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Scale and justice in water allocation

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Dedication

I dedicate this thesis to my wonderful Mum and Dad - Ans and Audie Neal – who have provided me with so many opportunities that have enabled me to complete this milestone in my life.

I thank them with much love!

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Abstract

Water allocation is a fundamental part of water resources management. Water allocation is often a contested process because it involves multiple uses and users of water. Issues of justice arise when resources are, or are perceived to be, in short supply. When water is allocated the rules for the distribution of the resource may result in just outcomes for some stakeholders but may create injustices for other stakeholders. Issues of scale thus form an important component of water allocation. This thesis draws from an amalgam of ideas on justice, scale and water management and aims to present a conceptual framework that explicitly utilises an understanding of scale and levels as a means to enrich the concept of justice in the context of the water allocation. The discovery that there was no exciting conceptual framework described in the literature that explicitly addressed and defined water, scale and justice simultaneously and in sufficient depth revealed the necessity to develop a such a framework hence providing the primary impetus for this study.

Two scales – a regulatory and an institutional scale – were identified using a specific issue facing water management within the Murray-Darling Basin in Australia, namely Domestic and Stock (D&S) dams. The management of D&S dams currently falls outside the formal water entitlement framework for the Basin and presents a scenario of perceived injustice in that water share holders pay for their water and rely on it for their livelihoods while those accessing water for D&S use do not pay for it and often it is for aesthetic purposes. Five levels within the regulatory and institutional scale were found to be relevant to this issue and comprised the federal, basin, state, regional and local levels. These levels described the boundary of the system under investigation and they defined the scope of the study. They also provided the means to identify the relevant legislation, strategy and policy documentation at each level within the regulatory scale and the relevant institutions and key decision makers that were interviewed at each level in the institutional scale.

Content analysis techniques were used to examine five regulatory documents and ten interview transcripts; one document from each of the five levels within the regulatory scale and two interviewees from each of the levels within the institutional scale formed the primary data source for the study. The texts were coded, categories were identified, ideas were clustered and three themes were developed. These themes were

entitled: *Broadening the Scope of Justice*; *A Continuum of Justice* and *The Dynamics of Justice*. Each of these themes provided a different perspective of justice and contributed to the development of a conceptual framework entitled *The Cycles and Spirals of Justice*.

This study explored justice through the lens of the issue of Domestic and Stock (D&S) dams. The issue of D&S dams was taken up by a number of institutions and addressed via a number of policies and regulations. As it moved through the various levels of the regulatory and institutional scales it was perceived to be dealt with justly by some and resulting in injustices by others. Justice is in the eye of the beholder! Politics and power shifted the D&S issue around the system; it was reframed by institutions along the way to suit their mandates and their cause. What was deemed as a just way of dealing with D&S dams at one level was deemed unjust at another.

Three *justice for whom* categories were identified and explored through the case study, namely justice for social, economic or environmental concerns. They were found to vary between the levels of the regulatory and institutional scale and their positions on each scale shifted under extreme water scarce conditions. The case study illustrated the interdependency of social, economic and environmental concerns, the need to be fully inclusive of all three concerns within a scope of justice and called for a re-examination of obligations towards the environment. Recognition of the deteriorating state of the environment within the Murray-Darling Basin highlighted that it underpinned most of the Basin's social and economic activities.

Striving for or managing for justice is not a static act; if justice is achieved at one level, it might not be at another. What is often perceived as a just outcome at one level of one scale could result in injustices at another level or scale. It is important to recognise that there exists at each level a cycling continuum of justice and injustice, and that because we are dealing with issues in a complex system we need to be cognisant of the relationship between justice and injustice in the decision making process. There exists a distinct possibility that we might be unaware of the injustices that our actions at one level might have at another. I have developed a conceptual framework entitled the *Cycles and Spirals of Justice* that helps make sense of the relationship between justice and injustice in the context of the water allocation decision making by explicitly utilising an understanding of scale and levels.

This is a transdisciplinary study so it is hoped that the findings of this research will contribute to building bridges between disciplines, enhance the current

understanding of the concepts of justice and scale in the context of water allocation and ultimately contribute in some small way to water being used and distributed more justly and sustainably in the future.

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CHAPTER 1: Introduction

Water allocation is a fundamental part of water resources management. Water allocation has been described as an unavoidable conflictual process because it is a political process (Allan, 2003) and it involves multiple uses and users of water. The scarcity of water resources, driven by anthropogenic and/or natural means, exacerbates the already politically sensitive process of water allocation. Issues of justice arise when resources are, or are perceived to be, in short supply. In these situations individuals or groups of people are concerned about getting their fair share and arrangements are made, or institutions created, to allocate resources (Wenz, 1988).

This concern about getting one's fair share arises when an individual or group feel that others are not contributing their fair share to a public good or are taking more than their fair share from a common or communal resource (Schroeder *et al.*, 2003). This can and has resulted in winners and losers in water resources management. This presents a problem because the burden of being the loser can impact negatively on people's livelihoods and/or ecosystem health; and often results in some degree of discontent. Often the losers are marginal communities or disempowered individuals or groups, and/or the natural environment. This can result in social and environmental injustices, especially if they are continuously perpetuated.

Conflict over water has a long and fascinating history. Interestingly there is a globally accepted misperception that the next wars will be fought over water (Allan, 2005). On closer examination of the evidence, there are in fact more instances of international co-operation than conflict over water (Wolf, 1998). The reason behind this is that there is a not a direct linear relationship between water resource scarcity and conflict, with co-operation over resources other than water factoring into the political economy of international relations (Allan, 2005). Regardless of whether one errs on the side of co-operation or conflict, issues of justice come into play. When negotiating water sharing arrangements there is always a process of identifying for *what* and *why* water is needed by different parties followed by decisions on *how* water should be

distributed between water uses and users. This is where issues of justice surface – both in process and outcome.

This need for justice in water management is recognised in many water laws and policies around the world and is articulated through calls for equity and equitable allocation. For example:

1. the UN Convention on the Law of the Non-Navigational Uses of International Watercourses states, in Article 5 and 6, the need for "*equitable* and reasonable utilization" of international watercourses (UN, 1997);
2. Integrated Water Resources Management (IWRM), the current and generally accepted approach to water management, "promotes the co-ordinated development and management of water, land and related resources....in an *equitable* manner..." (GWP, 2000); and
3. the Australian Commonwealth Water Act of 2007 states that "decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and *equitable* considerations" (Commonwealth of Australia, 2007).

Although the term equitable is commonly used in policy and legislation, the implications of its meaning have not been explicitly articulated or dissected in the water management realm. Biswas (2008 p9), in a critique of the definition of IWRM, asks "What is precisely meant by equitable? How will this be determined operationally? Who will decide what is equitable, for whom, and from what perspectives and under what conditions"?

These are important questions and in the context of transboundary water management where decisions about water sharing between sovereign States are made at the international level they can open up a Pandora's Box. International agreements or treaties are often used to codify water sharing arrangements between sovereign States but there have been some cases where local communities have been disproportionally burdened with some of the negative outcomes of decisions made at the international level. This is illustrated by way of example by the Lesotho Highlands Water Project, an international water sharing project between Lesotho and South Africa. South Africa pays royalties to Lesotho for water transferred to its economic hub; and Lesotho receives hydropower electricity for its domestic use. The treaty signed between Lesotho and South Africa is considered by some as an example of good practice (Haas *et al.*, 2010). However the infrastructure involved in this

interbasin transfer and hydropower scheme includes large dam development which has had significantly negative impacts on the long term ability of the affected local communities within Lesotho to maintain their livelihoods even though they received monetary compensation or were resettled (Mokorosi & Van der Zaag, 2007). This example illustrates that decisions that are sometimes considered good practice at one level (in this case at the international level between South Africa and Lesotho) do not necessarily translate to positive outcomes at other levels (in this case at the local community level within Lesotho).

This notion that what is apparent at one level might not be at another resonates with work done in the field of landscape ecology. Landscape ecologists call for a minimum of three adjacent levels to be examined in order to gain some insight into landscape heterogeneity and its underlying ecological processes (Patrick & Ellery, 2006). The primary reason for this is that what often appears at one level may not be seen at a coarser level and vice versa, and what offers an explanation for certain phenomena at one level may not at another (Gibson *et al.*, 2000). A simple example would be a spatial examination of the distribution of trees; within a one square kilometre plot size their distribution might appear random, but within a ten square kilometre plot size their distribution may be explained by proximity to a water course that was not visible at the one square kilometre plot size. The difference in the plot size or the scale of resolution of the study has a direct impact on the possible explanation of the pattern of tree distribution. Could the same apply to justice in decision making? What appears to be just or equitable at one level may not be at another. What is the relationship between the different levels of decision making and how does this influence the justice or equity of water allocation decisions?

These questions provided the imperative for this study and were instrumental in the development of the research question and proposition which guided this study.

How can justice be met in water allocation?

By understanding and being explicit about scale and levels.

The aim of this thesis is to draw from the amalgam of ideas on justice, scale and water management and present a conceptual framework that explicitly[1] utilises an understanding of scale and levels as a means to enrich the concept of justice in the context of water allocation.

This aim was the product of two iterations of literature review. The first is captured in *Chapter 2: Literature Review: Water, Scale and Justice* which presents the background to the research question and proposition. It briefly reviews the current water management paradigm of sustainability and water allocation mechanisms, and it defines the concepts of justice and scale. The second iteration comprises *Chapter 3: Beginnings of Conceptual Bridges* which explicitly reviewed the literature in search of conceptual links between justice, scale (and levels) and water allocation. This review revealed the lack of a conceptual framework that could adequately explain the relationship between justice and scale in the context of water allocation decision making and thus exposed a gap in the knowledge base.

Because the aim draws from work in a variety of disciplines, the approach to the study had to be couched in a methodology that could embrace multiple disciplines. *Chapter 4: Methodology* describes how and why transdisciplinarity filled this niche and how when coupled with a system thinking approach provided the means to define the scope of this study. This chapter also describes, in the form of a narrative, the six phases of research that were undertaken in this study. The scope of this study was bounded by a specific issue in the format of a case study described in detail in *Chapter 5: Defining the System: Case Study and Issue*. The issue centred on how increasing numbers of Domestic & Stock (D&S) dams were impacting on water entitlements of downstream irrigators in a small catchment in the State of Victoria, Australia. This issue presented a platform to explore perceived injustices between multiple water users and also enabled two scales relevant to water allocation decision making to be identified, a regulatory and an institutional scale, each of which comprised the five levels of federal, basin, state, regional and local government.

Data on how uses and users of water were prioritised in the decision making process, and information on whether a change in circumstances such as a drought could alter this prioritisation, was captured from legislation, policies and strategies at each level in the regulatory scale and from interviews with key decision makers at each level in the institutional scale. These data were analysed and coded using content analysis

[1] As opposed to its implicit or undefined use in most policy documents and some studies.

techniques and after a number of iterations three overarching themes emerged. Each theme contributed in a different way to the enrichment to the concept of justice in the context of water allocation, and they form the hub of the discussion in *Chapter 6: Enriching the Concept of Justice*.

The final chapter, *Chapter 7: Cycles and Spirals of Justice*, synthesises the outcomes from Chapters 3, 5 and 6 to form a conceptual framework that explicitly utilises an understanding of scale and levels as a means to enrich the concept of justice in the context of the water allocation – thus fulfilling the aim of this study and filling a gap in the knowledge base.

CHAPTER 2: Literature Review
Water, Justice and Scale

Introduction

This chapter presents the background to the research question and proposition. ***How can justice be met in water allocation? By understanding and being explicit about scale and levels*.** It briefly reviews the current water management paradigm of sustainability and the range of existing water allocation mechanisms. It defines the concept of justice with the explicit purpose of illustrating that it is a complex and dynamic concept and that there is more to its meaning than commonly associated with its use in regulatory documents. It defines the concept of scale and levels and the importance of understanding the interactions and dynamics between and within different scales and levels.

Water

Environmental Discourses

The tensions and challenges that face water management and allocation stem from the demands of water users for their fair share of the resource. These demands change over time because the needs of society constantly evolve. The way water resources are managed generally reflects a shared perspective of how the (watery) world works and changes as priorities change and as knowledge of it deepens. This notion of a shared way of looking at the world is described as a discourse and in the context of natural resources management, as an environmental discourse (Dryzek, 1997). Dryzek (1997) describes the history of environmental affairs and developments as a collection of discourses which are identified and distinguished from each other by the language they use to describe the environmental challenges and solutions facing society. Hussey and Dovers (2006) have adapted Dryzek's typology of environmental discourses, Table 1 provides a summary of the them.

Table 1 Summary Descriptions of Five Environmental Discourses (adapted from Hussey & Dovers, 2006 p44).

Environmental Discourse	Description
Sustainability	Reinforces capitalist economy but economic growth, environmental protection, distributive justice, and long term sustainability are seen as together. Reassures society that no tough choice will be made between economic growth and environmental protection.
Democratic Pragmatism	Stresses the importance of interactive problem solving involving participants from within government and outside it. It takes the structural status quo of liberal capitalism as given, but government is seen not as the administrative State, but rather as a multiplicity of decision processes populated by citizens and driven by liberal democracy.
Economic Pragmatism	Relies exclusively on the deployment of market mechanisms to achieve public ends. Opposes regulation. No role for government except to establish the basic parameters of designed markets. There are no citizens in economic rationalism, only consumers and producers.
Survivalism	Recognises and emphasises the resources upon which human beings depend. Stresses that human demands on the carrying capacity of ecosystems threaten to explode out of control. Population is seen as an aggregate entity to be managed by elites. Rich in metaphors based on 'limits to growth' theory.
Green Rationalism	Recognises that nature is a series of complex ecosystems whose wellbeing requires change in human behaviour. Social, political and economic structures are recognised as having important influence that cannot be reduced to the sensibilities of the individuals inhabiting them. Humans are set apart from nature by virtue of their reasoning capacities, but they are not seen as dominant. A stewardship relationship between humans and nature is advocated.

All these discourses are still currently evident in one form or another. Although sustainability is currently the predominant discourse, none has superseded the other. This in itself feeds into the tensions and challenges that face decision making for water management and allocation. The various discourses are also not necessary mutually exclusive, there is in fact compatibility and overlap between them on some issues and approaches. The relevancy of the different discourses varies according to

different problems in differing contexts. Although there is no explicit discussion on the influence of scale and levels on the evolution of the different environmental discourses or on how they possibly interact on different levels, interestingly Dryzek (1997) in the concluding chapter of his book does pay it some deference. He says that some discourses are more amenable to global issues, for example the survivalism discourse tends to focus on global environmental issues, while others such as democratic pragmatism and economic pragmatism tend to relate to more local issues. No attempt is made at further defining what is meant specifically by global and local, except he goes on to say that "potential compatibilities notwithstanding, it remains the case that most of the discourses analysed offer a comprehensive account of and orientation to environmental affairs at all levels, from the global to the local, and across different issue areas" (Dryzek, 1997 p198).

Water Management Paradigms

Linked to and influenced by the evolution of environmental discourses, the way water is viewed and managed has evolved substantially over the past century. Allan (2003) summarises this evolution in five water management paradigms. His analysis targets water scarce, developed countries and he uses water use in irrigation as an indicator of the trajectory of water resource development. This is illustrated in Figure 1.

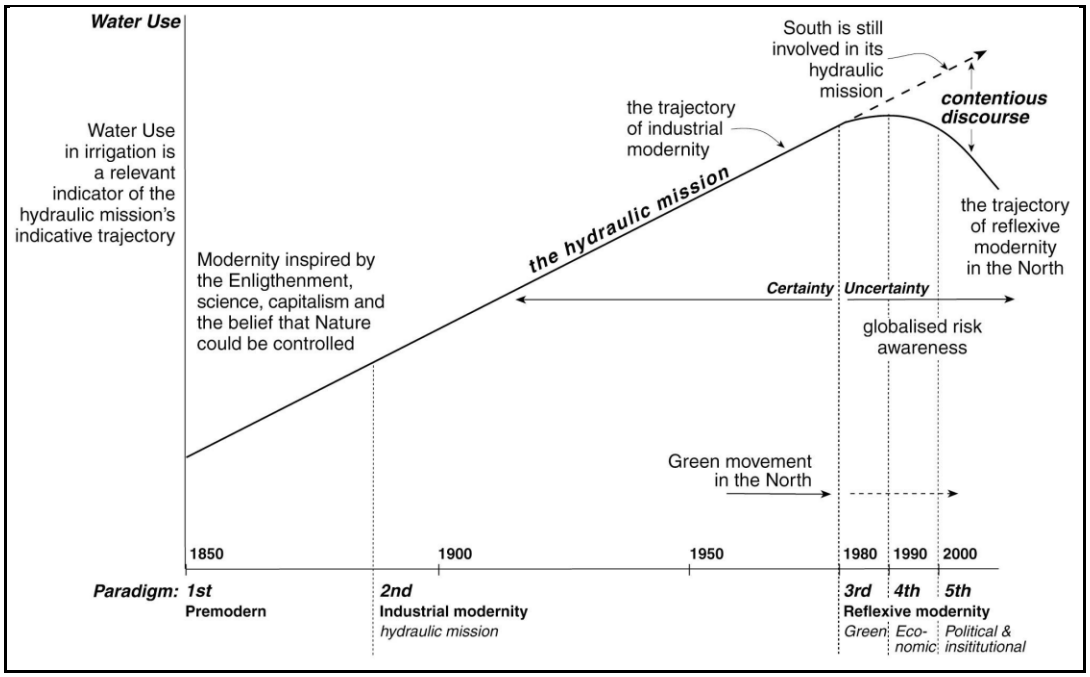

Figure 1 The evolution of water development described in five water management paradigms (Allan, 2003 p10).

The first paradigm is the premodern paradigm which is characterised by communities that had limited technical and organisational capacity and where water is regarded as a social resource – providing for domestic consumption, sanitation and small scale production – essentially basic human needs. This is followed by an industrially driven water management paradigm, where water plays a fundamental role in the economic development of a country – this paradigm reached its peak in the mid-twentieth century and has also been termed the hydraulic mission phase (Reisner, 1993) and is characterised by dam construction, irrigation schemes and commercial agriculture. In the 1980s a third paradigm emerged primarily as a result of the environmental activism that took place in the 1960s and 1970s when it was realised that the economic development in the industrial period was damaging the natural environment. This environmentally driven water management paradigm was however short-lived and was superseded in the 1990s by a revised economic model where the monetary value of water was espoused. Allan (2003) asserts that the current emerging paradigm is borne out of the principles of integrated water resources management and the environmental discourse of sustainability. This fifth paradigm is one that seeks a balance between the driving forces of society, economy and environment. A summary of the five water management paradigms and their relation to its driving force is illustrated in Figure 2.

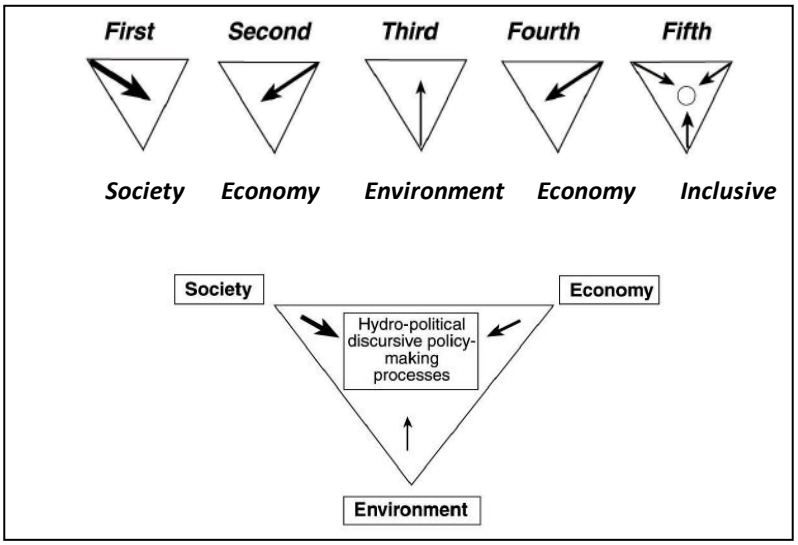

Figure 2 Five water management paradigms and their dominant political drivers influencing water policy development (Allan, 2003 p13).

Allan (2003) notes that countries with developed economies, are currently wrestling with the fifth paradigm of water management, while most developing countries, are still engaged in the second paradigm where water management is driven primarily by an economic agenda. It can also be argued that, similar to the way the environmental discourses are not necessarily linked to a time scale, so neither are the water management paradigms. Facets of each are currently alive and well, and while an integrated approach of sustainability is the current sanctioned discourse, the emphasis and priority of society, economy and environment ebb and flow with specific problems and within particular political contexts in both developed and developing countries.

Water Allocation

Within the fifth paradigm described by Allan (2003), a balance or integration of the voices from society, economy and environment is sought in the determination of appropriate water allocation policies and practices. There are three main perspectives from which water allocation decisions can been made, they are water viewed as an economic good, a social good and an environmental good. Water allocation mechanisms have emerged from each of these perspectives.

Water as an Economic Good

Dinar *et al.* (1997) provide a brief review of the water allocation mechanisms that have developed from the economic or water costing perspective. There are four broad types of water allocation mechanisms namely marginal cost pricing, public allocation, water markets and user-based allocation. These mechanisms are briefly described in Box 1 and are summarised from Dinar *et al.* (1997).

Box 1 Economic Based Water Allocation Mechanisms (Dinar*, et al.*, 1997).

Marginal cost pricing – this mechanism for water allocation results in a value or unit price based on the cost of supplying that unit of water. This method is considered to be economically efficient and could deter overuse as prices would rise to reflect the relative scarcity of the water supplied. However accurate costing of the true cost of water is difficult and this method can also result in some lower income groups not being able to afford water as prices increase due to increased scarcity.

Public allocation – this mechanism for water allocation is where the State determines what water resources will be used by different sectors and

users; and allocates and distributes water accordingly. This method is advantageous because its main concern is satisfying the public good. However one of its main problems is that the real costs of water supply and distribution are unaccounted for and there are no incentives to conserve water and improve efficiencies.

Water markets – this mechanism of water allocation is based on an exchange of water rights or allocations in a competitive market environment. Demand and supply forces dictate the quantities to be traded and the unit price for the commodity. This method is flexible to users and creates options for users when water is scarce. However any inconsistencies in measuring water flows, defining of rights or rules for withdrawal or pricing can result in third party effects and environmental degradation.

User based allocation – an example of this mechanism of water allocation is farmer-managed irrigation systems. This method requires collective action institutions with authority to make decisions on water rights. A major advantage of this method is the degree of flexibility in water supply and delivery to meet local needs. If however the institutions regulating water allocation don't promote water use efficiency it can result in inefficiencies and environmental degradation.

The principles of efficiency and equity are promoted by the perspective of treating water as an economic good, however these principles are sometimes mutually exclusive (Dinar*, et al.*, 1997) with criteria for allocation often falling back on efficiency based rules as they are easier to account for and justify than equity to the political elite.

Water as a Social Good

The most fundamental derivative of water as a social good is that of basic human needs. There is much debate in the literature about the right to water, primarily fuelled by the fact that until only recently access to water was not explicitly mentioned in the Declaration of Human Rights as a right. This however changed in 2010 when the General Assembly included the right to water and sanitation as a human right (UN, 2010). The right to life and a standard of living adequate for health and well-being can only be achieved if access to water of a quantity and quality that supports these rights is secured. Although no specific volumes are mentioned in the new declaration, the challenges of implementation and the necessity to link this new right explicitly with the Millennium Development Goals were voiced. Various global

organisations have made some recommendations of what should be the minimum basic human needs for water. Gleick (1998) suggested the following:

Table 2 Quantity of water for basic human needs (Gleick, 1998 p496).

Purpose	Litres per person per day
Drinking water	5
Sanitation	20
Bathing	15
Food Preparation	10

From an international law perspective there is a right to sufficient water to sustain life and the State has a due diligence obligation to safeguard these rights (Gleick, 1998). Recognising the basic human need of 50 litres per person per day provides a very practical mechanism for water allocation. Gleick (1998 p499) states that "meeting a basic water requirement for all people is constrained by institutional and management failures, not by basic water availability".

It is interesting to note that the Universal Declaration of Human Rights (UN, 1948) is also unclear about the right to water to grow food to achieve an adequate standard of living. Some argue that it is an implied need while others argue that sufficient food can be sourced without the local provision of water. The latter perspective is supported by the concept of virtual water, i.e. "water that is used in the production process of a commodity is called the 'virtual water' contained in the commodity" (Hoekstra & Hung, 2005 p45). Although the concept is promoted more at a global-water-use-efficiency level, it is relevant at a local basic human needs level in that instead of a country importing actual water or growing water intensive crops in a water scarce environment, it makes more sense to import water intensive crops, along with its contained virtual water, to satisfy local food security needs. This logic is often undermined by the ideals and politics of sovereignty and the need for a country to be food self sufficient.

Water as an Environmental Good

Falkenmark (1999) describes water as the bloodstream of the biosphere. The environmental benefits of water-based ecosystems have been thoroughly documented and include *inter alia* provisioning services (e.g. food, fresh water, fuel), regulating services (e.g. flood attenuation and disease control), cultural services (e.g. spiritual and religious, recreation), and supporting services (e.g. soil formation, nutrient

cycling) (Ranganathan *et al.*, 2008). There is often a view expressed that concerns about the environment are in direct conflict with economic growth and development. This conflict is essentially a short vs. a long term view; and there is increasing realisation that the health of ecosystems is critical if human needs and economic goals are to be met in the future.

Ironically it was the hydraulic mission phase of water resources management that initiated a new and now accepted science of instream flow requirements (IFRs) or environmental flow requirements (EFRs) (Tharme, 2003). This science was borne from the negative environmental consequences of large dam construction around the world where altered flows were the cause of major negative downstream ecological impacts (Bunn & Arthington, 2002) (and contributed to the environment vs. development debate). A need to calculate the minimum flow requirements for rivers below dams was thus initiated. Today the need for environmental flows to sustain water based ecosystems is recognised and accepted, and has been decoupled from concerns solely over dam construction and their impacts (although they are still relevant in these cases). Like the minimum basic human needs for water, the need for minimum environmental flows has received growing priority in the planning of water allocations.

Tharme (2003) has published a comprehensive review of the numerous mechanisms and methodologies used to calculate environmental flow requirements. She categorises four broad types of methodology: hydrological, hydraulic rating, habitat simulation and holistic methodologies (see Box 2 for details).

Box 2 Categories of Environmental Flow Methodologies (Tharme, 2003).

Hydrological Methodologies – this type of methodology primarily uses hydrological data to calculate flow targets and recommend minimum flows for a specified ecosystem service such as freshwater fisheries. They are rapid, low resolution methodologies that are appropriate at a coarse planning level and in situations of low water allocation controversies.

Hydraulic Rating Methodologies – or habitat retention methodologies use hydraulic variables such as discharge based on wetted perimeters across specific river sections regarded as surrogates for different riverine biota and habitats. These discharges are assumed to be limiting factors for these habitats and environmental flows are calculated to be at or just above these discharge thresholds.

Habitat Simulation Methodologies – these attempt to measure environmental flow requirements based on detailed hydrological, hydraulic and biological response data. The outputs of these methodologies develop complex indices for a range of ecosystem goods and services and produce habitat discharge curves or series that are used to calculate optimum environmental flows.

Holistic Methodologies – these methodologies are the most sophisticated of the EFRs techniques. They focus on developing EFRs for the whole riverine ecosystem. Important and critical flow events form the basis of the EFR and are identified from all the major components and elements of the riverine system, including ecological, geomorphological, water quality and social characteristics. Redundancy is built into the outcomes by including scenario based approaches to varying environmental flows to flag departures from the desired flow regime.

The current trend in determining environmental flow requirements is a hierarchical approach comprising two phases. The first is categorised by a rapid assessment usually at a basin, regional or national level and usually utilises hydrological methodologies. The second phase is a more comprehensive assessment carried out at a river reach or local level and utilises either the habitat simulation or holistic methodologies (Tharme, 2003). Some countries have chosen to focus their resources solely in the more comprehensive assessments. This approach has been criticised because it is extremely time consuming and much ecological degradation happens before the environmental flow requirements are established and allocated (O'Keeffe, 2008). The rapid assessment has also received its fair share of critique because its low resolution is to such an extent that its usefulness has been questioned (O'Keeffe, 2008). There is still much research in this field to be undertaken before definitive or universal methodologies can be promoted. Water allocation to the environment thus remains a contentious issue resulting in ecological water needs often being neglected or relegated to the bottom of the list of water allocation priorities.

In conclusion, the environmental discourse and water management paradigm of sustainability is valuable because it has created an impetus to be aware of and inclusive of all social, economic and environmental concerns. This has translated into the development of water allocation mechanisms that address at least the minimum requirements of each of these concerns. Conflict in allocation of water between and within each of the concerns is however still inevitable and the potential for injustices to arise is unavoidable.

Justice

Definitions and Theories of Justice

Justice is a concept that most people commonly associate with the legal system – justice will be served when a wrong is righted. In the ambit of ethics something is just if it adheres to the current sanctioned philosophical discourse – the problem being of course whether there is agreement on what that philosophical discourse is (Colquitt *et al.*, 2001). The meaning of justice in the context of its role in decision-making and resource allocation is multifaceted and leads us down the paths of sociology, social psychology, philosophy and political science. Issues of justice arise when resources are, or are perceived to be, in short supply. In these situations people are concerned about getting their fair share and arrangements are made, or institutions created, to allocate resources (Wenz, 1988). There are two underlying assumptions in this statement, the first is that people care enough about the resource to want their fair share of it and secondly that the resource is able to be distributed. A resource such as clean air cannot be allocated in bundles and therefore decisions and reasons to manage for clean air would be different than for example a resource such as water that can be stored, allocated and distributed (at least at some stages of the hydrological cycle).

A brief examination of the trends in social psychology justice research helps with defining the concept. In the 1960s and 1970s much of the justice literature assumed that people's sense of justice was concerned with the distribution of outcomes or resources based purely on motivations of self-interest (Skitka & Crosby, 2003). Equity theory provided the prominent distribution or outcome orientated viewpoint. Equity is achieved according to Adams (1963) when a person's rewards or outputs are perceived to be in proportion to that person's inputs or contributions. In other words equity is affected by what is termed the contributions rule (Leventhal, 1976) where a person who contributes greater should receive higher rewards or outputs[2]. There were some challenges to this mainstay theory. Deutsch (1975) introduced two additional rules that determine how rewards or outputs should be distributed, these are the needs rule, where a person who has a greater need should receive higher

[2] It is assumed that the use of terms 'equity' and 'equitable' in many water policies and legislation don't use it in this narrow sense but rather in a broad justice sense– this however does contribute to some of the confusion over the use of term and its implications for water allocation.

rewards or outputs; and the equality rule, where everyone should receive equal rewards or outputs regardless of their needs or contributions. Equity (or contributions), needs and equality are rules that are used to determine how resources or rewards could be distributed. They are often referred to in the literature as distributive justice rules.

These 'rules' however all focus on the distribution of outcomes or allocation of resources. During the late 1970s and 1980s research shifted from distribution to procedural issues. Thibaut and Walker (1975) (and Deutsch and Leventhal) expanded the notion of justice to include not only distribution rules but also procedural rules. They contend that the manner or procedures in which the allocation of rewards or outputs are decided is also critical for determining what is just. The main premise of procedural justice is that the output or final distribution of resources is more likely to be accepted as just or fair[3] if the manner in which the decision was made is deemed to be just or fair by the affected parties. In the 1980s and 1990s, since Thibaut and Walker's initial ideas on procedural justice, many more facets of procedural justice have been posited as important to defining the concept. They include *inter alia* the need for consistency, accurate information, opportunity to correct decisions, representation of all affected parties – the procedural equivalent to distributive equality, interpersonal behaviour, articulation of reasons for allocation decisions, accountability and treating affected parties with respect (Brockner & Wiesenfeld, 1996; Gross, 2011).

Brockner and Wiesenfeld (1996) suggest that there is a third dimension to distributive and procedural justice that focuses on the interactive effects between these two categories of justice. They suggest that the effect of procedural justice on individuals' reactions to a decision depends on the level of outcome favourability; similarly, individuals' reactions to outcome favourability depend on the degree of procedural fairness with which the decision is planned and implemented. It is therefore difficult in an empirical study to separate out which category of justice is the independent variable. Hence it is suggested by Brockner and Wiesenfeld (1996) that it is more important to view the interactions between distributive and procedural justice. They neatly sum this up with the suggestion that the phrase "it is not only

[3] The terms fair or fairness is often used in the social psychology literature rather than the terms just or justice - in this thesis they are considered synonymous and are used interchangeably

what you do, but how you do it" should be replaced with the phrase: “the effects of what you do depend on how you do it” (Brockner & Wiesenfeld, 1996 p206).

Distributive rules and procedural processes were adopted by the political science, public policy administration, and the environmental management fields in the form of public participation (involvement/consultation) in resource allocation decision making (Smith & McDonough, 2001). Calls for procedural justice to be more part of public participation programmes have illuminated the need to balance self-interest and group-value models of behaviour (Lawrence *et al.*, 1997). This idea of self interest or individualism vs. the group as a whole poses a social dilemma situation that can be traced to Hardin’s Tragedy of the Commons. The dilemma is deciding whether to sacrifice personal maximum benefit for the potential joint benefit of all members of the group. Schroeder *et al.* (2003) classify social dilemmas into two categories: one where individuals are extracting a resource from a common pool where the individual gains from all they can take and the costs are borne by the entire group; and the second where individuals make personal contributions to provide some desired benefit that will be enjoyed by the whole group, which opens the door to the possibility of free riders. The risk in both cases arises when there is an asymmetry in where the gains and burdens fall; and it is this asymmetry that challenges our notions of justice and fairness.

Distributive and procedural justice provides some insight into the complexity of defining and understanding justice especially in the context of natural resource management. If however we delve a little deeper into the literature, the concept of justice becomes more textured and layered. There are many models of justice which attempt to provide an underlying or unifying explanation of why we make the decisions we do, and how we should make decisions in specific contexts. This Holy Grail - that there exists a unifying theory of justice - has not yet materialised, and is unlikely to in the near future. The reality is that there are many competing principles or perspectives of justice that can be used to make convincing arguments for the advocacy of quite contrary positions.

There is an extensive history and array of research that has contributed to the development of the many theories of justice; and a wide ranging review would not be appropriate for the purpose of this study. The aim here rather is to present a brief overview that provides sufficient background on the range of existing justice theories

but also focuses on some that are relevant to this study. Bearing this mind, I propose four families of theories that warrant some exploration. They are an economic family, a rights-based family, a social family and an environmental family. The description of each theory is taken from Wenz (1988), from his book on Environmental Justice, which provides an overview of a number of models and theories of justice.

The Economic Family

Efficiency is the driving force behind this family of justice theories where maximising surplus is advocated. This family is represented by the following:

Libertarian Theory – provides an underlying rationale for settling all issues of justice through the free market (and the courts). People have the right to be able to buy and sell whatever they want so long as they don't use force or fraud.

Efficiency Theory – is similar to libertarian theory in that it advocates a free market where there is a minimal State that protects private property but does not interfere with the economy. It differs in the means to achieving this goal in that it advocates maximum efficiency rather than the right to liberty and private property as its central tenet.

Cost-Benefit Analysis – although a technique rather than a theory, cost-benefit analysis is often used in decision making. It is underpinned by the principles of Efficiency and Utilitarian (see below) theory. CBA analyses alternative courses of action based on the costs and benefits (primarily expressed in monetary terms) associated with each, and recommends the option with the greatest benefits and/or lowest costs as the most desirable choice.

The Rights-based Family

Human Rights – provides a means of settling disputes by appealing to fundamental human rights. These comprise negative rights which are rights to non-interference (e.g. people's life, liberty, expression, religion or property) and positive rights which are rights to assistance (e.g. health, education and wellbeing)[4].

Animal Rights - provides a means of settling disputes by appealing to fundamental animal (or non-human animal or subjects-of-a-life) rights. Animal rights comprise negative rights such as right to life and freedom, and apply to wild animals. In most

[4] Miller Miller, D. (2009). Justice and boundaries. *Politics, Philosophy and Economics, 8*(3), 291-309. suggests that human rights should not be comparative i.e. it is not about how one person is treated relative to others, but should be about how they are being treated. In all other circumstances justice is comparative and is about getting one's fair share.

countries positive animal rights only come into play when dealing with domesticated animals.

The Social Family

These theories generally reflect a concern for the welfare of society. Two of the most popular and well known theories are:

Utilitarian Theory - provides a rationale for making decisions, taking action and designing policies that produce the greatest good. This theory supports decisions that maximise happiness or preference satisfaction, and is laudable in its aim to improve the wellbeing of all people.

Rawls' Theory of Justice – Rawls offers a hybrid theory that reconciles the consideration of rights and utility. The basic premise of the theory is that decisions can be made based on which alternatives offer the most help for the worst off or that the worst possible outcome is made as good as it can be. Thus decisions are made on principles that are considered fair for everyone without any prejudice.

The Environmental Family

These theories focus on ecosystem and environmental concerns, values and/or rights; and shine a light on the need to take the environment into account when making decisions about natural resource management and allocations; they are important when sustainability issues are taken seriously.

Biocentric Individualism – is not a justice theory *per se*, but is a perspective that contributes to the discussion. It is based on the belief that there is value in every living thing and that people have an obligation to take this value into consideration whenever their actions affect living things.

Ecocentric Holism – is a view that people should limit their activities out of concern for the continued existence of a species and the continued health of ecosystems. It is also not a theory *per se*, but offers an additional view point that considers the broader environment in decision making.

Precautionary Principle – often referred to when development has the potential to impact negatively on the environment. Where there is a risk of irreversible harm or damage, the absence of evidence cannot be used as a reason to proceed with development.

Of all these theories or perspectives on how decisions should /could be made, no one theory is flexible enough to accommodate all views or rationales on how matters should be justly resolved. Each of them can however be used to make decisions in

specific scenarios or contexts. They can be used in whole or in part, modified or blended, to form a pluralistic theory. In other words they can be used to design a framework which provides some guidance as to how the variety of principles, theories, perspectives and models of justice can be appealed to in a consistent manner in particular contexts and situations. Wenz (1988) has developed such a framework, calling it the Concentric Circle Theory.

The Concentric Circle Theory

Wenz's *Concentric Circle Theory* can be visualised as a series of concentric circles that represent relationships. The individual of interest is placed at the centre of the concentric circles and people, non-human animals and the non-sentient environment are placed in more distant circles from the centre as the strength and number of obligations to them decreases (Wenz, 1988). The major tenets of Wenz's conceptual framework are listed below (summarised from Wenz, 1988):

1. closeness is defined in terms of the strength and number of one's obligations to others;
2. the obligations arise in the context of actual or potential interactions. These relationships of interaction are tied by commonly respected justifications to the obligations in question. So the closeness is not formally tied to emotional attachments or to subjective feelings of closeness;
3. the commonly respected justifications for obligations include, but are not limited to, the following: I have benefited from another's kindness or help; I am in a particularly good position to help the other; another person and I have undertaken a project together; the other person and I are working to realise the same goal, foster the same ideal, or preserve the same traditions; I have unilaterally undertaken a commitment to another; my actions have a particularly strong impact upon the other; and I have perpetrated or benefitted from a past injustice toward the other, or a past injustice which adversely affects the other. These relationships and others give rise to a complex set of moral considerations to which the concentric circle perspective adds some order, without imposing a rigid hierarchy;
4. mere biological relatedness does not justify obligations, so the concentric circle approach does not promote racism or speciesism;

5. other things being equal, I have stronger and/or more numerous obligations to satisfy the desires/wants/preferences/needs of others as they occupy closer concentric circles;
6. other things being equal, I have stronger and/or more numerous obligations concerning the positive rights of others as they occupy closer concentric circles;
7. other things being equal, I have a greater obligation to respond to positive rights than to the satisfaction of desires/wants/preferences/needs, even when those whose positive rights in question are more remote from me than are those whose preferences are at issue;
8. non-human animals do not have positive rights except in cases of domestic and farm animals (whose dependence is caused by human beings);
9. negative rights apply to all subjects-of-a-life, regardless of placement on a concentric circle. But such rights are not absolute. They can in some circumstances be overridden by other considerations; and
10. non-sentient constituents of the environment do not have rights, but we have an obligation to ameliorate the destructive environmental impact of our industrial civilization. We have some obligation to work for the preservation of evolutionary processes that tend to increase biotic diversity. This includes working to preserve endangered species and remaining wilderness areas[5].

Wenz's concept of justice provides us with a consistent menu in terms of how we can apply and appeal to different principles in decision making. However, the meaning and concept of justice and its underpinning principles are dynamic, they evolve as human understanding and technologies evolve (Wenz, 1988). What was just in the past may not be today and what is just in one context is often not in another.

Scale

Definitions

There is much confusion in the literature regarding the use of the terms scale and levels (Allen & Hoekstra, 1990; Neumann, 2009). They are often used interchangeably, for example the global scale or the global level, and often no attempt is made at defining what is meant by either of them. Gibson *et al.* (2000 p219) define scale "as

[5] Tenets 8, 9 and 10 have progressively evolved over the last few decades where the positive rights of non-human life and the natural environment are increasingly represented in the legal system of most countries.

the spatial, temporal, quantitative, or analytical dimensions used...to measure and study objects and processes" and levels are locations along a scale. Cash *et al.* (2006) further clarify the definition of scale and level diagrammatically. Figure 3 is taken from Cash *et al.* (2006) to illustrate different scales: spatial, temporal, jurisdictional, and institutional as well as several examples of levels within each of those scales.

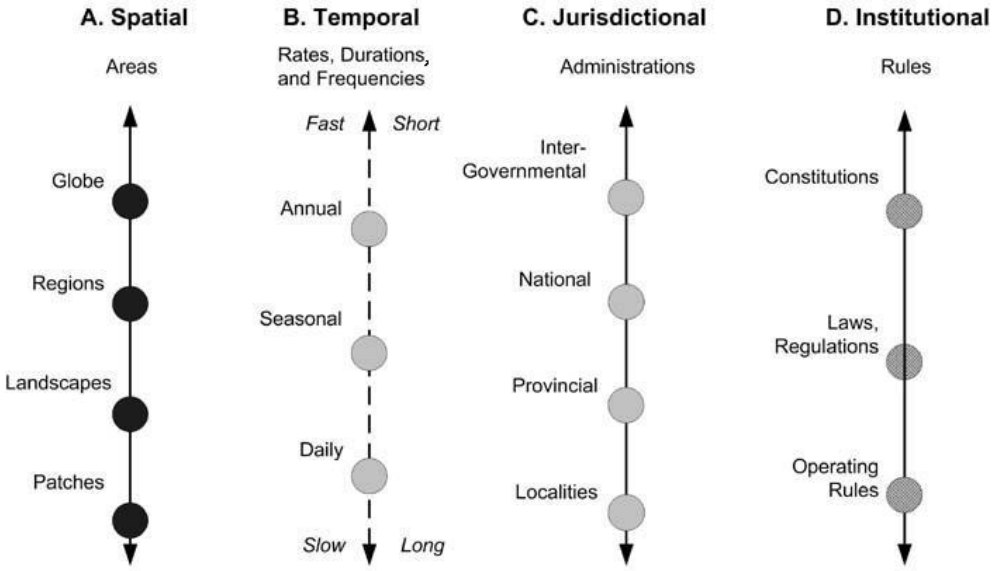

Figure 3 Illustration of Cash *et al.*'s (2006 p3) definitions of scales and levels, where A to D represent different scales, each divided into various levels.

In the geography literature in general and the landscape ecology literature in particular, scale is defined by grain and extent (Kotliar & Wiens, 1990). The grain or resolution refers to the unit used to measure a phenomenon of interest at a particular level. In Figure 4 if the scale was time and the level was one month as illustrated by the two squares of the same size; the grain in the first large square could be seconds – represented by the mosaic of smaller squares; and in the second large square it could be days. So the grain is increasing from seconds in a month to days in a month.

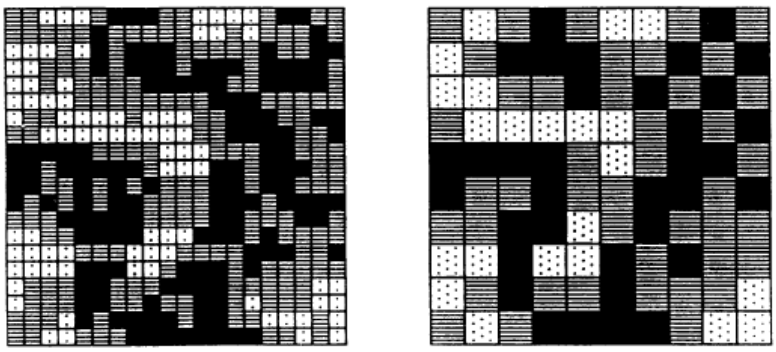

Figure 4 Illustration of increasing grain size or resolution (Gibson*, et al.*, 2000 p219).

"Extent refers to the magnitude of a dimension used in measuring a phenomenon" (Gibson*, et al.*, 2000 p219) and is illustrated in Figure 5. Again using a scale of time, the grain is constant, in this case it could be days, but the extent is increasing from, for example a week (the small square), to a month (the middle sized square), to a year (the largest square); all measured in days.

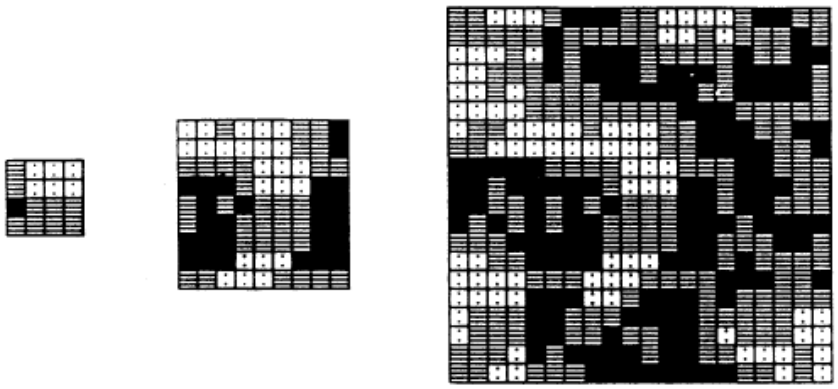

Figure 5 Illustration of increasing extent (Gibson*, et al.*, 2000 p219).

Thus increasing extent introduces the notion of multiple levels - a week, a month and a year represents three levels in the scale of time; and the unit of analysis or measurement in this example is days. It is important to articulate grain and extent when discussing scale issues as they affect what and how phenomena, problems and solutions are identified, observed and interpreted. This highlights the frequently used phrase in the literature – the 'issue of scale' or the 'problem of scale'.

The Issue of Scale

At its simplest the 'issue of scale' is a call for caution in the interpretation of data because what often appears at one level may not be seen at a coarser level and vice versa, and what offers an explanation for certain phenomena at one level may not at another (Gibson*, et al.*, 2000). The selection of one scale, or even worse one level of one scale, to the exclusivity of others can frame a study too narrowly. This is especially problematic in natural resource management which is characterised by complex social-ecological systems (Wilbanks, 2006). This can result in the misinterpretation of results, the introduction of bias or the initiation of management actions that could have longer term negative consequences at a level not imagined to be connected to the

one where the problem originally emerged[6]. One way to mitigate for not capturing the whole picture or system is inter- or transdisciplinary studies. These focus the research on the interconnectivity of different scales and levels, and therefore perspectives resulting in the problem and hence solutions being explored in a more comprehensive manner (Lovell *et al.*, 2002).

Ison (2008 p140) defines a system as "a perceived whole whose elements are interconnected". Perceiving wholes rather than parts is at the heart of the definition of systems and also the heart of the debate between reductionist science and systems science. Reductionist science is currently unpopular in natural resources management and is often apologetic in its manifesto, whereas systems based science basks in the glow of its advocates. Provenza (2000) offers refreshing insight to the opposing factions, claiming that both views are deeply interrelated and that neither position on its own will solve the complex problems of today.

Reductionist science seeks to understand how individual parts of the system work in order to predict and then control their behaviour. This process of reductionism or differentiation in its extreme has resulted in silos of knowledge and fragmentation of information resulting in negative unintended consequences. Unintended consequences are not always knowable in advance. They may arise because feedback processes (both positive and negative feedback) are not appreciated (Ison, 2008). Provenza (2000) states that differentiation in isolation from integration, and vice versa, is unhelpful; and uses the analogy of the growth of a complex organism from a single cell, where cell division proceeds, followed by cell differentiation into specialised tissues and organs and then integration into a coherent functioning organism. Similarly systems science focuses on the whole system but needs to understand that the differentiated parts are integrated and integral to its behaviour and identity. In others words an understanding of scale and levels is paramount because what is described as a part of a system from one perspective is in fact a system composed of other systems from another.

[6] This is an example of the emergent properties typical of complex systems – they are properties that are revealed at a particular level and are not possessed by or revealed in constituent sub-systems Ison, R. L. (2008). Systems thinking and practice for action research. In P. W. Reason & H. Bradbury (Eds.), *The Sage handbook of action research participative inquiry and practice* (pp. 139-158): Sage Publications, London..

The feedback or interactions in a system and its constituent subsystems may occur within levels, between levels of the same scale and between different scales (Cash*, et al.*, 2006). These interactions are complex and dynamic and they may change in strength and direction over time (Cash *et al.*, 2006). They are illustrated by the arrows in Figure 6 and can represent relationships between institutions or people, exchanges of information or more formal pathways of regulation and management. Figure 6 shows the increasing complexity of these interactions from simple single scale multi-level systems with no interactions between the levels (top of Figure 6) to complex cross scale and cross level systems with interactions between and within all levels and scales (bottom of Figure 6).

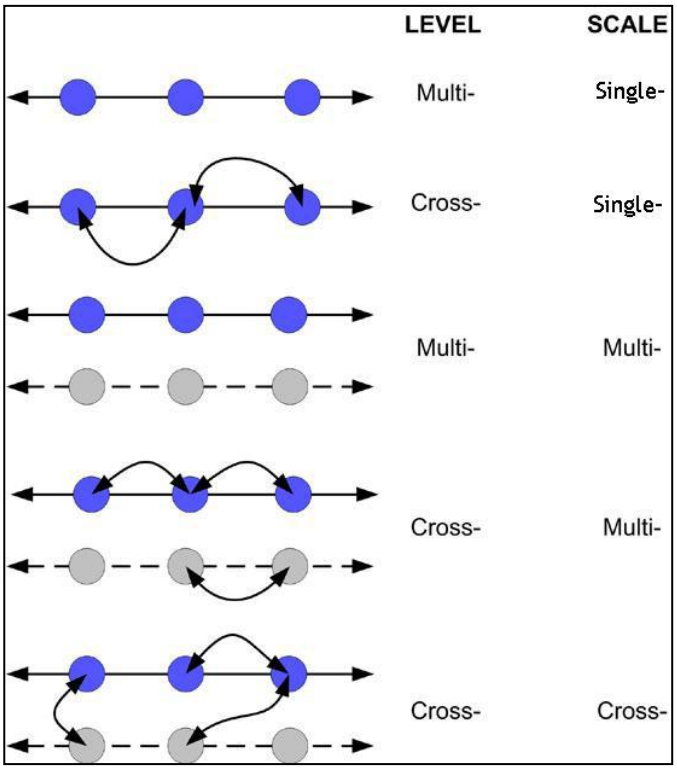

Figure 6 Cross level and cross scale interactions (Cash*, et al.*, 2006 p5).

These cross level and cross scale interactions focus on the properties of scales and levels (or multiple extents). The property of grain is not included in Figure 6, but the unit of measurement of the interactions that may occur within a level, between levels and between scales should be described when investigating the issue of scale.

A side-bar worth noting here is that in Cash *et al.'s* diagrams and descriptions of scales and levels they are always illustrated along a line (either horizontally as in Figure 6 or vertically as in Figure 3). This observation presents an opportunity to discuss

hierarchy, a term that is often used in conjunction with scale and levels in the literature and is also a source of some confusion as it is commonly associated with a command and control management structure. This is simply not the case - the broadest categories of hierarchy are nested and non-nested hierarchies (Gibson*, et al.*, 2000). A non-nested hierarchy is one where higher levels do not contain the levels beneath it. An example from a political science perspective could be an army ranking of generals, then captains, lieutenants etc. An ecological example could be the food chain with carnivores on the top level, followed by herbivores then plants. There are two types of nested hierarchical systems, namely inclusive and constitutive (Gibson*, et al.*, 2000). The most well known inclusive hierarchy is the Linnaean biological hierarchy of taxonomic categories. Most inclusive hierarchies are classificatory rather than explanatory systems. The second type of nested hierarchy is constitutive where the lower levels combine into higher levels with new organisation, function and emergent properties (Gibson*, et al.*, 2000). An example could be molecules contained in cells, contained in tissues, contained in organs etc., where the degree of sophistication in function increases with each level of organisation. An understanding of the hierarchical properties of the levels within a scale would therefore offer some explanation to the types of interactions that could take place between levels and scales (Wu & David, 2002).

Interactions between levels in scales are often referred to as vertical interplay (Young, 2006) or up-scaling or downscaling (Lovell*, et al.*, 2002). This interaction implies a vertical plane of interaction between levels of the same scale and is most commonly discussed in the form of top-down and bottom-up management, i.e. using a scale of jurisdiction or administration. The debate of top-down and bottom-up management is synonymous with the debate of centralised vs. decentralised water management institutions. The conundrum is the same - smaller units or local level institutions lack the co-ordination or overarching vision to address problems greater than the local level, and larger institutions are often too remote and out of touch with local level problems to be effective (Lovell*, et al.*, 2002). This conundrum enhances our understanding of the 'issue of scale' and is explored by examining interactions between levels and scales; i.e. cross level and cross scale interactions using Cash *et al.*'s nomenclature (see Figure 6). In the literature the problems encountered by these types of interactions are referred to as scale mismatches (Cumming *et al.*, 2006; Lee, 1993).

Scale Mismatches

In natural resource management the scales most often referred to are the ecosystem or natural resource, the jurisdiction (the scope of management authority) and/or the institutions (the administrative bodies, regulations and social norms of natural resource management). Lee (1993 p561) declares that "when human responsibility does not match the spatial, temporal or functional scale of natural phenomena, unsustainable use of resources is likely, and will persist until this mismatch of scales is cured". These spatial, temporal or functional mismatches are described by Folke *et al.* (1998):

- *spatial mismatches*: where the jurisdictions of institutions do not coincide with the boundaries of the ecosystem being managed;
- *temporal mismatches*: where time horizons of institutions are based on electoral cycles rather than ecosystem processes or where in rapidly changing ecosystems, the complementary institutions respond too slowly to be effective (bureaucratic inertia); and
- *functional mismatches*: where the mandate of the institution is too narrow in relation to the whole ecosystem. This often occurs where broad level policies are used to manage fine details in an ecosystem.

Cumming *et al.* (2006) describe in more detail four scenarios of mismatches in natural resource management, these are illustrated in Figure 7 (a – d):

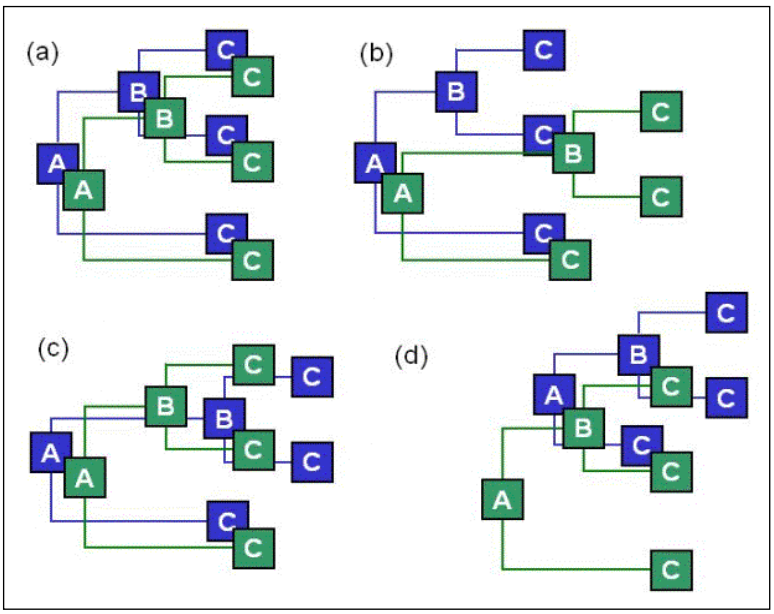

Figure 7 Scenarios of mismatches (Cumming, *et al.*, 2006 p7).

In Figure 7 three levels are illustrated A, B, C. The green boxes represent the ecosystem or natural resource, and the blue boxes represent the people managing the ecosystem. Figure 7(a) portrays the ideal situation, ecological processes (green boxes) are managed by people (blue boxes) who have the mandate and the power to act at the same level as the ecological process; in Figure 7(b) scale mismatches may result when the mandates of upper-level managers are not linked to an equivalent level operating within the ecosystem, while lower-level managers are confronted with ecological problems that they lack the resources to deal with (C-B mismatch); in Figure 7(c) another kind of mismatch results in a lack of management at some key levels (unmanaged B) and the involvement of higher-level managers in lower-level resource management (B-C mismatch), leaving junior managers with little power to effect change (dangling C); in Figure 7(d) in an international context, a common scale mismatch occurs when no institution exists to deal with the broad-scale environmental problem (unmanaged A). Note that in many examples, scale mismatches are not necessarily system-wide (Cumming*, et al.*, 2006) i.e. mismatches may occur at some levels between the two scales but not all, and not all simultaneously.

Lee's statement that mismatches need to be cured or else unsustainable resource use will prevail (Lee, 1993) seems to be quite dramatic and perhaps not altogether helpful if it spawns a potentially unnecessary round of institutional reform. The usefulness of being aware of scale and associated level mismatches lies in the recognition that understanding scale is critical to understanding whole systems. And that often the mismatch, or the environmental degradation or social injustice that results as a consequence of for example management inefficiencies, is due to a lack of interaction or co-operation between scales and levels rather than a spatial, temporal or functional mismatch *per se*. This leads logically to the next question – what is the 'right' set of scales and associated levels that should be investigated or comprise natural resource management arrangements that would result in sustainable resource use? This is a political question and therefore necessitates an exit out of the realm of understanding scale from a landscape ecology and physical geography perspective and into the political science, political ecology and the human geography domain[7].

[7] There are of course many overlaps between all these disciplines when dealing with scale and levels and this is by no means an attempt to ascribe the origins of any particular idea to any particular discipline.

When drawing on work from multiple disciplines there is a danger of using the same word but its meaning is different and discipline specific. This is especially true in inter- or transdisciplinary research. As Max-Neef (2005 p5) so eloquently states, transdisciplinary "is not achieved through the accumulation of different brains. It must occur inside each of the brains". The consequence of integration not happening inside each brain is that there can be a tendency to cling to the underlying, sometimes subconscious, assumptions of a specific grounding discipline. For example psychologists tend to focus on the individual level; international relations at the Nation-State level; river management at the basin level; cell biologists at the cellular level etc. There thus exists an entrenched 'right' or most appropriate scale and/or level that each discipline has a tendency to gravitate toward.

In the water or hydrological sciences this level tends to be the basin (or catchment/watershed). Integrated Water Resources Management (IWRM) advocates institutional reform at the basin level thus entrenching it as the means for achieving the successful integration of land and water management (GWP, 2000). More and more studies are surfacing however that challenge that a match between the natural surface water flows and the institution that manages the water is necessary for sustainable resource use; and that a compulsion to achieve this can in fact be detrimental to co-operation over shared resources (Fischhendler & Feitelson, 2005). Mollinga *et al.* (2007) feel quite strongly about this and state that "the idea that a specific organisation is necessary for integrated management of a basin may be based on a false assumption that the physical reality of integrated river-basin systems *ipso facto* requires an organisation coinciding with its boundaries". River basin organisations such as the Murray-Darling Basin Authority are one such example. IWRM principles also promote the principle of subsidiarity[8] i.e. decentralisation to, and decision-making at, the lowest appropriate level (GWP, 2000). This belief is underpinned by an assumption that local is better – that management at the local level inherently results in more desirable social and ecological outcomes than other levels. Caution against falling into a local 'trap[9]' has been raised by a number of

[8] IWRM advocates both basin level management as well as subsidiarity resulting in much critique and further confusion Biswas, A. K. (2004). Integrated water resources management: A reassessment. *Water International, 29*(2), 248-256, Biswas, A. K. (2008). Integrated water resources management: Is it working? *Water Resources Development, 24*(1), 5-22..

[9] Trap: "A way of thinking which is inappropriate for the situation or issue being explored" Ison, R. L. (2008). Systems thinking and practice for action research. In P. W. Reason & H. Bradbury (Eds.), *The Sage handbook of action research participative inquiry and practice* (pp. 139-158): Sage Publications, London..

authors (Brown & Purcell, 2005; Norman & Bakker, 2009) although the same caution should apply equally to other levels i.e. no one level is inherently more applicable or desirable than another in achieving policy goals.

If one examines how social theory has engaged with defining scale (and levels) it becomes clear that a lot of the confusion surrounding the concept originates from trying to identify the 'right' scale (and level) for analysis. This stems from the ontological and epistemological underpinnings of the definition of scale. A realist understanding of scale (and levels) is that it is something out there awaiting discovery and that once this is achieved it will provide explanations to processes, actions and behaviours. These tensions are articulated well by Sayre (2005) where he describes scale (and levels)[10] as being either produced (Constructionism) or pre-given (Realism); and by Buizer *et al.* (2011) who promote dialogue between the realists and the constructionists. Social theorists, especially Henri Lefebvre, are largely responsible for providing the perspective that scales (and levels) are produced or socially constructed (Marston, 2000). There are many studies and reviews that describe, illustrate and substantiate scale (and levels) as socially constructed (see Delaney & Leitner, 1997; Marston, 2000; Neumann, 2009). Essentially what it means is that there exists a complex set of economic tensions, social interactions, power relations, and political practices that continuously construct, shape, manipulate and nurture scales and levels; and that their production is dynamic and constantly evolving.

One of the main drivers of scale (and level) construction is politics – the politics of scale is at the heart of much research on the interactions between nature and society (political ecology). If we continue with our example of the basin not necessarily being the most appropriate level of management for rivers, Allan (2005) promotes a 'problemshed' approach. This approach suggests that water resource problems can be solved within the boundaries of a problem or issue rather than relying on spatially imposed levels such as the river basin. Although he does not advocate any particular scale or level explicitly in this approach, he is stating that water management is a

[10] Sayre Sayre, N. F. (2005). Ecological and geographical scale: Parallels and potential for integration. *Progress in Human Geography, 29*(3), 276-290. uses the term scale in many instances to mean level. I will follow Cash *et al.*'s Cash, D. W., Adger, W. N., Berkes, F., Garden, P., Lebel, L., Olsson, P., Pritchard, L. & Young, O. (2006). Scale and cross-scale dynamics: Governance and information in a multilevel world. *Ecology and Society, 11*(2), 8pp. nomenclature on scale and levels and will always add 'and levels' where referenced authors have only used scale but where I interpret them to mean levels as well.

highly political and therefore contested process. We can further develop this idea of the 'problemshed' by examining a fundamental aspect of the politics of scale; namely scale framing. Recognising that scale and levels are socially constructed opens up the possibilities for social actors to influence how problems are understood and described; and therefore how solutions or outcomes are designed and distributed – this process is termed scale (and level) framing (Kurtz, 2003). Lebel (2006) describes a number of strategies that actors can adopt to reframe an issue or problem[11]. They include:

- *reframing to interest* - Actors shift issues up or down levels along a scale in ways that support their own interests;
- *reframing to beliefs* - Actors shift issues to between scales and levels to fit with their beliefs about causes, changes, or consequences;
- *reframing to capacities* - Actors shift issues to a level where they have the greatest influence on negotiations, even if their interests are at another level; and
- *reframing to conceal* - Actors bundle more difficult issues with easier ones in the hope that they are accepted so that they are seen to negotiate at one level without having to trade at another (Lebel, 2006).

An example of reframing is where a water shortage can be framed as a problem of "insufficient water supply" by one actor and of "excessive water consumption" by another. When a problem is framed as insufficient water supply, the most relevant uncertainties will be those associated with the amount of water available and technical solutions will be favoured. However, when the problem is framed as an excessive water consumption issue, other solutions can be considered, such as changing the way in which water is allocated, used and consumed.

Reframing issues, problems and solutions is common practice whether implicit or explicit but it can come with negative consequences such as excluding some actors or perspectives (Van Lieshout *et al.*, 2011) that might challenge our notions of justice. Reframing could also be used to include previously excluded actors or perspectives thus it should not necessarily be regarded as a negative process, in some cases reframing could, depending on perspective, be used as a means to correct an injustice.

[11] Lebel Lebel, L. (2006). The politics of scale in environmental assessments. In W. V. Reid, F. Berkes, T. J. Wilbanks & D. Capistrano (Eds.), *Bridging scales and knowledge systems: Concepts and applications in ecosystem assessments*: Island Press, Washington DC. uses the term rescale rather than reframe but because of the conflation of the terms scale and level I have replaced the term rescaling with reframing when listing his strategies.

Conclusion

This chapter has served to present some background to the context for this study namely water allocation by describing the current water management paradigm and environmental discourse of sustainability. It has shown how these have influenced the range of water allocation mechanisms available that address social, economic and environmental concerns. Allocation between and within these competing concerns gives rise to issues of justice. This chapter has provided a brief overview of various definitions, models and theories of justice to illustrate its complexity. There is no universal theory of justice to which appeals can be made to ensure that allocation outcomes and processes are justly achieved. Justice is also a concept that is dynamic and constantly changing depending on perspective, worldview and context. This chapter has also presented some definitions on scale and levels from a number of disciplinary perspectives. It has shown that understanding the interactions between scales and levels are important, that the relationships between and within different scales and levels are socially constructed and that politics plays an important role in determining these interactions. This chapter has provided the background necessary to fully understand the complex nature of the research question and its proposed answer in relation to scale.

CHAPTER 3: The Beginnings of Conceptual Bridges

Introduction

This chapter is the result of a second iteration literature review which explicitly searched the literature for existing conceptual links between justice, scale (and levels) and water allocation. It is divided into three main sections: *Scale and Justice*, *Water and Scale,* and *Water and Justice*. As is evident from these sub-headings there is no section simultaneously addressing Justice, Scale and Water. This review reveals the lack of a conceptual framework that adequately explains the relationship between justice and scale in the context of water allocation. The purpose of this chapter is thus to present the beginnings of potential conceptual bridges between justice, scale and water and lay the foundations necessary to fulfilling the aim of this study which is to present a conceptual framework that explicitly utilises an understanding of scale and levels as a means to enrich the concept of justice in the context of the water allocation.

Scale and Justice

The Scope of Justice

The politics of scale is encapsulated in the idea of reframing. Reframing a problem, a solution or a system can be used as means of including or excluding certain actors, perspectives and processes (Kurtz, 2003; Van Lieshout*, et al.*, 2011). This process of inclusion and exclusion has also been examined in the justice literature, primarily by Susan Opotow. She explores it in the context of environmental conflicts and has termed it the *scope of justice* (Opotow & Weiss, 2000). The scope of justice, also known as the scope of moral exclusion, has been defined as the psychological boundary for fairness (Opotow & Weiss, 2000) or the boundary within which justice is perceived to be relevant (Hafer & Olson, 2003). Principles of justice govern our conduct towards those within our scope of justice, while moral exclusion rationalises the denial of those outside our scope of justice (Opotow & Weiss, 2000) and thus enables and justifies the application of justice principles in an inconsistent or even in an unjust manner.

Opotow and Weiss (2000) describe three types of denial that can drive the process of exclusion in environmental conflicts. They include *denial of outcome severity* – where the significance of environmental harms are concealed from others. *Denial of stakeholder inclusion* – where stakeholders or their interests are excluded from a process in order to for example trivialise their concerns about negative environmental impacts. And *denial of self-involvement* – where you as an individual rationalise to yourself why for example you don't need to participate or contribute to maintaining a public good or that your actions are not contributing to an environmental harm. Denial and moral exclusion are most obvious in escalated conflicts but are insidious and common in non-escalated conflicts as well (Opotow & Weiss, 2000).

There is plenty of empirical evidence to show how justice principles are used inconsistently - within vs. without the scope of justice (see Cole & Schroeder, 2004; Hutchings, 2007; Miller, 2009). This begs the normative question: should there be such a boundary or separation of principles; and how does one decide who is entitled to inclusion? Miller (2009) discusses whether principles of justice should be universal - where the same principles apply in all circumstances; or whether the principles used in decision making should be circumstance or context specific. In one circumstance (ironically) Miller calls for universal justice principles and this is when dealing with basic human rights. In these circumstances he says that justice is non-comparative i.e. "it is not about how one person is being treated relative to others, but about how they are being treated, period..."(Miller, 2009 p293)[12]. In all other circumstances justice is comparative, context specific and is about getting one's fair share.

Binaries of Justice

Similar to the concept of a scope of justice, there are a number of studies exploring justice that implicitly tackle the issue of scale (and levels); they do so by referring to least two levels: the local vs. the global; the individual vs. the group; or the situational vs. the universal. I have termed these the binaries of justice and they contribute to

[12] There is much debate in the human rights literature about exactly which rights fall under the ambit of basic human rights – access to safe drinking water and basic sanitation being until recently not recognised under the Universal Declaration of Human Rights Carey, S. C., Gibney, M. & Poe, S. C. (2010). *The politics of human rights: The quest for dignity*: Cambridge University Press, Cambridge, Gleick, P. H. (1998). The human right to water. *Water Policy, 1*, 487-503, UN. (2010). *Declaration of water and sanitation as a human right*. General Assembly GA/SHC/3987, Human Rights Council. Accessed online: www.un.org/en [October 2011]..

formulating some of the links between the concept of scale and levels and the concept of justice.

Global - Local

There are two aspects to the global-local justice binary that are pertinent to this study. First is the relationship and tensions that exist between international justice and social justice at the local level as described by Cole and Schroeder (2004). The development of theories of social justice have predominately focused on or assumed the Nation-State level rather than the international level (Cole & Schroeder, 2004) – this is another example of an entrenched disciplinary focus at a particular level – and has resulted in much discussion about which should take precedence. The debate centres on whether international justice is about just relations between Nation-States or whether it is between people throughout the globe. This discussion is becoming more and more relevant with the globalisation of industry and commerce, and the development of regional level institutions; and is a concern when discussing issues of justice within and between supranational entities, such as the European Union, and individual persons whose claims for justice are largely confined to Nation-State structures. This is related to the discussion on who is included or excluded from the scope of justice and whether the Nation-State is a boundary that should or shouldn't matter when dealing with issues of justice. As it stands issues of social justice at the local level as well as issues of social justice at the global level are seen as the responsibility of the Nation-State (Cole & Schroeder, 2004); it is therefore a boundary that matters.

The second aspect of the global-local justice binary that warrants mention is how individuals conceptualise local and global environmental problems. Uzzell (2000) surveyed approximately 600 participants in three separate studies and found three main outcomes to his research on this topic. Firstly that respondents were able to conceptualise both local and global problems – this was contrary to much previously published literature which found that people at the local level had difficulty conceptualising global problems[13]; secondly that respondents felt that global problems were more concerning than local problems; and thirdly that responsibility

[13] This change in ability to conceptualise both local and global environmental problems has been largely attributed to the success of environmental awareness campaigns Uzzell, D. (2000). The psycho-spatial dimension of global environmental problems. *Journal of Environmental Psychology, 20*, 307-318..

for environmental problems were felt strongest for local problems but as the level increased towards the global level, they felt more powerless to influence or act.

Individual - Group

Clayton explores the social dilemma of individual or self interest vs. group benefit and has termed this binary as microjustice and macrojustice respectively (Clayton, 1998). A more rigorous definition of these terms is "justice principles concerned with the characteristics of an outcome distribution or more generally with the welfare of a group have been referred to as macrojustice; whereas principles that assess the outcome to individuals and the process by which those outcomes are assigned are called microjustice" (Clayton, 1998 p165). Clayton summarises the various models and theories of justice as concerned either with justice for the individual (microjustice) or justice for the larger society (macrojustice). In the context of natural resources management these two perspectives are often used to form an explanation for the types of rationale used by pro-environmentalists (macrojustice) and anti-environmentalists (microjustice) by describing broadly what justice principles are employed when defending or advocating a position. In general Clayton argues that principles such as equality lend themselves more to a pro-environmental stance, whereas equity and procedural justice are more often appealed to by anti-environmentalists (those holding a position opposite to those of pro-environmental advocates). Further studies on individual and community views on environmental conflicts and pro-environmental decision making however show increasing evidence that these two neat categories are considerably blurred and that self centred motives are decreasing as a predictor of behaviour in environmental conflict situations (Kals & Russell, 2001; Kals *et al.*, 2007; Wilke, 1991).

Situational - Universal

In a study reviewing their research over a decade Syme *et al.* (1999) explore the concept of fairness in water allocation decision making. A component of this review focused on the consideration of decisions in general or disinterested terms – universal fairness; and consideration of decisions where the outcome was likely to impact personally or locally – situational fairness. There is a common belief that everyone can afford to be generous and kind at a general level, but when one is directly negatively impacted by these philanthropic beliefs, self interest and protectionism come to the fore. This tug-of-war between universal and situational fairness has been ongoing since the publication of Hardin's Tragedy of the Commons; each camp either defending or attacking the idea that people will resort to self-interest to the detriment

of a shared resource. Although Syme *et al.* (1999) found evidence of the influence of both behaviours in their research, they were not clearly mutually exclusive views. There was evidence that water users at the situational level had wider considerations then merely self interest when defining what was fair. Thus situational fairness cannot simply be equated with self-interest, similarly universal fairness cannot simply be equated with general, disinterested justice principles. Syme *et al.* (1999 p67) recognise that there needs to be a "mix of fairness ingredients" in allocation decision making.

Scale and the Concentric Circle Theory

This section attempts to explicitly describe Wenz's (1988) Concentric Circle Theory using Cash *et al.*'s (2006) scale and level nomenclature and incorporating the descriptor of grain. In essence the concentric circles in the Concentric Circle Theory describe three scales namely space/culture, time and species/phenomenon; these three scales are illustrated in Figure 8. Within each of these scales are a number of levels for example global community, region, nation etc within the space/culture scale. The grain for each of the three scales is the number and strength of obligations as described by Wenz (1988).

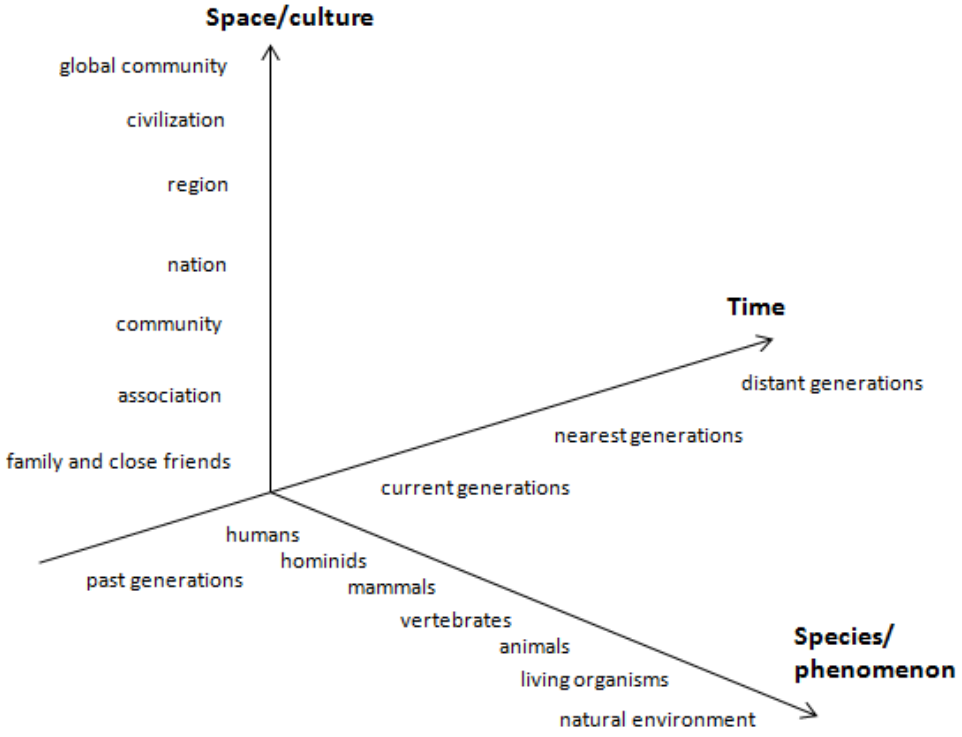

Figure 8 The scales and levels of the Concentric Circle Theory (redrawn from Arler, 2006 p140).

If a decision-maker is placed at any level on any of the three scales, the number and strength of obligations to any other level can be explicitly articulated or mapped. Cross scale and cross level interactions can and do occur but not all scales and not all levels within each scale will be relevant to all contexts and situations. These will need to be determined by the stakeholders involved and affected by the decision being made. The Concentric Circle Theory presents a framework of scales and levels that can be used to make a decision – it does not provide *the* answer – but rather provides a means to 'map' the alternatives thus making their potential consequences explicit and ensuring that the process of decision making is procedurally just as well.

A Justice / Injustice Cycle

Roe (1997) builds on the ideas of Jon Elster and his conception of a local justice framework. Elster's definition of local justice is where justice principles are designed by relatively autonomous institutions below state level and that they are primarily concerned with the allocation of goods and burdens not money[14]. His local justice framework is conceived as a framework not a unified justice theory because he says systems vary and principles used to make decisions vary. The decision makers in these systems also vary. Elster (in Roe, 1997) describes three levels of decision making:

- *first order decisions* made by politicians over how much to allocate - motivated primarily by efficiency principles;
- *second order decisions* made by allocative officers over how to distribute the amount to be allocated - driven by equity[15] and efficiency concerns; and
- *third order decisions* made by or responded to by recipients. These decisions affect the recipients' need for the resource being allocated or affect their likelihood of receiving it - typically motivated by self interest.

First order decisions are typically about getting the 'bigger picture' right – the ambit of sustainability advocates; often the second and third order decision levels are lost from the sustainability discourse but they fall comfortably in the realm of justice advocates. "Sustainable development means little if local justice systems are not central to its imperative" (Roe, 1997 p105).

[14] While he describes global justice as justice principles designed centrally at the level of the national government and typically concerned with the allocation of money.
[15] I assume in this case equity to be the same as the contributions rule described by distributive justice.

There are two critical points for this study to take from Elster's Justice Framework. Firstly it recognises a multi-level scale of decision making, and secondly it presents the idea that decision makers use different justice principles when making decisions about allocating resources depending on their position or level in the system and that they influence each other. In other words the system is dynamic, interactions or decisions between and within these levels affect processes and outcomes of resource allocation and distribution (Roe, 1997). These interactions between the different decision making levels can be viewed as a cyclic process; and this leads us to Roe's (1997) conception of a justice/injustice cycle.

Hypothetically if the third order decision makers or recipients of allocated resources feel that they have been treated unjustly, they will pressure the second and first order decision makers for justice. The third order level then becomes more just, but this creates the potential for more injustices at the second and first order levels through a potential reduction in the ability of achieving the overarching vision (which is assumed to strive for sustainability as defined by that level of decision makers). Different groups of actors and decision makers that operate at different levels will be motivated to act if they feel injustices are being perpetuated against them. There is thus a constant cycling of justice and injustice in this multi-level decision making scale. This relationship between justices and injustices at different levels is similar to the paradox of a globalised sustainable development that is everywhere localised and variable (Roe, 1997). From this perspective "sustainable development should be seen not as ending when unjust global systems become more just, but rather as continuing through a set of iterations whose moments include a rejection of an overly globalised sustainable development. What keeps the cycle one of sustainability is not its success at one particular point but its constantly coming back to that moment where people still insist that resources should be used today in ways that keep options open for tomorrow, whether locally or globally" (Roe, 1997, p111) – or at any one of the levels that comprise the scale under study.

Water and Scale

Social-Ecological Systems

Throughout history humanity has shaped nature and nature has shaped the development of human society. Hence there are neither natural or pristine systems, nor are there social systems without nature. Instead humanity and nature have been

co-evolving in a dynamic fashion and will continue to do so into the future (Folke *et al.*, 2002). The separation of nature and people was and is perpetuated by scientific disciplines which box knowledge into silos of understanding. Complex systems thinking can be used to bridge the social and biophysical sciences and hence it underpins many of the new integrative or transdisciplinary approaches to research (Folke*, et al.*, 2002). Scholars have used concepts like coupled human-environment systems, ecosocial systems and socioecological systems to illustrate the interplay between social and ecological systems, but treating the social or the sociological dimension as a prefix may give it less weight during analysis. Consequently Berkes and Folke coined the term 'social-ecological' systems to emphasise the integrated concept of humans in nature and to stress that the delineation between social and ecological systems is arbitrary (Folke *et al.*, 2005).

A number of frameworks have emerged from a variety of disciplines in an attempt to explain social-ecological systems. They include but are not limited to: Resilience/Robustness of Social-Ecological Systems (eg Anderies *et al.*, 2004; Folke, 2006); Vulnerability Analysis (eg Eakin & Luers, 2006); Sustainable/Rural Livelihoods Approach (eg Farrington *et al.*, 1999); Quality of Life Assessment (eg Costanza, 2007); and Panarchy (eg Holling, Gunderson & Ludwig, 2002). The Panarchy Framework offers some insights into understanding complex systems and nature-society linkages; and is one of the few frameworks that explicitly includes scales and levels. The term panarchy originates from a combination of the words Pan, after the Greek god, and hierarchy. Pan represents unpredictable change and hierarchy the multi-scale (multi-level) nature of change (Holling*, et al.*, 2002). Panarchy is a conceptual model of how social-ecological systems change across scales of space and time and is illustrated in Figure 9.

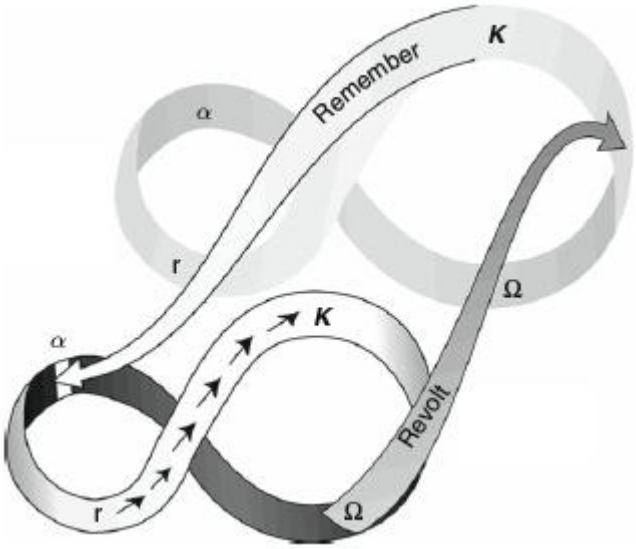

Figure 9 The Panarchy Framework (Gunderson, 2008 p2637).

The Panarchy Framework consists of a number of interacting adaptive cycles. The adaptive cycle is, according to Holling and Gunderson (2002), the fundamental unit for understanding complex systems. Each cycle comprises four phases; K, Ω, α and r (Figure 9):

1. K is a conservation phase where there is a slow accumulation and storage of material or energy in the system – it is also known as the bureaucratic phase;
2. Ω is a release phase where after the accumulation of materials the system becomes increasingly fragile and is suddenly released – it is also known as the creative destruction phase;
3. α is a reorganisation phase where material and energy re-organise so they become available for the next phase; and
4. r is a exploitation phase where rapid growth and colonisation occurs in a recently disturbed area – it is also known as the entrepreneurial phase.

Each adaptive cycle is linked to cycles above and below it by potentially numerous connections between phases at one level and phases at another (Holling, 2001). It is these interactions that are of interest in terms of understanding cross-level and cross-scale interactions. Two of these interactions have been examined in more detail by the authors of the Panarchy Framework; they are *remember* and *revolt* as illustrated in Figure 9. The interaction of revolt describes how fast and small events can overwhelm slow and large ones. It occurs between the Ω phase of one level and the K phase of the next level up in the panarchy (Gunderson, 2008). When a level enters the Ω phase it

can collapse, this collapse can cascade to the next higher, slower level. The point of entry of the cascade is likely to be towards the end of the K phase when the system is at its most vulnerable. The interaction of remember is important at times of change and renewal. It occurs between the K phase of a level and the α phase of the level below. Once a cycle enters the α phase the opportunities and constraints for renewal are influenced by the K phase of the next slower, larger level (Holling, 2001; Holling, Gunderson & Peterson, 2002). These interactions and negative and positive feedbacks drive and enable learning and adaptability within the system.

Panarchy is marketed as a heuristic model and is essentially underpinned by ecologically based principles. Although there are some empirically tested examples of its application in contexts that are not purely ecological (eg Allison & Hobbs, 2004; Nkhata *et al.*, 2009)[16] it is useful for explaining social-ecological systems as it illustrates cross-scale and cross-level interactions and that the adaptive cycle provides an inherent driving force within the system such that it never remains static and is constantly changing and evolving (Gunderson, 2008).

Water Governance

Water governance can be defined as a system for managing water according to objectives that reflect the goals of society. This system includes various institutions such as government departments, non-government organisations and civil society groups, and a range of mechanisms such as principles, policies, regulations, legislations and social norms that operate at a variety of levels (Ashton *et al.*, 2005). As environmental discourses and water management paradigms have evolved, so too have the structure and mandate of water governance systems evolved.

During the hydraulic mission phase of water development, water supply was secured and controlled by building infrastructure, mostly in the form of dams (Turton *et al.*, 2007). A belief that water could be controlled was held and was successful in many respects resulting in improved sanitation and water supply to urban environments. Similarly improvements in technology, farming practice and markets resulted in the increase of large, commercial irrigation schemes in the agricultural sector. This led to a form of water management now termed command and control (Holling & Meffe,

[16] Allison & Hobbs discussed the resilience and capacity for change of the economic cycles of a large scale agricultural social-ecological system; Nkhata *et al.* discussed community-based management of fisheries in the context of resilience in social-ecological systems.

1996) which essentially strived to reduce any variability in the resource such as daily flows and seasonal fluctuations in order to improve the predictability of supply to humans. It is now recognised that this management approach assumed that water management issues and problems were clearly bounded and comprised simple, linear cause and effect relationships that could be solved using engineering solutions (Allan, 2005; Holling & Meffe, 1996). Command and control approaches resulted in short term, necessary gains but it precluded the central tenet of sustainable development where development should 'meet the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987). This approach resulted in many unforeseen consequences such as collapsing resources, social and economic strife, and losses of biological diversity (Holling & Meffe, 1996). And is especially apparent in water scarce contexts where 'externalities' such as social and environmental justice surface and can become problematic (Meinzen-Dick, 2007).

The recognition of these consequences led to a call for an alternative approach to water management - one that integrated the needs of society, economy and environment. This call aligned with the evolution of water management approaches to those based on sustainability – the fifth paradigm. Integrated Water Resource Management (IWRM) was hailed as a potential alternative to command and control water management approaches. The Global Water Partnership defines IWRM as ''a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP, 2000 p22). This definition and the concept have received much criticism mainly due to its poor record of implementation (Biswas *et al.*, 2005). One main criticism of IWRM has focused on the vagueness, simplicity and reductionism of the definition, and the difficulty of translating its theoretical groundings into practice (Biswas, 2008; Jeffrey & Geary, 2004). As a result, it is argued that IWRM has been used as an umbrella term for many water management projects, but without a sound understanding of what it stands for. Because of its all-encompassing definition, IWRM therefore tends to allow practices to remain unchanged under a new name, which in some cases is the perpetuation of command and control practices.

As discussed earlier (see page 30) IWRM is also firmly anchored in the belief that water is best managed based on natural boundaries at a river basin level, allowing the integration of land and water processes as well as upstream-downstream interactions

(GWP, 2000). At the same time however, IWRM promotes the principle of subsidiarity, the decentralisation of institutions and decision-making to the lowest appropriate level (GWP, 2000). The difficulties in reconciling these different levels of action form an important part of the challenges facing the implementation of IWRM.

The legacy of command and control approaches that resulted in centralised water management institutions followed by the call for decentralisation by the proponents of IWRM has led to much confusion about what the most appropriate institutional structures for successful water management should be and has resulted in a campaign for finding the 'right' level for management. Much of this debate has focused on the positives and negatives of centralised vs. decentralised institutions (Meinzen-Dick, 2007) and the problems of mismatching institution and ecosystem or problem boundaries (Cumming, *et al.*, 2006; Young, 2002). Much of this research has also uncovered a belief that there are inherently desirable attributes linked to particular levels of management – for example a belief that local problems are solved best at the local level. This belief has been challenged by some authors (eg Brown & Purcell, 2005) and caution raised against falling into a trap of assuming any one level or scale has inherently positive (or negative) properties. Polycentric governance is a concept that circumvents both the centralised – decentralised debate and the search for the right scale or level for the successful management of water resources.

In striving to understand what determines the resilience or success of institutions Ostrom defines a number of design principles that underpin their success (Anderies, *et al.*, 2004) as well as the concept of multi-level governance (Ostrom & Janssen, 2004) which is now termed polycentric governance (Ostrom, 2010). Polycentric governance is an arrangement where institutions operate at various levels (eg local, regional, state, national, global) with multiple mandates and across different, but overlapping areas. This network arrangement of institutions can co-operate to successfully manage common pool resources such as water. Some of these institutions may be initiated to manage specific aspects of natural resource management such as water allocation or they may be of a more general nature where water allocation is one aspect of a bigger portfolio. Each institution is essentially independent of the other, although some may be nested, where the scope of authority is superseded by the next higher level or they may form an autonomous network of institutions with overlapping goals and policy objectives (Ostrom, 1996). Essentially this is a hybrid of

nested and non-nested hierarchical institutional arrangements (see page 26 for discussion on hierarchies).

A polycentric institutional arrangement could distribute resources and capacities in such a way that any "perverse incentive and information problems at one level are offset to some extent by the positive incentives and information capabilities for actors at other levels" (Andersson & Ostrom, 2008 p73) and that this arrangement will achieve better water management outcomes than either a completely decentralised or centralised institutional structure. Caution against falling into the same trap as the proponents of either centralised or decentralised systems should however be raised in case a claim surfaces that polycentric institutional arrangements are the panacea of all common pool resource management problems. There are costs associated with polycentric governance such as production, administration and bureaucratic costs (McGinnis, 2005) that might exclude it as the most appropriate institutional arrangement for all problems and goals. It is however an appealing concept as it does not prescribe a specific blueprint governance model (Andersson & Ostrom, 2008) thus it can accommodate contextual issues and differences and make use of existing institutional structures. It is a system that also acknowledges the dynamic nature of water resource management and is thus more adaptive and responsive to issues that arise at different levels and encourages a co-operative approach to addressing water management issues. The proponents of polycentric governance refer to it as a theoretical construct (Andersson & Ostrom, 2008) and it is likely to remain so, as long as decentralised institutional reform is still being actively promoted through IWRM.

Water and Justice

Just Sustainability

There has been some research on understanding some of the linkages between sustainability and justice – in this case environmental justice; particularly focusing on common points for the integration of the two concepts (Agyeman, 2005a, 2005b). This research is especially useful for this study because it provides some points of traction between justice and water management. A useful place to start exploring *Just Sustainability* is briefly recapping the origins of both environmental justice and sustainability. Environmental justice rose to prominence shortly after the civil rights movement in the United States of America and focused on the locating of toxic waste sites in close proximity to minority residential communities. Rallying around this and

other forms of environmental racism led to the emergence of grassroots activism that protested against development and policy that did not embrace the principle that all people and communities are entitled to equal protection under environmental and public health laws and regulations (Towers, 2000). The definition and scope of environmental justice has evolved since this initial movement around local environmental hazards and is now widely acknowledged and understood by many environmental justice organisations to include broader social justice considerations (Agyeman & Warner, 2002). It does however run the risk of focussing too narrowly and solely on the community level in finding solutions to injustices.

The concept of sustainability emerged from the opposite end of the spectrum – a global rather than a grassroots phenomenon. Although its beginnings pre-date the 1972 United Nations Conference on the Human Environment in Stockholm, sustainable development was popularised through this event; and then progressively mainstreamed into our consciousnesses and policies through the 1983 World Commission on Environment and Development and the subsequent publication of *Our Common Future* in 1987; the 1992 World Summit in Rio de Janeiro and the publication of Agenda 21; the 2002 World Summit for Sustainable Development in Johannesburg and the publication of the Plan of Implementation, and lastly the 2009 World Conference on Education for Sustainable Development held in Bonn and the publication of the Bonn Declaration. Sustainable development emerged as a response to the recognition that many of the environmental problems that we currently face are now manifest at a global level and that individual Nation-States or a piecemeal response to these problems would be unsuccessful in addressing them. Sustainability has now become a "higher order social goal" (Dovers, 2005 p8), it aims to address the bigger picture but it can potentially lose sight of the social justice dimension of meeting the needs of current generations.

One of the major tensions between the two concepts is scale and level related. Environmental justice operates primarily on the local – grassroots – community level, while sustainability is an international call for action. The proponents of sustainable development have recognised the conflict between the need for an overarching vision and the practical implementation of action plans at a more local level through the Local Agenda 21 programme and the Johannesburg Plan of Implementation; but there is still continuing and growing poverty and environmental degradation. This tension presents an opportunity for synergy between the two concepts – the strengths of one make up for the weaknesses in the other. It is clear that there exists an imperative to

include justice issues into the higher social goal of aiming for sustainable development. Sustainability cannot be achieved if there is a perpetuation of social exclusion, be it racism or classism, or the exclusion of any other social, economic or environmental voice. Agyeman suggests this revised rationale for sustainability: "The need to ensure a better quality of life for all, now and into the future, in a just and equitable manner, whilst living within the limits of supporting ecosystems" (2005b p17).

Although water issues fall broadly under the banner of sustainability issues, the concept of *Just Sustainability* does not refer to water management and allocation specifically. The field of international water management however explicitly engages with justice issues – and often treaties and agreements refer to striving for equity or the equitable distribution of shared water resources.

Water Sharing

The potential for conflict or co-operation over water is most obvious at the international level because international politics and sovereignty issues add further complication to water sharing arrangements between Nation-States that share a common watercourse. Over the last two decades the international community's concern for shared water resources has prompted a burgeoning collection of declarations, treaties, agreements and joint basin organisations in the quest for peaceful co-operation over shared water (Giordano & Wolf, 2003). There is however no internationally universally accepted criteria for allocating shared water resources. There are some 'rules' or factors that can be appealed to or are described from an international law perspective. They include Article 5 of the International Law Association's Helsinki Rules (ILA, 1967) and Article 6 of the 1997 United Nation's Convention on the Law of the Non-navigational Uses of International Watercourses (UN, 1997).

According to the Helsinki Rules the relevant factors which should be considered when determining reasonable and equitable use of shared watercourses include, but are not limited to:

- the geography of the basin, including in particular the extent of the drainage area in the territory of each basin State;
- the hydrology of the basin, including in particular the contribution of water by each basin State;

- the climate affecting the basin;
- the past utilization of the waters of the basin, including in particular existing utilization;
- the economic and social needs of each basin State;
- the population dependent on the waters of the basin in each basin State;
- the comparative costs of alternative means of satisfying the economic and social needs of each basin State;
- the availability of other resources;
- the avoidance of unnecessary waste in the utilization of waters of the basin;
- the practicability of compensation to one or more of the co-basin States as a means of adjusting conflicts among uses; and
- the degree to which the needs of a basin State may be satisfied, without causing substantial injury to a co-basin State (ILA, 1967).

Factors deemed relevant to equitable and reasonable utilization of shared watercourses listed in the Convention on International Watercourses include:

- geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;
- the social and economic needs of the watercourse States concerned;
- the population dependent on the watercourse in each watercourse State;
- the effects of the use or uses of the watercourses in one watercourse State on other watercourse States;
- existing and potential uses of the watercourse;
- conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect; and
- the availability of alternatives, of comparable value, to a particular planned or existing use (UN, 1997).

Both these instruments don't lay down specific decision making rules or even indicate which justice principles should be appealed to over others when making water allocation decisions. Shades of the distributive justice rules of equity and need are present in the two instruments and also emerge when one examines two of the most

quoted factors taken into consideration in most treaties and agreements; that of *equitable utilisation* and *no significant harm*.

The principle of equitable[17] utilisation is the more subtle version of the doctrine of absolute sovereign territory that argues that a (Nation) State has absolute rights to all water flowing through its territory. The principle of no significant harm is the delicate version of the doctrines of both absolute riverain integrity (where every riparian State is entitled to the natural flow of a river system crossing its borders) and historic rights (where every riparian State is entitled to water that is tied to a prior or existing use) (Wolf, 1999). Generally upstream riparians favour the doctrine of absolute sovereignty while downstream riparians favour river integrity or historic right. In reality these two extremes are rarely explicitly written into water sharing agreements; rather the more moderate equitable use and obligation of no significant harm are written into agreements (Wolf, 2007).

Negotiations over internationally shared water can follow a theoretical trajectory. They generally start from a rights based position which often takes some form of the two extreme doctrines described previously, then move to more moderate positions based on needs, where often the reasons why water is needed are explored, and then sometimes progress to broader discussions where the underlying interests of each of the riparian States are explored (Wolf, 1999). This third stage of negotiations can open up discussions beyond purely volumetric water allocations and can include other shared benefits such as hydroelectric power development; integration of regional agriculture production and trade markets; data and technical knowledge exchange; and shared water quality and other environmental objectives (Sadoff & Grey, 2002, 2005). When water sharing is linked to the development of other resources or co-operation initiatives, negotiations can generally progress to positive sum outcomes, where win-win solutions can be found for all riparians (Phillips *et al.*, 2008; Sadoff & Grey, 2002). Win-win outcomes are aspired to as they imply no losers; and no losers implies just outcomes. There are however some researchers cautioning against assuming that benefit sharing automatically implies just outcomes at all levels (eg Mokorosi & Van der Zaag, 2007) and it is this cautioning that provided the imperative for this study.

[17] Equitable in this context is analogous with justice and not only refers to equity or the contributions rule of distributive justice but to the broader concept of justice.

Summary

The purpose of this chapter was to document any conceptual links between water, scale and justice that were relevant to the research question and its proposition and to the aim of this study.

In summary the section on *Scale and Justice*:

- examined the scope of justice and how boundaries resulted in the inclusion and exclusion of people, ideas and perspectives;
- summarised a number of binaries of justice illustrating how the justice literature is implicitly grabbling with at least two levels; and
- described a justice/injustice cycle where decision makers at different levels utilise different justice principles that sets up a cycle of interacting justices and injustices.

The *Water and Scale* section:

- introduced the conceptual model of Panarchy that described the interactions between levels and phases of the adaptive cycle in complex social-ecological systems;
- reviewed the debate between decentralised and centralised institutional arrangements to manage water; and
- noted how polycentric governance recognises that there is no one level inherently more desirable or capable than another to manage resources.

The *Water and Justice* section*:*

- described how Just Sustainability attempts to bridge the concepts of sustainability and social justice; and
- listed some of the suggested criteria for water allocation between States at the international level.

The discovery that there was no literature that explicitly addressed and defined water, scale and justice simultaneously and in sufficient depth revealed the necessity to develop a conceptual framework that was relevant to this study. Each of the bullet points above represent a conceptual link that has contributed firstly to the development of the aim and secondly to laying the foundations or building blocks necessary for achieving the aim of this study.

CHAPTER 4: Methodology

Introduction

This chapter summarises the approach and methods undertaken in order to achieve the study's aim. This chapter first describes what a systems and transdisciplinary approach is and why these approaches were appropriate for the study and how they helped shape the methods and techniques of data collection and analysis. The research process evolved in an iterative manner during the course of the study, the current literature and the creative ideas it sparked formed a vital part of the methodology. The most eloquent means to describe this journey is through a methods narrative. This narrative forms the second part of this chapter and describes six phases of research.

A Systems Approach

As previously mentioned Ison (2008 p140) defines a system as "a perceived whole whose elements are interconnected". He states however that defining a system as a noun is constraining and that it should also be viewed as a verb. He advocates that "more attention needs to be paid to the process of 'formulating' a system" and has illustrated this idea graphically (see Figure 10). This figure depicts a researcher identifying a system of interest and its constituent sub-systems by making a boundary judgement on where that system of interest ends and the environment which provides its context begins. Ison (2008) goes on to state that the researcher's background, perspectives, worldviews and interests impact on their boundary judgement and that is unlikely to be the same as any other researcher. It is therefore important that this boundary is explicitly communicated as it plays a vital role in defining the system of interest and the context of the study. This idea of constructing the system of interest and its boundary resonates with the social construction of scale and the meaning of justice. It is also directly linked to the concept of a scope of justice and cognisance that a boundary judgement can have the potential to impact of the interpretation of research should therefore be borne in mind.

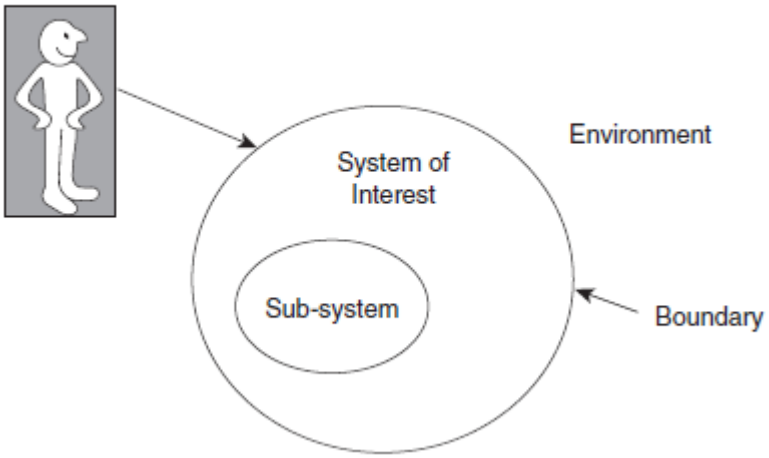

Figure 10 Defining the system, its boundary and environment (Ison, 2008 p143).

In this study the system of interest has been defined through the lens of the case study developed around the issue of Domestic and Stock dams and is described in detail in *Chapter 5: Defining the System: Case Study and Issue*. This issue is multifaceted and its understanding draws on a number of different disciplines. A transdisciplinary approach is therefore valuable for ensuring that the boundary judgement for defining the system is not too simple but simple enough.

A Transdisciplinary Approach

Max-Neef (2005) defines and illustrates (see Figure 11) the terms disciplinarity, multidisciplinarity, interdisciplinarity and transdisciplinarity in the following way. ***Disciplinarity*** focuses on one discipline which represents specialisation in isolation (like the discipline of biology). ***Multidisciplinarity*** involves many disciplines where team members undertake their analyses separately as seen from the perspective of their own disciplines without any integrating synthesis. ***Interdisciplinarity*** can be defined by two hierarchical levels. There is co-ordination between disciplines at the lower level due to a common sense of purpose being introduced as defined by the higher level in the hierarchy. In other words, co-ordination between many disciplines is driven by a higher order purpose.

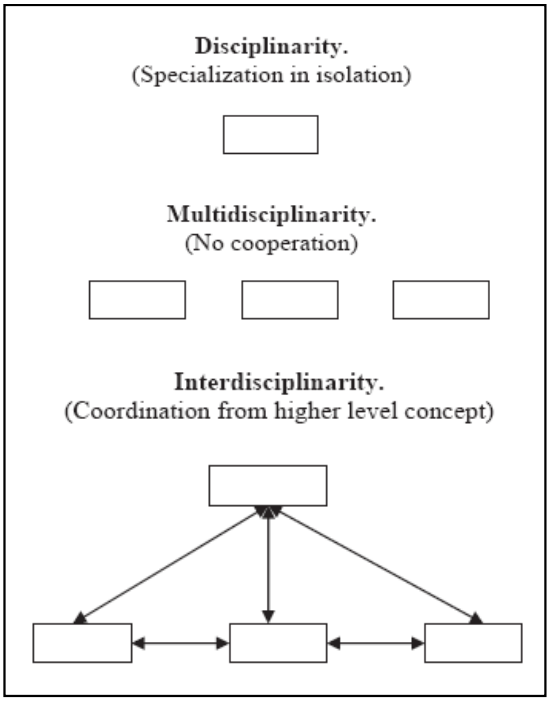

Figure 11 Illustrative definitions of disciplinarity, multidisciplinary, interdisciplinarity (Max-Neef, 2005 p7).

Within interdisciplinarity there are four types of interdisciplinary hierarchies; the empirical hierarchy which includes for example disciplines such as economics, ecology and sociology; the pragmatic hierarchy which includes disciplines such as engineering, architecture and agriculture amongst others; the normative hierarchy which includes planning, politics, and environmental design amongst others; and the value hierarchy which includes disciplines such as ethics, philosophy and theology.

Transdisciplinarity is defined as the co-ordination of all four hierarchy types described above. The disciplines at the base of the pyramid describe the world as we see it and asks and answers the question ***What exists?*** The next level is composed mainly of technological disciplines, asking and answering the question ***What are we capable of doing?*** The normative level asks and answers the question ***What is it we want to do?*** and the value level asks and answers ***How should we do what we want to do?*** (Figure 12).

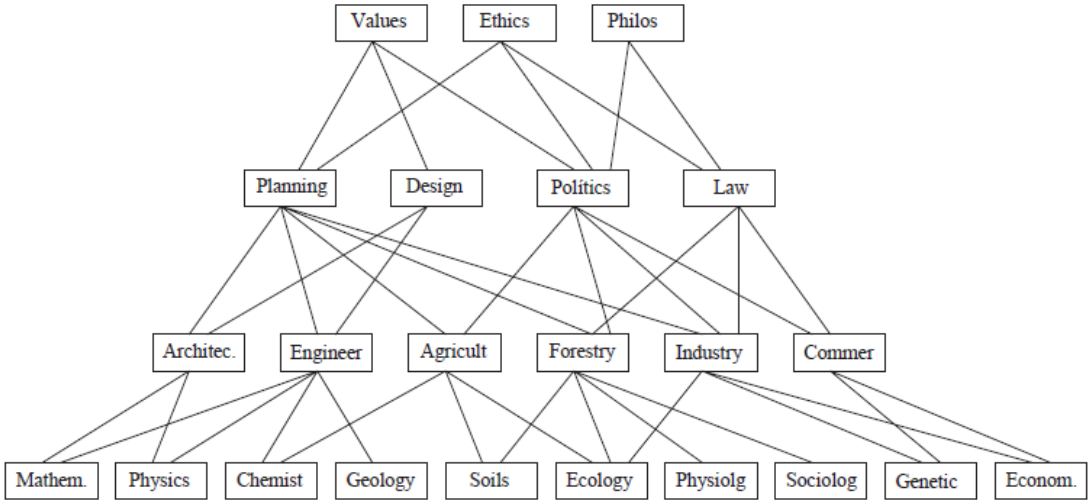

Figure 12 Illustrative definition of transdisciplinarity (Max-Neef, 2005 p9).

Transdisciplinary research "is not achieved through the accumulation of different brains. It must occur inside each of the brains"(Max-Neef, 2005 p5); and it this that has posed the greatest challenge of this study. The research process and approach to this study comprises a number of phases, each of these phases in some way was challenged by the question posed at the various levels of the transdisciplinarity hierarchy. The collection of disciplines that this study draws on are found in all four levels of Max-Neef's pyramid – it is interesting to note that Max-Neef is describing a scale of disciplines which comprise a number of levels that are interacting in a similar manner to *Cash et al.'s* (2006) cross levels interactions.

A Methods Narrative

One of the challenges of transdisciplinary research is that there is no blueprint on how to undertake it. Transdisciplinary research has been described by Pohl (2005 p1160) as "searching for a viewpoint that lies between disciplines" therefore this type of research does not have the comfort of established research methods typically found with individual disciplines (Gross, 2008).

The research journey is often marked by dead ends, u-turns, merging traffic, taking the scenic route and road rage. This study comprised a number of phases, although written for the purposes of this thesis in compartmentalised segments; the research process was iterative and the steps within the phases not necessarily chronological.

Phase 1: Literature Review and Conceptual Bridges

The initial literature review examined literature on justice and scale (and levels) in the context of water allocation. *Chapter 2: Literature Review: Justice, Scale and Water* provided the background and definitions of these concepts and context. This laid the foundation necessary to develop a draft proposition that posited that there was an explicit relationship between scale and justice and that interactions between these concepts could contribute to understanding how injustices arise in the context of water allocation.

The next iteration of literature review explicitly examined the literature for theoretical, practical and conceptual links between the concepts of justice and scale and the context of water allocation whilst retaining their depth. The literature is rich when each concept is examined individually but the strengths of the links between them varied. The product of this second iteration literature review is described fully in *Chapter 3: The Beginnings of Conceptual Bridges*. In summary the conceptual links between *Justice and Scale* were fairly poor but there were some, albeit implicit, connections between justice and scale; the links between *Justice and Water* were there but primarily explored water allocation and equity or equitable distribution of water rather than the full concept of justice; and the links between *Scale and Water* were good especially in reference to governance / institutional arrangements and the politics of scale but made little or no mention of justice.

As mentioned previously, the discovery that there was no literature that conceptually linked the concepts and context simultaneously and explicitly addressed and defined the concepts in sufficient depth revealed the necessity to develop a theoretical framework that was relevant to this study. As a researcher I felt an obligation to start this process from the perspective I had most experience and knowledge in i.e. from a social-ecological complex system - water governance perspective rather than a justice perspective since this was a fairly new field for me.

A significant amount of time was spent exploring Panarchy (Gunderson, 2008) as a potential foundational theoretical framework for the study that could link the concepts and the context: social-ecological systems covered the context for water allocation; and the interactions between levels – remember and revolt - provided a conceptual basis for illustrating relationships / feedbacks between levels in a system. Each phase in the adaptive cycle had the potential to describe conditions where issues of justice or injustice could arise.

I organised a workshop to brainstorm how to conceptually link Roe's cycles of injustice / justice (Roe, 1997) and Gunderson and Holling's Panarchy (Gunderson, 2008; Holling & Gunderson, 2002). I invited a contemporary philosopher and social justice writer, a lecturer from Murdoch University who used the Panarchy framework in her PhD research, a social psychologist and researcher in fair resource allocation, and a lecturer from Edith Cowan University working in the field of ecosystem health who was familiar with Panarchy. I presented the background on both concepts and facilitated a discussion on where and how possible links could be made that would ultimately provide a useful theoretical framework for this study.

After the workshop I concluded that Panarchy was not suitable for this study as a theoretical basis to understand justice / injustice in water allocation decision making, primarily because justice / injustice can occur at any phase of the adaptive cycle and did not necessarily play a part in driving the system from one phase to another. There was no consistent logical placing of justice or injustice issues in the adaptive cycle given the current definitions of and relationships between the different phases. It felt like I was trying to force the two concepts together and it was becoming clear that the foundational theoretical basis for this study would be better coming from a justice rather than a complex system or multi-level /scale perspective. As a researcher I felt I had reached a point in the research journey where I was more comfortable and familiar with the justice literature to consider tackling the theoretical framework from this perspective. The problem was of course that no such conceptual foundation is described in the current literature; there are building blocks such Roe's (1997) justice / injustice cycle and Wenz's (1988) Concentric Circle Theory but not one that satisfied the specific context of water allocation for this study. The primary aim of this study now significantly altered as a result of this phase to one of developing and describing a conceptual framework that explicitly utilised an understanding of scale and levels as a means to enrich the concept of justice in the context of the water allocation – thus striving to fill this newly discovered gap in the current literature and knowledge base.

Phase 2: Constructing the Research Question, Proposition and Case Study

Once the overarching aim was study was identified and articulated, suitable research approaches and techniques were investigated. A variety of ontologies and epistemologies were explored. Ontology is the study of being; it deals with questions of reality (Crotty, 1998). There is a continuum of understanding of reality, from

Realism to Constructionism, with many understandings of reality in-between. Realism is where there is an underlying assumption of a singular objective reality that exists independently of individuals perceptions of it. Constructionism assumes that reality is neither objective nor singular, but that there are multiple realities that are socially constructed (Weed, 2009). Similarly there is a corresponding epistemological continuum. Epistemology deals with the nature of knowledge, it provides the grounding for deciding what kinds of knowledge are possible, adequate and legitimate (Crotty, 1998). At one extreme of the continuum is Positivism. Positivism assumes it is only possible to achieve knowledge of the world through direct objective observation or measurement of the phenomenon being investigated. At the other extreme is Interpretivism, where there are assumptions that direct knowledge of the phenomenon of interest is not possible and that observations and accounts of the world provide indirect indications of the phenomenon of interest, and thus knowledge is developed through a process of interpretation (Weed, 2009).

In transdisciplinary research there are no definitive positions that can be selected along either continuum since the very nature of this type of research is that it draws from multiple disciplines and hence multiple ontologies and epistemologies. However critical realism emerged as the most germane ontology since it adopts a stratified approach across three domains of reality: the real, the actual and the empirical. The empirical consists of events that can be observed, the actual consists of events whether or not they are observed, and the real domain consists of structures and mechanisms that produce these events (Blaikie, 2007). In terms of epistemology the most relevant is interpretivism given that both justice and scale can be regarded as (and are in this study) socially constructed concepts. Justice and scale are constantly evolving concepts, open to interpretation and perspective, and change and adapt as society changes.

A range of methods and techniques were examined and because this study was primarily asking ‘how’ and ‘why’ questions rather than ‘what’ and ‘when’ questions, the case study emerged as the most suitable method. The definition of a case study is “an empirical inquiry that investigates a contemporary phenomenon within its real life context” (Yin, 1989 p23). This method is commonly adopted in circumstances “when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used” (Yin, 1989 p23), both of which were true for this study.

It was evident that the case study employed in this study needed to be structured and defined around a specific issue that for some of the actors involved constituted a perceived injustice. Early in the research process three case studies were considered and locations within India, Western Australia and Victoria were identified as possibilities. Each case study was linked by a common issue namely farm dams. The idea of using farm dams as a golden thread linking the three case studies arose from discussions with my supervisors and a Professor from the University of Ballarat who were aware of previous and current research in each location that could provide an entry point for this study. In Western Australia salinity and drainage dams off farms were an issue because salt was being moved off private properties and into 'public' rivers; in India check dams built in one area were altering water table levels resulting in bores drying up in other hydrologically linked areas; in Victoria increasing numbers of Domestic & Stock dams were impacting on water entitlements of downstream irrigators.

With the case study approach starting to take shape, I started reading more intensely on case study research design. A case study comprises a number of components, namely:

1. a study's questions;
2. its propositions;
3. its units of analysis;
4. the logic linking data to the propositions; and
5. the criteria for interpreting the findings (Yin, 1989).

Through the lens of the case study design I began my first attempts at articulating components one and two and worked through a number of iterations until the final research question and its proposition was crafted:

Research Question: How can justice be met in water allocation?

Proposition: By understanding and being explicit about scale and levels.

By attempting to articulate the third component of the case study – its unit of analysis or grain if we use landscape ecology nomenclature, two important issues were highlighted. The first was whether the study should focus on the users and/or the

decision makers. If users were the unit of analysis then the focus would be on the individual e.g. the landowner, if the decision makers were the unit of analysis then the focus would be on the group e.g. an institution. In social psychology and sociology the individual and group are significantly different units of analysis and if the users of the resource and the decision makers involved in the management and regulation of the resource were conflated this would impact on how data were collected and interpreted. Of course users such as landowners can also be regarded as decision makers but their decisions are usually applied at an individual level and are not part of the government regulatory / decision making process. The need to define the scope of study became apparent. Since the proposition was about explicitly understanding and using scales and levels it made sense to restrict the actors to those involved in the decision making process made by government institutions and through regulations. The unit of analysis was therefore refined to obligation (as in Wenz's (1988) number and strength of obligation in the Concentric Circle Theory). In water management obligation in policy and institution is recorded in their policy objectives and mandates.

The second issue that attempting to articulate the unit of analysis highlighted was normative and raised the question of whether there was a 'right' level at which water allocation decisions *should* be made that would result in just outcomes and processes at all the other levels within the system. The literature tells us that there is nothing inherently desirable in any particular level or scale; this and the lack of an overarching theory of justice started to plant the seeds for the idea that justice is a dynamic concept in the decision making process and that there is a direct interconnected relationship between justice and injustice. Can justice ever be achieved for all actors at all levels within a complex multi-level system?

At this point ethics approval was sought and granted by the University. An application for research involving human participants had to include a summary of the study, its aims and research questions; the methods to be used for data collection; how participants would be engaged; an explanation of how data would be handled in terms of confidentiality and storage; and a risk assessment for both researcher and participants. It also included information on the requirements for consent to participate in the study that needed to be obtained from each participant prior to formal engagement.

Phase 3: Defining the Case Study

The next step was to investigate each of the potential case studies and describe the issue facing each with regard to farm dams and gather related background information.

In September 2009 I travelled to Hyderbad, India to participate in a three day inception meeting for a project that was managed by my principal supervisor and was investigating the impacts of meso-scale Watershed Development in the State of Andhra Pradesh, India. This project could potentially provide a home for my specific research needs and the inception meeting provided much background and access to people with local knowledge about the check dam issue.

In October 2009 I met with three policy officers from the Department of Water, Western Australia to discuss the drainage and salinity issues facing the South-West region of Western Australia. Insights into the Salinity Management Programme and the downstream impacts of drainage were gleaned.

In November 2009 I met with a Professor from University of Ballarat and the Science & Strategy Leader from the North Central Catchment Management Authority in Melbourne for a discussion on the issue of Domestic and Stock dams in the Campaspe catchment in the State of Victoria. Ideas and information from this meeting were further complemented by a field trip along the length of the Murray River from Myrtleford near the source to the Coorong at the mouth in February 2010.

This field trip was organised by La Trobe University for a group of visiting scientists who were part of a research project investigating Australian and Indian water management policies and practices[18]. I was invited to be part of the field trip which provided me with valuable background information on the Murray-Darling Basin. Many issues, problems and challenges of the Murray River were illuminated along the way through a series of presentations by experts from a variety of institutions, namely Catchment Management Authorities (CMAs), the Department of Primary Industries, the Murray-Darling Freshwater Research Centre, Water Corporations, the Northern Victoria Irrigation Renewal Project, Parks Victoria, the Murray-Darling Basin Authority, CMV Farms, the Department of Sustainability and Environment, South Australia Water and the Coorong National Park.

[18] A different but related project to the one I was investigating as a potential home for one of my case studies.

At this point it was evident that the level of complexity in terms of institutional and regulatory arrangements for the Victorian case study would be sufficient on its own to address the study's research question and its proposition. Since the intention of this study was not to generalise and develop formal or substantive theory there was no onus from a methodological perspective to investigate the issue of farm dams in more than one case study. In addition, I felt, as a researcher, an obligation to the people involved in each case study to explore and describe their issues and relationships in a credible and genuine manner. This would be possible for one case study but if the other two case studies were attempted time constraints would have reduced the ability to examine them in sufficient depth.

Phase 4: Regulatory and Institutional Mapping

This phase consisted of defining the boundaries of the case study and mapping its components. It involved an intensive desktop study that identified institutions and regulations involved in water management and allocation at the federal, basin, state, regional and local levels. These institutions and regulations were mapped and those directly relevant to the case study and the issue comprised the levels within the regulatory and institutional scales. A meeting with a policy officer from the Victorian Department of Sustainability and Environment (DSE) was secured to verify that those levels were relevant and current and to ensure that there were no glaring omissions or errors. In addition the policy officer provided me with many additional background documents on the regulation of farm dams in general and domestic and stock dams in particular for the State of Victoria.

The legislation, strategies and policies at each of the levels within the regulatory scale comprised the source data for further analysis. For the institutional scale, besides the mandates outlined in the relevant regulatory documents, interviews would comprise the data source. The next step was to identify key decision makers from each level in the institutional scale to interview. Those key decision makers had to be in top positions - Directors, CEOs, Board Members and Heads of Divisions – those who were very familiar with water allocation policies and processes, were familiar with domestic and stock water use, could comment on the interactions / relationships with other institutions at different levels, had knowledge of the history of water management in the Murray-Darling Basin and were very familiar with existing and potentially new legislation and policy relevant to this study. A Professor from Monash

University and an employee from the North Central Catchment Management Authority provided the means to access those key decision makers. This type of sampling is a sub-set of purposive or non-probability sampling which does not rely on the random selection of participants. It is often referred to as expert sampling and involves the assembling of a sample of persons with known or demonstrable experience and expertise in some area (Trochim, 2000).

Phase 5: Identifying Topics, Developing Questions and the Interview Process

The next phase centred on developing the questions that would be posed to each of the key decision makers. This was done in conjunction with the first reading of the regulatory documents. The following documents were read with a view to understanding the basis and context for water allocation decisions:

- Commonwealth Water Act 2007;
- Guide to the Murray-Darling Basin Plan;
- Victorian Water Act 1989;
- Victorian Our Water Our Future; and
- Northern Region Sustainable Water Strategy.

After reading these documents three broad topics were identified, they included:

- understanding the overarching goals, mandates, objectives and/or principles of each regulatory document and institution;
- understanding water allocation mechanisms – water rights, entitlements, qualification of rights/tradeoffs, water trading, environmental water, water for critical human needs – prioritising water uses/users in water scarce contexts; and
- understanding the regulation mechanisms and challenges facing the management of domestic and stock dams and water.

The interview questions were designed around these topics and had a twofold purpose, firstly they were a means to verify my own interpretations of the decision making processes outlined in the regulatory documents and secondly they provided a source of data on how water allocation decisions were made at each level within the institutional scale and the interactions between the various institutions. The justice element would be explored via how uses and users were prioritised in the decision making process on paper as well as in practice and whether a change in context such as a drought could alter this prioritisation.

In order to weave the justice element into the questions to be posed to the interviewees as well as during the document analysis, the literature on Susan Clayton's work on macro- and microjustice was revisited.

As shown in the literature review, Clayton (1998) states that people advocating a pro-environmental position (with regards to an environmental conflict) gain more support if they describe their position in terms of the welfare of society at large: the need for society to act together and take equal responsibility. People advocating an opposing position to the pro-environmental position gain more support for their position by appealing to individual rights which especially includes property rights and the need to protect individual behaviour from societal controls (Clayton, 1998). In addition, Clayton also stresses that the language used to describe a conflict and its options for resolution can influence people's choice of which position to support. Descriptions which tend to personalise the impact of a conflict by referring to specific individuals and their families tend to gain more support than positions that are described in more general terms. Clayton uses scenarios in her research to describe pro-environmental vs. anti-environmental and general vs. personalised outcomes of an environmental conflict situation and recruits participants to rank which scenario they deem most fair or just. A similar format was used to design a scenario exercise that would be presented to each of the key decision makers as part of the interview process.

Four scenarios were described, two were pro individual rights to build D&S dams on private property – one was described in general terms, the other was personalised by referring to Clair McDonald who wanted to build a dam as part of her dream retirement home plans. The other two scenarios were pro-society – one described the importance of river health to society in general; the other described Dylan Neal's enjoyment of recreational fishing activities for himself and his father and his hope to be able to undertake this activity in the future with his own children. During the interview process, the key decision makers from each level in the institutional scale were asked to rank which one the four scenarios they deemed the most fair and explain why (See Box 3). The intention of this exercise was to initiate discussion on the prioritisation of water users and uses; and generate insights into how the issue of D&S dams was viewed - whether individual vs. society concerns, or micro- vs. macrojustice, were more or less predominant.

Box 3 Campaspe Domestic and Stock (D&S) dam scenarios.

There has been much debate recently over the impact of the increasing number of farm dams for stock and domestic use in the Campaspe catchment. Because of the increasing number of hobby farms in the upper catchment and the associated increase in small farm dams, there are claims that the cumulative impact of these dams is affecting the runoff into Lake Eppalock which in turn is impacting on the security of supply to the surrounding urban centres and irrigation districts further downstream.
Please rank which one of these reactions to the issue you deem to be the most fair – with 1 being the most fair and 4 the least.

It has recently been decided that the rights of individual landowners to be able to build these dams on their own land is paramount. If landowners don't feel confident that they are able to exercise control over the activities and development of their own properties, the entire social order will be undermined. For this reason, the government must compensate the hobby farm owners for any restrictions that are placed on the size of current and future farm dams.

Dylan Neal, grew up in regional Victoria and has enjoyed camping on the banks of Lake Eppalock his entire life. A major part of his childhood memories included boating, fishing and bird watching with his dad. He has already declared that he hopes to enjoy these simple pleasures with his own children. To preserve the lake ecosystem and flows into Lake Eppalock and thus all the recreational activities enjoyed by Dylan, the government must restrict the size of current and future farm dams.

It has recently been decided that the long term health of the river and associated ecosystems is paramount. If the environment is not protected, then the basis for all the goods and services that are derived from the river could be undermined and negatively impact on all users including the hobby farm owners, irrigators and urban dwellers. Protecting the rights of the environment so that future generations can enjoy the benefits it offers is vital. For this reason, the government must restrict the size of current and future farm dams.

Clair McDonald, from Melbourne invested her retirement savings in a hobby farm in the upper catchment region, and planned to build her dream house where she would live out the rest of her life. This was the fulfilment of a lifelong ambition and included a small farm dam that would supply her domestic needs and provide a view that included a waterscape that she felt was relaxing and adding value to her property. It has recently been decided that the rights of individual landowners to be able to build these dams on their own land is paramount. For this reason, the government must compensate Clair for the loss of value of her land that resulted because of the restriction they imposed on the size of the dam she could build on her land.

During the process of designing these scenarios it became apparent that uncovering the justice principles used or appealed to in water allocation decision making was not so much about the justice principles themselves but rather whether they supported individual vs. societal concerns as espoused by Clayton's macro- and microjustice. Taking this logic further, it began to make more sense to examine for whom or what justice was sought (individual vs. society) rather than trying to uncover the specific justice principles involved (e.g. egalitarianism, libertarianism, utilitarianism, equity or need). This line of thought was further confirmed as being a preferred way forward for this study by a number of authors who have stated that all sides of an environmental conflict will claim that justice favours their position even when they are directly opposing (eg Clayton, 1998; Wenz, 1988). For this study where water has the potential to be allocated to a number of different users and uses, it was more relevant to investigate *justice for whom* than the underlying justice principles used to make decisions. This was because, for example, the justice principles from the economic family could be used to justify water for individual farmers as well as for societal concerns such as river health[19]. So a decision was made to design the 'questions' for the document analysis and the key decision makers to identify *justice for whom* rather than identify the specific underlying justice principles used in the water allocation decision making process. However, rather than stick to Clayton's dichotomy of individual vs. society, the categories of social, environmental and economic concerns were used as these align with the current environmental discourse and water management paradigm of sustainability. At this point I revisited the sustainability literature and tried to link it to macro- and microjustice. Environmental concerns fell neatly into the macrojustice category but social and economic concerns had elements of both micro- and macrojustice; this further supported the argument that justice principles can't simply be divided into binaries such as macro- and microjustice. More intermediate levels are apparent – the idea started to surface that a continuum of *justice for whom* must exist.

In August 2010 I initiated contact with the key decision makers previously identified with the help of the two gatekeepers from Monash University and the North Central Catchment Management Authority. Each potential interviewee was provided with an information letter detailing the study and its purpose along with request for an

[19] This might be peculiar to the Murray-Darling Basin which uses a water market as a mechanism to allocate water.

interview. In all cases, bar one, I secured appointments for interviews with each of the key decision makers originally identified. The one exception was replaced with a suggested colleague by the originally targeted decision maker. Each interview was between one and one and an half hours in length, nine were conducted face to face, one was telephonic and they were all scheduled over a two month period (between October and November 2010) at a date, time and location that suited the interviewee.

Between scheduling the interviews and conducting them – a two month period – I read the regulatory documents a second time. During this iteration I identified and marked the locations of the 'answers' to the topics described earlier in this phase in each of the documents. This was done manually with a hardcopy of each document – each topic 'answer' was highlighted and flagged with different coloured post-its. This process also provided further inputs to refine the interview questions.

The interview with one of the representatives from the Federal Department of Sustainability, Environment, Water, Population and Community (SEWP&C) was conducted first and was used as a test/pilot run for the way the interviews would be conducted and structured. The interview consisted of following steps and exercises (see Appendix 1 for Interview Plan).

1. Firstly a brief introduction was made, issues of confidentially were discussed, a consent form was signed and permission to digitally record the interview were secured.
2. Next the first question, which was printed out, was handed over to the interviewee to read and answer either verbally or by writing on the page. The purpose of this question was to find out what each interviewee thought were the preferences for their institution in terms of social, environmental or economic concerns and whether they believed they focused on individual or societal concerns. Then after identifying their most relevant official regulatory document they were asked to answer the same question with regards to this document. Conceptually this question was linked to sustainability and macro- and microjustice.
3. I then explained in a bit more detail what the study was about and why I was interviewing them. At this point I also gave the interviewee the chance to ask me any questions.
4. The next part of the interview focused on discussing the current water allocation mechanisms in place and how decisions are made as to who and

how much water is allocated. I was especially interested in how decisions or trade-offs were made between environmental, social and economic demands on water resources. I used the following points to guide the pursuant discussion:

- water abundant vs. water scarce conditions (the qualification of rights);
- critical human needs;
- minimum environmental flows;
- downstream allocation to South Australia; and
- Tier 1, Tier 2 and Tier 3 water allocations in the State of Victoria.

5. The next part of the interview centred on the interactions between the different institutions at the various levels. I constructed a simple diagram illustrating the institutions and the associated regulatory documents for this study (Figure 13). I printed it out and handed it over to the interviewee and used it as a focusing tool to discuss the relationships between the various institutions. This was also used to verify whether I had anything missing from my system of regulatory documents and institutions.

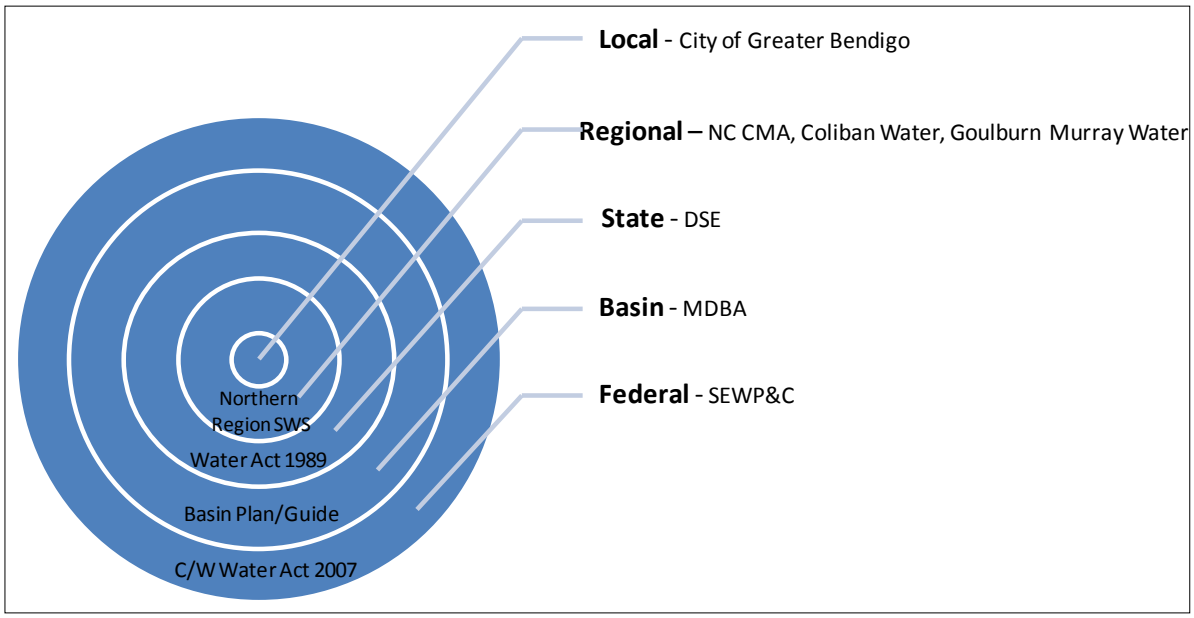

Figure 13 Institution and associated regulatory documents relevant to the case study.
(SEWP&C = Department of Sustainability, Environment, Water, People and Communities; MDBA= Murray-Darling Basin Authority; DSE= Department of Sustainability and Environment; NC CMA= North Central Catchment Management Authority; SWS = Sustainable Water Strategy; C/W=Commonwealth).

At the time the interviews were conducted the Murray-Darling Basin Authority (MDBA) had just released the Guide to the Basin Plan. This plan detailed *inter*

alia intentions to secure environmental water for the Murray-Darling Basin. This intention created much publicised angst in the farming community, particularly among the irrigators, who were concerned that their water allocations would be reduced. This tension was fuelled by the previous 10 year drought which was, at the time of interviewing, just beginning to show early signs of breaking. The irrigators felt that they were just seeing the promise of rain and potentially more productive years ahead only to be told, as they understood it, that continued restrictions would be placed on them in the form of recovering and reallocating water for the environment. The impact of the Guide, the timing of its release and the relationships between the MDBA and the other government institutions were therefore very topical and discussed during the interviews.

6. The final part of the interview focused on the D&S dam issue and was initiated by handing over a printed page describing the four scenarios (Box 3). Each interviewee was asked to rank which scenario they believed was most fair. This resulted in much discussion about each scenario and the interviewees were encouraged to put caveats to any or all of the scenarios to edit them so that they would feel comfortable ranking them. The results of this exercise illustrated very clearly to me that there were no neat categories that can used to predict what justice principles will be used to make decisions. For example, if you are pro-environment you will not necessarily always use the same set of justice principles to make allocation decisions.

After the first interview I made a few minor changes to the institutional diagram and wording of some of the questions, thereafter the balance of the interviews were conducted. After each interview I wrote up a memo recording the learning or important points from the discussion, my own impressions on how the interview progressed and flagged common ideas and emerging themes.

Phase 6: Analysis

The 'sources of evidence' for this study included documents and interviews; hence the primary analytical technique employed was that of content analysis. Content analysis "is a research technique for making replicable and valid inferences from texts to the contexts of their use". There are a number of variants of the content analysis technique - some are highly quantitative and centre on word count and statistical

analysis, others are highly qualitative and centre on identifying the inferences and meanings of texts within a particular context. This study employed the latter variant of content analysis.

All interviews and memos were personally transcribed. This enabled me to become very familiar and comfortable with the data. Each interviewee was asked whether they wanted to review the transcript of their interview before it was analysed – none accepted this offer. The transcripts along with the five regulatory documents were uploaded into NVivo (Version 9). NVivo is a data analysis software package designed for coding and thematic mapping of text rich data sources. In November 2009 I attended a 2 day intensive training course in NVivo with a special interest in how it could be used in qualitative research and specifically in qualitative content analysis. NVivo is a useful tool to manage and order large datasets. The total volume/length of source material for this study was large and is detailed in Table 3 and Table 4 below.

Table 3 Word Count of Interview and Memo Transcripts.

Interviewee Institution	Interview Word Count	Memo Word Count
City of Greater Bendigo	9515	613
Coliban Water	6950	237
Goulburn-Murray Water	9945	489
North Central CMA	8931	323
DSE 1	8301	230
DSE 2	9374	521
MDBA 1	10 443	322
MDBA 2	5204	440
SEWP&C 1	6347	582
SEWP&C 2	9305	503
Total	**84 315**	**4260**

DSE = Department of Sustainability and Environment; MDBA = Murray-Darling Basin Authority; SEWP&C = Sustainability, Environment, Water, Population and Communities.

Table 4 Page Length of Regulatory Documents.

Regulatory Document	Number of Pages
Commonwealth Water Act 2007	543
Guide to the Murray-Darling Basin Plan	260
Victorian Water Act 1989	766
Victorian Our Water Our Future	172
Northern Region Sustainable Water Strategy	206
Total	**1947**

NVivo was used to code and analyse the data and comprised a number of steps which are generically illustrated in Figure 14. The analysis of qualitative data is a time consuming, difficult and creative process with the primary purpose of determining

relationships, categories and patterns within the data (Basit, 2003). The analytical process allows for reflection, verification and constant refinement at each of the steps illustrated below.

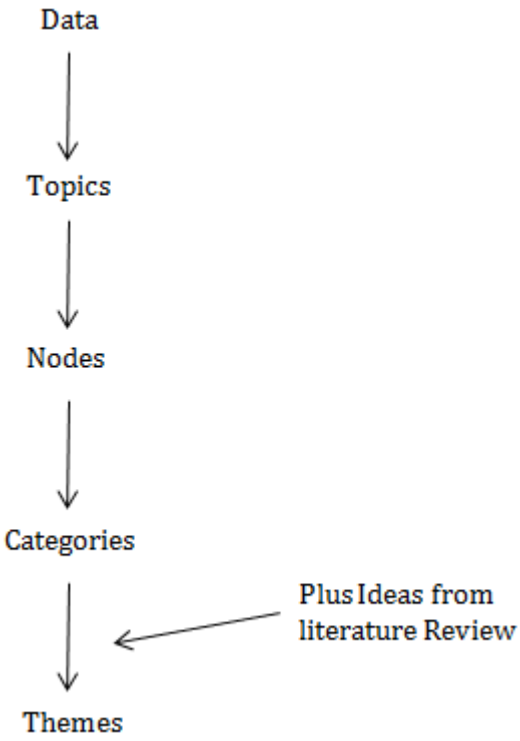

Figure 14 Steps in coding and analysis of data from transcripts and documents.

Using the NVivo software the first iteration of 'coding' included grouping the 'answers' to the three broad topics described in Phase 5 for both the transcripts and the documents. In this way the data was sorted by topic rather than source. The second step in the coding process involved creating a number of nodes in NVivo, these in turn were clustered into categories. Three main categories emerged: the first centred on how the preferences for social, economic and environment concerns were described in the mandate, aims, principles or purpose of each regulatory instrument and how priorities shifted to other uses or between the broader categories of social, economic or environmental concerns during severe drought. The second category explored the power dynamic between the various institutions, both through the formal delegation of decision making power and establishment of institutions cited in the legislation, as well as from the anecdotal stories told by the key decision makers during the interview process. The third category centred on the issue of D&S dams and tracked the issue through the various legislation and policy documents.

With the ‘answers’ to the topics, the nodes and the categories in mind, the literature was revisited and the ideas that justice was dynamic, that there was a direct relationship between justice and injustice, that there must exist a continuum rather than a binary of justice were all linked and developed into major themes. After a number of iterations of this clustering of categories and ideas, three overarching themes emerged. Each theme was slowly developed and constructed using evidence from the data in form of a selection of representative quotes from the interviews and documents to support each point in the argument or story. A more detailed explanation of the data analysis process illustrated in Figure 14 is provided in Appendix 2 using a specific annotated example. Each theme contributed in a different way to the enrichment to the concept of justice in the context of water allocation. They were entitled: Broadening the Scope of Justice; A Continuum of Justice and The Dynamics of Justice; and form the hub of the discussion in Chapter 6.

CHAPTER 5: Defining the System
Case Study and Issue

Introduction

This chapter defines the system of interest and its constituent sub-systems. It utilises Ison's logic of constructing and thus defining the system around an issue (Ison, 2008) – in this case the issue of Domestic and Stock (D&S) dams in the Campaspe catchment in the State of Victoria, Australia. It explicitly articulates the boundary of the system through the use of two scales, a regulatory and an institutional scale, and their respective levels. In so doing this Chapter provides background information on the Domestic and Stock dam issue, the Campaspe catchment, the Murray-Darling Basin and the current regulatory and institutional arrangements pertinent to this study.

The Issue: Domestic and Stock Dams

There has been much debate recently over the impact of the increasing number of farm dams for Domestic and Stock (D&S) use in the Campaspe catchment. Because of the increasing number of 'hobby' farms in the upper catchment and the associated increase in small farm dams, there are claims that the cumulative impact of these dams is impacting on the security of supply to the surrounding urban centres and irrigation districts further downstream (Cetin *et al.*, 2009; Van Dijk *et al.*, 2006).

The Campaspe River is a tributary of the Murray River located in the State of Victoria, just north of Melbourne (Figure 15). The Campaspe is one of 18 catchments or regions that comprise the Murray-Darling Basin. The Murray-Darling Basin is located on the eastern board of Australia and is shared between five States namely Queensland, New South Wales, Australian Capital Territory, Victoria and South Australia. The basin comprises over one million square kilometres, has a population of approximately two million and accounts for 40% of the agricultural sector's contribution to the GDP and comprises about three quarters of the irrigated land in Australia (Crase *et al.*, 2004).

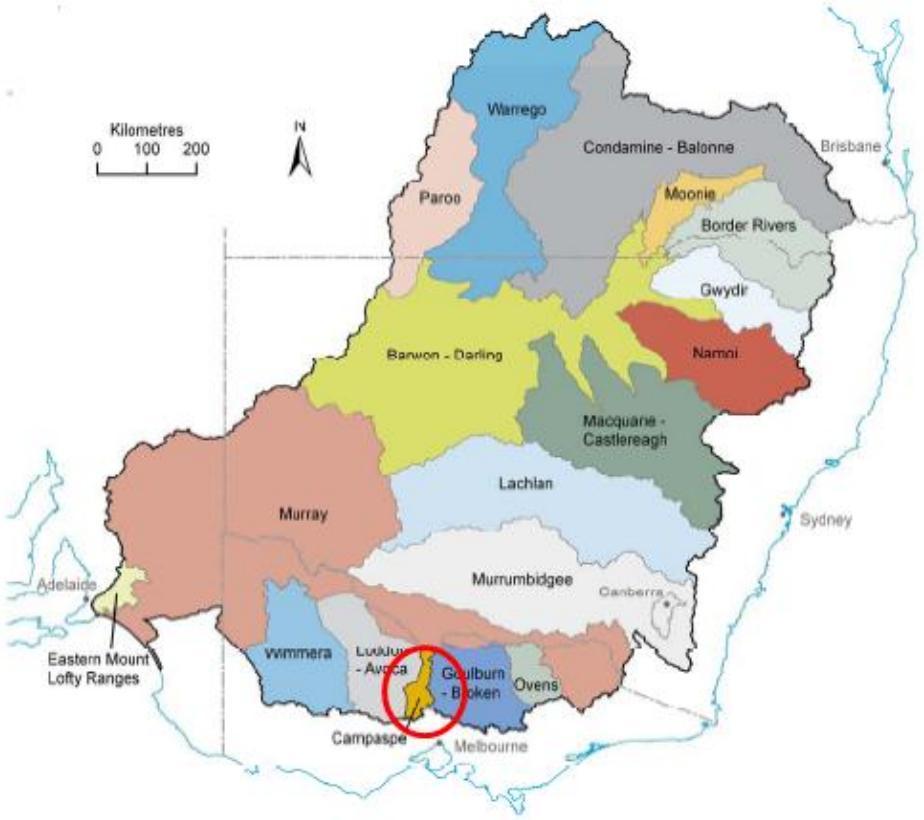

Figure 15 The location of the Campaspe River catchment within the Murray-Darling Basin (circled in red) (adapted from CSIRO, 2008 p2).

The Campaspe catchment is the smallest catchment within the basin, covering just 0.4 percent of the total area. It has a population of approximately 42 000 people concentrated primarily around the town centres of Echuca, Rochester, Elmore, Heathcote and Kyneton (Figure 16). Over 75 percent of the region is used for dryland agriculture, while extensive irrigation is undertaken on the floodplain south of Rochester towards the Murray River (CSIRO, 2008).

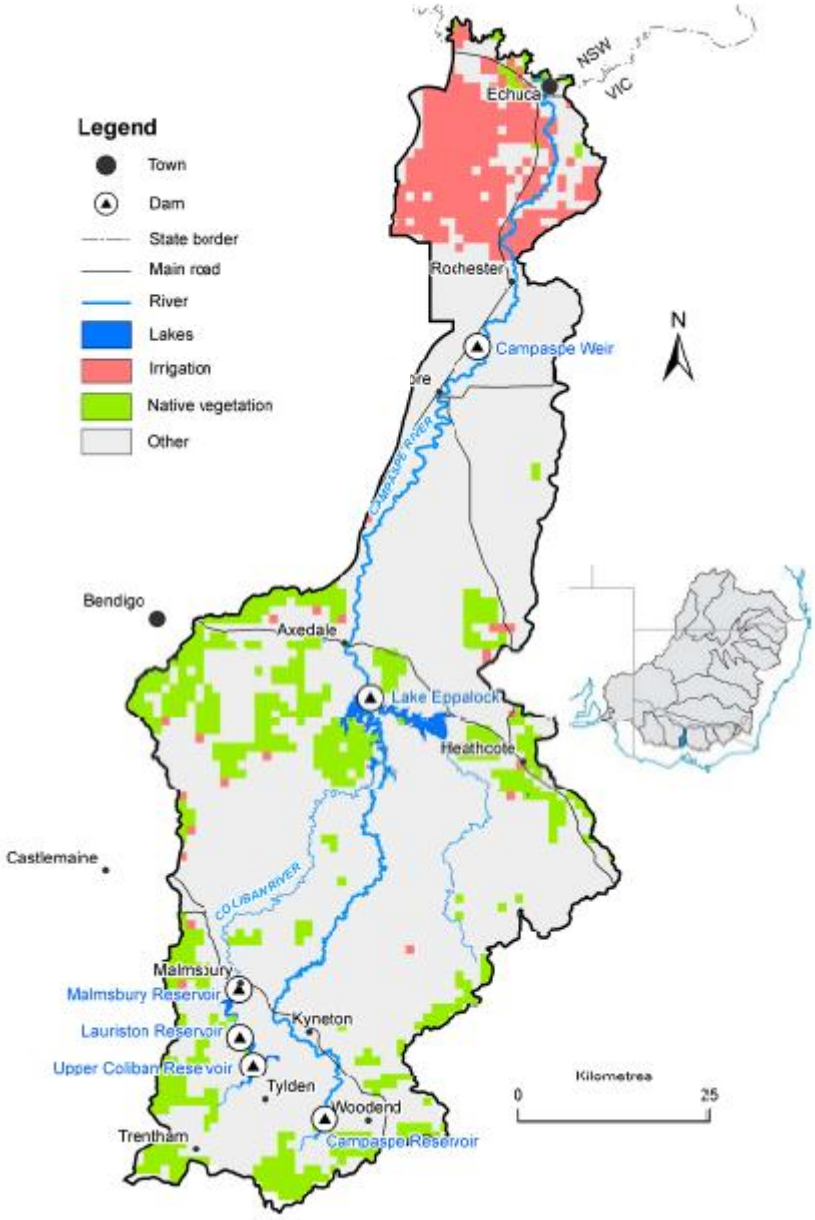

Figure 16 The Campaspe River catchment, State of Victoria showing the State border at the northern extremity (between New South Wales (NSW) and Victoria (Vic) (CSIRO, 2008 p15).

As the Campaspe is situated within the State of Victoria, the regulation and management of D&S dams falls under the Victorian Water Act of 1989 (State of Victoria, 1989). D&S dams is covered by *Section 8 of the Act: Continuation of Private Rights to Water*, where a person has the right to take water, free of charge, for that person's domestic and stock use from a waterway or bore to which that person has access. Domestic and Stock use includes water for household purposes, for pets, for the watering of cattle or other stock, for fire prevention purposes and for irrigation of a kitchen garden. The Act excludes the use of domestic and stock water for intensive

or commercial uses such as piggeries and dairies; and for the irrigation of a garden from which any produce is sold. Water use under *Section 8* is essentially an opened-ended right, which means that:

- the location where water is taken is not always recorded;
- the volumes taken are not metered; and
- there are no restrictions in times of shortage (DSE, 2009).

One of the main concerns for Department of Sustainability and Environment (DSE) and the National Water Initiative regarding D&S dams is that there are no accurate data regarding their number, location and their storage capacity (Duggan *et al.*, 2008). A number of studies have been carried out in order to get some idea of the numbers and there are an estimated 310 000 D&S dams in the State of Victoria (State of Victoria, 2009b) and in Northern Victoria they are estimated to capture 6% of available surface water (State of Victoria, 2009a). The Campaspe catchment was used as an illustrative example by the Department of Sustainability and Environment (DSE) of how D&S dams impact at a local level and the results of that study fed into the draft of the Northern Region Sustainable Water Strategy (State of Victoria, 2008). Within the Campaspe catchment the number of D&S dams has grown significantly. Figure 17 illustrates how with the sub-division of land, the number of D&S dams has increased between 1982 and 2008. This proliferation of dams in rural residential zones is driven primarily by the proximity of these zones to Melbourne and the development of the Calder Freeway, making commute times between towns in the upper Campaspe and Melbourne substantially shorter and thus appealing as residences for city workers.

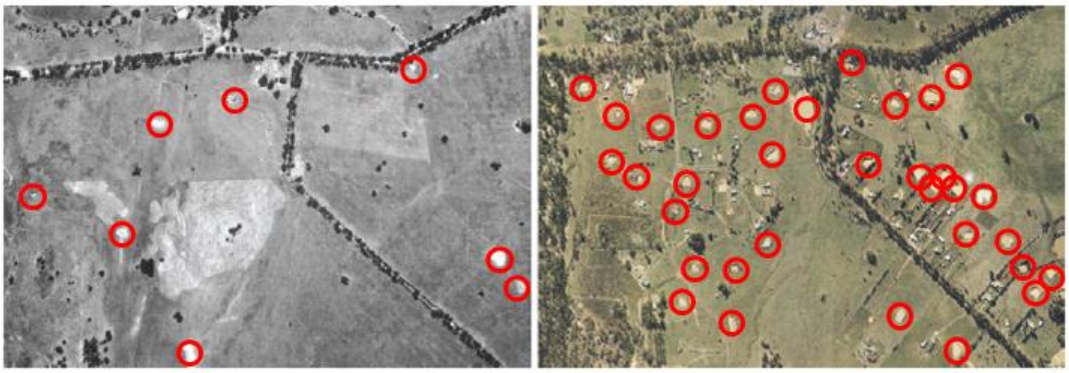

Figure 17 An illustration of the growth in D&S dams (circled in red) in Mt Ida - a sub-catchment of the Campaspe River catchment from 1982 to 2008 (adapted from State of Victoria, 2009b p3).

Studies on D&S dams in the Campaspe catchment report that they currently intercept 11 % of surface flows and that under various scenarios of climate change (in this

region that means drier conditions) this percentage increases to 16 % (State of Victoria, 2008, 2009a). In addition, there are approximately 53 000 land parcels in the Northern Region that could potentially activate their domestic and stock water use rights (State of Victoria, 2009a), combined with climate change predictions, the cumulative impact of D&S dams has the potential to drastically reduce surface water flows in the northern region of Victoria in the near future. In terms of the management of D&S dams, the only form of regulation, until recently, was via a *Section 67* works licence which is required if the dam falls within a prescribed size class, is potentially hazardous or is on a waterway (State of Victoria, nd).

There is a history of farm dam policy reforms in Victoria which was initiated by the Farm Dams Review Committee in 2000 because of the recognised need for increased control of farm dam development. The final report from the Committee recommended to the Minister for Water that D&S dams be excluded from this reform process and should focus on dams for commercial and irrigation purposes only (Victorian Farm Dams (Irrigation) Review Committee, 2001). This process culminated in the *Water (Irrigation Farm Dams) Act 2002* – an act that was grudgingly accepted by the local communities and caused much anxiety for farmers during its development (Pers comm DSE Policy Officer – 2010). It also left the legislative fate of D&S dams to the future for when tensions over dam regulation had subsided (Pers comm DSE Policy Officer – 2010).

The issue was picked up again during the development and drafting of the Northern Region Sustainable Water Strategy in 2008 which proposed a number of management options. A phased approach comprising a number of steps of increasing regulation were presented for public opinion and comment. They ranged from the simple recording of retrospective D&S use; to registering new and/or existing use; to licensing new and/or existing D&S use (State of Victoria, 2009a). In January 2011 an amendment to the Victorian Water Act was passed in Parliament requiring all new or altered domestic and stock dams within rural residential areas to be registered with the local rural water corporation (State of Victoria, 2010). This registration included location and capacity details. The government is currently developing guidelines for 'determining reasonable domestic and stock use' which will provide advice regarding an appropriate dam size to meet domestic and stock needs.

There are a number of reasons why D&S dams provide such a useful mechanism for developing the conceptual framework for this thesis. Two primary ones are that the

issue of D&S dams is inherently about levels. At the level of the individual farm they are not a problem; it is only when they are viewed as a collective (i.e. at the level of a sub-catchment, catchment or even region) that their cumulative impact on surface water flows becomes apparent. The second reason is that within the Campaspe catchment they create a scenario where there is an asymmetry in where the gains and burdens fall in terms of water allocation; and thus it is an issue that challenges our notions of justice. The reason why this is so lies in the way water is allocated in the State of Victoria.

In the State of Victoria water is managed via the Water Allocation and Entitlement System. This system comprises three tiers (Figure 18). In tier one the Victorian Government has the overall right to the use, flow and control of all surface and ground water on behalf of all Victorians. In the second tier, the Minister for Water allocates water for consumption through bulk entitlements (BEs) and for maintaining environmental flows through the Environmental Water Reserve. The third tier comprises the rights that are allocated to private individuals for consumption. These include water entitlements such as water rights, licences and shares (State of Victoria, 2004).

A *water share* is a legally recognised, tradable, secure share of water owned by an individual. A share of the water is available from the regulated system for a specific use. It may be, for example, water a farmer has ordered for irrigation purposes to be delivered to a specific field, at a specific time and at a rate suitable for a particular crop. Because it is a share, it is a relative volumetric amount that is linked to the seasonal availability of water within the system. In other words, in times of water scarcity only a percentage of the total entitlement is allocated by the relevant Water Corporation to the individual. *Section 51 licences* allow for diversions from unregulated streams and are issued for a specified volume and time. *Supplies to urban customers* are supplied by urban water corporations within a defined district. *Section 67 licences* grant construction permission for a bore or dam on a waterway when a section 51 licence is required. *Section 8* rights allow individuals to take and use water for domestic and stock use. Note that section 8 rights circumvent tier 2 (Figure 18) and thus are not taken into account when calculations regarding the balance between bulk entitlements and environmental water are made.

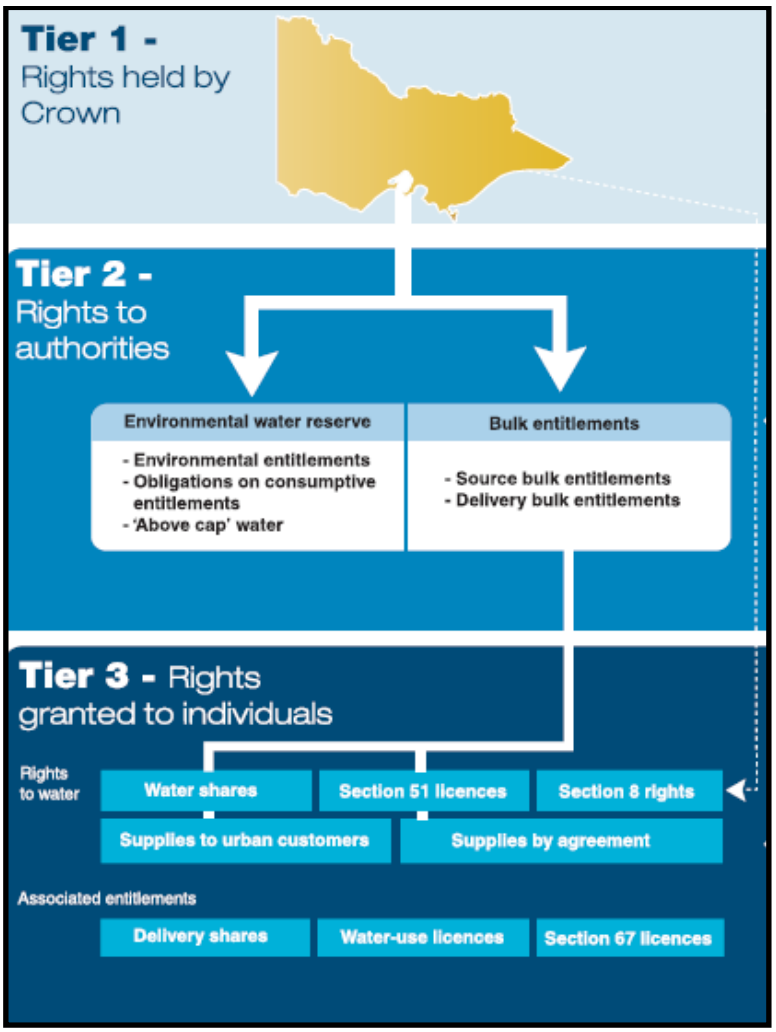

Figure 18 Victoria's water entitlement system (State of Victoria, 2009a p9).

A water market has existed in Northern Victoria since 1991 (State of Victoria, 2009a). This system has enabled water users – rural water users, urban water corporations and environmental managers to buy and sell water shares. Trading shares on the water market allows for example irrigators to buy additional water in water scarce times to protect their crops and sell in water abundant times for extra revenue. The Commonwealth Government's recent commitments to purchase water entitlements or shares for the environment have further stimulated the water market.

Within the Campaspe catchment there are a range of water users. Broadly speaking in the upper catchment the land use is predominately rural residential 'hobby' farmers or lifestylers that activate their Section 8 rights to domestic and stock water. In the middle of the catchment is Lake Eppalock (Figure 16) which is a reservoir shared between two water corporations that provide water to urban customers and irrigators. The irrigators are located primarily in the lower catchment, while the mid-

catchment is predominately dryland agriculture. All farmers have water shares to secure their access to water for their farming activities. In times of water scarcity Lake Eppalock does not fill to its capacity and hence all farmers whose entitlements come from that reservoir don't receive their full allocations. It is argued that if the number of domestic and stock dams in the upper catchment were reduced, in times of water scarcity, Lake Eppalock would receive more water and hence water share holders would be allocated higher percentages of their water entitlements. The perceived injustice lies primarily in the fact that water share holders pay for their water and rely on it for their livelihoods while those accessing water for D&S use don't pay for it and often it is just for aesthetic purposes. In addition, during water scarce times, the percentage of water allocated to water share holders is reduced while no restrictions are imposed on D&S water users.

The Case Study

The system of water allocation and D&S dam regulation in the State of Victoria involves an overwhelming number of institutions and associated legislation and policy. This is illustrated in Figure 19 – the heuristic intent of this figure is to show the necessity of a boundary judgement in order to define the system under investigation to make the study manageable yet conceptually useful.

The next step in the research process was to identify the requisite simplicity of the governance system without losing the complexity of the management of D&S dams as illustrated in Figure 19. This was done using the issue of D&S dams as a golden thread, and the nomenclature of Cash *et al.* (2006). Two scales were identified as the most relevant to this study, namely an institutional scale and a regulatory scale. Next the extent of each of the scales was identified. Because the problem of D&S dams only becomes apparent at a collective level (the cumulative effect) and not at the level of individual farmer; and because the perceived injustice being examined is one of how water is allocated by the government; the lower extent of the scales examined was set at the local municipality level.

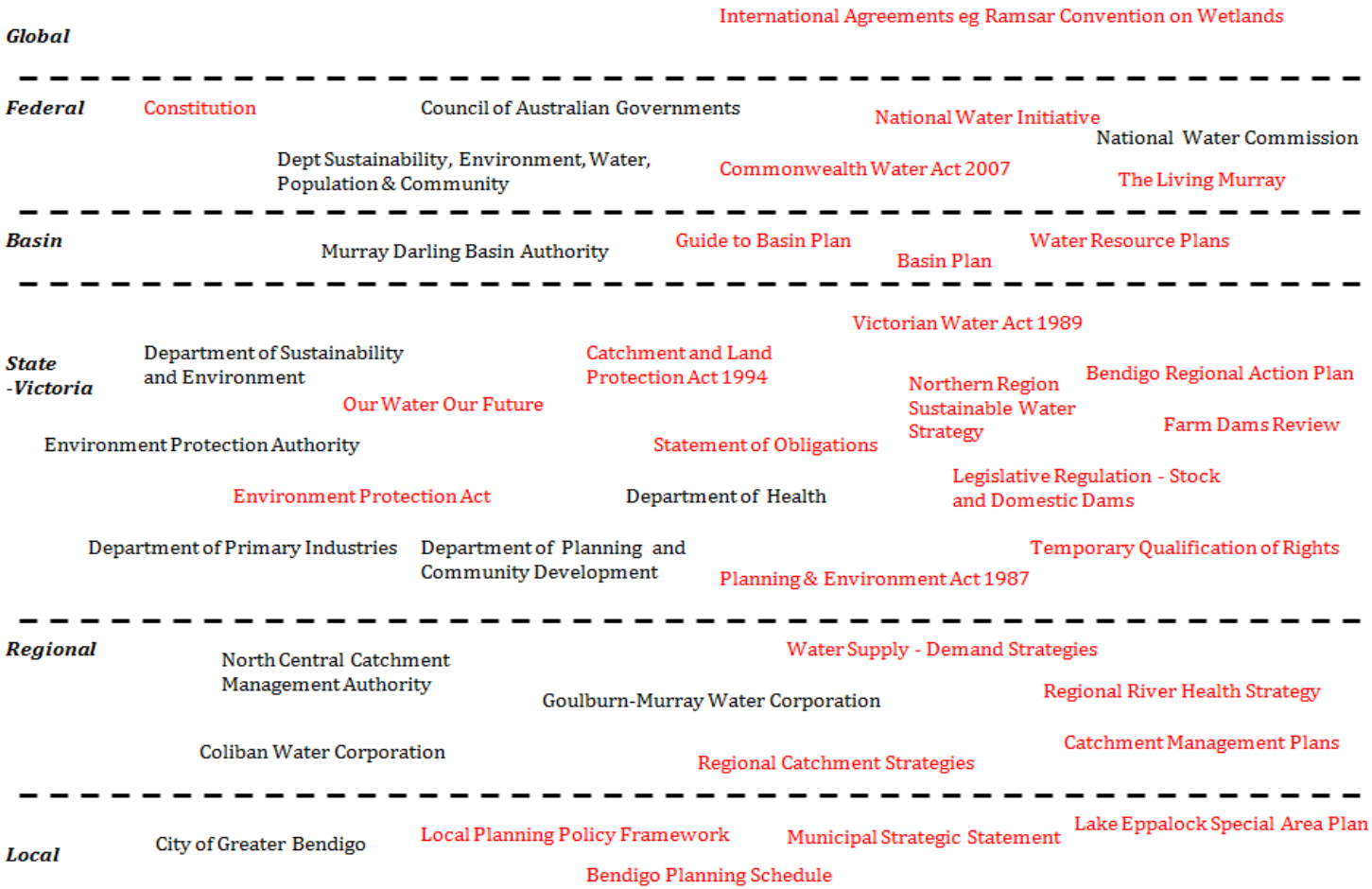

Figure 19 Map of institutions (black text) and legislation, strategies and policies (red text) directly or indirectly related to the management and regulation of D&S dams in the Campaspe catchment, Victoria.

The upper extent of the scales was set at the Federal Government level and did not include the international or global level because international conventions and treaties only had an influencing effect of the Water Act 2007 and no international agreement mentions D&S dams in their text. Next the various levels within each of the scales were determined and these are illustrated in Figure 20. Using this framework of scales and levels, the legislation and policies listed for each of the levels were sourced for document analysis and key decision makers from each of the institutions listed in Figure 20 were identified and targeted for interviews.

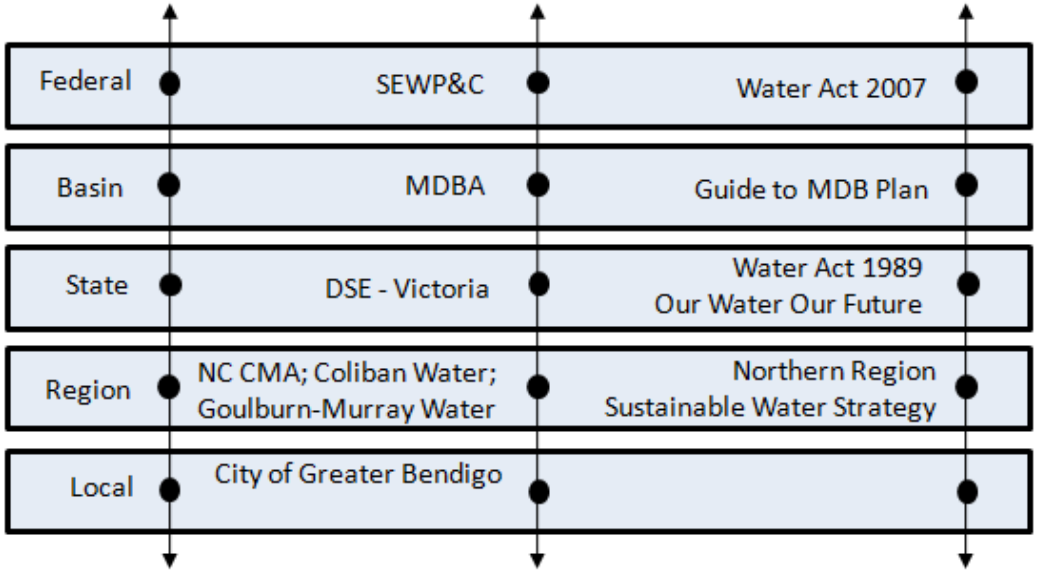

Figure 20 The spatial, institutional and regulatory scales and their associated levels pertinent to the issue of D&S dams in the Campaspe catchment.

(SEWP&C = Department of Sustainability, Environment, Water, People and Communities; MDBA= Murray-Darling Basin Authority; DSE= Department of Sustainability and Environment; NC CMA= North Central Catchment Management Authority).

In August 2008 the ***North Central Catchment Management Authority*** (NC CMA), the local municipality of the ***City of Greater Bendigo***, and the two water corporations of **Coliban Water** and **Goulburn-Murray Water** signed a memorandum of understanding (MoU) to better manage D&S dams in the Campaspe catchment. This was the culmination of identifying the potential impact of D&S dams and informally tracking their growth over a number of years. These four institutions (later joined by the local municipality of Mount Alexander Shire) signed this MoU to lay a platform for co-operation to work with Government to achieve the necessary regulatory and

legislative changes, and the development of an integrated action plan to manage the impact of dams in the upper Campaspe (MoU, 2008).

The Campaspe catchment falls within the jurisdiction of NC CMA who recognised the impact that D&S dams were having on river health. CMAs are established under the auspices of the State's Catchment and Land Protection (CaLP) Act 1994 (No 52 of 1994), and are administered by the Minister for Environment and Climate Change. CMAs are provided with regional waterway, floodplain, drainage and environmental water reserve management powers under the Water Act 1989 through a Statement of Obligations. Coliban Water and Goulburn-Murray Water are two of 19 State owned water corporations. The Board of each water corporation reports to the Minister for Water via the ***Department of Sustainability and Environment (DSE)*** on the irrigation districts, the water districts and the waterway management districts that fall under their jurisdiction.

The ***Water Act 1989*** (No. 80 of 1989) is administered by the Minister for Water, who is supported by the Office for Water within the Department of Sustainability and Environment (DSE). DSE is responsible for the overarching direction of water management within Victoria which is captured in their strategy document: ***Our Water Our Future.*** There are a number of regions within Victoria that are then responsible for implementing this strategy via a number of regional strategies, and the one relevant to this study is the ***Northern Region Sustainable Water Strategy***.

Although each of the States and Territories in Australia hold the primary decision making power and not the Federal Government, each of the States through the Council of Australian Governments (COAG) is committed to the National Water Initiative, launched in 2004, which is considered the overarching policy framework guiding Australian water management (Hussey & Dovers, 2007). The principal piece of water legislation at the Commonwealth (federal) level is the ***Water Act 2007*** (No.137 of 2007), administered by the Federal ***Department of Sustainability, Environment, Water, People and Communities (SEWP&C)***. Although this act is applicable to the whole of Australia, the region that it focuses on is the Murray-Darling Basin. The Water Act calls for the establishment of the ***Murray-Darling Basin Authority (MDBA)*** via the Murray-Darling Basin Agreement (Part 1A of the Water Act) (Commonwealth of Australia, 2007). The MDBA is responsible for the development of the ***Murray-Darling Basin Plan,*** which at the time that the interviews for this study were conducted, was still out for public comment in the form of the ***Guide to the Basin***

Plan. The Guide's purpose was to act as a background document to present proposals to people about the current state of the Basin's water resources, the factors impacting on these water resources and the new management arrangements within the Basin. The central tenet of the proposed plan is that new limits on water that can be utilized within the Basin are planned. They are based on what has been termed long term average sustainable diversion limits (SDLs), which are calculated after water for the environment has been set aside for key ecosystem assets and functions (MDBA, 2010). D&S dams are referred to in the guide as an interception activity that needs to be included in the calculation for SDLs.

The Guide to the Basin Plan was released in September 2010 stating that the environment needed between 3000 and 4000GL of water in order to restore and ensure the long term health of the river ecosystems. The Guide's proposed buy-back of entitlements or water shares for the environment was hailed by environmentalists but met with dismay and fury by farmers. The irrigation community's anger stemmed from an understanding that the buy-back for the environment would be through the forced acquisition of water shares. The timing of the release of the Guide also added fuel to the debate – a ten year drought was just at the cusp of breaking and farmers were anxious for a turn in their fortunes and production rates. The outcry was widespread in many regional towns throughout the Basin and pushed the Government to initiate inquiries into the social and economic impacts of the Plan's proposed goals. A revised plan now calls for 1300GL for environmental needs. Now environmental groups are dismayed. The draft Basin Plan is currently out for formal public consultation and comment (March 2012) and is expected to be brought before Federal Parliament in the second half of 2012.

CHAPTER 6: Enriching the Concept of Justice

This chapter is the result of the data coding and analysis process outlined in *Chapter 4:Methodology*. Three overarching themes emerged from this process, each contributing in a different way to the enrichment to the concept of justice in the context of water allocation. These themes in turn provide the balance of the building blocks necessary to complete the conceptual bridges necessary to present a conceptual framework in Chapter 7.

Theme 1: Broadening the Scope of Justice

An understanding of the dependence of social and economic uses of water on the underlying environmental aspects of it, is the central tenet of social-ecological systems (SESs). As already outlined in the literature review, SESs emphasise the integrated concept of humans in nature and stress that the delineation between social and ecological systems is artificial (Folke*, et al.*, 2005). Throughout the 1990s the Council of Australian Governments (COAG) recognised this interdependence and initiated a number of reforms, agreements and amendments related to or directly impacting on the management of water resources in Australia (National Water Commission, 2011a). These culminated in the National Water Initiative, launched in 2004, which is described as a paradigm shift in the way water is managed and is considered the overarching policy framework guiding Australian water management reforms (Hussey & Dovers, 2007). The driver behind this reform process was *inter alia* a recognition of environmental decline (Connell *et al.*, 2007).

But how does the recognition of the interdependency of social, economic and environmental concerns impact on our understanding of justice. Importantly it helps define the scope of justice. The scope of justice, also known as the scope of moral exclusion, has been defined as the psychological boundary for fairness (Opotow & Weiss, 2000) or the boundary within which justice is perceived to be relevant (Hafer & Olson, 2003). Principles of justice govern our conduct towards those within our scope of justice, while moral exclusion rationalises the denial of those outside our scope of justice (Opotow & Weiss, 2000). In the past the environment and some social

issues (such as cultural uses of water) were excluded from the scope of water management concerns in Australia.

The scope of justice for water management and allocation within Australia has been flexing and changing over the years. Prior to European settlement the Indigenous people managed water to support their livelihoods (Hussey & Dovers, 2006) – primarily a social approach to water management, but one that also recognised the underlying environment. The European settlement of Australia from 1788 brought with it British rules for water management and in 1901 the Federation assumed control of all water (see Cathcart, 2009 for more on the history of this era.). A mix of social and economic imperatives steered water management for the next century through the provision of quality drinking water, agricultural development, irrigation and drainage infrastructure, soldier settlement schemes and massive dam building in the 1950s to 1970s (Cathcart, 2009; Hussey & Dovers, 2006). The legacy of this period has been a raft of environmental problems emanating primarily from irrigated agriculture and its associated bush clearing, and the resultant salinity issues (Crase*, et al.*, 2004). These environmental concerns initiated the 1994 audit on water use within the Murray-Darling Basin which resulted in a cap on water extractions (Crase*, et al.*, 2004) and a new environmentally driven imperative to water management. Ironically the concern for environmental issues within the Basin has driven the interest and practice in water markets and trading (Crase*, et al.*, 2004). In other words an economically constructed mechanism that aims to secure the environment as a legitimate user of water and thus safe guard its protection.

This first theme is entitled broadening the scope and it is a recognition that because the current environmental discourse and water management paradigm is that of sustainability, all social, economic and environmental concerns need to be considered.

> *"All* [referring to social, economic and environmental concerns in Question 1 of the interview] *are important and all essentially equal [...] it* [the Commonwealth Water Act] *places the environment on the same pedestal as social and economic for the first time and that is the major departure".*
>
> -Pers. comm. Federal Level Representative, 2010

Within the Murray-Darling Basin the environmental concerns were the ones that tended to receive less attention:

"Our traditional approach to managing water has been to exploit rivers and aquifers, create dams to supply towns, industry and irrigation, and then dispose of the 'waste water' back into rivers or the ocean. This is not sustainable".

-Our Water Our Future (State of Victoria, 2004).

But now the value of the environment has been recognised and its management is being woven into the newest strategies for the Murray-Darling Basin, one of which is the Basin Plan, where one of its objectives is to:

"Maintain and improve the ecological health of the Basin".

-Guide to the Basin Plan (MDBA, 2010).

This shift to include environmental concerns was also reflected in a number of interviews:

"The environment is now not a second class citizen".

-Pers. comm. Federal Level Representative, 2010

"When the act [Victorian Water Act] *was changed in 1989 that for the first time started to explicitly recognise the environment as a stakeholder in the process".*

-Pers. comm. State Level Representative, 2010

A large part of instating environmental issues at the same level of concern as social and economic issues is an increased awareness that the environment underpins the social and economic activities within the Basin:

"...the focus is on the environment but that's largely in recognition of the fact that that is the basis which provides for a social and economic end".

-Pers. comm. State Level Representative, 2010

"...the broader objectives of the act [Victorian Water Act] *are about a sustainable river and a healthy river so that we can have the communities that we want that are producing the agriculture that we want and doing all*

the recreation activities that they like and have water for critical human needs".

-Pers. comm. State Level Representative, 2010

Water management within the Murray-Darling Basin is now functioning under the discourse of sustainability where social, economic and environmental imperatives seek to be balanced. There is now no justifiable reason for excluding any of these broad concerns from the scope of water management and allocation decision making. All concerns should have a voice in the decision making process and be included as drivers or rationales for possible outcomes in water allocation decision making – they all need to be included in the scope of justice.

The literature tells us that there is no unifying theory of justice which will provide the rule book on how to make a good or the right decision. There are however a range of justice principles that can be appealed to but they are not organized in a hierarchical manner or in a particular order that defines which ones should prevail in cases of conflict. This poses a dilemma since even though all social, economic and environmental concerns need to be accounted for in the decision making process, water uses still need to be prioritised and trade-offs still need to be made.

Wenz's Concentric Circle Theory (Wenz, 1988) suggests that common sense morality should prevail and provides us with two questions to help prioritise water uses and users in cases of conflict: how close to you among the concentric circles are the others who will be affected by your actions or decisions? And how important relative to one another are the *prima facie* duties that come into conflict in a given situation? In general, closeness among the concentric circles relates not to physical closeness but to the number and strength of obligations that common sense would say that you have regarding the other who will be affected by your actions. The other question relates to the strength of the *prima facie* duties that may come into conflict with one another in a given situation.

A relevant hypothetical example: You are a key decision maker in government, there has been a decade long drought and you need to decide whether to allocate water to the irrigators for their pasture crops or to send down a flush of fresh water to restore the salinity levels in the river to avoid catastrophic fish kill. Concentric circle analysis shows that you have a 'closer' relationship with the irrigators – they need the water to sustain their livelihoods. Common sense morality says that human needs are more

important than fish needs and so the decision to allocate water to the irrigators makes sense based on *prima facie* evidence. However using an understanding of social-ecological systems, and the fact that the environment underpins many social and economic activities – this scenario warrants further exploration. The site of the potential fish kill is located at the tourism hub of one of the major towns in the area. A fish kill at the height of the tourist season would impact on the paddle boats, local fishing guide industries and create water quality concerns for the children swimming in the river. The environment in this case underpins the tourism industry and a trade off with the irrigator's need for water has to be made. With this further information what would at first appear to be the 'right' decision based on *prima facie* evidence would be to ensure that the irrigators have water for their crops, but with an understanding of social-ecological systems (SESs) the priorities for water allocation would change.

Although this is a very simplistic example, recognition of the interdependency of social, economic and environmental concerns does impact on our understanding of justice; it essentially rearranges our priorities as a society. If we take Wenz's Concentric Circle Theory (Wenz, 1988) and illustrate it as a series of concentric circles using the '*justice for whom'* categories of social, economic and environment, typically the strength of our obligations and thus the priority for water allocation would be in the order of water for critical and basic human needs (a social imperative); water for activities that support livelihoods (an economic imperative) and water for ecosystem health (an environmental imperative) (see Figure 21A). If an understanding of SESs is infused into the concentric circle theory, the strength of our obligation towards the environment needs to be re-examined. Although the environment can and is valued for its inherent properties, in most cases it is the fundamental basis for social and economic activities, and thus rather than sitting in the position of an outer circle it would underpin our obligations to social and economic activities (see Figure 21B). The measure of our strength of obligation to these activities must be routed through a filter of obligation to the environment.

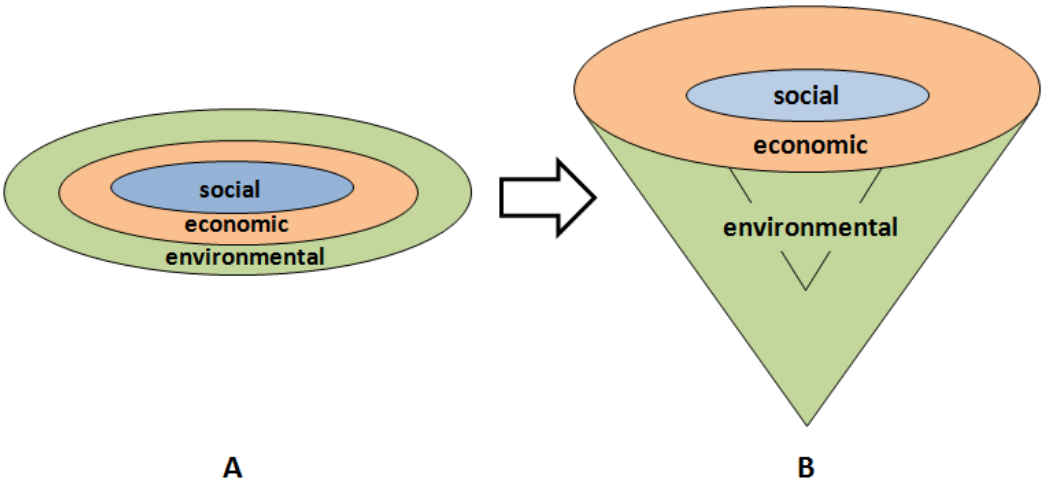

Figure 21 Typical concentric circle ordering of priorities (A); Concentric circle ordering of priorities with an SES understanding (B).

Reprioritising the strength of obligation to environmental issues that support social and economic activities is often more indirect and sometimes necessitates a longer term view to the more immediate social and economic imperatives – the introduction of the temporal dimension to the debate is a long standing one – satisfying short term or more immediate needs vs. satisfying long term or underpinning environmental needs is a dilemma that challenges our sense of justice. The longer term view does however support "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987).

This theme enriches the concept of justice at the level of discourse and paradigm rather than at the fundamental level of decision making. The scope of justice is expanded under the discourse of sustainability and sustainability is expanded when viewed through the lens of social-ecological systems. The environment underpins many of the social and economic concerns of sustainability to such an extent that the environmental can no longer be continuously ignored without the burden of injustices spilling out of the environmental domain and creating injustices in the social and economic domain.

Theories and principles of justice based primarily on social and economic drivers now need to encompass a different form of environmental justice - not one based on a traditional understanding of environmental justice based on pollution and minority rights but one based on an understanding of sustainability and social-ecological systems.

Theme 2: A Continuum of Justice

This theme aims to explore how the *justice for whom* categories of environmental, social and economic concerns vary between levels and scales, and to explore how they change in water scarce conditions.

When the regulatory scale is examined and the objectives/principles of the various legislation and policies that exist at the federal, basin, state and regional levels are summarised it is interesting to see how the emphasis in environmental, social and economic concerns change according to their stated objectives/principles.

The Commonwealth Water Act aims:

"...to manage the Basin water resources in the national interest..."

"...to give effect to relevant international agreements [...] and [...] in accordance with those agreements, to address the threats to the Basin water resources..."

"...in giving effect to those agreements, to promote the use and management of the Basin water resources in a way that optimises economic, social and environmental outcomes..."

"...to ensure the return to environmentally sustainable levels of extraction for water resources that are overallocated or overused..."

"...to protect, restore and provide for the ecological values and ecosystem services of the Murray-Darling Basin..."

"...to improve water security for all uses of Basin water resources..."
(Commonwealth of Australia, 2007).

The overall focus of the Commonwealth Water Act is neatly summarised in the following quote:

"...the focus is on the environment but that's largely in recognition of the fact that that is the basis which provides for a social and economic end."
-Pers comm. Federal Level Representative, 2010

The next level in the regulatory scale is the basin level. This level is in fact one that sits within the jurisdiction of the Federal or Commonwealth Government – the Basin Plan is a requirement of the Murray-Darling Basin Agreement which is Part 1A of the Commonwealth Water Act.

"...There is to be a Basin Plan for the management of the Basin water resources. The Basin Plan will provide for limits on the quantity of water that may be taken from the Basin water resources as a whole..."

(Commonwealth of Australia, 2007).

One of the main purposes of the Basin Plan is "*the establishment and enforcement of environmentally sustainable limits on the quantities of surface water and ground water that may be taken from the Basin water resources (including by interception activities*)" (Commonwealth of Australia, 2007). Interception activities here include forestry plantations, mining activities and domestic and stock farm dams.

The primary focus of the Basin Plan and hence the Murray-Darling Basin Authority (MDBA) is therefore environmental:

"...the MDBA's main focus is clearly environmental..."

-Pers comm. Basin Level Representative, 2010

"...environmental priorities come first..."

-Pers comm. Basin Level Representative, 2010

The next level in the regulatory scale is the state level; in this case this refers to the Victorian Water Act.

This Act has *inter alia* the following purposes:

"...to provide for the integrated management of all elements of the terrestrial phase of the water cycle";

"...to promote the orderly, equitable and efficient use of water resources";

"...to make sure that water resources are conserved and properly managed for sustainable use for the benefit of present and future Victorians"

(State of Victoria, 1989).

The White Paper - Our Water Our Future sets out an action plan to secure Victoria's water future. One of the fundamental principles of water management in Victoria is:

"The management of water will be based on an understanding that a healthy economy and society is dependent on a healthy environment".

(State of Victoria, 2004).

It is clear that both the Victorian Water Act and Our Water Our Future reflect the social-ecological system philosophy of the importance of the environment as a foundation for social and economic uses.

The next level in the regulatory scale is the regional level. The Victorian Water Act calls for the preparation of regional sustainable water strategies for the purpose of providing a strategic plan for the use of water resources in a particular region – in this case the Northern Region Sustainable Water Strategy (NR SWS) is the relevant document for this level.

The NR SWS aims to:

- *"identify and understand threats to water availability and quality, including the implications of climate change and variability;*
- *help regional communities to adjust to reduced water availability*
- *ensure secure water entitlements for towns, industry and the environment*
- *encourage economically viable and sustainable agriculture;*
- *improve choice and flexibility for entitlement holders to manage the risks of climate change and variability;*
- *protect and where possible, improve the health of rivers, wetlands and aquifers from the impacts of drought, climate change and variability and other risks; and*
- *recognise and respond to Indigenous and other cultural and heritage values associated with the region's rivers and catchment areas".*

(State of Victoria, 2009a).

It is evident from this list of aims that all three concerns are mentioned. It could be argued that social and economic issues take slightly more precedence than environmental issues based purely on the order of the aims. However it is very clear that there is nothing in the wording of the aims that explicitly recognises the

environment as underpinning the economic and social activities in the region i.e. a social-ecological system philosophy is not evident.

In summary – at the federal and state level the discourse of social-ecological systems is clear where the environment is emphasised because it underpins the social and economic activities within the basin. At the basin level – the Basin Plan clearly focuses on the environment (although current protests over the Basin Plan are pushing it towards a more SES aligned approach). At the regional level economic and social concerns are emphasised more than environmental, although all are recognised (see Figure 22). There is therefore a continuum of *justice for whom* ranging from a very strong recognition that environment is a priority, followed by a recognition that the environment underpins all activities to one where social and economic concerns are more emphasised. This continuum and the fact that the range does not match the order of the levels in the regulatory scale illustrate the fact that a binary or dichotomy of justice is too simplistic as a means to understand justice in a complex system context.

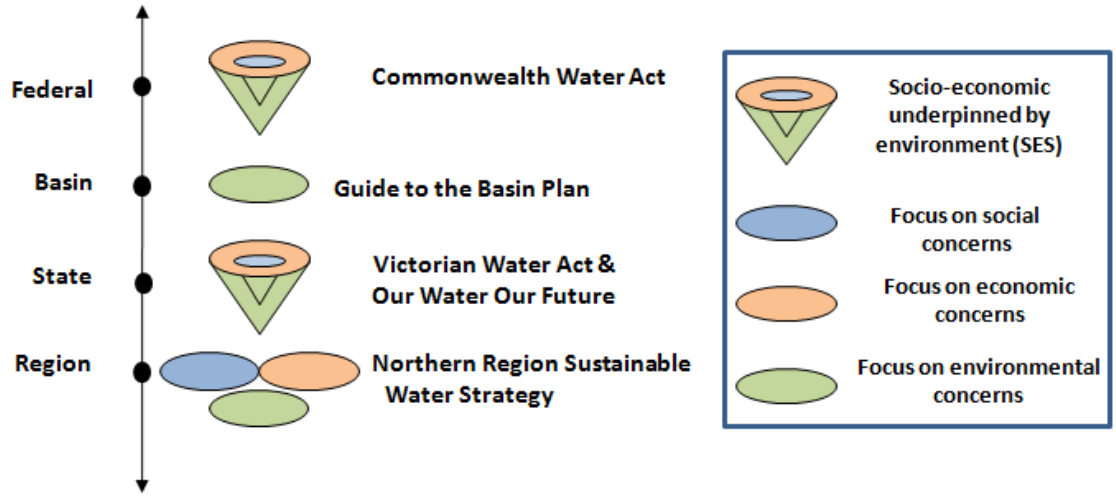

Figure 22 Summary of justice for whom continuum - environment, society, economy for each level within the regulatory scale.

Although the Northern Region Sustainable Water Strategy is regionally applicable it is a product of the state level. The implementation of this strategy therefore sits with regional level institutions and the function of these institutions is essentially determined by the Victorian Water Act. There are three institutions at the regional level relevant to this case study; they are the North Central Catchment Management Authority; Goulburn-Murray Water – a rural water corporation; and Coliban Water –

an urban water corporation. The Water Act establishes and delegates authority from the Minister to Water Corporations to manage rural and urban water services; and in conjunction with the Conservation and Land Protection Act establishes and determines the functions of Catchment Management Authorities through a Statement of Obligations. Each of these institutions is mandated to address social, economic and environmental concerns.

North Central Catchment Management Authority:

"...we're an environmental business...in the Statement of Obligations they identify CMAs as [the] *caretaker of river health and we have this function which is called environmental water reserve manager..."*

-Pers comm. NC CMA Representative, 2010

Goulburn-Murray Water:

"Goulburn-Murray Water's...primary focus is...economics...simply because it's about primary production, its connection to primary production, the delivery of water and the availability of water..."

-Pers comm. Goulburn-Murray Water Representative, 2010

Coliban Water:

"...our main concern is social...our core task is to provide safe drinking water to the community, the health of the community is important to us..."

Pers comm. Coliban Water Representative, 2010

These three institutions at the regional level are essentially the implementation arm of the State government's Department of Sustainability and Environment and it is interesting to note that the focus of each one covers the three *justice for whom* categories separately and are thus appropriately nested under the social-ecological systems philosophy of the Victorian Water Act (Figure 23).

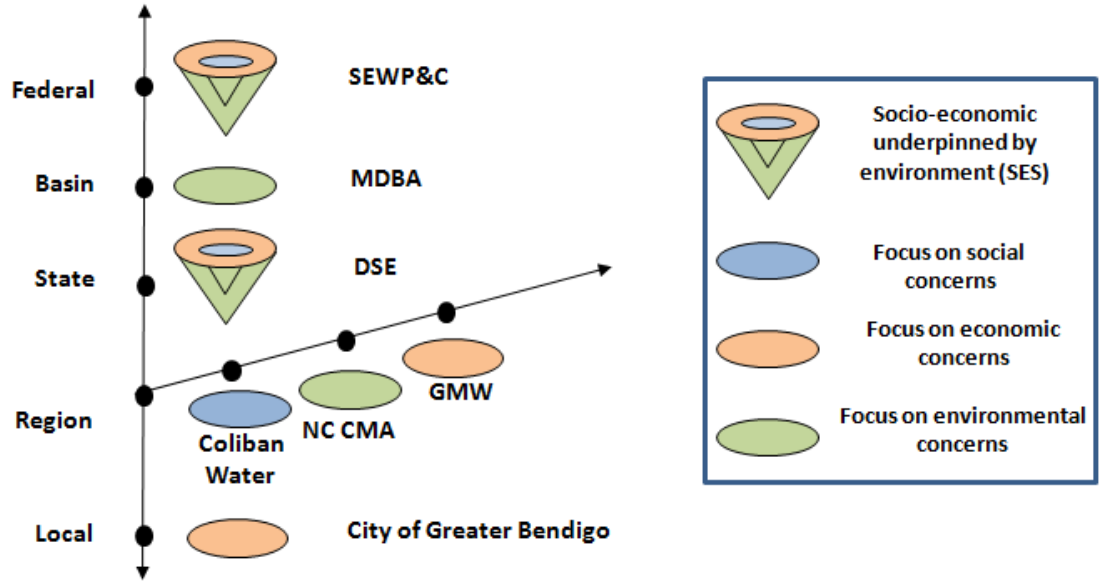

Figure 23 Summary of justice for whom continuum - environment, society, economy for each level within the institutional scale.

(SEWP&C = Society, Environment, Water, Population & Community; MDBA=Murray-Darling Basin Authority; DSE=Department of Sustainability and Environment; NC CMA= North Central Catchment Management Authority; GMW= Goulburn Murray Water).

There exists therefore a continuum of justice in the vertical as well as the horizontal plane which inherently makes sense in order to practically achieve the objectives of the overarching goal of sustainability. If we examine the state and regional level of the institutional scale in more detail it offers some insights into cross level interactions as described by Cash *et al.* (2006).

"...we have a lot of partnerships with Goulburn Murray Water [...] we work heaps with Department of Sustainability and Environment..."

-Pers comm. NC CMA Representative, 2010

"...we report to the Water Minister...so Department of Sustainability and Environment is our main body."

-Pers comm. Coliban Water Representative, 2010

"...most interaction is with either Department of Sustainability and Environment or the [North Central] *Catchment Management Authority..."*

- Pers comm. Goulburn-Murray Water Representative, 2010

There are interactions are illustrated in Figure 24.

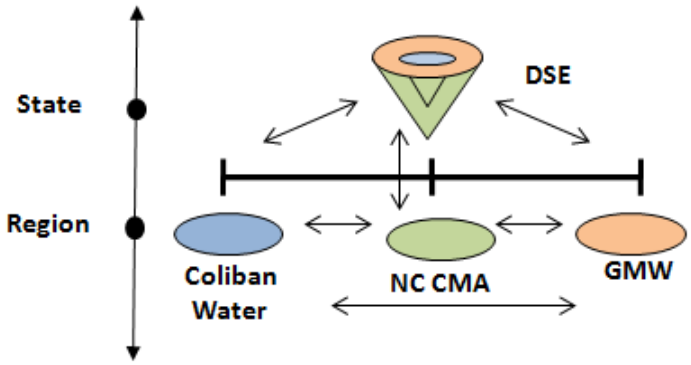

Figure 24 Cross level interactions between the state and regional level of the institutional scale.

(DSE=Department of Sustainability and Environment; NC CMA= North Central Catchment Management Authority; GMW= Goulburn Murray Water).

There also exists cross scale interaction between levels of the regulatory scale and the institutional scale; the DSE is mandated to implement the goals of the Victorian Water Act as are the three regional level institutions. In theory therefore it looks as though the institutional structure of the state and regional levels is well suited to achieving their regulatory objectives and principles. A similar structure is not apparent at the federal and basin level. One would expect if there is an overarching goal of sustainability - as is determined by the Commonwealth Water Act - that there would be institutions at the basin level that would address each of the concerns for environment, society and economy as is evident by the Water Corporations and CMA at the regional level. If not three separate institutions then at least that the MDBA should be mandated to address all three concerns instead of just the environmental concerns as is advocated by the Basin Plan and the Commonwealth Water Act. Interestingly it is this missing interaction between federal and basin level that has received much criticism with the release of the Guide to the Basin Plan and has resulted in protests about its potential unjust outcomes (see Figure 25 for an example of the consequences of this missing interaction). Although the push for the inclusion of social and economic concerns in the Basin Plan will no doubt change this in the near future.

Figure 25 Copies of the Guide to the Basin Plan being burned at the Griffith community meeting in October 2010 (Accessed from www.abc.net.au on 3 April 2012; © ABC 2012).

The Guide to the Basin Plan was released in September 2010 for public comment. The Guide's purpose was to act as a prelude to the release of the Basin Plan (the draft plan was released in November 2011 for formal public comment) and to act as a background document to present proposals to people about the current state of the basin's water resources, the factors impacting on these water resources and the new management arrangements within the Basin. The Murray-Darling Basin Authority undertook 28 information sessions with communities in all the Basin States in order to explain what the implications of the new plan would be on all water users and uses. There were a number of points of conflict but the most clearly articulated was that the irrigators felt that water would be taken from them and re-allocated to the environment. This impression was vigorously voiced at a number of the community meetings and protesters called for the Commonwealth Water Act to be scrapped and the Basin Plan to be thrown out.

The lack of consideration of the social and economic impacts in the Basin Plan ultimately resulted in the Chairman of the MDBA resigning because he felt that the socio-economic issues were a vital part of the plan but that legally the plan could only focus on environmental issues and thus presented an impasse. Subsequently a new Chairman was appointed and an additional round of consultation was undertaken

from January to April 2011 that specifically addressed the social and economic concerns of the Basin communities (EBC *et al.*, 2011). The Winsor Enquiry further articulated many of the concerns and envisaged impacts that may materialise on the implementation of the Guide (and Plan) (Parliament of the Commonwealth of Australia, 2011). Interestingly although this appears to have soothed the Basin Plan development process, the implementation of the Basin Plan objectives will rely heavily on the state and regional level institutions and thus future interactions and relationships between all the institutional scale levels will need strengthening.

At this point it has been illustrated that there exists a continuum of *justice for whom* across both the regulatory and institutional scales and potentially where some mismatches are in terms of policy objective and institutional mandate between levels and scales. The next layer in the analysis revolves around getting a clearer understanding of how trade-offs are made between environmental, social and economic concerns in water scarce scenarios. What happens to the objectives/principles of legislation, policy and strategy in times of water scarcity? What happens to the *justice for whom* priorities in drought conditions? In order to answer this, the water allocation framework needs to be re-examined (see Figure 18 illustrating tiers of water allocation).

At tier one when water is allocated between the States, with reference to the Murray River[20], the three States involved are Victoria, New South Wales and South Australia. In normal or water abundant conditions, the flows within the Murray are divided into two equal portions for Victoria and New South Wales; they then each supply half of the monthly volumetric amounts to South Australia as outlined in Part 1A of the Commonwealth Water Act – the Murray-Darling Basin Agreement. During periods of water scarcity when the volumetric amounts comprising South Australia's entitlements cannot be met, a period of special accounting is declared, and the inflows into the Murray River are shared equally between the three States[21] (Dyer, 1999). Although this arrangement does not impact on the distribution of water between environment, society and economy *per se*, it does illustrate that the downstream user is protected to some degree – thus the obligation not to cause significant harm to South Australia is fulfilled (at least in terms of Critical Human Needs).

[20] Note different water sharing arrangements exist for the Darling River.
[21] The rules are not quite that simple but in essence this is what it amounts to – see reference for more details.

Once water has been allocated at tier one, it is up to the States to allocate those amounts as it sees fit – the Federal Government has no say over how water is distributed in both normal and water scarce conditions. Critical human needs are however the exception to this – all contracting governments to Part 1A of the Commonwealth Water Act - the MDB Agreement have agreed *"...that critical human water needs are the highest priority water use for communities who are dependent on Basin water resources..."* (Commonwealth of Australia, 2007).

"...each State is putting aside water to meet its critical human needs and it's got an obligation to do that under the Commonwealth Act..."

-Pers comm. State Level Representative, 2010

Even though critical human needs have been prioritised they are generally not regarded as that important within the Basin since they are inextricably linked to conveyance water – the system needs a certain amount of water to flow and to be able to distribute and deliver water for consumptive uses. This conveyance water and water for critical human needs are generally bundled together as the amounts are relatively small and thus assuring that that priority is fulfilled and is never in jeopardy.

"...the Act [Commonwealth Water Act], *certainly the amendments to the Act in 2008, make it quite clear that critical human needs comes first...but you need to keep in mind that's a pretty small amount..."*

-Pers comm. Basin Level Representative, 2010

At tier two water is allocated to bulk entitlements for consumptive uses and water for the environment. It is at this level that the balance between these two broad categories is supposedly achieved. The environment's share however is not explicitly protected:

"...you have consumptive water which is allocated through Bulk Entitlements - water shares, water licences ...anything that isn't in a Bulk Entitlement is deemed under the Water Act to be part of the environmental water reserve...now the environmental water reserve consists of a number of components ...and that might be an explicit environmental entitlement...in some cases in the Bulk Entitlements that have been granted there are obligations on Corporations to provide passing flows below certain structures [...] and then any unregulated water, any spills in the system are deemed to be

part of the environmental water reserve..."

-Pers comm. State Level Representative, 2010

This arrangement works fine in normal water abundant times but in water scarce conditions the environment always loses as it does not have enough water secured in the entitlement framework to provide minimum environmental flows in drought conditions. The situation is even more dire when the tier three shares that are secured for the environment are examined in terms of whether they are high or low reliability shares. Figure 26 illustrates the order of priority of water entitlements starting with this year's conveyance water and working its way up to this year's low reliability water entitlements and then spills and overflows. In the Campaspe catchment there are no high reliability water shares for the environment and only 5GL of low reliability environmental entitlement. For the northern region of Victoria – the jurisdiction of the Northern Region Sustainable Water Strategy – only six percent of environmental flows are secured by environmental entitlements (State of Victoria, 2009a).

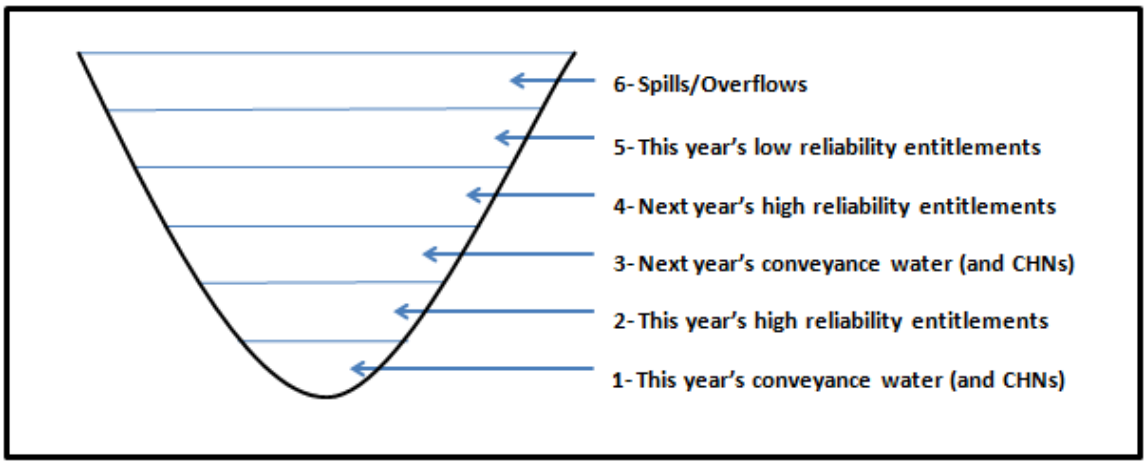

Figure 26 The order of priority of water use from a storage reservoir in relation to entitlement type in Victoria starting with *1-This year's conveyance water* (CHNs – Critical Human Needs).

-Pers comm. State Level Representative, 2010.

The other mechanism that can be triggered by a water shortage is that of a temporary qualification of water rights.

"If the Minister declares... that a water shortage exists in an area or water system, he or she may temporarily qualify any rights to water whether or not they relate to the same area or water system"

*(*State of Victoria, 1989).

Under the qualification of rights period the amount of water used cannot be greater than the volume specified in an owner's high reliability water share and water may only be used for domestic household uses, stock watering, fire fighting, eligible businesses that use water in manufacturing (e.g. piggeries and feedlots) and dairy wash down (State of Victoria, 2007). Importantly it does not allow for any irrigation use; all irrigation water can only come from an allocation or if more is required it must be bought on the market during this period. Once again because of the lack of high reliability environmental entitlements, during water scarce periods the environment bears a disproportionally greater burden than consumptive water users.

There is however some hope:

"*...the solution to that is for the environment to take a much greater share of the same sort of rights that the irrigators have...which is what's happening in the Murray-Darling Basin because the Commonwealth is coming in and buying up water shares or other consumptive rights...*"

- Pers comm. State Level Representative, 2010

Herein lies the social dilemma and the source of conflict over the proposals in the Guide to the Basin Plan – water is being 'taken' away from irrigators and 'given' to the environment. Advocates of the Basin Plan claim they are 'right' because the environment should take precedence since it protects the long term social and economic activities within the Basin; while protestors of the Basin Plan claim they are 'right' and the Basin Plan is 'wrong' because their immediate livelihoods are threatened as well as those who run associated businesses.

This theme has illustrated through the case study:

- that the *justice for whom* categories of social, economic and environment vary between the levels of the regulatory scale and the institutional scale;
- that interactions between the two scales and their levels potentially contribute or hinder the ability to achieve the objectives/ principles stated in legislation and policy documents;
- that the realities of who has what shares within the water allocation framework does not match the stated regulatory objectives/ principles – this is especially evident for environmental water; and

- that the *justice for whom* categories shift from those promoted in the regulatory objectives/ principles in times of water scarcity.

The main learning point from this theme is that the *justice for whom* categories or the priorities for justice are determined by regulatory goals and institutional mandates which can be argued represent the broader values of society and that when resources become scarce these priorities shift and change. There is therefore a continuously shifting continuum of *justice for whom* within and between scales and levels in a system such as illustrated by this case study.

Theme 3: Dynamic Justice

This theme explores justice from a political perspective and follows the dynamics of justice through the lens of the Domestic and Stock dam issue. It tracks how the issue moves between the scales and levels within the case study system. The concept of reframing is particularly useful to interrogate this theme, especially reframing to interest where actors shift issues up or down levels along a scale to support their own interests (Lebel, 2006).

During the late 1990s and early 2000s the impact of all types of farm dams on the water resources in the Victorian portion of the Murray-Darling Basin were investigated and the associated policy reviewed. This resulted in an amendment to the Victorian Water Act that now requires that water for irrigation and commercial dams are part of the water entitlement framework and therefore require a licence (Victorian Farm Dams (Irrigation) Review Committee, 2001). Domestic and stock dams were excluded from these legislative amendments because they fall under Section 8 Private Rights of the Water Act (see Figure 18). The year 2006 had the lowest rainfall on record within the Murray-Darling Basin and was the worst year within a decade long drought. During this period the issue of D&S dams was once again resurrected. The NC CMA was particularly concerned about their impact within the Campaspe catchment where their numbers in the upper catchment were steadily increasing (State of Victoria, 2009a). In 2008 the NC CMA picked up on the issue of D&S dams because it was seeing how their cumulative effect was impacting on passing environmental flows and hence river health in the upper reaches of the Campaspe River:

> *"...we've got [...] an incredibly stressed Campaspe River, that capacity* [referring to the amount intercepted by D&S dams]*...would be pretty handy for...the river".*
>
> -Pers comm. NC CMA Representative, 2010

The CMA initiated discussions with three key regional / local level institutions regarding their concerns over the increasing number of D&S dams. It is interesting to see how the issue of D&S dams has been reframed by each of the four institutions – each has their own position on why they interpret the issue as being unjust:

Goulburn-Murray Water:

"...the issue was that anyone can build a dam of any size and call it stock and domestic.... these sorts of issues are happening and they're concerning to us as what it does in respect to the harvestable yield within the catchment...our regulated customers were starting to raise the issue so there was general concern about it..."

-Pers comm. Goulburn-Murray Water Representative, 2010

Coliban Water:

"...the average runoff into our storages and the impact of the farm dams on our storages... is very small...[but] *in drought situation...then it becomes a bigger issue..."*

-Pers comm. Coliban Water Representative, 2010

City of Greater Bendigo:

"...these dams were basically taking water away...before it got into Lake Eppalock...and to be able to fulfil the rights of those that had an allocation...we get an entitlement...we are Coliban Water's customer..."

-Pers comm. City of Greater Bendigo Representative, 2010

The position of the North Central Catchment Management Authority was that they wanted to restrict all new small farm dams. The reason for this – their interest – was that the cumulative effect of the dams was impacting on the environmental flows of the Campaspe River and therefore its ecological health. Because the small dams were also impacting on the amount of runoff into Lake Eppalock which is located roughly in the middle of the catchment, and is a supply dam for the downstream irrigators and some of the local rural towns, there was support for the issue to be discussed further by the local council (the City of Greater Bendigo), the rural water corporation (Goulburn-Murray Water) and the urban water corporation (Coliban Water). Thus there was a ground swell of support that this issue needed to be addressed and this culminated in the signing of a Memorandum of Understanding in August 2008 between the four regional/local level institutions to "better manage the impacts of dams within the upper Campaspe" (MoU, 2008).

Collectively these institutions were successful in ensuring that the issue of D&S dams was recognised by the state level institution of the Department of Sustainability and Environment (DSE). Two background reports released in September 2008 and November 2009 focused on the D&S dams: *Farm Dam Interception in the Campaspe* and *The Uncontrolled Growth in D&S water use in the northern Victoria Region* respectively (State of Victoria, 2008, 2009b). These two documents resulted in the issue now being firmly on the State's political agenda. Importantly the State is the level at which decisions regarding policy reform can be initiated and implemented. In the NR SWS – DSE's strategy document - small catchment dams or D&S dams are listed as a threat to water availability because they capture rainfall before it becomes surface runoff or groundwater recharge.

> *"Unlike dams for commercial and irrigation use, dams for domestic and stock use are not licensed and therefore can continue to be built without scrutiny of their impact on downstream users and the environment. Based on current estimates, unlicensed dams capture six per cent of the available surface water in northern Victoria. At a local level, the impact of unlicensed dams can be even greater. For example, with long-term average water availability, small catchment dams in the Campaspe system collectively intercept 11 per cent of streamflow. This increases to 16 per cent under medium climate change, and 29 per cent under a continuation of recent low inflows"*
>
> (State of Victoria, 2009a p20).

In response the NR SWS recommended a number of steps - they are illustrated in Figure 27. As is evident there are three broad phases, the first is trying to get an estimate of the numbers of dams involved – this was done through a voluntary call to owners to register their D&S dams in 2009, the second phase is to formally register new D&S dams – the legislative regulation on D&S dams that was passed by Parliament in January 2011 mandated that all new D&S dams in rural residential areas be registered, followed by a third phase where ultimately water for all D&S dams will need a licence and therefore fall within the water entitlement framework of Victoria (State of Victoria, 2009a).

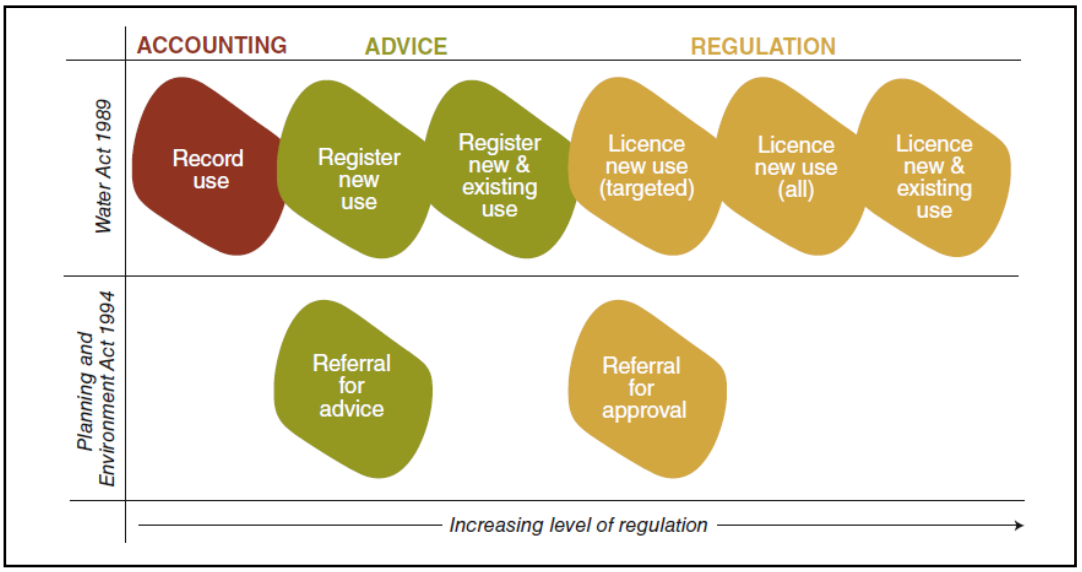

Figure 27 Phases of management options and trajectory proposed for D&S dams (State of Victoria, 2009a p58)

The State of Victoria's next steps with regard to managing D&S dams was complicated by the release of the Guide to the Basin Plan in October 2010 because Victoria doesn't want to go ahead and licence D&S dams if the Basin Plan doesn't require it of all the States (State of Victoria, 2009b). The Victorian government is also a little wary of the issue of D&S dams as it involves converting an age old right (Section 8 Private Rights) to a licence (Water Shares or Section 51 Licences) and this is potentially a politically sensitive move.

"...and then with stock and domestic we have made some tentative moves into that area but government will always pull back...they will only ever go so far...it's a significance test, if combined it's having a big impact, then the perception is that we need to do something about it [...] if it's not making a significant impact the government will never take that step..."

Pers comm. State Level Representative, 2010

The significance referred to here is an important one as it links neatly to what happens next to the issue of D&S dams.

"The National Water Initiative requires that [...] significant interception activities must be recorded, and use above a certain threshold must purchase water entitlements. It is unclear whether domestic and stock use will be classified as significant, although it clearly can be significant at a local scale..."

(State of Victoria, 2009a p58).

It is interesting that what is deemed significant is scale or level dependent – the quote above clearly states that D&S dams are a significant issue at a local level but might not be at coarser levels. With the ultimate goal of getting D&S water within the entitlement framework the D&S dam issue has been reframed to secure its significance at multiple levels. This was achieved by referring to D&S dams as an interception activity in the NR SWS. The Commonwealth Water Act requires of the Basin Plan that interception activities should be taken into account when determining the sustainable diversion limits (SDLs):

"The purpose of the Basin Plan is to provide for the integrated management of the Basin water resources in a way that promotes the objects of this Act, in particular by providing for...[inter alia]*...the establishment and enforcement of environmentally sustainable limits on the quantities of surface water and ground water that may be taken from the Basin water resources (including by interception activities)..."*

(Commonwealth of Australia, 2007).

Although the issue of D&S dams was the only interception activity mentioned in the NR SWS and in the Commonwealth Water Act, it was taken up into the federal level through the Guide to the Basin Plan, where it was mentioned as an interception activity along with forestry plantations and mining activities.

"The SDLs will be applied to [...] interception activities - including uses such as farm dams[22] and forestry plantations".

And later in the guide under the section on Interception Activities:

"...it is noted by the Authority that interception through mining activities can have a locally significant impact on groundwater..."

(MDBA, 2010).

The National Water Commission Report card of 2011 also notes that inception activities are only to some extent appropriately considered and that "no other potential intercepting activities have been identified in the area in planning

[22] The Guide to the Basin Plan refers to farm dams as an interception activity, this includes dams for irrigation and commercial use as well as for D&S use – this adds a degree of ambiguity to the interpretation of the data related to interception but it does empirically boost the significance of issue of interception activities in general.

documents, despite forestry and mining occurring in the catchment" (National Water Commission, 2011b p195).

Now whether the architect of this reframing of the D&S dam issue as an interception activity (thus bundling it with mining and forestry where its significance cannot be disputed) was instigated by the state or federal level it is unknown. It does however suit the state level more since it shifts the responsibility of converting the right to take water for D&S use to a licence out of their hands.

The issue of D&S dams up to this point has been reframed to match each institution's mandate and therefore their *justice for whom* categories (see Figure 23). What comes into play now is power and politics. At the state level this still matches their policy goals as the Victorian Water Act is underpinned by sustainability and the social-ecological approach. At the federal level even though the Commonwealth Water Act is the same as the Victorian Water Act in terms of a sustainability and social-ecological goal, the mismatch lies in that the issue of D&S dams is now embedded in the Basin Plan which has a primarily environmental focus. (Interestingly the instigators of the issue, the NC CMA, are a primarily environmentally focused institution!). The implication of this has created an interesting power dynamic between the Federal and State Governments. Even though there are four levels of jurisdiction in the regulatory scale in this study, essentially there are only two levels with decision making power namely the Commonwealth and the State governments. There is a commonly held view that the Federal government is trying to encroach on the States' power and that it is doing so through the Commonwealth Water Act and Murray-Darling Basin Plan:

> *"...the Commonwealth wrote that Act* [the Commonwealth Water Act] *which as a result is simply around their international obligations, that's the only basis on which they could write it..."*
>
> -Pers comm. State Level Representative, 2010

> *"...there was concern...about enough water to supply Adelaide*...[referring to the low inflows of 2006]*...and that's what started off this process of the Commonwealth trying to make a takeover...and that morphed into the Basin Plan type stuff...that gave the Commonwealth an opportunity to say we would really like to get into the water business, they don't have the constitutional powers and in the end they moved in, used their international treaty powers to*

get a leg in...".

-Pers comm. State Level Representative, 2010

The constitution confirms the limits of the Commonwealth's powers – Section 100 states that:

"The Commonwealth shall not, by any law or regulation of trade or commerce, abridge the right of a State or of the residents therein to the reasonable use of the waters of rivers for conservation or irrigation"

(Commonwealth of Australia, 1900).

With regards to the issue of D&S dams and converting a private right to D&S water to one where water for D&S dams would now need to be licensed and part of the entitlement framework, the perception that the Federal or Commonwealth Government is trying to take over works in favour of the State, who ultimately want D&S dams to fall within the entitlement framework but who don't want to make the decision to take that final step. Thus any potential political fallout from the state level voting constituents caused by taking that final step can be blamed on the Federal Government. The Department of SEWP&C is well aware of this role that they play:

"...the Commonwealth's involvement comes into play when the issues are really intractably hard for them [the States] *to get over, and they can say it was some else who did it..."*

-Pers comm. Federal Level Representative, 2010

"...one of the ways that the Commonwealth is useful for the States is that the States can then say well that was the Commonwealth Government - we just have to wear that [decision]..."

-Pers comm. Federal Level Representative, 2010

If one moves beyond the policy formulation phase of the Basin Plan and onto its potential future implementation, the power dynamics between the federal and state levels of the institutional scale take on another dimension. Suddenly the power shifts back to the State and its implementing agencies because the Federal Government is reliant on them to implement their Basin Plan. The notion that the Commonwealth is trying to take over from the States is not conducive to good relationships and co-

operation. This and the general unhappiness with the process of the formulation of the Basin Plan has created some tensions between the two centres of decision making power.

Interviewer: "Has there been a lot of interaction with the MDBA with respect to the Basin Plan "?

Interviewee: No, not a lot, it's a top down approach...it's a relationship in flux at the moment...".

-Pers comm. State Level Representative, 2010

This is especially relevant when examining how environmental water will be managed in the future. The Commonwealth Government is buying back water for the environment – this water is managed by the Commonwealth Environmental Water Holder (a division of SEWP&C) but this federal level institution is reliant on the co-operation of institutions at the regional level for the successful management and operationalisation of environmental watering (the CMAs and the Water Corporations). This begs several questions – was the reframing and shifting of the D&S dams issue to federal level a good idea? Was it merely moving a potential conflict to another level and not really resolving it? Will it 'bite' back – an unintended consequence - in an unpredictable way in the future and make the situation worse? One requirement is the need to maintain good relationships between all the levels within the institutional scale to ensure co-operation over the formulation and implementation of new policy no matter from which level of regulatory scale it emerges.

The scenario exercise presented to each interviewee shows a more positive side to the dynamics of the relationships between the institutions – all bar one interviewee ranked the rationale for a decision made in favour of the river health, future generations and recreational activities as the most fair. This illustrated that in principle there was general acceptance that something needed to be done to protect the ecosystem health of the rivers as well as the underlying social and economic activities within the Murray-Darling Basin. The explanations as to why each interviewee chose that option provided further insights into how justice was viewed. Firstly there was recognition that during policy formulation through to policy implementation justices and injustices are perpetuated at different levels at different times.

"...so government policies reflect society's broader views and clearly we have to implement government policy and have regard to that, so again we focus on... setting it up so that we're not adversely impacting on individuals but invariably ...it's like building a road, if you are going to build a road through a place and you've got to decide where it's going to go, someone is going to be affected... even in water, you're going to do some things, and take water back, there is someone who is going to be affected or feel aggrieved in some way..."

-Pers comm. State Level Representative, 2010

This sentiment is echoed by Steve Dovers in his book on Environmental and Sustainability Policy:

"Even when policy is formulated and implemented in a democratic and inclusive manner in keeping with widespread social goals, there will be some who will be encouraged or forced to change the way they live against their preferences or wishes. Human behaviour is tied to human values, and values are intensely personal and political things, and sustainability has deeply normative or value-laden dimensions. To imagine otherwise would be unrealistic" (Dovers, 2005 p30).

This notion that injustices are inevitable can sound crass and disheartening but if one recognises that they will occur then they can be addressed - the rationales and caveats provided by the interviewees in the scenario exercise illustrate this:

"...there is an issue about retrospectivity...retrospective changes by governments that destroy value...whatever the Commonwealth does it does on just terms...that's part of our constitution...very little Commonwealth legislation is retrospective in nature..."

-Pers comm. Federal Level Representative, 2010

"...the approach in Victoria is always to recognise the legacy of previous government policy so normally you ratify the status quo...and then you manage for the future ...then if you need to claw back or restrict you run an initiative...so say in the case of farm dams what that might look like is...you would have to come out on a Monday morning say that on the weekend we flew remote imagery, every dam that's out there we're going to give you water entitlement for that dam but there's too many farm dams...we going to register every farm dam, no one can have any additional farm dams unless you buy a right from someone who currently has a right...we are going to offer a programme for

people to decommission their farm dams and we will meet the cost of doing that or there's an initiative where you can try to tap into alternative sources of water...something like that..."

-Pers comm. NC CMA Representative, 2010

"...you've got to work out a process that determines who gets what...and then you need to work out how to get people there...you can't just go to a soldier settler and say sorry about that we've changed our minds, you are going to have to move on, you can't have any water...you have to work out how to transition that person..."

-Pers comm. Federal Level Representative, 2010

"...you could have an incentive scheme which compensates someone to do away with their dam..."

-Pers comm. Goulburn-Murray Water Representative, 2010

These quotes illustrate two further aspects of justice with regard to D&S dams – firstly that all new policy would not be retrospective, it would recognise the *status quo* and only apply a policy change from a publicised time onwards so no persons that currently have a D&S dam will be adversely affected by new policy aimed to change a right to a licence or that limits the numbers of new D&S dams built; and secondly that alternatives, incentives, compensation and assistance would be offered to those impacted by any change in policy – so those persons with existing D&S dams on their properties are offered incentives to decommission their dams, practical alternatives of water supply and where appropriate offered assistance to make the transition to change; while those persons who want to build a new D&S dam would be made aware of alternatives and offered incentives to adopt them. Although these aspects of justice fall primarily in the procedural justice camp, they are important in that they illustrate that time (the temporal scale) is a vital ingredient to understanding the dynamics of justice.

This theme has illustrated that the continuum of *justice for whom* is dynamic. Justice is a fluid concept that shifts and changes according to perspective and the level that it emerges - the same can be said for injustices. Politics drives the reframing process – be that party politics or institutional politics. Reframing an issue reframes justice and injustice such that they play out at multiple levels and often at different scales.

CHAPTER 7: Cycles & Spirals of Justice

Synthesis and Conceptual Framework

This synthesis begins with a summary of the learning points from the case study and the relevant literature and finishes with the presentation of a conceptual framework called 'cycles and spirals of justice'. The purpose of this framework is to explicitly utilise an understanding of scale and levels as a means to enrich the concept of justice in the context of the water allocation.

Synthesis

There are no absolutes when it comes to justice – there is no recipe or blueprint that can be followed that will ensure that the right outcome – that the just outcome is achieved. Justice is a concept that has evolved in its definition over time, it is a concept underpinned by principles that can be used to argue quite opposing points of view very eloquently. Yet it is a concept that is vitally important especially in the context of scarce common pool resources such as water. The principles of justice that are evoked when making allocation decisions of common pool resources are often described in the justice literature as dichotomies or binaries. The two positions in the binary have been loosely linked to two levels along a spatial scale namely global and local. Attributes have been ascribed to these levels such as those described by Susan Clayton's macro- and micro justice, where microjustice is associated with the local or individual and macrojustice with the global or society. The case study has shown that these binaries and their associated justice attributes are an erroneous oversimplification especially when working within a complex system that comprises multiple scales and levels.

When dealing with an individual it is easy to have a discussion with them to find out why for example they feel the environment should receive more water than irrigators. One can uncover what the underlying principles are that have led that person to that conclusion and ascribe those principles to the particular position of that individual. It is very hard to do the same for an institution or a policy document. Questioning all the employees of an institution or the authors of a policy document on what justice principles have informed their mandate or policy goals is unlikely to distil down to a common answer; the level of policy analysis can only meaningfully go as far as identifying a *justice for whom* category.

Three *justice for whom* categories were identified and explored through the case study; namely justice for social, economic or environmental concerns. They were found to vary between the levels of the regulatory scale and the institutional scale and their positions on each scale shifted during extreme water scarce conditions. The typical binary of justice was not evident in this case study, replaced rather by a continuously shifting continuum of *justice for whom*. The categories of course mirror those of the current environmental discourse and water management paradigm of sustainability. The case study illustrated the interdependency of social, economic and environmental concerns, the need to be fully inclusive of all three concerns within the scope of justice and called for a re-examination of our obligations towards the environment. Recognition of the deteriorating state of the environment within the Murray-Darling Basin highlighted that it underpinned most of the Basin's social and economic activities. This understanding of the dependence of social and economic uses of water on the underlying environmental aspects of it, is the central tenet of social-ecological systems (SESs). SESs are a way to view complex systems that advocate that there are neither natural systems without society nor are there social systems without nature. Conceptually they are best described by Holling and Gunderson's heuristic model of Panarchy. Panarchy is useful as it is one of the few frameworks that explicitly includes scales and levels, describes cross-scale and cross-level interactions and an adaptive cycle that provides an inherent driving force within the system such that it never remains static and is constantly changing and evolving.

Although useful in describing the resilience of SESs, Panarchy was not helpful in explaining the notion that justice is constantly evolving. The case study explored the dynamics of justice through the lens of domestic and stock (D&S) dams. The issue of D&S dams was taken up by a number of institutions and addressed via a number of policies and regulations. Politics and power shifted the D&S issue around the system; it was reframed by institutions along the way to suit their mandates and their cause. As it moved through the various levels of the regulatory and institutional scales bundled with other interception activities it was perceived to be dealt with justly by some and resulting in injustices by others. Justice is in the eye of the beholder!

Conceptual Framework

I used the learning points described above to build a conceptual framework of justice. The conceptual framework, ***Cycles and Spirals of Justice***, describes a generic complex system comprising two scales each of which are further described by three generic levels (Figure 28). The two scales are based on the regulatory and institutional scales

relevant to the issue of D&S dams for the case study used in this thesis but they can comprise any scales relevant to any particular issue under investigation.

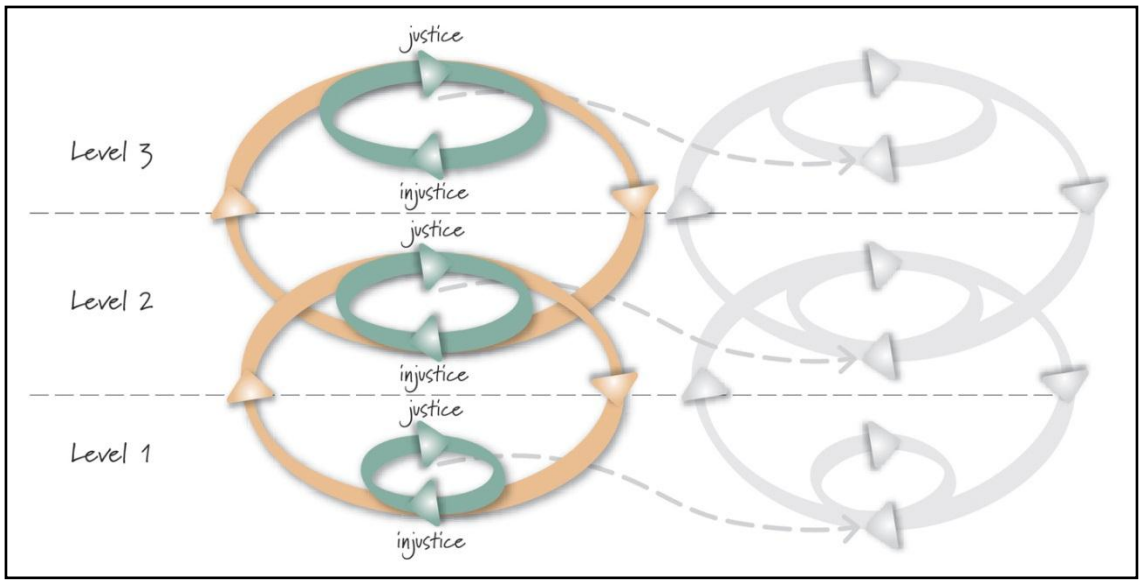

Figure 28 A conceptual framework illustrating the cycles and spirals of justice.

Three levels are illustrated for each of the two scales in the conceptual framework diagram and are considered the minimum number of levels that should be investigated when examining complex systems. If the issue being investigated can be visualised as emerging at the middle level (level two) then at least interactions (positive and negative feedbacks) between the level below it and the level above it can be captured. In many systems many more levels are relevant and necessary in order to describe the system under investigation.

In the area of application for this study: water allocation decision-making, the two scales of institutions and regulations describe a government decision-making engine. The levels within each of the scales are identified and populated using an issue of particular interest to water allocation decision-making; in this case the issue was D&S dams in the Campaspe catchment, Victoria.

In this way the scales, levels and issue can be used in combination to define the system under investigation and make a boundary judgement on what gets included and excluded from the system.

Based on the case study and the perceived injustice by group of stakeholders in relation to the issue of D&S dams, a cycling justice-injustice continuum is described at each level within each scale. This is based on the fact that what is just for one group of

stakeholders sharing a common resource such as water can be considered unjust for another group of stakeholders. There is no overarching or unifying theory of justice that will provide the answer on what allocation process or outcome is the correct one.

Those individuals or groups or institutions that feel that an injustice has been perpetrated against them will strive to restore justice in some way. This may be sought from within the same level that the injustice originated or they may seek resolutions from other levels or scales within the system. As they do so their actions to restore justice for their purpose might result in different injustices at the level at which they operate or it may result in injustices at another level or scale that they as stakeholders or decision-makers might not even be aware of.

Each cycle of justice-injustice is linked to another cycle of justice-injustice at the level above it and below it. This continuous shifting of justice and injustice sets up a spiralling motion of justice and injustice between the various levels in the system. This motion or interaction illustrates that what can appear as a just decision or allocation outcome at one level can create injustices that might appear at a level higher or lower in the system. It is only when the possibility of this phenomenon occurring is considered and a systems perspective is used that potential injustices could anticipated or existing ones understood in their context within the system.

The interactions between the scales and their constituent levels are illustrated by the arrows in Figure 28. The coloured part of diagram could also illustrate the formal, explicit side of the decision making process while the greyed shadow part of the figure could illustrate the informal background lobbying, reframing and negotiating side of the decision making process that together are made apparent in the policies and legislations that are formulated. A continuum of justice and injustice can occur at any level within either of these scales thus influencing the decision making process of water allocation.

The cycling and spiralling within the system is driven by social learning and the motivation to aspire for justice. Both of which themselves are constantly changing and evolving as our knowledge and understanding of social and ecological systems improves, as our definitions of what is just and what is unjust changes, and as our priorities change regarding environmental, social and economic concerns. Because we are a diverse society where all these factors and learning outcomes are not adopted uniformly the cycling and spiralling results in perpetual motion of and within the system.

Limitations and the Way Forward

The research question *How can justice be met in water allocation*? is the primary limitation of this study – it served well as a question that guided the research process but creates a false sense of security that this question has an answer. This study showed that it is not so much that justice can be met in water allocation by understanding scale and levels but rather that an understanding of how justice interacts with injustice in a multilevel system is important to the decision making process and striving to achieve 'higher order social goals' such as sustainability.

Defining a perceived system and making a boundary judgement on what falls inside the system and what constitutes its context is a process that is inherently determined by the researcher. A potential limitation of this study is that another researcher would define the system differently and come up with different perspectives and conclusions. This however is the nature of transdisciplinary research but can be overcome if 'the integration in each of the brains' of a group or team is explicitly shared and a collectively agreed definition of the system under investigation is sought.

This study focused on one in-depth case study developed through the lens of one issue. Time and budget were limiting factors but it would be interesting to investigate multiple issues in multiple contexts to test the validity of the conceptual framework in an effort to develop generalised theory of the relationship between justice and scale. Conceptual frameworks are neither models nor theories. Models describe how things work and theories explain phenomena. Conceptual frameworks do neither, rather they help us think about phenomena, order material and reveal patterns (Berkes *et al.*, 1998).

In terms of a practical contribution that this research could make, the framework could be used in two ways by water resource decision makers: either pro-actively or reactively. In the pro-active scenario, decision-makers operating at a specific level within a multi-level system could map out who their partner decision-makers are and collectively discuss how decision outcomes at different levels affect each other and the stakeholders within the system. In this way (at least some of) the potential injustices could be recognised before they occur, affected parties drawn early on into the decision making process and where possible injustices could avoided, mitigated or compensated. In the reactive scenario, if decision-makers were faced with a heated response to a new policy related to water resource allocation they could use the

framework to understand the context of the perceived injustice. In this way the injustice can be viewed from a systems perspective, an understanding of its relationship to other 'justice for whom' concerns recognised and any history of the injustice taken into consideration. In both cases the value of the framework lies in its use as a tool to ensure that different scales and levels and their influence on the justice of decision-making processes and outcomes are explicitly taken into account by water authorities.

In terms of future research it would be a useful to build on and confirm the conceptual framework presented in Figure 28. Here are a number of suggestions:

1. continue to enrich the concept of justice via other case studies especially in the context of social-ecological systems, water management and other common pool resources;
2. investigate the context of international water sharing agreements and whether there exists a justice-injustice cycle/spiral cascading down from the international level to the local community level;
3. explore the links between adaptive management and the conceptual framework – explore the justice-injustice cycle/spiral at all the phases of the adaptive cycle;
4. research how time impacts on the justice-injustice cycle/spiral – especially the concept of lags in relation to the perpetuation of injustices – can the cycle of justice-injustice be balanced in time or does the cycle need to move through the justice-injustice cycle at a certain pace?;
5. explore the drivers of the cycle and the spiral – some drivers could include the socialisation of norms, social learning, and need to find resolution of injustices.
6. refine the notion of managing for justice and how it can be operationalised in current management paradigms and decision support systems;
7. investigate how the scalar nature of transdisciplinarity as described by the hierarchy of disciplines of Max-Neef influences systems thinking and cross scale and cross level interactions;
8. investigate how justices and injustices are perpetuated from policy formation through to its implementation and ultimately how this impacts of policy effectiveness; and
9. explore how water allocation decision making within government institutions interacts with non-government organisations and the individual users within a system.

Conclusion

This thesis aimed to enrich the concept of justice by examining it from a different perspective - from a systems perspective, by specifically using an understanding of scale and levels. Achieving justice is not a static act; if justice is achieved at one level it might not be at another. If justice is achieved within a short time frame, it might not be achieved within a longer time frame. If justice is achieved by one individual, group or institution, it might not be by another. If the goals of one policy are designed to achieve justice, has it (can it) achieve justice at all levels. The simple answer is no - achieving justice is a journey not only in its meaning but also in its application. It is important to recognise that there is a continuum of *justice for whom* and that because we are dealing with justice in a complex system we need to be cognisant that there exists a possibility that we might be unaware of the injustices that our actions at one level might have at another.

If we understand the justice- injustice cycle/spiral then we need not fear those stages of the cycle that are unjust. We do however need to ensure that the cycle and the spiral remain dynamic so that injustices are not constantly perpetuated against the same individual, group or institution. The injustice might not be immediately apparent, it might be separated from the initial just decision by years or decades, it might be hidden in the system at a different level from one that is currently apparent. It might also be hidden within our current knowledge or understanding of how a system operates and will only surface and be recognised as an injustice once our understanding of a particular system has improved in time. The conceptual framework of this thesis presents injustices as inevitable - this might be a difficult message to hear especially when the goal of just sustainability and good and fair outcomes of decisions are constantly striven for. It does however highlight that an awareness of this relationship between justice and injustice creates an obligation to address injustices when they occur. In situations where it is clear where and how an injustice arises they should be resolved, ameliorated or compensated. When an injustice is not apparent to some actors in a system but is to others, they have a responsibility to illuminate the injustice.

In the context of water allocation it is especially important that the environment and marginalised communities are not continuously bearing the brunt of injustices. Changing unjust entrenched behaviours and economic activities cannot happen overnight, that in itself can create injustices, but the transition to justice is necessary if it is a goal worthy of striving for, if justice is a goal worthy of managing towards.

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Appendix 1: Interview Plan

Before we start any discussion, would you look at these two questions and choose the most appropriate answer:

Which would best describe [insert name of institution eg SEWP&C]?

A focus on environmental concerns; or

A focus on social concerns; or

A focus on economic concerns

And then:

Focus on individual concerns; or

Focus on society concerns

Would your answers be the same in reference to [insert name of legislation/policy relevant to level eg the Commonwealth Water Act]? Yes or No

If No, please indicate differences.

Let me begin my giving you some background on my research project:

The title of my PhD is Justice and Scale in Water Allocation.

[Explained aim and context of study]

Guiding Questions:

1. If you could in a single sentence describe the primary objective of *[insert name of legislation/policy relevant to level eg the Commonwealth Water Act]* – what would it be?

2. Could you explain how trade-offs are made at the [insert appropriate spatial level eg federal level] between environmental, social and economic demands on water resources?

   - In water abundant vs water scarce conditions
   - To meet Critical Human Needs
   - To ensure Minimum Environmental Flows
   - For Downstream users – eg South Australia
   - Explain Tier 1, Tier 2 and Tier 3 water allocations

3. Do you believe that there is harmony between the different water policies at the federal, state and regional levels?
   - International water agreements?
   - Others?

4. Could you give me some background on the circumstances that led to the creation of the MDBA - the States superseding some power to the federal level

5. Does the [*insert name of institution eg Dept of SEWP&C*] work directly with the MDBA/DSE/CMAs/Water Corps/Local Shires?

<D&S dam questions>

As I mentioned when describing my research project...I am using the issue of the farms dams in the Campaspe Catchment as a focusing lens for this study. I have written a paragraph describing the issue <hand over paragraph below on separate page – including map of catchment location> and four scenarios to the issue.....could you rank

each scenario according to what you think is most fair – with 1 being the most fair and 4 being the least.

See Box 3 for Scenarios.

6. Do you have questions related to the exercise you have just completed? Would you like to make any comments in regard to your responses?

7. What would the most relevant piece of legislation be, to resolve this potential dispute? And which institution?

8. Could you explain to me how and when individuals are compensated when changes are made to their rights to access water or use water on land they own?

    - Land and water ownership issues

Appendix 2: Annotated Data Analysis Process using the Development of Theme 1 as an Example.