise the different problem-solving perspectives used to understand how society and governments respond to different social problems [such as environmental and water management issues]. The table summarises these perspectives and highlights the key aspects and characteristics of each understanding, as well as noting strengths and limitations. In turn, the perspectives are set in comparison with Dryzek's (2013) problem-solving rationalities allowing both similarities and differences to be noted.

Table A1: Problem-solving perspectives: a comparison
(Niskanen, 1971; Dunleavy, 1991; Beetham, 1991; Downs, 1993; Parsons, 1999; Birkland, 2011; Dryzek, 2012)

PERSPECTIVE	KEY THEMES AND CHARACTERISTICS	DRYZEK'S PROBLEM-SOLVING RATIONALITIES
Top-down Perspective	▪ The perspective fundamentally exists as a model and understanding of policy implementation ▪ Focuses on governing agents and decision-making at the top of the policy chain/process ▪ Key actors: senior government officials, high level bureaucrats, senior civil servants, and politicians ▪ A hierarchal system of management and implementation ▪ Increasing authority in a vertical format within government or a given administrative body	- Administrative rationalism reflects a top-down understanding based on managers and experts being deemed the most important governing actors - Hierarchal management and a vertical format of authority reflects the idea of administrative rationalism that claims people are subordinate to the state
	Strengths + Focuses on the core policy-makers and policy cycle + Can enable a longer timeframe of policy analysis and evaluation + Importance attached to legislative structure of implementation ***Limitations*** – Focus on central decision-makers neglects the perspective and action of others in the policy process – Does not account for the influence of street-level bureaucrats	
Bottom-up Perspective	▪ An understanding and model of policy implementation ▪ A direct response to the top-down perspective ▪ Focuses on the importance of lower level governing actors or so-called 'street-level' bureaucrats ▪ Key actors: civil servants, those responsible for enacting policy that have day to day influence and control	- Democratic rationalism is the most bottom-up in character based on recognising the importance of ground-level actors and in this case also including the citizen as a key actor
	Strengths + Considers the role and influence of street-level bureaucrats + Identifies the consequences of policy and appreciates discretion + Recognises interaction between actors	

	Limitations – Can over-emphasise the influence of street-level bureaucrats – Failure to recognise how policy is formed prior to ground-level	
Bargaining and Negotiation	▪ Considers policy implementation and decision-making as a complex process that relies upon the interactions and exchanges between governing actors at all positions ▪ Decision-making and problem-solving is dependent on bargaining and negotiation between various actors at the top and bottom of the policy process ▪ Attempts to bridge the gap between the opposing top-down and bottom-up perspectives ▪ Introduces the idea of a policy-action continuum ***Strengths*** + Appreciates exchange between actors at a variety of positions + Recognises that an interactive bargaining process occurs in policy-making + An emphasis is placed on aspects of power and dependence ***Limitations*** – Focuses on interaction processes rather than policy	- The idea of bargaining and negotiation can be linked to democratic pragmatism through the notion of interaction between different actor levels. To a certain extent democratic pragmatism reflects this idea by recognising interaction between many different actors such as civil servants, managers, experts, and citizens
Power Approaches	▪ Decision-making and the policy process shaped and determined by power constructs, including; class, wealth, technical knowledge, bureaucratic arrangement, and professional status **1. Elitism** - Policy and decision-making process centralised and controlled by certain groups or individuals [so-called elites] - Mirrors the top down perspective by suggesting that high level [or elite] actors and senior officials hold the most prominent role in problem-solving - Directly opposes the concept of pluralism - Decision outcomes may be influenced by high level actors in order to help achieve personal or group advantages, including; personal financial gains, increased control and authority, or the protection of electoral status to maintain political legitimacy **2. Technocracy** - Focuses on the role and power of technical experts - Experts dominate the decision-making and policy process - An evolved concept of rationalisation that integrates a range of previously conceived aspects of structural control and power, namely; bureaucracy and hierarchy, technical control, and professionalism **3. Pluralism** - Focuses on the way in which power is distributed - Participation in the policy process is open to all individuals and groups - Basis of policy networks and communities approach ***Strengths*** + Elitism: identifies the potential for policy control through power + Technocracy: focuses on experts and scientific research + Pluralism: acknowledges different interests	- Administrative rationalism reflects elitism by suggesting those at the top level of the policy process [for example the managers and senior government officials] have a primary role in problem-solving and decision-making. This link is also apparent in terms of professionalism, which prioritises the role and influence of the professional - Administrative rationalism reflects the concept of technocracy based on the importance attributed to technical experts. In this case, both perspectives suggest that experts dominate the decision-making and policy process - Democratic pragmatism recognises that a range of actors have the ability to facilitate change through decision-making, and thus shares similarities with the concept of pluralism - The concept of pluralism is utilised by Dryzek in the context of democratic

	Limitations – Elitism: policy control by one dominant group and the issue of limited participation – Technocracy: encourages a lack of public participation – Pluralism: in practice the state can often be dominant	pragmatism to explain the development and expansion of policy dialogue as well as the resultant behaviour of policy actors
Public Choice Theory	▪ Considers how institutional structures or arrangements can affect individual actions and patterns of incentives. ▪ Assumes that governing agents act in terms of economic models and seek to maximise their personal interests **1. Tullock: market forces and self-interest** - Bureaucracy and policy-making based on the same assumptions used to understand business - The idea of economic models applied to policy - Market forces are required to combat bureaucratic self-interest - Power and self-interest are the key variables of decision-making and politics **2. Downs: laws, bureaucrat types, and motives** - Based on a theory of psychological motivation - Governing officials are motivated by self-interest - Organisational function, bureaucrat type, and motive drivers identified as key categories of self-interest - Self-interest can be pure or mixed - Different organisational arrangements, bureaucrat types, and motivations produce certain self-interest outcomes **3. Niskanen: budget-maximising** - A model framed by neo-classical economics - Governing officials seek to maximise their budgets just as businesses would seek to maximise profit - It is claimed that individuals seek to increase the budget and size of the bureau in order to maximise their personal interests **4. Dunleavy: bureau-shaping** - An alternative understanding that suggests self-interest is expressed through 'shaping' rather than increasing the size of a bureaucracy - Senior bureaucrats/officials are concerned with shaping their departments and budgets to advance their interests alongside politicians and business ***Strengths*** + Recognises the motivations of certain actors + Organisational functions and bureaucrat types are considered ***Limitations*** – Focuses on one dimension of actor behaviour and motivation – The potential for acting only in the public interest is not considered	- Administrative rationalism opposes public choice theory and the idea that governing actors and civil servants act only to maximise their personal interests, by instead claiming these actors can [and do] act in the public interest - Economic rationalism is similar to public choice theory in terms of actors being motivated by personal interests and economics - Economic rationalism also differs as it claims that some key agents actually act in the public interest - Democratic pragmatism identifies multiple conceptions of self-interest and public interest. To a certain extent, this reflects the organisational laws, bureaucrat types, and motives defined by Downs, which allow for various types and levels of self-interest to exist - Democratic pragmatism utilises public choice theories when explaining the development and expansion of policy dialogue and the resultant behaviour of policy actors
Policy Networks	▪ The perspective offers a wider interpretation of relationships and interactions between governing agents ▪ Concerned with the relationships, interactions, and informal aspects of the policy-making process ▪ Builds upon the bargaining and negotiation perspective by responding to limitations such as the incomplete conceptualisations of policy actor interactions and the failure to	- Democratic rationalism can be linked to a policy network understanding based on the idea that a wider range of individuals and groups are considered to be relevant as part of the problem-solving and decision-making process.

	specify where in the policy process actor interactions take place ▪ In contrast to top-down and bottom-up perspectives, the network approach recognises the existence and significance of different policy actors and levels of decision-making	In this case, both perspectives appreciate the different policy actors and levels involved in policy-making
	Strengths + A wider scope of understanding on policy-making + Multiple actors and levels are recognised ***Limitations*** – Public interest is not clearly considered or positioned in the network context – The potential ssues of power and conflict are poorly represented	

APPENDIX 2: Interviewee information

Table A2: Interviewees and associated interview details

Interviewee name	Role[s] and responsibilities	Interview date/duration	Interview and recording format
Neoklis Antoniou	*At time of interview* - Environment Department; engineer and manager, with focus on water pollution, chemistry, and quality *Previous* - Chemist and engineer - Water pollution; chemistry, fertilizers, fuels, and liquid fuels	January 7th 2013 1h:23m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Bambos Charalambous	*At time of interview* - Consultant; institutional management of water utilities and distribution network management *Previous* - Water Development Department; engineer and supply projects - Limassol Water Board; head of technical services	May 23rd 2013 1h:57m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Symeon Christodoulou	*At time of interview* - NIREAS international water research center; member, board of directors - Water distribution networks and reducing leakage/loss *Previous* - Risk analysis and construction management engineer	May 16th 2013 1h:39m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Sofoclis Christoudides	*At time of interview* - Larnaca Water Board; director/head *Previous* - Civil engineering background - Municipality of Larnaca; design of highways, roads, and buildings - Larnaca water board; manager	May 16th 2013 1h:17m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Costas Constantinou	*At time of interview* - Geological Survey Department; director/head - Member of advisory committee - Involved in water schemes and responsible for village supplies and irrigation schemes - Involved in groundwater management directive and the WFD	September 20th 2013 2h:39m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]

	Previous - Geology and hydrogeology - Consultant - Geological Survey Department; role as a hydro-geologist		
Charalambos Demetriou	*At time of interview* - Water Development Department; head division of hydrometry - Implementation of WFD - Monitoring quality and quantity *Previous* - Civil engineer and hydrologist	January 8th 2013 1h:22m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Christos Hadjiantonis	*At time of interview* - Department of Agriculture; land and water use section head - Monitoring and management of water used in agricultural	September 18th 2013 1h:18m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Panayiota Hadjigeorgiou	*At time of interview* - Water Development Department; section head division of planning - Planning and implementation for the Water Framework Directive, and especially article 14 related to public participation and involvement - Public relations *Previous* - Design, planning, and construction of infrastructure projects; new pipelines and irrigation networks - First engineer in WDD - Executive engineer in WDD	December 21st 2012 2h:02m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Panicos Hadjigeorgiou	*At time of interview* - Agricultural chemist of the Government General Laboratories *Previous* - Chemist in Pharmaceutical industry - Land and water use section head	September 20th 2013 0h:52m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Costas Hadjipanayiotou	*At time of interview* - Environment Department; director - Water pollution - Environmental pollution and waste management *Previous* - Applied geology - Environmental impact assessment - Industrial waste treatment	May 20th 2013 1h:19m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]

Agathi Hadjipanteli	*At time of interview* - Water Development Department; executive engineer - Division of the operation and maintenance of irrigation water works - Water management and allocation - Irrigation management *Previous* - Design of water development projects - Management, allocation, and pricing of water - Civil engineer background	January 4th 2013 1h:12m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Iacovos Iacovides	*At time of interview* - Water consultant - Impact assessment and consultancy expertise for government departments *Previous* - Water Development Department 1966-2002; hydrologist, senior hydrogeologist section head, principle water engineer, assistant director - Involved in all WDD water works	May 24th 2013 1h:15m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Nektarios Karyos	*At time of interview* - Panagrotikos farmers union; general secretary/head - Public consultation and representation of farmer interests at national and international level *Previous* - Natural Resource Science - Forrester	September 18th 2013 1h:32m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Anna Koupparis	*At time of interview* - Department of Agriculture; director/head of section of legislation - In charge of all sections of the department when dealing with the enforcement of laws *Previous* - Pesticide laboratory - Head of water laboratories - Chief agricultural officer	September 20th 2013 0h:43m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Kyriacos Kyrou	*At time of interview* - Water Development Department; Director - Responsible for all actions of the department and for managing divisions - Close liaison with the minister and the MANRE as a whole	December 31st 2012 2h:18m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]

	Previous - Water Development Department; executive engineer, senior water engineer, and chief water engineer - Water research centre UK; Geo-technical engineer		
Socrates Metaxas	*At time of interview* - Limassol Water Board; head - General management of board - Liaise with board of directors and implement strategies - Close cooperation with WDD and ensure sufficient quantity and quality for consumers *Previous* - Economist and accountant	May 23rd 2013 1h:37m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Charis Omorphos	*At time of interview* - Water Development Department; senior executive/head of EU division - Harmonisation of EU directives, specifically the WFD - Implementation of the European acquis; coordination between divisions and departments for effective implementation of EU regulations *Previous* - n/a	May 24th 2013 1h:10m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Charalambos Palantzis	*At time of interview* - Nicosia Sewerage Board; senior project manager - The bi-communal treatment plant *Previous* - Civil engineer for WDD [1970] - Water engineer for WDD [1974] - Water supply of Nicosia [1974-1978] - Head of Nicosia Water Board [1978-2000]; supply system development; distribution; technology	May 21st 2013 2h:01m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Charalambos Theopemptou	*At time of interview* - Lecturer at University of Cyprus *Previous* - Ecological movement head [1990s] - Founding member of Cyprus green party [1996] - Executive secretary of the green party - Commission for the Environment [2006-2013]	May 15th 2013 1h:21m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]

Nikos Zambakides	*At time of interview* - Nicosia Water Board; director/head - General management - Application of tariffs, implementation of water policy, distribution *Previous* - Nicosia Water Board; financial controller [1992] - Nicosia Water Board; acting head [2002]; director/head [2004 onwards]	May 22nd 2013 1h:23m	- Face-to-face interview - Hand-written notes - Voice recorder used - Confidentiality agreed [non-attributable]
Angelos Agapiou	Larnaca District Office	n/a	Interview declined / No response
Pannico Champas	EKA Farmer Union	n/a	Interview declined / No response
Nicholas Christofides	Ammochostos District Office	n/a	Interview declined / No response
Consumer Association	General contact of Consumer Association	n/a	Interview declined / No response
Mixalis Lytra	PEK Farmer Union	n/a	Interview declined / No response
Georgios Moutas	Agrotiki Farmer Union	n/a	Interview declined / No response
Pan-Kyprian Environmental Movement Harmonization	Environmental organisation - general contact	n/a	Interview declined / No response
Argiros Papanastasiou	Nicosia District Office	n/a	Interview declined / No response
Paphos District Office	General contact of District Office	n/a	Interview declined / No response
Christina Rodosthenous	Limassol District Office	n/a	Interview declined / No response

APPENDIX 3: Cypriot water legislation

Table A3: Key water legislation in Cyprus translated from Greek to English

Νομοθεσία Περί Υδάτων και Πλημμυρών	Legislation regarding Water and Flooding
2017 - ΟΙ ΠΕΡΙ ΤΗΣ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ ΝΟΜΟΙ ΤΟΥ 2010 ΕΩΣ (ΑΡ.2) ΤΟΥ 2016 ΚΑΝΟΝΙΣΜΟΙ ΤΕΛΩΝ ΥΔΑΤΟΣ ΔΥΝΑΜΕΙ ΤΩΝ ΑΡΘΡΩΝ 130 ΚΑΙ 132 (Κ.Δ.Π. 48/2017)	2017 - SUMMARY WATER MANAGEMENT LAWS OF 2010 TO 2016 WATER RATES REGULATIONS UNDER ARTICLES 130 AND 132 (PI 48/2017)
2016 - Ο ΠΕΡΙ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ (ΤΡΟΠΟΠΟΙΗΤΙΚΟΣ) (ΑΡ. 2) ΝΟΜΟΣ - Ν. 122(Ι) - 2016	2016 - THE SINGLE WATER MANAGEMENT (AMENDMENT) (NO. 2) LAW – N. 122 (I) -2016
2016 - Ο ΠΕΡΙ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ (ΤΡΟΠΟΠΟΙΗΤΙΚΟΣ) ΝΟΜΟΣ ΤΟΥ 2016 - Ν. 2(Ι) / 2016	2016 - THE SINGLE WATER MANAGEMENT (AMENDING) LAW OF 2016 - N. 2 (I) / 2016
2015 - Ο ΠΕΡΙ ΠΡΟΣΤΑΣΙΑΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ ΤΩΝ ΥΔΑΤΩΝ (ΤΡΟΠΟΠΟΙΗΤΙΚΟΣ) ΝΟΜΟΣ ΤΟΥ 2015 - Ν. 159(Ι) / 2015	2015 - WATER PROTECTION AND MANAGEMENT (AMENDING) LAW OF 2015 - N 159 (I) / 2015
2015 - ΤΟ ΠΕΡΙ ΠΡΟΣΤΑΣΙΑΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ ΤΩΝ ΥΔΑΤΩΝ (ΤΡΟΠΟΠΟΙΗΣΗ ΤΩΝ ΠΑΡΑΡΤΗΜΑΤΩΝ V ΚΑΙ X ΤΟΥ ΒΑΣΙΚΟΥ ΝΟΜΟΥ) ΔΙΑΤΑΓΜΑ ΤΟΥ 2015 (Κ.Δ.Π 310/2015)	2015 - WATER PROTECTION AND MANAGEMENT (AMENDMENTS TO ANNEXES V AND X TO THE BASIC LAW) 2015 (PI 310/2015)
2015 - ΟΙ ΠΕΡΙ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ (ΑΣΦΑΛΕΙΑ ΜΕΓΑΛΩΝ ΥΠΕΡΥΨΩΜΕΝΩΝ ΤΑΜΙΕΥΤΗΡΩΝ) ΚΑΝΟΝΙΣΜΟΙ ΤΟΥ 2015 (Κ.Δ.Π. 64/2015)	2015 - THE SINGLE [LAW] ON/ABOUT THE WATER MANAGEMENT (SAFETY OF LARGE ELEVATED RESERVOIRS) REGULATIONS OF 2015 (PI 64/2015)
2014 - ΟΙ ΠΕΡΙ ΤΙΜΟΛΟΓΗΣΗΣ ΚΑΙ ΜΗΧΑΝΙΣΜΩΝ ΑΝΑΚΤΗΣΗΣ ΚΟΣΤΟΥΣ ΤΩΝ ΥΠΗΡΕΣΙΩΝ ΥΔΑΤΟΣ ΚΑΝΟΝΙΣΜΟΙ ΤΟΥ 2014 (Κ.Δ.Π. 128/2014)	2014 – [LAW] ON/ABOUT THE PRICING AND MECHANISMS ON / FOR COST RECOVERY OF WATER SERVICES REGULATIONS OF 2014 (PI 128/2014)
2013 - ΝΟΜΟΣ ΠΟΥ ΤΡΟΠΟΠΟΙΕΙ ΤΟΥΣ ΠΕΡΙ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ ΝΟΜΟΣ ΤΟΥ 2010 ΕΩΣ 2013	2013 - LAW THAT AMENDS THE SINGLE WATER MANAGEMENT LAW OF 2010 TO [UP TO] 2013
2013 - Ο ΠΕΡΙ ΤΗΣ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ (ΤΡΟΠΟΠΟΙΗΤΙΚΟΣ) ΝΟΜΟΣ ΤΟΥ 2013	2013 - [LAW] ON/ABOUT THE SINGLE WATER MANAGEMENT (AMMENDMENT) ORDINANCE OF 2013
2012 - ΝΟΜΟΣ ΠΟΥ ΤΡΟΠΟΠΟΙΕΙ ΤΟΝ ΠΕΡΙ ΑΞΙΟΛΟΓΗΣΗΣ, ΔΙΑΧΕΙΡΙΣΗΣ ΚΑΙ ΑΝΤΙΜΕΤΩΠΙΣΗΣ ΤΩΝ ΚΙΝΔΥΝΩΝ ΠΛΗΜΜΥΡΑΣ ΝΟΜΟ	2012 - LAW ON AMENDING [THAT AMMENDS] THE ASSESSMENT, MANAGEMENT, AND CONTROL OF [THE] FLOOD RISK ACT
2012 - Ο ΠΕΡΙ ΠΡΟΣΤΑΣΙΑΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ ΤΩΝ ΥΔΑΤΩΝ ΤΡΟΠΟΠΟΙΗΤΙΚΟΣ ΝΟΜΟΣ ΤΟΥ 2012	2012 - [LAW] ON/ABOUT THE PROTECTION AND WATER MANAGEMENT (AMMENDMENT) ORDINANCE OF 2012
2012 - Ο ΠΕΡΙ ΤΗΣ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ ΤΡΟΠΟΠΟΙΗΤΙΚΟΣ ΝΟΜΟΣ ΤΟΥ 2012	2012 - [LAW] ON/ABOUT THE SINGLE WATER MANAGEMENT LAW AMMENDMENT LAW OF 2012
2011 - Ο ΠΕΡΙ ΠΡΟΣΤΑΣΙΑΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ ΤΩΝ ΥΔΑΤΩΝ ΝΟΜΟΣ - ΚΑΝΟΝΙΣΜΟΙ (Κ.Δ.Π. 296/2011)	2011 - [LAW] ON/ABOUT THE PROTECTION AND WATER MANAGEMENT LAW – RULES (PI 296/2011)
2011 - Ο ΠΕΡΙ ΤΗΣ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ ΝΟΜΟΣ (ΚΑΝΟΝΙΣΜΟΙ ΔΥΝΑΜΕΙ ΤΟΥ ΑΡΘΡΟΥ 132) Κ.Δ.Π 50/2011	2011 – [LAW] ON/ABOUT THE SINGLE WATER MANAGEMENT LAW (REGULATIONS UNDER ARTICLE 132) PI 50/2011
2011 - ΟΙ ΠΕΡΙ ΤΟΥ ΥΔΑΤΙΚΟΥ ΕΡΓΟΥ ΚΙΤΙΟΥ (ΚΑΤΑΡΓΗΣΗ) ΚΑΝΟΝΙΣΜΟΙ (Κ.Δ.Π. 92-2011)	2011 – [LAW] ON/ABOUT THE KITIOU WATER PROJECT (REPEAL) REGULATIONS (PI 92-2011)

2011 - Ο ΠΕΡΙ ΤΗΣ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ (ΤΡΟΠΟΠΟΙΗΤΙΚΟΣ) ΝΟΜΟΣ ΤΟΥ 2011 Ν. 147(Ι)/2011	2011 – [THE LAW] ON/ABOUT THE SINGLE WATER MANAGEMENT (AMMENDMENT) LAW OF 2011 N. 147 (I) / 2011
2010 - Ο ΠΕΡΙ ΤΗΣ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ ΝΟΜΟΣ ΤΟΥ 2010 - Κανονισμοί δυνάμει των άρθρων 107 και 132 (2) (στ)	2010 - [THE LAW] ON/ABOUT THE SINGLE WATER MANAGEMENT LAW OF 2010 - Regulations under Articles 107 and 132 (2) (f)
2010 - ΝΟΜΟΣ ΠΟΥ ΠΡΟΝΟΕΙ ΓΙΑ ΤΗΝ ΑΞΙΟΛΟΓΗΣΗ, ΔΙΑΧΕΙΡΙΣΗ ΚΑΙ ΑΝΤΙΜΕΤΩΠΙΣΗ ΤΩΝ ΚΙΝΔΥΝΩΝ ΠΛΗΜΜΥΡΑΣ Ν.70(Ι)2010	2010 - LAW THAT PROVIDES FOR THE ASSESSMENT, MANAGEMENT, AND TREATMENT OF FLOOD RISK N.70 (I) 2010
2010 - Ο ΠΕΡΙ ΤΗΣ ΕΝΙΑΙΑΣ ΔΙΑΧΕΙΡΙΣΗΣ ΥΔΑΤΩΝ ΝΟΜΟΣ ΤΟΥ Κ.Δ.Π. 452/2010	2010 – THE LAW ON THE SINGLE [INTEGRATED] WATER MANAGEMENT LAW OF PI 452/2010
2010 - ΝΟΜΟΣ ΠΟΥ ΤΡΟΠΟΠΟΙΕΙ ΤΟΝ ΠΕΡΙ ΠΡΟΣΤΑΣΙΑΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ ΤΩΝ ΥΔΑΤΩΝ ΝΟΜΟ Ν.113(Ι)/2010	2010 - LAW AMENDING THE PROTECTION AND WATER MANAGEMENT LAW N.113 (I) / 2010
2010 - Διάταγμα δυνάμει του άρθρου 26 ΤΟΥ ΠΕΡΙ ΠΡΟΣΤΑΣΙΑΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ ΤΩΝ ΥΔΑΤΩΝ ΝΟΜΟΣ Κ.Δ.Π. 500/2010	2010 - Order under Article 26 ON/ABOUT THE PROTECTION AND WATER MANAGEMENT LAW PI 500/2010
2009 - Ο ΠΕΡΙ ΠΡΟΣΤΑΣΙΑΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ ΤΩΝ ΥΔΑΤΩΝ ΝΟΜΟΣ ΤΟΥ 2004 - ΚΑΝΟΝΙΣΜΟΙ Κ.Δ.Π. 272/2009	2009 - [THE LAW] ON/ABOUT PROTECTION AND WATER MANAGEMENT LAW OF 2004 - REGULATIONS PI 272/2009
2009 - Ο ΠΕΡΙ ΠΡΟΣΤΑΣΙΑΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ ΤΩΝ ΥΔΑΤΩΝ ΝΟΜΟΣ - ΤΡΟΠΟΠΟΙΗΤΙΚΟΣ Ν. 67(Ι)/2009	2009 - [THE LAW] ON/ABOUT PROTECTION AND WATER MANAGEMENT LAW - AMMENDMENT N. 67 (I) / 2009
2009 - Ο ΠΕΡΙ ΕΛΕΓΧΟΥ ΤΗΣ ΡΥΠΑΝΣΗΣ ΤΩΝ ΝΕΡΩΝ ΚΑΙ ΤΟΥ ΕΔΑΦΟΥΣ ΝΟΜΟΣ Ν.68(Ι)/2009	2009 - [LAW] ON/ABOUT THE CONTROL OF POLLUTION OF WATER AND SOIL - LAW N.68 (I) / 2009
2009 - Ο ΠΕΡΙ ΕΛΕΓΧΟΥ ΤΗΣ ΡΥΠΑΝΣΗΣ ΤΩΝ ΝΕΡΩΝ ΝΟΜΟΣ - ΤΡΟΠΟΠΟΙΗΤΙΚΟΣ Ν.68(Ι)/2009	2009 - [THE LAW] ON/ABOUT CONTROL OF POLLUTION OF WATER LAW – AMMENDMENT N.68 (I) / 2009
2005 - Ο ΠΕΡΙ ΑΠΟΧΕΤΕΥΤΙΚΩΝ ΣΥΣΤΗΜΑΤΩΝ - ΝΟΜΟΙ ΤΟΥ 1971 ΜΕΧΡΙ 2005	2005 - [LAW] ON/ABOUT SEWERAGE - LAWS OF 1971 TO/UNTIL 2005
2004 - Ο ΠΕΡΙ ΠΡΟΣΤΑΣΙΑΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ ΤΩΝ ΥΔΑΤΩΝ ΝΟΜΟΣ Ν.13(Ι)/2004	2004 - [THE LAW] ON/ABOUT PROTECTION AND WATER MANAGEMENT LAW L.13 (I) / 2004
2003 - ΝΟΜΟΣ ΠΟΥ ΠΡΟΝΟΕΙ ΓΙΑ ΤΗΝ ΕΛΕΥΘΕΡΗ ΠΡΟΣΒΑΣΗ ΤΟΥ ΚΟΙΝΟΥ ΣΕ ΠΛΗΡΟΦΟΡΙΕΣ ΠΟΥ ΣΧΕΤΙΖΟΝΤΑΙ ΜΕ ΘΕΜΑΤΑ ΠΕΡΙΒΑΛΛΟΝΤΟΣ 2003/4/ΕΚ	2003 - A LAW TO PROVIDE FOR FREE PUBLIC ACCESS TO INFORMATION IN RELATION TO ENVIRONMENTAL ISSUES 2003/4 / EC
2003 - Ο ΠΕΡΙ ΕΛΕΓΧΟΥ ΤΗΣ ΡΥΠΑΝΣΗΣ ΤΩΝ ΝΕΡΩΝ ΝΟΜΟΣ (Απόρριψη Αστικών Λυμάτων) Κ.Δ.Π. 772/2003	2003 - [THE LAW] ON/ABOUT THE CONTROL OF POLLUTION OF WATER - LAW (Wastewater Disposal) PI 772/2003
2003 - ΝΟΜΟΣ ΠΟΥ ΠΡΟΝΟΕΙ ΓΙΑ ΠΡΟΣΤΑΣΙΑ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗ ΤΗΣ ΦΥΣΗΣ ΚΑΙ ΤΗΣ ΑΓΡΙΑΣ ΖΩΗΣ Ν.153(Ι)/2003	2003 - A LAW THAT PROVIDES FOR THE PROTECTION AND MANAGEMENT OF NATURE AND WILD LIFE N.153 (I) / 2003
2002 - Ο ΠΕΡΙ ΕΛΕΓΧΟΥ ΤΗΣ ΡΥΠΑΝΣΗΣ ΤΩΝ ΝΕΡΩΝ ΚΑΙ ΤΟΥ ΕΔΑΦΟΥΣ ΝΟΜΟΣ 106(Ι)/2002	2002 - [LAW] ON/ABOUT THE CONTROL OF POLLUTION OF WATER AND SOIL LAW 106 (I) / 2002
2002 - Ο ΠΕΡΙ ΠΡΟΣΦΟΡΩΝ ΣΤΟΥΣ ΤΟΜΕΙΣ ΤΟΥ ΥΔΑΤΟΣ, ΤΗΣ ΕΝΕΡΓΕΙΑΣ, ΤΩΝ ΜΕΤΑΦΟΡΩΝ ΚΑΙ ΤΩΝ ΤΗΛΕΠΙΚΟΙΝΩΝΙΩΝ ΝΟΜΟΣ ΤΟΥ 2002 29(Ι)/2002	2002 - [LAW] ON/ABOUT OFFERS [TENDERS] IN THE AREAS OF WATER, ENERGY, TRANSPORT AND TELECOMMUNICATIONS - LAW OF 2002 29 (I) / 2002
2001 - Ο ΠΕΡΙ ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΤΟΥ ΝΕΡΟΥ ΑΝΘΡΩΠΙΝΗΣ ΚΑΤΑΝΑΛΩΣΗΣ (ΠΑΡΑΚΟΛΟΥΘΗΣΗ ΚΑΙ ΕΛΕΓΧΟΣ) ΝΟΜΟΣ 87(Ι) ΤΟΥ 2001	2001 - [LAW] ON/ABOUT THE QUALITY OF WATER FOR HUMAN CONSUMPTION (MONITORING AND CONTROL) - LAW 87 (I) OF 2001
1998 - Ο ΠΕΡΙ ΕΞΟΙΚΟΝΟΜΗΣΕΩΣ ΝΕΡΟΥ (ΕΙΔΙΚΑ ΜΕΤΡΑ) ΝΟΜΟΣ ΤΟΥ 1991 ΚΑΙ Ο	1998 - [LAW] ON/ABOUT SAVING WATER (SPECIAL MEASURES) ORDINANCE 1991 AND

ΤΡΟΠΟΠΟΙΗΤΙΚΟΣ ΤΟΥ ΝΟΜΟΣ ΤΟΥ 1998 Ν.1/91, Κ.Δ.Π. 300/91, Ν.37(Ι)/98, Κ.Δ.Π. 138/98	AMMENDMENTS TO THE LAW OF 1998 n.1 / 91 PI 300/91, N.37 (I) / 98, PI 138/98
1990 - Ο ΠΕΡΙ ΥΔΑΤΟΠΡΟΜΗΘΕΙΑΣ ΧΩΡΙΩΝ ΓΙΑ ΟΙΚΙΑΚΟΥΣ ΣΚΟΠΟΥΣ ΝΟΜΟΣ Κεφ.349,66/1990	1990 - [LAW] ON/ABOUT WATER SUPPLY IN VILLAGES FOR RESIDENTIAL PURPOSES LAW Kef.349,66 / 1990
1972/82/88 - Ο ΠΕΡΙ ΥΔΑΤΟΠΡΟΜΗΘΕΙΑΣ ΔΗΜΟΤΙΚΩΝ ΚΑΙ ΑΛΛΩΝ ΠΕΡΙΟΧΩΝ ΝΟΜΟΣ Κεφ.350 25/1972, 31/1982, 172/1988	1972/82/88 - [LAW] ON/ABOUT MUNICIPAL WATER AND OTHER AREAS Kef.350 LAW 25/1972, 31/1982, 172/1988
1971 - Ο ΠΕΡΙ ΑΠΟΧΕΤΕΥΤΙΚΩΝ ΣΥΣΤΗΜΑΤΩΝ ΝΟΜΟΣ	1971 - [LAW] ON/ABOUT SEWERAGE SYSTEMS
1968/78/89/91 - Ο ΠΕΡΙ ΑΡΔΕΥΤΙΚΩΝ ΤΜΗΜΑΤΩΝ (ΧΩΡΙΑ) ΝΟΜΟΣ Κεφ. 342, 130/68, 5/78, 157/89, 47/91	1968/78/89/91 - [LAW] ON/ABOUT IRRIGATION DEPARTMENT (VILLAGES) LAW Cap. 342, 130/68, 5/78, 157/89, 47/91
1968/78/89 - Ο ΠΕΡΙ ΑΡΔΕΥΤΙΚΩΝ ΣΥΝΔΕΣΜΩΝ (ΙΔΙΩΤΙΚΟΝ ΥΔΩΡ) ΝΟΜΟΣ Κεφ.115, 131/1968, 6/1978, 156/1989	1968/78/89 - [LAW] ON/ABOUT IRRIGATION ASSOCIATIONS (PRIVATE WATER) - LAW Kef.115, 131/1968, 6/1978, 156/1989

(Source: WDD, 2017)

APPENDIX 4: The structure of the Water Development Department

Table A4: WDD sectors and divisions

Water Development Department Sectors	Divisions within given sector
Sector 1 Water Resources and European Union	*Hydrometry division* - Quantitative, qualitative, and biological monitoring of rivers and dams - Quantitative and qualitative groundwater monitoring - Ecology and hydrobiology - Environment issues, pollution, and protection of water bodies - Maintenance of monitoring stations and equipment - Quality control of monitoring data and results evaluation - Automation and the provision of data - Implementation of the European Water Framework Directive - Implementation of the program of measures of the Water Framework Directive - Licensing and monitoring of water abstractions - Licensing and control of borehole drillers - Protection zones for drinking water wells [well head protection] *Hydrology and Hydrogeology division* - Engineering hydrology and hydrogeology - Surface water studies - Groundwater studies - Water resources quality and pollution control studies - Information technology *Water quality control division* - Chemistry - Microbiology *European Union division* - Legislation and monitoring of the implementation of the European acquis - Coordination, communication, and data collection - Coordination of structural funds and the cohesion fund - International affairs *Wastewater and reuse division* - Planning and design - Wastewater monitoring - Implementation of the EU Water Framework Directive and EU matters
Sector 2 Planning and Design	*Planning division* - Project evaluation and strategic planning scenario - Feasibility studies - Environmental impact assessment - Water Framework Directive implementation of river basin management plans / programme of measures / development / public participation campaigns - Programme of measures monitoring - Land expropriation and water rights - Topography

	Design division - Irrigation works studies - Domestic water work studies - Drafting office - Supporting services *Tenders and contracts division* - Tenders - Contracts - Monitoring and executing - Archive and data processing *Information technology and publicity division* - Publicity, enlightenment, and training - GIS working group - Information technology and data processing - Telemetry and library services
Sector 3 Construction, Operation, and Maintenance	*Construction division* - Project management and supervision - Dam safety - Geotechnical works - Soil mechanics *Operation and maintenance of irrigation works division* - Operation and maintenance - Water management - Water [irrigation] pricing *Operation and maintenance of drinking water systems division* - Water treatment plants - Operations and maintenance of distribution network - Management and planning [of drinking water systems] - Desalination *Electrical-mechanical works division* - Design and planning - Construction - Large electrical-mechanical project supervision and contracts monitoring - Tenders and supply of equipment - Maintenance and repairs - Limassol and Paphos district office coordination
Sector 4 District Offices	*Offices – Nicosia/Lefkosia; Lemesos; Larnaka; Pafos; Ammochostos;* - Hydrometry and hydrology - Design for local projects - Construction - Regional operation and maintenance

(source: WDD, 2016)

APPENDIX 5: Water prices and tariff structures in Cyprus

Table A5.1: Summary of fees for drinking water supply from Governmental Water Projects - drilling/boreholes and other sources

		Water Fees [Τέλη Νερού]		
	WATER (drinking water) - Regulations 4 and 5 and Annex I [ΥΔΡΕΥΣΗ (πόσιμο νερό) - Κανονισμοί 4 και 5 και Παράρτημα Ι]	Finance - economics [Χρηματο-οικονομικό]	Environment & resources [Περιβάλλοντος & Πόρου]	**Total [Σύνολο]**
	Water supply from Government Water Projects / Government Water Supply Systems to Local Water Authorities [Παροχή νερού ύδρευσης από Κυβερνητικά Υδατικά Έργα / Κυβερνητικά Συστήματα Υδατοπρομήθειας προς τις Τοπικές Αρχές Υδατοπρομήθειας]	€ / per cubic metre [€ / κυβικό μέτρο]		
1	From the Southern pipeline plan (Government Water Supply Systems of Nicosia, Limassol and Larnaca-Famagusta) [Από το Ενιαίο Σχέδιο Νότιου Αγωγού (Κυβερνητικά Συστήματα Υδατοπρομήθειας Λευκωσίας, Λεμεσού και Λάρνακας-Αμμοχώστου)]	0,77	0,05	**0,82**
2	From the Government Water Supply System of Paphos [Από το Κυβερνητικό Σύστημα Υδατοπρομήθειας Πάφου]	0,59	0,05	**0,64**
3	From the Governmental Water Project of Pissouri to the Communities of Pissouri, Avdimou, Alectora, Fasoula and Archimanthrita [Από το Κυβερνητικό Υδατικό Έργο Πισσουρίου προς τις Κοινότητες Πισσούρι, Αυδήμου, Αλέκτορα, Φασούλα και Αρχιμανδρίτα]	0,60	0,05	**0,65**
4	From Governmental Water Project of Souni-Zanatzia to the Community Souni-Zanatzia [Από Κυβερνητικό Υδατικό Έργο Σούνι-Ζανατζιά προς την Κοινότητα Σούνι-Ζανατζιά]	0,34	0,05	**0,39**
	Abstraction of water from outside Governmental Water Works (from underground aquifers / surface sources) [Απόληψη νερού ύδρευσης εκτός Κυβερνητικών Υδατικών Έργων (από υπόγειους υδροφορείς / επιφανειακές πηγές)]	€ / per cubic metre [€ / κυβικό μέτρο]		

1	Fees applied by WDD to Local Water Authorities where they receive water from sources outside Governmental Waters Projects (boreholes, springs or rivers) [Τέλη που εφαρμόζονται από το ΤΑΥ σε Τοπικές Αρχές Υδατ/θειας που λαμβάνουν νερό ύδρευσης από πηγές εκτός Κυβερνητικών Υδατικών Έργων (γεωτρήσεις, πηγές ή ποταμούς)]			
	(a) For the supply of water intended for household water supply and other water uses. [(α) Για παροχή νερού που προορίζεται για ύδρευση οικιών και άλλες χρήσεις ύδρευσης]	-	0,05	**0,05**
	(b) For water supply to water resellers water supply (tankers / bottlers) [(β) Για παροχή νερού σε μεταπωλητές νερού ύδρευσης (βυτιοφόρα/εμφιαλωτές)]	-	0,12	**0,12**
2	Charges applied by the WDD to drinking water vendors with tankers, potable water bottlers, or other drinking water uses [Τέλη που εφαρμόζονται από το ΤΑΥ σε πωλητές πόσιμου νερού με βυτία, σε εμφιαλωτές πόσιμου νερού ή για άλλες χρήσεις πόσιμου νερού]	-	0,12	**0,12**

(Source: WFR, 2017)

Table A5.2: Summary of fees for irrigation water from Governmental Water Projects and recycled water

		Water Fees [Τέλη Νερού]		
	IRRIGATION - Regulations 6(1) and 7 and Annex II-A [ΑΡΔΕΥΣΗ - Κανονισμοί 6(1) και 7 και Παράρτημα II-Α]	Finance - economics [Χρηματο-οικονομικό]	Environment & resources [Περιβάλλοντος & Πόρου]	**Total** **[Σύνολο]**
	Provision of fresh-water irrigation water by Governmental Water Projects / Government Irrigation Networks [Παροχή φρέσκου-αδιύλιστου νερού άρδευσης από Κυβερνητικά Υδατικά Έργα/Κυβερνητικά Αρδευτικά Δίκτυα]	€ / per cubic metre [€ / κυβικό μέτρο]		
1	Fixed annual fee [Πάγιο ετήσιο τέλος]	€2,40/ [€2,40/δεκάριο]	-	€2,40/ [€2,40/δεκάριο]
2	For persons for agricultural and livestock use or aquaculture	0,15	0,02	**0,17**

	[Σε πρόσωπα για γεωργική και κτηνοτροφική χρήση/ή υδατοκαλλιέργεια]			
3	To irrigation water providers [Σε παρόχους νερού άρδευσης]	0,10	0,02	**0,12**
4	For industrial consumption [Για βιομηχανική κατανάλωση]	0,23	0,02	**0,25**
	For industrial use (with returns on the network). The amount that is not returned to the network is charged [Για βιομηχανική χρήση (με επιστροφή ποσοτήτων στο δίκτυο). Χρεώνεται η ποσότητα που δεν επιστρέφει στο δίκτυο]	0,23	0,02	**0,25**
5	For irrigation of other areas [Για άρδευση άλλων χώρων]			
	(a) lawns for football and sports fields; and islands, parks and other green areas that fall under the jurisdiction of State / Local Authorities [(α) χορτοτάπητα γηπέδων ποδοσφαίρου και αθλοπαιδιών και νησίδων, πάρκων και άλλων χώρων πρασίνου που εμπίπτουν στην αρμοδιότητα Κρατικών/Τοπικών Αρχών]	0,21	0,02	**0,23**
	(b) private lawns for football and sports and private green areas and hotel gardens [(β) χορτοτάπητα ιδιωτικών γηπέδων ποδοσφαίρου και αθλοπαιδιών και ιδιωτικών χώρων πρασίνου και κήπων ξενοδοχείων]	0,34	0,02	**0,36**
6	For overconsumption (quantity which exceeds the annual approval) [Για υπερκατανάλωση (ποσότητα που υπερβαίνει την ετήσια εγκριθείσα)]			
	(a) For agricultural production and livestock [(α) Για γεωργική παραγωγή και κτηνοτροφία]	-	-	**0,45**
	(b) For other uses [(β) Για άλλες χρήσεις]	-	-	Twice the norm [διπλάσιο του κανονικού]
	Supply of recycled water from tertiary units which fall within the competence of	€ / per cubic metre		

	the State Regulations 6 (2) and 7 and Annex III [Παροχή ανακυκλωμένο νερού από μονάδες τριτοβάθμιας επεξεργασίας που εμπίπτουν στην αρμοδιότητα του κράτους Κανονισμοί 6(2) και 7 και Παράρτημα ΙΙΙ]	[€ / κυβικό μέτρο]		
1	Fixed annual fee [Πάγιο ετήσιο τέλος]	€2,40/ [€2,40/δεκάριο]	-	€2,40/ [€2,40/δεκάριο]
2	To Persons for agricultural production [Σε πρόσωπα για γεωργική παραγωγή]	0,06	0,01	**0,07**
3	For / to irrigation water providers [Σε παρόχους νερού άρδευσης]	0,01	0,01	**0,02**
4	Industrial consumption [Βιομηχανική κατανάλωση]	0,15	0,02	**0,17**
5	Irrigation for other uses [Άρδευση για άλλες χρήσεις]			
	(a) lawns for football and sports; and islands, parks and other green areas that fall under the jurisdiction of State / Local Authorities [(α) χορτοτάπητα γηπέδων ποδοσφαίρου και αθλοπαιδιών και νησίδων, πάρκων και άλλων χώρων πρασίνου που εμπίπτουν στην αρμοδιότητα Κρατικών / Τοπικών Αρχών]	0,10	0,02	**0,12**
	(b) private lawns for football and sports and private green areas, hotel gardens and houses [(β) χορτοτάπητα ιδιωτικών γηπέδων ποδοσφαίρου και αθλοπαιδιών και ιδιωτικών χώρων πρασίνου, κήπων ξενοδοχείων και οικιών]	0,15	0,02	**0,17**
	(c) irrigation of golf courses (according to the decision no. 75.654, dated 28/8/2013) [(γ) άρδευση γηπέδων γκολφ (σύμφωνα με την απόφαση του Υ.Σ. αρ.75.654, ημερ. 28/8/2013)]	0,15	0,08	**0,23**
6	For over-consumption for all uses [Για υπερκατανάλωση για όλες χρήσεις]	-	-	Twice the norm [διπλάσιο του κανονικού]
	For all uses of water for irrigation and recycled water from the ΚΥΕ / ΚΑΔ fees			

	apply as follows: [Για όλες τις χρήσεις νερού άρδευσης και ανακυκλωμένου νερού από τα ΚΥΕ / ΚΑΔ εφαρμόζονται τέλη ως ακολούθως:]	
	Hydrometer / water meter connection: [Σύνδεση υδρομετητή:]	**€ 200,00**
	Reconnect hydrometer / water meter [Επανασύνδεση υδρομετρητή:]	**€ 20,00**
	Filter connection [Σύνδεση φίλτρων]	**€ 5,00 / δεκάριο**

(Source: WFR, 2017)

Table A5.3: Summary of fees for irrigation water from drilling/boreholes and other sources [other than governmental water projects]

		Water Fees [Τέλη Νερού]		
	IRRIGATION - Regulation 9 and Annex II-B [ΑΡΔΕΥΣΗ - Κανονισμός 9 και Παράρτημα ΙΙ-Β]	Finance - economics [Χρηματο-οικονομικό]	Environment & resources [Περιβάλλοντος & Πόρου]	**Total [Σύνολο]**
	Abstraction of irrigation water outside Government Water Works - They are applied by the WDD to consumers of irrigation water who receive water from sources outside the KYE (drilling, springs or rivers); and from aquifers enriched with recycled water) [Απόληψη νερού άρδευσης εκτός Κυβερνητικών Υδατικών Έργων - Εφαρμόζονται από το ΤΑΥ σε καταναλωτές νερού άρδευσης που λαμβάνουν νερό από πηγές εκτός ΚΥΕ (γεωτρήσεις, πηγές ή ποταμούς και από υδροφορείς που εμπλουτίζονται με ανακυκλωμένο νερό)]	€ / per cubic metre [€ / κυβικό μέτρο]		
1	For agricultural use / livestock farming and aquaculture [Για γεωργική / κτηνοτροφική χρήση και υδατοκαλλιέργεια]	-	0,01	**0,01**
2	For other uses as follows: [Για άλλες χρήσεις ως ακολούθως:]			
	(a) irrigation of lawns for football and sports grounds	-	0,02	**0,02**

	[(α) άρδευση χορτοτάπητα γηπέδων ποδοσφαίρου και αθλοπαιδιών]			
	(b) irrigation of islands, parks and other green areas under the authority of State / Local Authorities [(β) άρδευση νησίδων, πάρκων και άλλων χώρων πρασίνου αρμοδιότητας Κρατικών/Τοπικών Αρχών]	-	0,02	**0,02**
	(c) irrigation of private green areas and hotel / farm gardens [(γ) άρδευση ιδιωτικών χώρων πρασίνου και κήπων ξενοδοχείων/οικιών]	-	0,10	**0,10**
	(d) industry [(δ) βιομηχανία]	-	0,10	**0,10**
3	For irrigation of golf courses [Για άρδευση γηπέδων γκολφ]			
	(a) from surface sources - licensed private dams [(α) από επιφανειακές πηγές - αδειούχα ιδιωτικά φράγματα]	-	0,11	**0,11**
	(b) aquifers enriched with recycled water [(β) από υδροφορείς που εμπλουτίζονται με ανακυκλωμένο νερό]	-	0,23	**0,23**

(Source: WFR, 2017)

Table A5.4: Historical pricing of drinking water from governmental supply systems

Period of validity / Price of Water (per c.m.)	1984 - 1985	1986 – 1989 (from 1/11/1985)	1990 – 1993 (from 1/01/1990)	1994 – 2004 (from 1/1/1994)	2004 – today (from 1/1/2004)
GWCB of Limassol, Nicossia, Larnaca-Famagusta	0,1812 C£ 0,31 €	0,217 C£ 0,37 €	0,27 C£ 0,46 € *	0,335 C£ 0,57 €	0,45 C£ 0,77 €
GWCB of Pafos				0,16 C£ 0,27 €	0,33 C£ 0,56 €

** This price is valid since 01/01/1994 for the GWCB of Nicosia and Larnaca-Famagusta and since 01/01/1994 for the GWCB of Limassol, which is the date of start of operations for the Water Distillery of Limassol.*

(Source: WDD, 2007)

APPENDIX 6: Applicability analysis - a comparison between theoretical expectations and practical findings in Cyprus

The table uses a symbol and colour-based format in order to highlight the applicability of given categories, namely; green and a ☑ symbol to signal good evidence of the variable in practice and a good match with theoretical expectations; orange and a Ⓟ symbol to show the variable being partly evident in practice, with perhaps some aspects found and other aspects that disagree with the theory; as well as red and a ☒ symbol to signal limited evidence of the variable in practice and a lack of agreement with the theory.

A score system is also used in an attempt to provide a level of applicability for each of the rationalities when comparing theoretical expectations and practical findings. In this case, an aggregate score is given based on the number of variables that are fully evident [each given a score of 1], partly evident [each given a score of 0.5], or non-existent [each given a score of 0] in practice. For example, in terms of administrative rationalism, the first category of 'institutions and practices' has a maximum score of seven in terms of theoretical expectations [one point for each of the categories], while the practical findings score for this category is also seven points based on each variable being evident and agreeing with the theory. In contrast, the second category of 'basic entities recognised or constructed', the maximum score in terms of theoretical expectations is three points [one point for each of the categories], whereas the practical findings score for this category is 2.5 points based on two variables agreeing with the theory [each scoring one point] and one variable being partly evident in practice [scoring 0.5 points]. A final percentage score is also provided based on the scores for each category and the individual variables within these. This attempts to quantify the level of applicability for each of the rationalities according to the accumulated scores for both the expectations and findings.

Table A6: A comparison between theoretical expectations and practical findings

ADMINISTRATIVE RATIONALISM	
Expected characteristics	***Practical findings in Cyprus***
Institutions and practices ▪ Professional management bureaucracies - An important feature of the discourse that is assumed to be the result of governments seeking to manage natural resources and the economic activities associated with given resource sectors.	**Institutions and practices** ▪ Professional management bureaucracies ☑ - These were found to exist and operate. - In terms of water the primary examples were the MANRE and the WDD. - The WDD was the most influential, and consisted of a wide range of experts, which were defined as technical officers.

▪ Pollution control agencies - These are key institutions that provide evidence of a direct response for tackling and managing pollution issues. - Their existence signals a form of authority based on scientific expertise.	▪ Pollution control agencies ☑ - This agency type was noted to exist through the Department of Environment, which was situated within the MANRE. - The department has been responsible for; pollution control; urban wastewater treatment; general inspection and monitoring; waste management; as well as nature protection. - The WDD and general laboratories also work alongside the Department of Environment to monitor, manage, and respond to pollution and quality issues.
▪ Regulatory policy instruments - These instruments are central to the administrative rationalism response. - They involve regulations, policies, and laws that are formed by government, namely through associated resource management bureaucracies and pollution control agencies.	▪ Regulatory policy instruments ☑ - Regulations have been developed for water management in response to the problems of scarcity and quality. These have included laws relating to; municipal water usage; sewerage systems; irrigation; pollution control; water quality; resource protection; pricing; and integrated management. - The regulations were formed by government through the main resource management bureaucracies and pollution control agencies, namely the MANRE and the WDD.
▪ Environmental impact assessment - The technique signals presence of the discourse and involves a process of systematic assessment designed to evaluate the potential environmental damage expected by a given project. - Management issues can be expected when implementing these types of assessment, especially when large and controversial projects are involved.	▪ Environmental impact assessment ☑ - Evidence of environmental impact assessment and strategic environmental assessment. - The technique has been utilised for projects such as; dams and reservoirs; water treatment facilities; as well as desalination plants - Bypassing of assessment procedures was noted in the case of desalination plant construction. This agreed with expected management issues, and showed the influence high level politicians had in shaping decisions and bypassing procedures in order to implement desired outcomes.
▪ Expert advisory commissions - The commissions are formed in order to bring together scientific expertise and offer advice to government with regard to environmental issues. - Formed through policy, in response to general or specific issues, while being validated through policy and their high level of perceived expertise. - At national level, they exist in a position between the highest level	▪ Expert advisory commissions ☑ - An expert advisory committee on water management was found to exist and operate in conjunction with the Council of Ministers and the MANRE, as well as the various ministries that have responsibilities in the water sector. - The committee was a direct outcome of policy, namely the IWM Law, and has the role of advising the MANRE on matters relating to water resources and the formulation of policy.

actors and government departments, often having a direct link to presidents, prime ministers, or parliaments. - At international level, they have had more limited power, unless the given committee has been positioned within the structure of a supranational body.	
▪ Planning - Based on centrally established plans and targets that are set by government, with objectives to achieve these targets also being defined and communicated from the top of the organisational structure towards the bottom ground-level actors and consumers. - Plans and decisions are made by those positioned at the top of the decision-making system, such as parliament, ministers, and politicians. - A form of planning structured according to the top-down perspective.	▪ Planning ☑ - The expected form of planning was evident, based on a top-down format of planning structures, and more generally through the pathway of policy implementation. - Key role played by top-level actors, through parliament and the Council of Ministers, as well as an overall technocratic outlook based on control through technical bodies.
▪ Rationalistic policy analysis - Mainly concerned with identifying the best possible form of policy to be applied in a given situation. - The central role of expertise legitimates this type of analysis and problem-solving. - Involves a range of techniques, namely; cost-benefit analysis; risk analysis; technology assessments; forecasting; and decision analysis.	▪ Rationalistic policy analysis ☑ - Evident based on the use of techniques such as; cost-benefit analysis for infrastructure projects, water services management, and pricing structures; risk analysis and assessments for management options such as water recycling and reuse; as well as forecasting and risk analysis for understanding the effects of drought and climate change.
Potential maximum score: 7	*Practical score: 7*
Basic entities recognised or constructed ▪ Liberal capitalism - A structural status quo of liberal capitalism is a given.	**Basic entities recognised or constructed** ▪ Liberal capitalism ☑ - The presence of a structure centred on liberal capitalism is observed to be the governance system and political economy in place. This provides the suitable and necessary context for administrative rationalism to exist and operate.
▪ Administrative state - The most important and established basic entity in terms of the discourse. - Government exists and operates as the role of the administrative state, while	▪ Administrative state ☑ - The nation state was the first established and controlling entity with regard to water management and when shaping the response to problems of quantity and quality.

the process of governing is non-participatory and based on rational management that is guided by scientific and professional expertise. - The government is considered to exist in unitary terms, which involves a system of political organisation that operates with a central government having authority over and making decisions for subordinate local government offices or bodies. - Organisation of technical expertise, through a bureaucratic hierarchy and unitary government, is considered to be central in serving the nation state.	- The state is an important construct based on socio-political and organisational structures. This was based on factors such as; a highly political system; a closed community and society; a distinct culture; as well as strong hierarchal levels of organisation. - All water resources were controlled, developed, managed, and allocated by the state through government [WDD], and thus administered by the state before being given to water boards, district offices, municipal authorities, and regional or village boards for distribution to users.
▪ Experts and managers - The experts and managers assumed to have the primary role in decision-making, and adopt dominant positions in the state hierarchy. - Experts are defined as those that have scientific or technical expertise that are organised into bureaucratic hierarchy and motivated by the public interest. - Managers are defined as those that have a professional capacity to manage the response to a problem, being positioned to coordinate efforts. - An emphasis on the expert and manager, rather than the citizen or producer or consumer. This dynamic serves to establish how the social relationships of the discourse are based on bureaucratic hierarchy, rather than aspects of equality or competition.	▪ Experts and managers Ⓟ - Experts and managers have a key role, noted through examples such as expert policy guidance provided by the WDD and managers that operate at ground-level within the water boards and municipalities/villages. - Although the importance of experts and managers was evident, they did not exhibit the primary role in decision-making as expected. - Experts were defined in practice according to scientific or professional knowledge, specific skills, as well as roles in terms of research, policy guidance, and interaction with the advisory committee. - Experts were more prominently situated at the policy and executive levels of organisation, namely within the advisory commission, ministries, and technical departments that develop policy and give direction to the government on matters relating to water. - Managers operated further down the organisational hierarchy and had a focus on; a balance of multiple skills; working through groups; and implementing expert guidance that was given regarding different topics. - The managers played a greater role at the executive and consumer levels of organisation, for instance within water and sewerage boards, municipal authorities, irrigation divisions, and some sections of the WDD. - Some actors were identified as being both experts and managers. This was noted for experts within the MANRE and WDD, who showed responsibilities associated with both roles, as well as certain managers in the water

	and sewerage boards who exhibited expertise or had previous positions in expert roles. - The experts and managers identified in practice compared favourably with the expert and managers envisaged by Dryzek. In particular, key attributes were show, such as; an important standing; rational management; and public interest informed by expertise.
Potential maximum score: 3	*Practical score: 2.5*
Assumed natural relationships ▪ Nature subordinate to humans - Nature is deemed to be subordinate to human activities and problem-solving responses, thus implying that problem-solving gains priority above all else.	**Assumed natural relationships** ▪ Nature subordinate to humans ☑ - This relationship was evident through historical water management approaches, which were primarily founded on supply-based approaches and the development of infrastructure. - A range of examples noted how nature has assumed a subordinate position in comparison to problem-solving. These included; the vast number of dams and reservoirs constructed; development of the southern conveyor water transfer system; the exploitation of groundwater; as well as the expansion of desalination.
▪ People subordinate to state - The state is assumed to be the controlling force in comparison to the people. - In terms of this relationship, the position of the state can also be potentially occupied by a transnational authority.	▪ People subordinate to state ☑ - Society found to be subordinate to the state, as well as both society and the state also being subordinate to a supranational authority [EU]. - Evidence of this relationship based on; state control and the limited role of society in decisions made with regard to supply expansion and desalination. - The European Union was identified to be a strong influence and controlling force on state and society, through direct policy, economic requirements, and socio-cultural influences.
▪ Experts and managers control state - The experts and managers are assumed to be positioned in dominant roles within the state's hierarchy. This position is justified through expertise, and thus they are argued to control the state in terms of problem-solving responses and decision-making.	▪ Experts and managers control state ☒ - Although experts did have an important role, especially shown by the influence of the WDD, it was the higher level actors positioned above the experts and managers, namely ministers and politicians, that actually held the most power in terms of decision-making and problem-solving responses. - Politicians and ministers had the ability to control the direction of government and the

	state in relation to the management of water problems, specifically in the cases of water pricing and responses to drought.
Potential maximum score: 3	*Practical score: 2*
Agents and their motives ▪ Experts and managers - The variable of agency is attributed to both collective and individual actors. - The government is considered to be the primary agent, although not all individuals within government are viewed to have the equal ability to act. - Technical experts and managers are considered to be the most important agents, and they are assumed to have the greatest capacity to influence decision-making and the problem-solving response.	**Agents and their motives** ▪ Experts and managers Ⓟ - Agency was recognised through collective groups such as the government, boards, farmer unions, and advisory committees, while individuals such as experts, managers, ministers, and politicians were also acknowledged. - The government was argued to be the primary decision-making authority with regard to water, while the capacity to act varied according to ministry, position, control, and relative authority. - The capacity to act for those in government was variable. For instance, those in the MANRE and WDD had greater authority and capacity to act with regard to water management when compared to others such as those in the Ministry of Interior or municipal authorities and district offices. - Decisions are often heavily influenced and shaped by politicians, ministers, and parliament, thus meaning that the experts and managers do not have a greater capacity to act in comparison to these other collective and individual agents. This was highlighted in terms of changes to water pricing policy and in the case of drought management.
▪ Motivated by public interest - The motives of actors are orientated towards the interest of society, thus implying that important agents such as experts and managers seek to act in the public interest. - Motivations are assumed to be entirely 'public spirited', - Public interest is understood in unitary terms. This implies that identifying and applying this public interest is a technical procedure. As a result, technical experts are assumed to be in a better position to achieve this. For example, cost-benefit analysts or those	▪ Motivated by public interest ☒ - Civil servants, experts, and managers do try to act in the public interest, although exceptions to this rule were also found in which self or group-interests were the main motives. - Other individual or collective actors, such as politicians, municipal representatives/offices, or unions/organisations, did not always act in the public interest. - Many experts and managers sought to act in the public interest, even though these actions or decisions were often restricted by factors such as a lack of authority, limited control with regard to a given issue, and the complex politics associated with decision-making.

that assess risk can more effectively define what is in the public interest rather than the public or any other actors/groups. *Potential maximum score: 2*	- Despite many civil servants, experts, and managers trying to act in the public interest there were still exceptions, with self-interest in these cases often being determined by factors such as; a desire for votes; career promotions or opportunities; financial gains; as well as collective group benefits. *Practical score: 0.5*
Key metaphors and rhetorical devices ▪ Administrative mind - Considered to be much like the human mind, although it is collective and personified by the administrative state. - The administrative mind controls the state, just as the human mind controls the body. - Represents impartial reasoning and has unquestionable authority for the wellbeing of the administrative state. - An aura of knowledge and power. ▪ Navigating and steering - Associated with the imagery of the administrative mind. - The idea that society is steered in the appropriate direction and that effective navigation is needed in order to work through complex socio-environmental problems. *Potential maximum score: 2*	**Key metaphors and rhetorical devices** ▪ Administrative mind Ⓟ - This can be argued to exist based on the role and control of the state, which operates through government and administrative bodies that have long held authority for water management and problem-solving in Cyprus. - The government has sought to guide problem-solving in specific directions according to the perceived water issues at hand. For example, a period of supply expansion was deemed necessary when responding to the ongoing issues of scarcity as well as more frequent and severe drought periods. - Any presence of an administrative mind has been made weaker as a result of reduced control and authority held by the state and government in matters related to water. This has occurred as a result of the increasing influence of the EU in terms of new concepts, management approaches, and legislation. ▪ Navigating and steering Ⓟ - The idea of navigation and steering was evident based on the government guiding problem-solving in certain directions according to the perceived water issues a given time. These were identified through notable periods such as supply expansion, demand management, and more recent forms of integrated resources management. - Navigation and steering by the administrative state has been made weaker as a result of the increasing influence of the EU. *Practical score: 1*

Total potential score: 17	*Total practical score: 13*	*Applicability: 76%*

DEMOCRATIC PRAGMATISM	
Expected characteristics	***Practical findings in Cyprus***
Approaches and practices ▪ Public consultation - A primary tool when attempting to achieve public participation and involvement in decision-making. Thus it is assumed to have a central role as part of the discourse. - Can occur independently or as part of specific impact statements or procedures such as environmental impact assessment.	**Approaches and practices** ▪ Public consultation ☑ - Evident through both independent procedures as well as part of specific techniques such as environmental impact assessment. - It has occurred mainly as a result of EU legislation and the WFD. - Changes in policy due to supranational influences helped to drive changes in behaviour, which resulted in the adoption of more structured consultation procedures.
▪ Alternative dispute resolution - Builds on the technique of consultation by providing a more formal procedure with defined roles being given to non-governmental actors that take part. - Often utilised in legalistic systems, in order to avoid a legal impasse. - Attempts to bring together disputing actor groups to resolve issues under the authority and guidance of a neutral third party, such as a professional mediator.	▪ Alternative dispute resolution ☒ - Poorly represented, with no clear evidence of the technique being used in practice with regard to the management of water problems. - The closest examples of this type of mediation were related to joint projects in Nicosia regarding water supply, sanitation, and shared water treatment facilities, which caused conflicting groups to come together in order to produce a decision and provide an outcome with regard to infrastructure/services.
▪ Policy dialogue - This technique attempts to provide a more flexible style of mediation, which is based on discussions that are inclusive of relevant actor groups.	▪ Policy dialogue ☑ - The technique has been more apparent and used in certain cases with regard to water. - The policy dialogue process has included actors such as; experts in government departments; board representatives; municipal or village officials; non-governmental organisations; industry representatives, farmer unions; as well as community groups. - Evident in the case of; dialogue between the WDD, boards, and municipal and village authorities with regard to allocation; as well as discussions and mediation between the WDD and farmer unions in relation to irrigation water allocation and pricing.
▪ Lay citizen deliberation - A technique that focuses on the inclusion and role played by lay citizens in decision-making, rather than supporters of certain groups [defined as partisans by Dryzek].	▪ Lay citizen deliberation ☑ - Types of lay citizen deliberation were observed to exist in practice, mainly through; village meetings, municipal and town planning talks, as well as community discussions. - These were found to be related to topics such

- A softer form of participation that utilises situations which are centred on ordinary citizens, such as discussions, consensus conferences, planning cells, as well as town meetings.	as water supply and allocation, infrastructure projects, irrigation networks, distribution, and water pricing.
▪ Public inquiries - Assumed to enable a more visible forum for discussion, while encouraging arguments to be put forward by both advocates and opponents of a given project. - Considered to be useful democratic mechanisms, especially when projects are controversial or cause significant conflict between competing interest groups and different actors.	▪ Public inquiries ☒ - Poorly represented and have been essentially non-existent in practice. - A severe lack of evidence in Cyprus, despite similarities with impact assessment which itself has been observed.
▪ Right-to-know legislation - This type of legislation encourages public access to relevant information, which can often be enabled by freedom of information laws. - Specifically in terms of environmental problem-solving, right-to-know focuses on the need for actors, in particular industry, to disclose information with regard to the impact [or potential impact] of activities.	▪ Right-to-know legislation ☒ - This form of legislation was severely limited, and found to be almost non-existent. - A law ensuring public access to information for activities relating to water was not evident. - Access to specific information with regard to water was limited for the public, with the government only providing some information through certain reports, articles, and gazette journals or proceedings. - Requests for information could be filed by individuals to specific departments. For water, these could be primarily directed to the WDD. However, the amount and type of information disclosed was found to be highly variable.
Potential maximum score: 6	*Practical score: 3*
Basic entities recognised or constructed ▪ Liberal capitalism - The structural status quo of liberal capitalism is a given.	**Basic entities recognised or constructed** ▪ Liberal capitalism ☑ - The presence of a structure centred on liberal capitalism is observed to be the governance system and political economy in place. This provides the suitable and necessary context for democratic pragmatism to exist and operate.
▪ Citizens - Government provides a framework and setting for a form of governance based on interaction. - Governance does not focus on large single entities that have full control	▪ Citizens ☒ - It was found that citizens actually did not adopt a major role in problem-solving and decision-making. - The findings opposed the expected characteristics of democratic pragmatism and

and authority over decisions. - The network replaces the hierarchy, any central locus of authority is downplayed, and the response is considered in terms of multiple decision-making processes that are made-up of and directed by different actors with a focus on citizens. - The idea of *Homo-civicus* [power and organisation with the citizens, through public debate and being capable of taking into account the public good] is assumed to be the most important variable in decision-making. *Potential maximum score: 2*	the idea that *Homo-civicus* is the main underlying force that drives government, governance, and problem-solving. - Despite evidence of certain practices that signalled the existence of democratic pragmatism, such as public consultation and forms of deliberation, these still only served to provide very limited involvement for citizens in decision-making. - Citizens [and relevant actors] were often not a part of decisions, especially relating to; the construction of dams/reservoirs and expansion of infrastructure, such as desalination plants; as well as the pricing and allocation of water. *Practical score: 1*
Assumed natural relationships ▪ Equality among citizens - The discourse contrasts other problem-solving rationalities by recognising equality among citizens. - It is assumed that all actors, such as technical experts, elected officials/ politicians, civil servants, pressure groups, as well as the public, have the right to exert political pressure.	**Assumed natural relationships** ▪ Equality among citizens Ⓟ - A certain level of equality was identified due to the major influence of actors such as farmer unions [pressure group leaders] and politicians [elected officials], which debated alongside scientists, experts, and the public, while exerting pressure on decision-making. - However, even though there was evidence of different actors having the opportunity to exert pressure, the citizens/public that are deemed to be central to the discourse actually played a less prominent and limited role in practice. - The situation of equality in Cyprus was observed as being more uneven in practice, with the roles and influences of actor groups varying in their intensity.
▪ Interactive political relationships - Political relationships are considered to be more complex and interactive when compared to those observed in other discourses.	▪ Interactive political relationships ☑ - Political relationships were historically complex, while over time and particularly after EU accession, it was noted that interaction between actors had improved. - The aspects of cooperative problem-solving as well as conflict due to competing interests were evident in practice.
▪ Mix of competition and cooperation - Decision-making interactions are expected to involve a mixture of cooperation and competition, with both cooperative problem-solving as well as conflict taking place between	▪ Mix of competition and cooperation ☑ - Cooperative problem-solving was observed through consultations and community discussions that involved various stakeholders. - Conflict was also evident through numerous examples, including; delayed decisions and

different actors that hold competing interests.	disagreements relating to water pricing; conflict with regard to water allocation, particularly changes and restrictions during drought periods; as well as regional conflict in terms of drought management and restrictions on water usage.
Potential maximum score: 3	*Practical score: 2.5*
Agents and their motives ▪ Many different agents but citizens central - Agency in problem-solving is for all, and many different individual or collective actors are recognised. These include; citizens, experts, politicians, government agencies, unions, and community or environmental groups. - The citizen is considered to have a central role and influence in decision-making, and thus holds a primary role of highest importance.	**Agents and their motives** ▪ Many different agents but citizens central Ⓟ - Many agents observed that existed and operated as part of the problem-solving and decision-making process. These included; government bodies; technical experts; civil servants; politicians; boards; municipal and community representatives; as well as farmer unions and other environmental or non-governmental organisations. - In contrast to the discourse, agents were often observed to have varying roles and extent of influence, thus implying that in reality agency was complex, changeable, and not always for everyone. - Citizens in Cyprus were often not central to decision-making, while the importance and inclusion of the public only became more prominent through joining the EU and as a result of legislation such as the WFD.
▪ Motivation a mix of material self-interest and multiple conceptions of public interest - The discourse acknowledges that actor motives are often based on self-interests and material benefits, such as financial gains, job security, career progression, profit, or subsidisation. - Alongside this understanding, it is also assumed that at key points in the decision-making process, agents can be motivated by the public interest. - The public interest is often defined in plural terms, based on balanced compromise for all actors, with multiple conceptions recognised.	▪ Motivation a mix of material self-interest and multiple conceptions of public interest ☑ - Evidence of certain individuals and groups pursuing self-interests, as well as those acting in the public interest. - Observed through experts, such as those in the WDD, trying to act in the public interest, alongside politicians, ministers, and elected officials that were often found to be acting according to their own [individual or group] interests in order to primarily secure votes.
Potential maximum score: 2	*Practical score: 1.5*

Key metaphors and rhetorical devices	**Key metaphors and rhetorical devices**
▪ Public policy as a result of forces - These forces attempt to shape and move a given response in different directions according to the actor groups applying these forces.	▪ Public policy as a result of forces ☑ - Observed particularly in the case of specific pressure groups exerting their influence on the decision-making process in order to shift policy or a response to favour their interests. For example, represented by farmer unions applying pressure on politicians and government for increased water allocation.
▪ Thermostat description - It is assumed that problem-solving interventions and management responses are triggered based on the extent, type, and importance of environmental problems. - This analogy considers problem-solving interventions to occur as soon as the 'temperature' of an issue moves outside a desired range, with the heating and cooling temperature reflecting a wide range of political, economic, or environmental variables.	▪ Thermostat description ☑ - Evidence of this metaphor was observed in some cases, and was argued to have mainly occurred during the drought period of 2008 and the subsequent need to import freshwater from Greece. - In this case, the 'thermostat' level increased past a given point [temperature] at which political, media, and public pressure had departed from a desirable range, thus emergency measures were taken in order to mitigate the condition and ensure sufficient water provisions.
▪ Network system - Considered to exist as a type of metaphor, particularly by actors who embrace communication, technology, and the information society. - Networked governance emerges as an important variable through which responses proceed without any central controlling actor, but instead through a combination of different actors as well as coordinated efforts and forms of decision-making.	▪ Network system Ⓟ - Evidence of networks in practice has been limited, but their existence was still observed nonetheless. - The most notable network examples were apparent in the case of the Nicosia water treatment plant and a strategy on bi-communal cooperation for water resource management and supply. - Comparisons with information technology, as noted by the discourse, were not really evident in practice.
Potential maximum score: 3	*Practical score: 2.5*

Total potential score: 16	*Total practical score: 10.5*	*Applicability: 65%*

ECONOMIC RATIONALISM

Expected characteristics	***Practical findings in Cyprus***
Markets and incentives ▪ Privatisation - A central component of problem-solving and management in terms of economic rationalism. Based on the	**Markets and incentives** ▪ Privatisation Ⓟ - Privatisation as an extensive system of management was limited in practice, as water ownership and rights were found to be in the

application of economic principles and private property rights. - The discourse argues that problems emerge as a result of the failure of governments to privatise resources and attach property rights to environmental variables. - Privatisation adopts a definition that is centred on the sale of resource assets to the private sector and essentially the private ownership of water resources and related infrastructure. - Privatisation, through the private sector ownership of water [property/ resource] rights, can give the owner of these rights an incentive to protect their resource and investment, thus limiting damage such as pollution or overconsumption.	control of the state. - Property rights for water were held by the state, and managed through government, the MANRE, and the WDD. - The evidence of privatisation observed in practice involved the management of water-related infrastructure, and specifically the operation of desalination plants. - The funding and development of desalination plants was based on an economic model of public private participation. This shared similarities with forms of service-specific privatisation.
▪ Market instruments - The difficulties and complexities of privatisation are recognised by advocates of the discourse. As a result, market instruments are identified as being important to problem-solving and resource management. - These market instruments are defined as management tools that attempt to internalise environmental costs, taking shape through; incentives; pricing structures; subsidies; trading schemes; green taxes; and pollution rights or permits.	▪ Market instruments ☑ - A range of market instruments were evident in practice. The most prominent of these included; government subsidies; metering; as well as groundwater permits and licenses. - Government subsidies were considered to exist as direct and indirect types based on their application and influence. Direct forms involved the price of water, while indirect forms were deemed to influence water-using activities, the adoption of technology, and the development of infrastructure. - Metering was widely applied in practice. The majority of domestic supply was metered, even though some management issues were still evident in villages and rural areas. In turn, metering for agricultural water was prevalent, with this involving irrigation systems used to better manage resources. - A groundwater permitting and licensing scheme was applied in order to monitor and manage legal and illegal boreholes, as well as to deal with groundwater depletion and water quality issues caused by saline intrusion that had resulted from over-abstraction of aquifers.
Potential maximum score: 2	*Practical score: 1.5*

Basic entities recognised or constructed	**Basic entities recognised or constructed**
▪ Liberal capitalism - The structural status quo of liberal capitalism is a given. This is true for all of the rationalities.	▪ Liberal capitalism ☑ - The presence of a structure centred on liberal capitalism is observed to be the governance system and political economy in place. This provides the suitable and necessary context for economic rationalism to exist and operate.
▪ Markets, prices, and property rights - These are central to the discourse. - Markets provide context and the systems within which transactions can take place. - Pricing can be used to dictate transactions within a given market. - Private rights can allow markets to operate and are assumed to encourage environmental protection as a result of ownership.	▪ Markets, prices, and property rights Ⓟ - The existence and use of markets was observed to varying degrees. The use of metering, pricing, and government subsidies was evident, while in contrast there was a lack of an extensive market-based form of management such as privatisation. - Pricing was identified as an important economic management tool, while in many cases it was also a topic of conflict both within government and between certain actor groups. - Alongside the tool of metering, pricing was applied to control water consumption and influence usage in agricultural, domestic, industrial, and commercial sectors. It also gained further importance as a result of the WFD, which encouraged a structure based on the recovery of costs. - Private sector property rights were found to be poorly established, as the state, through government, municipal authorities, and the WDD, held rights to all water resources. - The government waterworks law ensured the property rights of almost all water [surface and groundwater resources] are owned by the state and controlled by government.
▪ Governments not citizens - Government is important and needed to establish the conditions and markets required for the discourse to exist. - The citizen is not recognised as an entity and does not play a role in the decision-making process. - As part of the discourse, some level of government is deemed to exist as an entity that is more than just a collection of economic individuals.	▪ Governments not citizens ☒ - Practical findings recognised both entities of the government and citizen. - Despite agreeing with economic rationalism regarding the importance and key role played by government, the idea that citizens did not exist or play a role in problem-solving was not true. The fact that the citizen is missing from economic rationalism does not agree with the findings of problem-solving and decision-making as observed in practice.
▪ Homo economicus - The discourse recognises the entity of Homo economicus, which assumes that actors are driven by self-interest	▪ Homo economicus ☑ - The existence of Homo economicus was identified in certain cases, mainly being observed through some government actors and

and seek to satisfy their own subjective goals. - This is at odds with the entities of Homo bureaucratis associated with administrative rationalism, and Homo civicus put forward by democratic pragmatism.	politicians who acted to satisfy their own self-interests, for example; to achieve job security; gain financial benefits through promotion; or to demonstrate political allegiance. - Self-interest was also represented through individual or group benefits, for example; individual politicians seeking to gain financial benefits; or groups such as the farmer unions which made decisions or applied pressure according to their associated political parties.
Potential maximum score: 4	*Practical score: 2.5*
Assumed natural relationships ▪ Competition - A basic relationship of competition is assumed to exist for all actors, and this fits closely with the central theme of economic markets that encourage competitive interaction.	**Assumed natural relationships** ▪ Competition Ⓟ - The existence of competition in the traditional economic sense was not observed, due to the government ownership of water and prices being set by the Council of Ministers according to given sectors. - Some competition was identified in terms of water allocation, with this occurring between sectors and for actors or groups within sectors.
▪ Hierarchy based on expertise - A government hierarchy based on expertise is deemed to exist, as experts must be in a position to assign and manage property rights, while forming and implementing market-based tools such as pricing structures, permits, and subsidies.	▪ Hierarchy based on expertise Ⓟ - This hierarchy was partly evident due to the position and influence of experts in government. - The structure of the water sector was based on expertise, and within this organisational setting experts and managers had a significant role in water management. However, it was also evident that experts often did not have full decision-making control, and instead it was the higher level politicians and ministers that had the power to shape final decisions. - Although a hierarchy based on expertise did partly exist in practice, the highest level of this hierarchy actually involved actors such as politicians and ministers that were deemed to be non-experts. It was these actors who influenced final decision outcomes according to their own individual or group interests.
▪ Subordination of nature - Nature is deemed to be subordinate to humans, the market, and problem-solving. - The discourse is anthropocentric and based on suitable expertise to ensure	▪ Subordination of nature ☑ - This type of relationship was argued to exist in practice, based on the extensive development of infrastructure and the exploitation of groundwater resources through boreholes, where human needs had taken priority over

that rights, incentives, and market instruments are developed. *Potential maximum score: 3*	the environment. - Human needs for increasing amounts of water were shown to outweigh the associated environmental costs of these activities. For instance, without the vast and long-term exploitation of groundwater the problem of saline intrusion could have been avoided. *Practical score: 2*
Agents and their motives ▪ Homo-economicus and self interest - Agency in the problem-solving process is primarily attributed to those who take on the role of Homo economicus. These actors are essentially motivated by self-interest. ▪ Some government officials must be motivated by the public interest - In order to allow the problem-solving process to develop and be effective, some agents within government must be motivated by acting in the public interest, with these individuals being required to carry out the arrangement of rights and the implementation of market instruments. - In terms of recognised agents, the concept of citizenship is not acknowledged in the context of economic rationalism. *Potential maximum score: 2*	**Agents and their motives** ▪ Homo-economicus and self interest ☑ - The existence of Homo economicus was identified in many cases, and was related to the motivation of self-interest. - In practice, this was observed through politicians, ministers, and non-experts, as well as some government actors and experts [even though these were a minority] who sought to satisfy their self-interests. ▪ Some government officials must be motivated by the public interest ☒ - Agency and motivation was not observed in the form expected by economic rationalism. The majority of experts and civil servants sought to generally act in the public interest, while it was the politicians, ministers, non-experts, as well as a minority of experts and civil servants who sought to act according to their self-interests. - Citizens were recognised as part of the decision-making and problem-solving process, with evidence of this found through public consultations, water board group meetings, as well as public forums for interaction. As a result, these findings opposed the expected characteristics of economic rationalism. *Practical score: 1*
Key metaphors and rhetorical devices ▪ Mechanistic - The social world is considered to be a machine that meets human needs and is made up of components with associated functions. - Involves the idea that the machine may need to be reassembled at some point, with this being achieved through the	**Key metaphors and rhetorical devices** ▪ Mechanistic ☑ - Two scenarios were linked to this concept in practice, namely; the changes in pricing that were a result of cost recovery; as well as the widespread and ongoing rearrangement of borehole permits and abstraction licenses for groundwater resources. - These have involved changes in management,

rearrangement of property rights.	a rearrangement of organisational systems, and the changing of 'components' associated with pricing and groundwater control.
▪ Regulation as 'command and control' - Regulation and regulatory approaches are defined as forms of 'command and control', thus giving a negative meaning to this response. - This rhetoric is used in an attempt to weaken other approaches, in particular administrative rationalism.	▪ Regulation as 'command and control' ☑ - This rhetoric was evident in Cyprus, mainly based on the interpretation and blame attached to government and regulation by certain actor groups, such as water boards, farmer unions, and the mainstream media.
▪ The use of horror stories - Rhetoric formed in relation to governmental actions. In this case, stories are created and defined as 'horror stories' based on the overly negative representation of government, while associated decisions or actions are deemed to give poor, inefficient, or expensive outcomes.	▪ The use of horror stories ☑ - These stories were identified through a range of examples, including; the drought of 2008 and regional government conflict associated with water allocation and supply restrictions; the self-interest of politicians as negatively portrayed in the media; as well as negative connotations associated with water usage and allocation, such as a lack of supply restrictions for tourists during drought periods.
Potential maximum score: 3	*Practical score: 3*

Total potential score: 14	*Total practical score: 10*	*Applicability: 71%*