CRC for
Water Sensitive Cities

Scientists and Policy Influence: A Literature Review

Strategies for influencing the political dynamics of decision making

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Scientists and Policy Influence
A Literature Review
Strategies for influencing the political dynamics of decision making
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Abstract

Despite their important role, how scientists interact with and influence the development of policy is a subject that is inconsistently and insufficiently treated by the policy literature. Political scientists, who have developed the largest and most comprehensive literature on policy processes, have produced many theoretical models but very few of these have been adapted to consider the role of scientists, who often have special roles and different claims to authority than most other participants in the policy process. Within some of the sciences including environmental science, there have been publications and debates on ideal methods for science to make an impact on policy but often these lack the depth of insight and theoretical rigor found in political policy studies. Finally, the lobbying literature brings together the critical collective experience of how policy influence is practically sought in real-world scenarios and yet this literature too rarely interacts with the theoretical work of political scientists on policy-making or the work of scientists themselves on the role of science in policy.

This literature review provides a broad overview of the disparate literatures relevant to looking at the role and influence of science in policy-making. It takes as a foundation the starting assumptions made by political scientists about what drives policy-making in modern democratic government (comprehensive rationality, bounded rationality and incremental analysis) and finds while many have strengths and weaknesses, comprehensive rationality and its associated models provide the weakest framework. Bounded rationality and incremental analysis models provide a far stronger basis for scientists to think strategically about how their research might fit into broader policy processes.

A synthesis of available approaches and models across a broad swath of the literature reveals three key considerations that scientists must make when approaching policy influence:

- **Expectations of Rationality:** There is a large gulf between what scientists expect from policy processes and what occurs in reality, however the difference largely rests on different understandings and expectations of rationality. Both scientists and policy-makers operate from very different standpoints in this regard, however ultimately it will be up to the scientists to be able to work within different structures and systems of rationality if they are to make the occasional transition from science and research into policy and politics.
- **Nature of Influence-Seeking:** Influence-seeking, or lobbying, works differently across different policy fora, and understanding the nature of influence-seeking is critical before it is attempted. Specifically, there are important differences between the *exchange* approach and the *pluralist* approach to influence-seeking. Both models are valid and commonly observed in practice, but given that even well-funded influence-seeking campaigns fail to produce meaningful change in a majority of cases, there is much to be said for carefully choosing tactics appropriate to the prevailing model of influence-garnering observed in a policy negotiation.
- **Role of Scientists:** Scientists are a special case within policy processes, as in contemporary policy-making scientists can quite legitimately play roles *internal* to the policy-making process (in official roles as advisors or sometimes policy-makers themselves), as well as roles *external* to that process (as lobbyists, in advocacy groups and other would-be influence-seekers). However, the role scientists choose to play should be a strategic consideration dependent on the answers to the previous two considerations. Although frequent, ethical and philosophical debates

about the 'appropriate' role of scientists are usually irresolvable and often divorced from practical reality. Furthermore, most actual case studies of science and policy interactions demonstrate that in practice it is impossible for science to be completely apolitical or objective. In many scenarios, the politicisation of science is inevitable, and scientists need to be prepared to advocate effectively under such conditions.

Stemming from these three considerations, the literature review also highlights three key elements common across many different models of policy-making and influence-seeking that are essential to successfully generating scientific influence within policy:

- **Entrepreneurs:** Policy entrepreneurs and leaders are required both inside and outside the policy sphere in order to provide the essential momentum to policy initiatives and ensure science is effectively communicated and translated into policy terms. Policy influence is only rarely transmitted passively, and much of what scientists publish or produce will not readily cross the boundary into the policy sphere. However, advocates and scientific voices outside the process must be matched by allies and proponents within the system and potentially at many levels of that system – from the bureaucratic and political to industry and business.
- **Networks:** Some of the most influential and intensively developed theories of the policy process see networks as a crucial element to the creation of influential policy coalitions. Entrepreneurs and change agents in policy processes need to work collectively, not just with each other but with active and passive supporters, in order to effectively challenge the status quo and marshal policy influence. Networks also play a secondary role in creating pathways through which policy can be transmitted to other jurisdictions, as policy is more easily adopted from a jurisdiction or niche that has already implemented it.
- **Timing:** Policy change follows its own unique rhythms that are disrupted only occasionally and usually by significant events, and for the most part scientists are not able to create their own opportunities to influence that rhythm in a significant way. Consequently, scientists and would-be influencers must be able to understand the importance of timing in policy and political life so as to better understand when the opportunities for change do arise, and be ready at those points to exploit those windows. The usual time horizon for the scientific and research process is generally much longer than the policy development timeline, yet much of the lobbying and political science literature points to the criticality of rapid exploitation of policy opportunities.

Due to the wide range of theories and experiences regarding the policy process, scientists can face a daunting task in exploring and understanding this broad subject - however, doing so is essential for creating entrepreneurs who can make strategically strong choices about the promotion of science in policy.

1. Introduction

Policy studies constitute a vast field, incorporating an enormous theoretical lexicon, a virtually limitless array of policy contexts, and a bewildering spectrum of goals from the pragmatic to the idealistic (and back again). Conducting a literature review of policy studies and drawing out relevant insights and conclusions with regard to advancing the implementation of water sensitive cities is a daunting task. However the aim of this review is not comprehensively to plumb the depths of every subfield in the search for pearls of wisdom, but to give a sense of the major ways in which policy processes have been described and modelled, how influence and lobbying is considered within the context of those frameworks, and how scientists fit into this picture. To achieve this, several scholarly areas, many of which do not traditionally interact, must be synthesised, and this literature review attempts to do that in order to build a foundation and background to the work of the CRC for Water Sensitive Cities (CRCWSC) project on *Strategies for influencing the political dynamics of decision making* (Project A3.3).

Considering the field as a whole, policy studies in political science can still best be categorised along similar lines to those which were laid down in a 1991 review by Paul Sabatier. In that review, he identifies four basic types of policy study:

- **Policy analysis and design studies**, which look at how policy is (or should be) designed and the policy instruments available to meet desired ends.
- **Evaluation and impact studies**, which have sought to evaluate the outcomes of policy along a wide range of criteria, and often draw upon the contributions of other disciplines to design and conduct those evaluations.
- **Process studies**, which seek to understand the process of policy-making itself and the factors that influence policy-formulation, decision-making, and implementation.
- **Substantive area studies**, which focus on telling a comprehensive policy story but only within a particular area or subfield, producing descriptively thick accounts rather than theoretical or analytical contributions. This latter group likely makes up the largest proportion of policy studies (Sabatier 1991, 143-44).

Strategies for influencing the political dynamics of decision making is interested in answering the question of how researchers and experts can better influence the dynamics of the policy-making process – hence most of the useful literature to answer this question will necessarily be drawn from the process studies tradition. However, there is also benefit to be gained from examining the substantive area studies tradition, in which there is no shortage of case studies that have taken water policy as their focus. Both traditions have their limitations. Process studies tend to focus on macro-level forces, systemic effects and the universal modes of behaviour present in policy processes which might produce useful models and broader insights into policy development. Such studies are worthwhile when engaging in strategic thought about influencing policy, but provide relatively few clues as to how to engage practically in policy influence in any particular case. Substantive area studies, and studies that focus on the individual dynamics of the policy process (such as decision-making behaviour), are more useful sources of information for drawing out insights into the tactics of policy influence. This literature review focuses on process studies and the theoretical and strategic views of the policy process. A practical manual to be produced at the end of the A3.3 project will bring together extant substantive area studies, as well as the case studies developed in the course of this project, to focus more on tactics and practical advice specific to the water policy sphere.

The *Strategies for influencing the political dynamics of decision making* project Literature Review summarises the process studies literature in relation to three dimensions:

1) the major theoretical models, traditions or approaches that have emerged in policy studies that provide explanatory frameworks for understanding how policy is made and how influence enters into that process;
2) the literature on lobbying and how policy-making is influenced by interests and individuals outside of the official policy-making processes, though not necessarily in conflict with those processes; and
3) how the literature has viewed the role of scientists in policy-making, both from the perspective of their official participation in policy processes, and their unofficial participation as lobbyers and influence-seekers.

In concert, these three aspects will give an overview of themes in the available literature regarding how scientists, theoretically, normatively or practically, interact with and influence the policy process, and what this might mean for the Water Sensitive Cities agenda and the work of project A3.3, as well as relating the future work of the project and eventual practical manual to a solid theoretical foundation.

1.1 Narratives of public policy

Two prevailing conceptions of policy – the *authoritative choice* view, and the *structured interaction* view – provide us with a starting point for thinking about the literature on influencing policy and ways in which scientists and experts might approach the question of gaining greater influence within policy decision-making.

Generally speaking, the policy discipline is dominated by narratives of 'authoritative choice' (Colebatch 2006, 7). This narrative treats policy as synonymous with "what government's do, why they do it, and what difference it makes" (Dye 1972, 2). Similar definitions of policy can be found peppered throughout the policy literature (Fenna 2004, 2; Klein & Marmor 2006; Birkland 2011; Althaus, Bridgeman & Davis 2013, 6-7): in some contexts this has been labelled as the 'standard view' of the discipline (Considine 1994, 3). This approach prompts the study of policy-making to focus on the deliberations and actions of government, and applies the label of policy-makers almost exclusively to public servants and elected officials. Policy-making becomes a purposive, goal-driven process consisting of distinct steps taken by authorised actors that lead to authoritative decisions being made and implemented (Maddison & Denniss 2009, 6).

The value of this framing is that it clarifies the process of policy-making and makes the discipline conducive to clear models outlining procedural steps and the relationships between relevant actors. It also comports with the generally understood broader truth about what governance is – it is the decisions made by authorised actors that ultimately count and create meaning (see Hajer 2009). Official or officially-accepted accounts of the policy-making process largely take the 'authoritative choice' perspective as the starting point (e.g. Australian National Audit Office 2006; Australian Public Service Commission 2007). The *Australian Policy Handbook,* an influential and standard text amongst student public servants, acknowledges alternative perspectives of the policy process but generally confines itself to the study of formal government actors and processes in the authoritative choice tradition (see Althaus, Bridgman and Davis 2013). What is more, the authoritative choice assumption is often implicitly built into various prescriptive fields of policy theory. For example, the evidence-based policy and participatory policy-making movements often rely on a policy-making system that is orderly, stepwise, rational and final in the manner which

the authoritative choice perspective generally encourages (Young et al. 2002; Sanderson 2009; Hoppe 2011).

Policy narratives

Authoritative choice: policy-making is purposive, goal-driven and follows distinct steps by authorised actors.

Structured interaction: government is an arena in which a broad range of actors pursue objectives.

However, critics of this vertical and highly-structured view of the policy process abound. Upon closer examination it is often difficult for both insiders and outsiders to observe an ordered, goal-orientated and authoritative policy-process playing out in the way commonly assumed. An alternative framework for policy studies sees policy as a far broader term: "a series of patterns of related decisions to which many circumstances and personal, group, and organisational influences have contributed" (Hogwood & Gunn 1984, 23-24). This is the so-called 'structured interaction' approach, and sees government not as the *actor* but the *arena* in which a variety of actors with varying degrees of official authorisation interact with one another and pursue objectives, though not necessarily the same objectives as each other. Policy is thus a complex collective process. It is still an orderly activity, though the precise order is contingent rather than fixed (Colebatch 2006, 7-8; also Considine 1994). In their introduction to the policy literature in the *Oxford Handbook of Public Policy,* Goodin, Rein and Moran go to great lengths to demonstrate just how porous and illusory many aspects of the authoritative choice perspective are. There is a broad variety of ways in which authority, procedure, goals and finality in policy-making can in fact be highly contingent and unpredictable (2006, 3-28).

Although the authoritative choice and structured interaction definitions of policy are divergent, ultimately, as Maddison and Denniss argue, they simply describe the difference between the ideal and the real. Ideally all policy-making would conform to an authoritative choice approach – when policy institutions are created and reformed, the catalyst is usually this assumption. However the practical reality of policy-making results in a process that is more amenable to a structured interaction interpretation (Maddison & Dennis 2009, 11). Hence these different definitional lenses serve as useful analytical frameworks for different scenarios – understanding policy-making structures, rules, institutions, authority and the relationships between these things lends itself to the authoritative choice perspective, which is able to better grasp and model such elements. Yet understanding agents, narratives, power, actors, influence and the relationship between these elements is likely more realistic if a structured interaction approach is adopted.

Those working within in the science-policy interface tend to embrace one or the other of these conceptions. Thus these divergent traditions provide a rudimentary starting point for the two basic ways we might approach the question of how scientists can better influence the water policy sphere. The authoritative choice approach, with its emphasis on what government does and a narrow conception of policy-makers, leads us to see scientists as **advisors** and **experts** who inform the making of policy, with clearly defined roles as objective inputs into the process. This particular notion as to the role of scientists is common, and the majority of leading works on the science-policy interface idealise scientists as objective advisors by defining the role of experts, and of policy and policy-makers, in relatively narrow terms (Nielsen 2001; Rykiel 2001; Lackey 2007; Pielke 2007; Keller 2009). Advice for improving the influence of science in policy thus concentrates on improving the **process** by which policy is made, with a particular emphasis on procedural objectivity, information-collecting and decision-making (for example, Lentsch & Weingart 2011). Ergo, improving structures and input pathways for decision-making will lead to greater scientific influence.

The water sensitive cities literature has contributed many recommendations for governance improvements in the water sphere that support a conception of the policy-process as fairly self-contained and the role of scientists as objective advisors and experts within improved processes (Pahl-Wostl 2007; van de Meene, Brown & Farrelly 2011).

Alternatively, a broader conception of the policy-process might allow the CRCWSC and partners to place themselves within the wider 'policy community' (Richardson & Jordan 1985) or 'issue network' (Heclo 1978). Their role in influencing policy should extend to interactions with other stakeholders and the public-at-large, and an active rather than passive role at various stages of the policy development process. In an arena perspective, scientists cannot take their role in policy-making for granted and cannot assume a seat at the table. In this conception, scientists and researchers must be **lobbyists** and **influence-seekers** amongst many other potential suitors for influence over policy. The outcomes of a policy process are contingent on the behaviour of actors and interests rather than the structured processing of inputs into outputs. Increasing influence within this arena is thus a question of improving actor strategies and tactics, and learning to compete better within the influence arena. This broader, more fluid and more competitive conception of policy-making and the role of actors within it is less common in the available literature on science in policy – indeed, conceptualising the role of scientists in this way has incurred the odium of many commentators (Tracey & Brussard 1996; Nielsen 2001; Rykiel 2001; Doremus 2008; Ruggiero 2011; Edwards 2013). However, this definition now implicitly undergirds most contemporary theories of the policy process, and is more or less central to the lobbying literature, which is sceptical about defined roles and sees policy-making and policy influence as a far more open-ended process.

1.2 Defining lobbying

Simply put, lobbying is the process of trying to influence public policy by those outside of the process (Darke 1997, 34). Functionally, this is virtually equivalent to the definition of 'advocacy'. Although the latter term is much preferred by the non-profit sector to describe its influence-seeking activity, clear distinctions between the two terms are hard to draw (Reid 2000). Generally speaking, self-styled lobbyists and advocates employ similar strategies and pursue the same aim of influencing government decision-making, notwithstanding significant variance in their respective rationales. Whatever term is used, the activity of lobbying or advocacy is widely engaged in across Western democracies, though the form and volume varies significantly across jurisdictions. Although the United States is traditionally considered ground-zero for the lobbying industry and much of the relevant literature relates to the institutional setting of United States state or federal governments, significant (but by no means domineering) influence is wielded by lobbyists and interest groups in Australia (for examples, see Fitzgerald 2006; Warhurst 2007; Sekuless & Sheehan 2012), as well as just about every other developed economy (for examples, see Zetter 2011; Coen & Richardson 2009; Kluver 2013). There is good reason for this – active lobbying and advocacy in general has been proven to be effective at influencing the outcomes of political decision-making, although context is critical and success is by no means guaranteed (for a review, see de Figueiredo & Richter 2014).

Modelling the effect and nature of lobbying and influence-seeking in policy is greatly affected by the particular models of policy-maker behaviour used. For example, in models of the policy process using an 'authoritative choice' definition and a strict assumption about strong policy-maker rationality, lobbying becomes a matter of horse-trading between interest groups and policy-makers. This can be termed the **exchange model** of lobbying behaviour, and if operating would mean that scientific influence must necessarily stem from scientists' capacity to bring benefits to policy-makers. The proponents of this model

generally assume that the interests with the largest pile of money or votes will have the most success in 'buying' policy outcomes; such an assumption does not favour scientists and researchers, who can offer little of either. This is an incomplete view however, as information, policy options and certainty are also resources politicians need to make good decisions that will in turn further their careers and win public support. Given that scientists and researchers can potentially offer these benefits to policy-makers, the exchange model can readily capture the influencing power scientists and researchers might have.

Major lobbying campaigns were successful in overcoming the status quo only 40% of the time

However, lobbying takes place in what is usually a context of vigorous competition for influence, and the effectiveness or perversity of influence on the part of the lobbying establishment is often overstated by external observers. In one of the most comprehensive studies of the influence of lobbying over policy outcomes in the United States, *Lobbying and Policy Change: Who Wins, Who Loses and Why,* across 98 issue areas major lobbying campaigns were successful in overcoming the status quo only 40% of the time - a significant figure but lower than most pundits would expect. Perhaps more surprisingly, the study concludes that lobbying resources (namely financial resources) accounted for less than five percent of difference between successful and unsuccessful campaigns. Yet when the campaign was successful and the status quo was overcome, the policy change that resulted tended to be highly significant and later classified as major reform (Baumgartner et al. 2009). Broad-scale studies of the impact of lobbying on policy or legislator behaviour have turned up similarly ambivalent answers. For example, Baumgartner and Leech's review of lobbying influence studies found exactly half demonstrated a strong link between lobbying and legislator behaviour or policy outcomes, and half did not (see Baumgartner & Leech 1998; also Potters & Sloof 1998). The most we can conclude from many of these studies is that there is no automatic link between either money and lobbying success, or lobbying activity and decision-maker behaviour. What you see instead are a lot of interests groups of varying sizes, motivations and resources competing on relatively equal terms with each other in order to secure their most desired policy outcomes. This is the basic embodiment of the **pluralist** model of lobbying, which sees lobbying success rest on far more subtle points – tactics and strategy – rather than energy and resources. Within this model scientists have neither the specific advantages nor disadvantages they might have in an exchange framework.

Much of the literature on lobbying is fragmented, and comprehensive studies of how influence is marshalled within the policy process is greatly limited by opaqueness of the process – tracking the exchange of benefits between interests and policy-makers is notoriously difficult (Evans 2004, 40-51; also Hall & Wayman 1990). And understanding which model best describes the influence process at any given time is often a matter of circumstances. Broad public debates over policy directions tend to be pluralist competitions – money and votes may only have a marginal effect on a debate in which many hearts and minds must be won, or where the goal is to change behaviours, practices and receptivity to new ideas. Narrow debates on specific policy issues with little public attention, on the other hand, may be more conducive to an exchange process, where specific benefits and costs are easier to quantify and a policy-maker's decisions are more easily influenced.

2. Theories and models of the policy process and lobbying

Policy-maker Behaviour

Comprehensive rationality: policy-making is inherently rational and well-informed, and policy-makers seek to maximise utility and reach most efficient outcomes

Bounded rationality: policy-making is only rational to a point, due to constraints on time, resources, and information; and policy-makers may be fallible and biased.

Incremental analysis: policy-making is heavily constrained by practical limitations, and most policy is pragmatic compromise and slow evolution rather than rational development.

Making sense of the policy process as whole is the necessary foundation to any inquiry about how to exercise influence within it. No framework or theory exhaustively explains the totality of the policy process – most are limited to what their authors believe to be the most critical dimension. What follows here is an overview of the most popular approaches to explaining the policy-process and the model of influence-seeking within each. Then a synthesis draws out the cues for strategic approaches to influencing the policy process.

The approach here draws on three general models of policy-maker behaviour, namely **comprehensive rationality, bounded rationality**, and **incremental analysis,** as the starting point for explaining the subsequent implications for models of the policy-process and models of lobbying behaviour.

2.1 Comprehensive rationality

The starting point for this model is *homo economicus* – economic man – who seeks to extract the maximum utility from his or her environment, subject to the norms and rules set out within the institutions surrounding him or her – a conceptual model of human behaviour that finds its origin with John Stuart Mill (Mill 1844). An individual's strategy hinges on his or her perceptions and valuation of costs and benefits associated with anticipated outcomes. In earlier applications the conception of utility was relatively narrow (generally focusing on economic rewards or costs) but has expanded over time to include other types of motivations (Persky 1995, 223-226). By this standard, all decision making becomes a rational balancing of benefits and costs associated with a course of action. Although any given individual choice may not be guided by a specific rationality, patterns of choices should conform to a model of this kind of rationality. Political science (along with many other social sciences) has frequently adapted this model when examining policy processes and the behaviour of actors within them (see Dunleavy 1992).

Furthermore, actors in this model are 'fallible learners' - it is understood that they make mistakes and have incomplete information when making decisions, but it is assumed that they learn over time. In repeated interactions (or 'games') and in competitive environments the participants who survive will learn and thus can be modelled as if they did have complete information and were able consistently to make decisions that maximised utility (Dosi & Egidi 1991; Ostrom 2007, 30-33).

Models of government based on these assumptions about individual behaviour have led to the public choice literature. This has expanded the model across government into the political and bureaucratic classes, arguing that the consistent patterns of individual behaviour elucidated by the rational choice models mean that for most political processes

individuals do not matter – their behaviour is highly convergent. Hence institutional and incentive structures (and not individual politicians or policy entrepreneurs) are the major drivers of policy change (Reksulak, Razzolini & Shughart 2013, 12-38; also Mueller 2003).

A model of policy-maker based on comprehensive rationality tends to favour what might be termed as the exchange model when the focus is shifted to lobbying activities within the policy process (Godwin, Ainsworth & Godwin 2012, 15-16). The exchange model presumes that effective lobbying and influence-seeking in a world of comprehensive rationality hinges on the ability of influence-seekers to offer something to decision-makers that they want, and through horse-trading and negotiation reach mutually desirable outcomes (Hayes 1981; Denzau & Munger 1986; Grossman & Helpman 2002). The exchange model treats the meeting of interest groups and policy-makers like a marketplace where personal rewards (like election support and campaign donations) or public rewards (like job creation or local investment) are exchanged for policy outcomes or regulatory decisions (like tax-concessions or regulatory favours). Policy-makers balance off receiving benefits from lobbyists and interest-groups with the likely benefits or costs stemming from voter and political responses to decisions that are made. For example, easing environmental protections for forests in Tasmania may result from negotiations between the government and business over the future of the logging industry, however the government is likely to be hoping that the benefits from the industry expanding (like jobs created and economic growth) outweigh the electoral backlash from environmentally-minded voters at the next election. Competition between interests for certain outcomes leads to fluctuations in the price of support and often the need for collective action amongst parties of similar interests, motivating coalition formation whilst concentrating efforts within processes that are outside of the public purview to minimise potential costs and backlash against policy-makers (Godwin, Ainsworth & Godwin 2012, 167-168).

Two particular models of the policy process stem directly from a comprehensive rationality assumption about policy-makers and lobbyists – the **stages heuristic** and the **institutional analysis and development** approach.

2.1.1 The Stages Heuristic

The notion of a policy cycle consisting of discrete and clearly definable steps has a strong logical foundation that has been reiterated in many studies of the policy process. Early pioneers Herbert Simon and Harold Lasswell elucidated the key stages as generally consisting of setting goals, then vetting options, then making and implementing decisions, and then evaluating the outcomes (Simon 1957, 66-70; Lasswell 1971, 27-30). These theses have subsequently been expanded upon and formalised into a basic five-step cycle of *agenda-setting* (problem identification), *policy formulation* (option vetting), *decision-making* (option choosing), *implementation* (decision execution), and *evaluation* (result monitoring). These five basic stages can be found in all policy process models: it has become the conventional way to describe the policy process (Jann & Wegrich 2007, 43-45), though some models try to break-down the stages into smaller sub-processes (see Brewer 1974; Jones 1977; Brewer & deLeon 1983; Howlett & Ramesh 2003; Anderson 2011). Notably, in Australia an eight-step process developed by Bridgman and Davis has proven influential, though that model places itself squarely within the long established orthodoxy that has evolved around the five general processes of policy making (Bridgman & Davis 1998). What is more, the Bridgman and Davis model includes normative stages, such as public and stakeholder consultation, which usually and ideally occur but are not always necessary to make effective policy. There have been other attempts to explain the policy-process in this manner, such as defining its functional needs rather than its procedural phases. Walters,

Aydelotte and Miller for example posit a policy process consisting of discovery, education, measurement, persuasion and legitimation (2000, 352; also Curtain 2006).

Although this approach to explaining the policy process continues to be popular and accounts of this nature are ubiquitous in standard texts on policy-making (for example, see Fenna 2005; Althaus, Bridgman & Davis 2013; Maddison & Denniss 2013), when subjected to rigorous scrutiny the 'stages approach' to understanding the policy process has been sharply criticised from a variety of angles (Nakamura 1987; Sabatier 1988; Sabatier & Jenkins-Smith 1993; Colebatch 2006). Sabatier and Jenkins-Smith most notably took aim at the stages heuristic naivety, criticising it for:

- Lacking a clear sense of the flow of causality.
- Lacking an empirical basis for testing.
- Being descriptively inaccurate and unrealistic in light of real-world policy experience.
- Assuming a legalistic and authoritative-choice focus.
- Failing to account for networks, policy-learning and analysis (Sabatier & Jenkins-Smith 1993, 3-4).

These criticisms, among others, led to the development of alternative theories of the policy-process and new schools of thought diverging from the established orthodoxy (DeLeon 1999, 24-25).

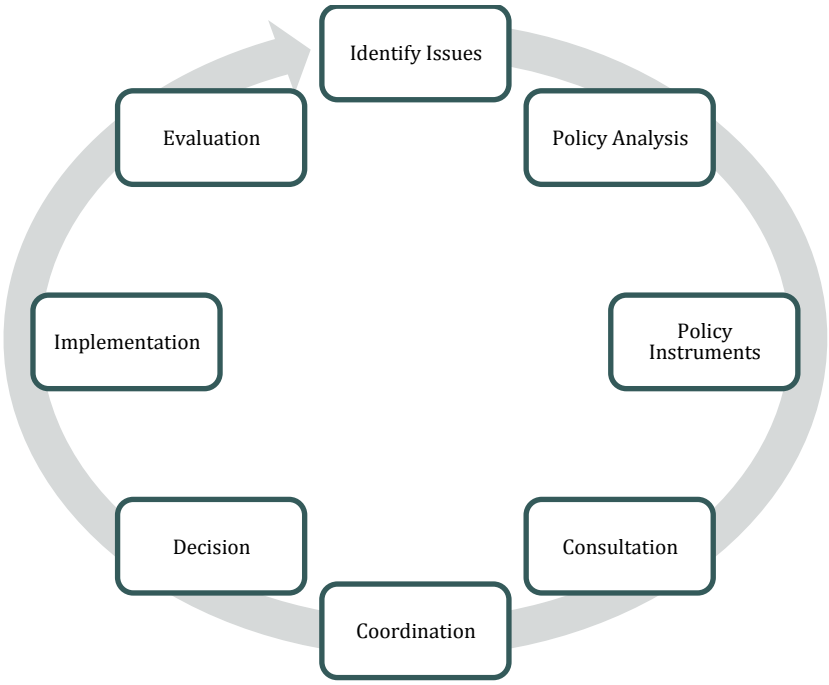

Figure 1: The Policy Cycle. (Adapted from Althaus, Bridgman & Davis 2013).

Sharp criticism has led to the moderation of claims by adherents as to the strengths of the stages heuristic – few would claim now that the standard model of the policy cycle has predictive power (DeLeon 1999, 29-30; Jann & Weigrich 2007, 57). Nor does it capture the often chaotic and non-sequential nature of the policy process, or take into account non-authoritative actors and processes. However in terms of simplifying an extremely complicated political process, the stages heuristic has staying power and has inspired a diverse research agenda. Many adherents choose to see as the stages heuristic as a starting point and a way of structuring inquiry into the policy-process that can incorporate within it a variety of sub-theories and ideas, and that agree that attempts to use it for more than that

are likely to run into problems (Schlager 1999, 239-258; also Jann & Weigrich 2007; deLeon 1999).

Exclusive use of this predominant framing is not the best research strategy for Project A3.3, for the emphasis will necessarily shift entirely to a focus on authorised decision makers and a highly formal view of how policy-making works. Analysis of option formulation and decision-making (the functional core of A3.3) in this vein would place most of the emphasis on public servants and politicians (the 'authorised') and would exclude or ignore the role of non-government actors in influencing policy decisions (see Hancock 2006; Keen 2006). This would introduce difficulty in accounting for agential-level factors in the process such as persuasion, power and ideology (Goodin, Rein & Moran 2006). This makes it particularly difficult to gain strategic or tactical insight into influence-seeking and lobbying in the policy process. The stages heuristic accounts for interest group and lobbyist participation in the policy-making process during the consultation and evaluation phases, which have prescribed formats for bringing in and balancing outside opinions within policy development (Denniss & Maddison 2013, 167-169). However, evidence abounds that lobbying of policy makers occurs routinely at all stages. For example, when reviewing the literature regarding scientists influencing the policy process, Ann Keller found that the boundaries between policy 'stages' was blurred and ample evidence existed to indicate the influence of scientific voices over the agenda-setting and implementation stages in addition expected influence over development and decision-making stages (Keller 2009, 9-10).

The most common form of policy consultation - written submissions to proposed changes – has not been shown to be particularly influential over policy outcomes.

Indeed, there is little evidence to indicate that attempts to influence the policy process are more successful within the confines of specific 'stages'. For example, the most common form of policy consultation - written submissions concerning proposed changes – has not been shown to be particularly influential over policy outcomes when compared with other avenues. Marissa Golden reviewed rule-making across several agencies in the United States and the effect of written submissions during review periods on changing eventual policy outcomes. In only one of eleven cases she examined was there significant change in response to submissions (Golden 1998), although other studies have found that particular types of interests may be able to get concessions and adjustments through this process in certain circumstances (McKay & Yackee 2007). One study compiling estimations of lobbying effectiveness from bureaucrats themselves revealed a collective perception that written submissions and public hearings were only moderately effective in influencing the policy process, and only slightly more influential than informal lobbying of agency personnel or other means outside the formal consultation processes (Furlong 1998).

But more than anything, the widely adopted stages heuristic provides too few clues as to how or why policy succeeds (or fails) at any given stage of the development process, how influence is wielded, and how individual agents within the process will behave and respond over the cycle.

An important and related debate to that which emerged over the accuracy of the 'standard model' policy cycle is whether or not the policy process can be considered to be rational. A much larger body of work regarding the rationality of the policy-process focuses on the bases on which individuals make decisions, but with regard to the contention that the process as a whole is rational, opinion is divided, often depending on how rationality is defined. The stages heuristic however presupposes that policy making is a largely stepwise and rational process. Althaus, Bridgman and Davis identify a policy cycle as a standard routine that is a part of the broader institutional framework of modern governance and

allows rules to guide behaviour in way that eliminate ambiguity and provide guidance and legitimacy to the process (Althaus, Bridgman & Davis 2013, 29-30).

This premise for the stages heuristic has attracted significant criticism– studies of policy makers and their behaviour through substantive area studies have generally found that the reality does not conform to the rational model, and the process as a whole is far less ordered and unambiguous than the stages heuristic would suggest (Hawker 1979, 281; Rattigan 1986, 273-274; Emy & Hughes 1988, 453-454). Still, others, such as Craig Matheson (1998), have found that when taken as a whole most policy decisions are rationally based (given a more forgiving definition of 'rationality'), and hence the totality of the policy process can be generalised as being in harmony with the stages heuristic, even if specific examples or areas deviate from the pattern.

Despite the ubiquity of the stages heuristic in discussion of the policy process, as an approach it has limited useability for developing strategic thought about influencing the policy process for the implementation of water sensitive cities (or any other type of policy). Firstly, because it lacks any clear causal variables or explanation of momentum drivers within the system, and a theory of these is essential to developing a strategy. It provides no sense of the critical questions regarding the development of policy: which ideas or values will prevail, how long the process will take (or if it will be completed at all), who or what influences the process, how policy disputes are resolved, and how to assess how effective each stage will be. Secondly, it either largely ignores lobbying in its analysis or brackets it into confined stages of consultation and evaluation. Both approaches are unrealistic given the ubiquity of influence-seeking in policy processes and the ample empirical evidence indicating that such stages are not the only, or even the most effective, forums for lobbying to influence policy outcomes.

Put simply, although the stages heuristic provides an eminently rational starting point for thinking about the policy process, its narrow focus precludes the **politics** which ultimately determines how the process proceeds (or whether it begins at all).

2.1.2 Institutional Analysis and Development

Institutional Analysis and Development (IAD) is a theoretically rigorous attempt to develop an understanding of policy-making using a foundation of rational choice theory. It too assumes individuals operate under something akin to comprehensive rationality, where policy-makers negotiate within a competitive environment and seek to maximise individual (and very occasionally collective or group) utility in the process of developing 'rules' or policies.

IAD developed out of the rational choice institutionalism (RCI) school and was championed by Elinor Ostrom and Kenneth Shepsle, amongst others. The RCI approach does not posit an alternative conception or model of the policy-process, offering instead a template for modelling the interaction between actors within institutional settings or *action arenas.* IAD is the most detailed treatment of policy-making operating on RCI assumptions and has been applied in a variety of policy contexts as a tool to explain the behaviour of policy-makers and the outcomes of policy decisions (Kiser & Ostrom 1982; Ostrom 1990; Ostrom, Gardner & Walker 1994).

The IAD approach operates with fixed assumptions about both actors and their institutional settings (or 'action arenas') in which community expectations and established 'rules' are significant. It uses this approach to predict outcomes and patterns of behaviour. This formalised approach allows game-theoretical experiments where variables are changed and adjustments of behaviour modelled.

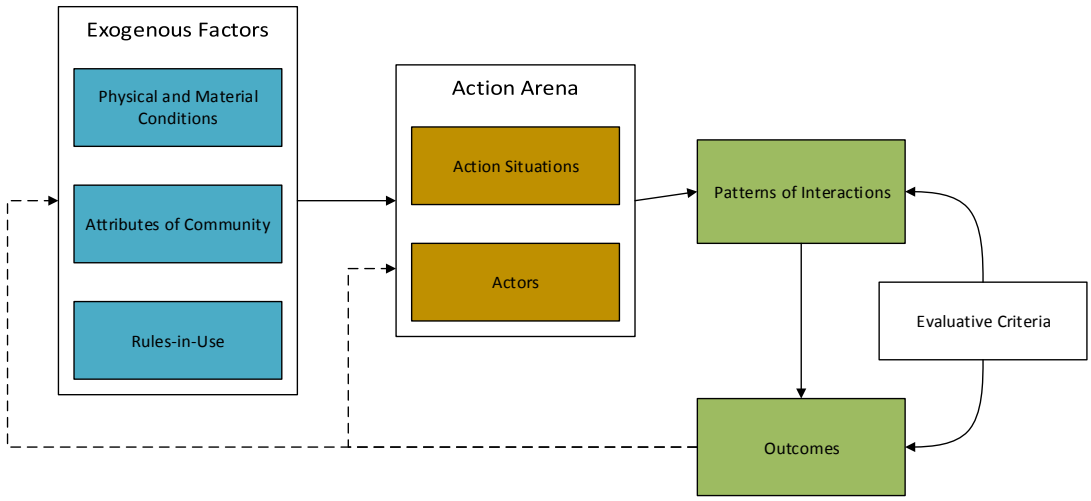

Figure 2: The IAD Model. (Adapted from Ostrom, Gardner & Walker 1994, 37)

The IAD approach interprets the policy process in relation to action arenas that are delimited and governed by physical/material conditions, community attributes and rules-in-use. The water policy sphere and policy development process, for example, is delimited by laws and government, by environmental factors such as climate and geography, the structure of pre-existing water institutions, the community perceptions of how water is used and valued, and so on. The physical/material conditions and the attributes of community are generally not changed by agents, but rules-in-use (like laws) can be, and the determination of these is subject to another action arena populated by policy-makers like a parliament. Thus the policy-area and policy-process are connected through a unified conceptual structure in this approach (Schlager & Blomquist 1996, 653-654). The IAD approach is also distinguished by a strong focus on institutional rules and how they shape actor strategies.

The IAD approach depends on firm conceptions of what motivates actors and why outcomes occur. It also provides a framework for orientating structures and agents within a system. This type of analysis is not only used in analysis of policy determination, but also to study political institutions themselves (Knott & Miller 1987; Shepsle 1989; Miller 1992). The approach offers a structure by which to understand incentives, norms and rules that motivate and constrain behaviour within the political system and the kinds of interactions that might result. The metalanguage of the rational choice approaches allows comparability between diverse policy areas.

Furthermore, the model provides platform for incorporating influence-seekers and lobbyists in the policy process. The action arena can be expanded to incorporate just about any interested party. Unlike the stages heuristic, IAD embraces a fairly expansive world in which policy formation might occur. It is akin to the 'structured interaction' definition of policy that incorporates a rational choice basis for actor behaviour, conducive to formal modelling and precise predictions of how policy-makers and lobbyists might interact in the political 'marketplace' (Hayes 1981; Denzau & Munger 1986; Grossman & Helpman 2002). The only distinction would be through the meta-language of rules-in-use, which constrains the actions of different types of actors – lobbyists and influence-seekers will play by different rules to policy-makers and politicians. However, the model would assume that lobbyists and influence-seekers are motivated by the same thing as policy-makers – utility maximisation and the reaching of an outcome that provides the most utility to the largest number.

However, the IAD and similar rational choice approaches have not found widespread adoption in the study of policy processes. Although they appear to offer more analytical rigour, comparability and testability than other methods there are many limitations; and

empirically use of the methodology has had mixed results. Hence the rational choice genre has many critics on many levels (see Green & Shapiro 1994; Cook & Levi 2008). In relation to our project we can note that RCI/IAD-style approaches often struggle in their application to complex political processes like policy-making for the following reasons:

- The rational choice basis of *homo economicus* in IAD runs into problems when handling intrinsic motivators rather than extrinsic motivators. Extrinsic motivators like cost, water-allocations, political support, time-investment, stakeholder discontent are far easier to quantify than intrinsic motivators like ideology, prejudice and achievement. Intrinsic motivators are far more common in higher-order political settings such as policy making than they are in operational contexts. Hence the application of strict actor rationality to the policy process has been critiqued from a number of angles regarding the diversity and frequently irrationality of policy actor motivations (Zey 1992; Shapiro 1994).
- The IAD approach assumes fallible learning as a basis for its model of acting, but the complexity, non-repeatability and institutional time-scales within public policy (and relative lack of competition compared to an open market) seriously undermines the usefulness of that assumption. Indeed under such circumstances, within policy making environments, cognitive biases, information asymmetry and changing preference ordering becomes highly relevant once more to explaining outcomes and behaviours. Some within the RCI tradition concede that bounded rationality employed to maximise personal utility is a more realistic view of individuals within the highly complex action arena of policy-making (Ostrom, Gardner & Walker 1994, 195-220).
- The diversity and complexity of actors, institutions and cultures interacting in a policy process is at a level that makes application of the IAD or related methods easier said than done. Given that the point of a model or theoretical approach is to simplify complex phenomena in ways that allows individuals to grasp and navigate those processes, the IAD approach, in order to be expanded sufficiently to include what we (in a water policy context) might deem all relevant criteria, might fail or at least be impracticable in this vital task.

Criticisms of the rational choice approach to studying processes like policy-making should not provoke outright rejection of the approach as there have been many applications of the theory to areas of water-management that have been useful in developing a better understanding of the field (Dorcey 1986; Bandaragoda 2000; Gunderson & Hollling 2002; Hermans 2005; Saravanan 2008). Despite its incompleteness in describing the full range of how the policy process might be influenced, it does forcefully remind us of the exchange process between interests and policy-makers. The implications for influencing the process are relatively clear as well – emphasis placed on individual policy makers will not capture patterns of consistent behaviour across the system. Would-be influencers need to address institutional incentive structures that capture a wide range of policy-makers and veto players. Policy influence can be understood as a fluid game of inducements and penalties in exchanges between decision makers, agencies and interest advocates/lobbyists, all operating within a framework of institutionally determined opportunities and constraints.

2.2 Bounded rationality

Herbert Simon in *Administrative Behaviour* (1957), echoing the basic philosophy laid down in Vilfredo Pareto's *Mind and Society* (1916), established a principle of 'bounded rationality' in public administration decision-making. Bounded rationality is distinguished from the assumptions of human rationality established in the economic sciences: it sees decision making as rational but only within the confines of a decision-making space that is limited by incomplete information, cognitive bias, and the finite time within which decisions must be made. Simon's conception of human decision-making functions is not incompatible with the model of *homo economicus,* but rather stresses that limitations to rationality are manifold and critical to actually understanding why certain decisions are taken. This relatively small move towards the limitations on rationality ultimately shifts the emphasis of policy studies away from institutions and incentive structures for rational actors, and back towards the specific limitations which constrain or distort decision-making. This has generated literature appraising the specific limitations to decision-making in policy contexts and how this impacts upon the process (for examples, see Munro 2009; Bendor 2010).

Interest groups and policy advocates are in an excellent position from which to influence bureaucratic stages of the policy-making process as those stages consist of much more technical and information-dependent components.

Bounded rationality, and specifically its notion of limited or incomplete information on the part of policy-makers, allows for a conception of lobbying that is more than merely horse-trading and gives some sense of why it is an essential and ongoing component of the policy process in democracies. As Hall and Deardorff describe, information disparity puts a different slant on lobbying as not merely an exchange of electoral support for policy influence (neither of which, it can be argued, is easy for either side to guarantee), but as a "legislative subsidy" – a matching grant of policy information, political intelligence, and legislative labour to the enterprises of strategically selected legislators. The proximate political objective of this strategy is not to change legislators' minds but to assist natural allies in achieving their own, coincident objectives" (Hall & Deardorff 2006, 69). Other studies have also argued that the most important function played by lobbying and advocacy is to supply expertise and policy information to policy-makers that allow them more confidently to make decisions and eliminate professional risk (Whiteman 1995; Esterling 2004). What is more, interest groups and policy advocates are in an excellent position from which to influence bureaucratic stages of the policy-making process as those stages consist of much more technical and information-dependent components. "Frequently, interest groups and the individuals or firms they represent have ready access to the information that agencies need. This gives such groups a considerable amount of leverage" (Kerwin 1999, 34-35). Ainsworth and Austen-Smith & Wright argue that legislators are more likely to listen to and perceive as credible lobbyists' messages when they present information that is costly or difficult for a lobbyist to collect. The provision of information that proved costly to collect also signals to the policymaker that the lobbying organisation is truly committed to an issue and the more costly the information the stronger the signal of how important the issue is to the group (Austen-Smith & Wright 1994; Ainsworth 1997). Much like political leaders, within the policy cycle bureaucratic participants require information and support in order to win policy battles and/or maintain agency prerogatives and authority (Godwin, Ainsworth & Godwin 2012, 168-169). In Australia, lobbying the bureaucracy as well as political leaders remains an important task for lobbyists (Sekuless 1984, 40-55; Sekuless 1991, 31-37).

Another important adjunct to the concept of bounded rationality in policy-maker behaviour is the so-called *principal-agent problem*. Information asymmetry, a central problem of modelling human interactions, leads to a common problem in modern policy-making settings where the key decision-makers (i.e. leaders and politicians) usually possess far less information regarding their policy areas and the decisions they are charged to make than those institutions charged with implementing those decisions (i.e. bureaucrats and practitioners). The asymmetry is often compounded by disparity in available resources for procuring information – the politician generally has less time, resources and staff to dedicate to a question than the bureaucrats charged with responsibility for determining options and implementing decisions. Thus the problem: the principal (in this case a politician) necessarily delegates decision-making power to agents (the public service), yet cannot be sure due to information asymmetry whether the agent is working in the principal's best interest or in their own interest.

The problem is that of bounded rationality, in that decision-makers can only be rational insofar as they can adjudicate upon available information, however the information available to them may be constrained by other parties. We should not assume that this problem will automatically occur, however the problem has frequently appeared in studies of policy decision-making. "Bureaucrats in these models tend either to take advantage of a multiple or alternating principal situation to implement policy independent of direct executive control or use their informational advantage and technical expertise to charge an excessive price for the goods they provide" (Indriadson & Kam 2008, 623; also Laffont & Tirole 1991; Bawn 1995; Laffont & Matrimont 2009). Some research has indicated that ministerial instability exacerbates the principal-agent problem, given that frequently changing ministers rarely have enough time to gain mastery over their portfolio sufficient to counterbalance bureaucratic expertise, and that long serving ministers are a necessary (but not sufficient) condition for overcoming principal-agent problems (Huber & Lupia 1999). Indeed, one of the key justifications for lobbying in Australia and elsewhere is that it forms a check on the bureaucratic arms of state, the actions of which are far less accountable to the public and affected interests than the elected branches of government (Sekuless 1991, 1-9; Fitzgerald 2006, 16-19; Barnett 2010, 16-19). In other words, working with lobbyists and interest groups may enhance the capacity of the principal to maintain oversight over the agent.

Another key issue at stake is how decision-makers and politicians process and make sense of policy options, which are technically infinite and often extremely complex, requiring specialised knowledge to develop and assess. This problem is well established in Kingdon's *Agendas, Alternative and Public Policies* (1984). In that study, politicians and decision-makers generally determine the agenda – that is, what policies are being decided upon. However the alternatives or options for addressing the agenda generally come from below, and usually the bureaucracy, as they are better equipped to sift through all the potential options and deduce viable courses of action. Lobbying however can and does serve this purpose too. Lobbying behaviour is a process of information exchange that is valuable (even necessary) to political decision-makers in order to make optimal decisions and make sense of what is usually an oversupply of information and policy options (even amongst those presented by their departments), all whilst maintaining a check on those departments through external validation and the reduction of uncertainty about courses of action. This reduction of uncertainty is of critical value to legislators, according to one study (Baumgarter *et al*. 2009). So in addition to helping decision-makers balance the flow of information and break away from the principal-agent problem, advocates and lobbyists reduce uncertainty and simplify options for decision-makers or help them eliminate options altogether. The

utility of successful lobbying, in presenting clear and simplified decision-making structures for politicians, should be recognised.

When examining American methods for Congress to administer oversight for the policy actions of the civil service, McCubbins and Schwartz draw the metaphorical distinction between 'police patrols' and 'fire alarms' as descriptors of oversight methods. Police patrols are centralised and routine inspections of policy-work, and conform to what many public stakeholders expect government to do when overseeing policy development and implementation. Yet 'fire alarms' – flashpoints in policy caused by interest groups or citizens groups seeking political redress or remedy from the impact of policy implementation – are far more common. They cost less and create stronger motivations for political action (McCubbins & Scwartz 1984; Wohlstetter 1990). So, as information subsidies and 'fire alarms' become essential for the work of ministers to properly conduct oversight and make decisions, so too does advocacy and lobbying become an essential component of the political process. In this way, lobbying remains particularly influential during political windows or periods of regulatory oversight (Godwin, Ainsworth & Godwin 2012, 78-81).

The bounded rationality model is quite common amongst policy theories but does not prescribe a clear logic for a policy-making process as comprehensive rationality does. Therefore, we might further divide theories of policy and influence falling under the loose category of bounded rationality approaches into two sub-groups – those that emphasise the leadership role of individual policy entrepreneurs in driving policy outcomes, and those than emphasise the role of networks and coalitions in driving policy outcomes.

2.2.1 Policy entrepreneurs

Policy entrepreneurs: display social acuity, define problems, build teams and lead by example

There is a well-established scholarly tradition identifying individuals critical to the development and adoption of policy – they are commonly termed 'policy entrepreneurs'. In John Kingdon's analysis of nearly two dozen policy formulation case studies, entrepreneurs were never solely responsible for the eventual adoption of a policy, but were identified as critical to the final outcome in two-thirds of cases, and unimportant in only three (1984, 189). Kingdon's terminology of 'policy entrepreneur' has gained widespread acceptance, however the centrality of individuals as driving forces in policy development and change has long been discussed in policy studies (see Price 1971, Walker 1974, Eyestone 1978). Policy entrepreneurship is an idea that emerges within many other broader theories of the policy process. It deserves elaboration, although it does not contribute a broader explanation of the policy process.

Policy entrepreneurs are individual agents in the policy-making context who are willing to sacrifice time, resources and social/political capital in order to advance a particular policy outcome. They "specialise in identifying problems and finding solutions" and mobilising resources and connections across networks in order to bring certain solutions to the identified problems (Polsby 1984, 171-172). Kingdon in his elaboration of the role of entrepreneurs saw them as key coordinators who could connect together the problems, policies and politics of any given policy window. In other words, policy entrepreneurs are the key figures who will exploit political or policy opportunities effectively to bring about policy outcomes (Kingdon 1984, 178-180).

Later analyses of the policy entrepreneur have revealed a broad list of their possible functions in policy development, however in synthesising the literature Norman and Mintrom summarise them as four-fold: displaying social acuity, defining problems, building teams and leading by example (Mintrom & Norman 2009, 649-650). Some entrepreneurs

seem to specialise in some types of tasks more than others, yet all have the capacity to engage in these four functions at some level. However, what sets an entrepreneur apart from other agents in the policy-making sphere is variously identified as either their willingness to spend resources and take risks (Kingdon 1984; Cohen 2013, Ch. 2); or their capacity to innovate (Polsby 1984; Fowler 1994); or their ability to coordinate and influence key policy networks (Lewis 1980; Doig & Hargrove 1987).

This final point is identified by many as a key starting point for policy entrepreneurship – its practitioners must possess a high degree of social intelligence and have an ability to engage with actors right across their issue network. Typically entrepreneurs have connections across different jurisdictions and possess a strong understanding of the motivations and agendas of other players in the policy network (Mintrom & Vergari 1996; Rabe 2004, Ch.3; Mintrom & Norman 2009). This gives entrepreneurs a capacity then to excel at problem definition – either by using events and crises (Solecki & Michaels 1994; Boin, 't Hart & McConnell 2009), or highlighting policy failure in order to put the issue on the agenda (Baumgartner & Jones 1993), or drawing support from actors beyond the immediate scope of the problem (Levin & Sanger 1994).

However, entrepreneurs will generally be unable to achieve change unaided – indeed, their real strength lies in creating teams with sufficient knowledge, skills and momentum to drive a policy through the development process and win political battles. Policy entrepreneurs often are better able to navigate the wider authorising environment in a policy area to make key connections and draw outside support for change, as well as bring in additional knowledge and skills (Roberts & King 1991; Mintrom & Vegari 1996; Dudley & Richardson 1999; Huitmea & Meijerink 2010). Finally, policy entrepreneurs take risks and clear the path for more risk-averse decision-makers to cooperate after seeing their example. Policy entrepreneurs often run pilot programs or take responsibility for lower risk implementations to demonstrate value or get the public onside, or at the political level are willing to assume political responsibility and fight for the outcomes of policy adoption at political risk to themselves.

The individual behavioural characteristics of policy entrepreneurs may be idiosyncratic. There is no clear model of what motivations, personality or specific skills a policy entrepreneur should have, save an ability to assume those four key functional roles, although there have been psychological and behavioural studies that attempt to determine why some policy operators emerge as entrepreneurs whilst most do not (e.g. Teodoro 2011). Nevertheless, policy entrepreneurs in various forms have been identified as key components in many theoretical models; either as originally conceived or in subsequent analysis and expansion of models (see Mintrom & Norman 2009).

Thus policy entrepreneurs have emerged as a crucial element in studies of policy change. In water policy, policy entrepreneurs have been identified as critical drivers of policy development in a number of jurisdictions and cases (Bhat & Mollinga 2009; Hughes & McKay 2009; Font & Subirats 2009; Huitema & Meijerink 2010). Strategies for lobbying the policy process thus shift from providing mutually agreeable terms of exchange between policy-makers and interested parties to strategies of empowering policy champions to advance options within a policy sphere. From a lobbying and influence perspective, the idea of champions and entrepreneurs is of particular interest to scientists and researchers, as the literature readily establishes that science and access to convincing information can significantly aid entrepreneurs in winning internal battles (Gupta 2009, 49-50). Yet there also remains the potential for influence-seekers themselves to play an entrepreneurial role. Effective entrepreneurs, as established previously, generally have credibility and social capital sufficient to break down barriers and create momentum towards policy outcomes. Because advisors and scientists may come to occupy institutionalised positions within the

policy process, this can create a platform for policy entrepreneurship (Mintrom 2003). Although entrepreneurial analysis is infrequently applied to scientists and experts, recent studies of the nuclear power industry (Duffy 1997) and public health policy (Craig *et al*. 2010) in the United States have indicated the capacity for experts to assume the roles of policy entrepreneurship and to provide momentum to policy reform, albeit with limitations if they do not also hold positions of authority within relevant political or bureaucratic policy structures.

The shortcoming of policy entrepreneurship however is that it describes only one aspect of a much larger process and a successful policy entrepreneur is not sufficient to guarantee success. Indeed, as Kingdon in his original review found, in some cases there was no evidence of a policy entrepreneur in delivering change. Hence policy entrepreneurship by itself cannot provide a full account of the change process, and instead is more properly treated as one element in a broader conception of the policy process.

2.2.2 Multiple streams approach

Standing quite separately from the previously described models of the policy process is the 'multiple streams' approach that was first put forward by John Kingdon and has been taken up by other authors in the policy sciences (Kingdon 1995; Zahariadis 2003). It takes as its basis the 'garbage can' model of organisational decision-making set out by Cohen, March and Olsen (1972). The garbage can model sees decision-making arenas as fundamentally chaotic: constantly fluctuating as members enter and leave, with preferences that are inconsistent and changeable as those members often don't know precisely what they want. In start contrast to the rational choice model, the garbage can model sees internal preference ordering as very vague and changeable. Problems, solutions, choice opportunities and participants develop independently of each other; and the authors describe the policy-making process in general as similar to rummaging through garbage cans trying to find solutions to match problems.

Garbage Can Model: policy processes are inherently chaotic and unstable. Policy making is not an orderly process from problem to solution.

The garbage can view of policy-making participants is particularly important, as it stipulates that the decision-making arena itself is not well understood by those who are part of it. Members are aware of and able clearly to articulate their own responsibilities and interactions but have only rudimentary ideas about how the process as a whole works and how information moves through the system to create outputs (Cohen, March & Olsen 1972, 1-10). Thus another point of contrast with the more rationally based models of decision-making is that the garbage can model is characterised by a high degree of information asymmetry and ambiguity (Feldman 1989, 4-7; March & Olsen 1976). A system of rational behaviour as construed by the rational choice school or the stages heuristic is unlikely as neither problems, solutions or preferences are well known and thus accurately discerning the options of greatest utility is virtually impossible (Zahariadis 1999). The garbage can model can be loosely classed under the bounded rationality approaches, but rationality in this case is severely bounded.

What emerges from this is that time becomes the primary means by which rationality becomes constrained. "Who pays attention to what and when is critical. Time is a unique, scarce resource" (Zahariadis 1999, 75). Decision-makers are handed responsibilities for a wide range of problems for which they must make choices – their metric become rummaging through the 'garbage can' to find solutions that can be applied. The process is

not inherently irrational, but any response is only proximally rational based on an environment in which choice is very limited.

Kingdon's subsequent model of the policy-process took the garbage can model as its starting point and described a policy process consisting of three streams – problems, policies and politics. Policy change only occurs when 'windows' – brief moments of potential alignment between these streams – are exploited by entrepreneurs willing to invest the time, capital and reputation to do so (Kingdon 1995, 178-180).

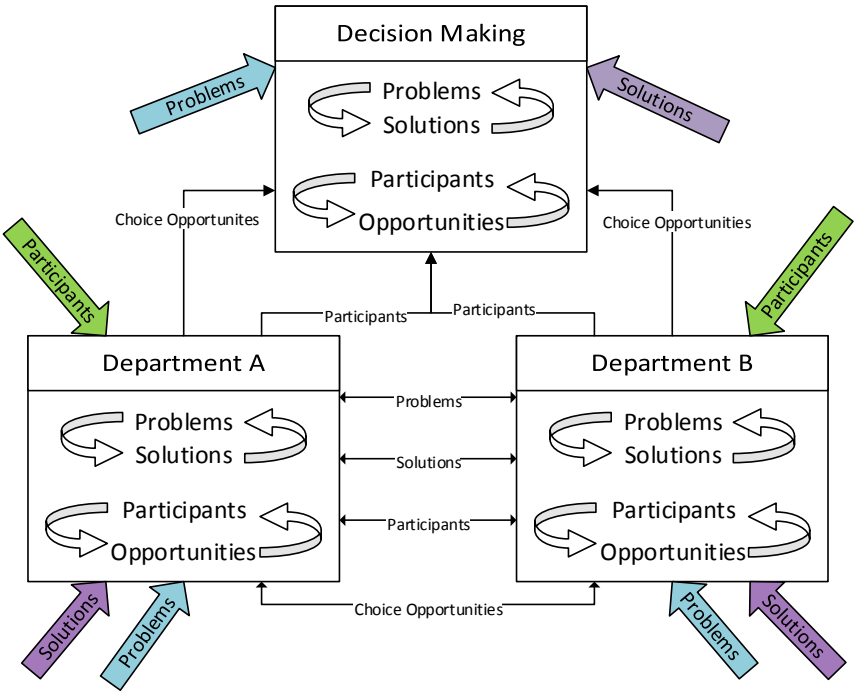

Figure 3: Garbage Can Model of Policy. (Adapted from Cohen, March & Olsen 1972).

The problems stream is the agenda, and problems come into and out of the stream depending on a wide range of factors, from the technical to the political. The policies stream runs independently alongside, and its contention (somewhat conflicting with other models, but in agreement with ideas like policy diffusion) is that policy solutions are pre-existing and are simply looking for problems. For example, deregulation and other neoliberal policy options for public utilities (like water) have been popular and often mooted in government circles over the past three decades. They are regularly advocated by like-minded politicians and bureaucrats as viable policy options for improving the water industry, regardless of how fitting those solutions are to a particular problem, or sometimes in the absence of the existence of problems altogether. Finally there is a political stream, which consists of vaguer indicators of political action such as public sentiment, advocacy campaigns and administrative turnover (Kingdon 1995). Policy therefore represents an alignment between the identification of problems, the identification of solutions, and the politics that allow the two to join.

This particular model of the policy process suggests that successful lobbying and influence-seeking occurs largely when a policy window emerges and when the options promoted are most convincingly matched with the problems and politics operating concurrently in the window. Policy windows are "openings in the policy process that create the possibility for influence over the direction and outcome of that process" (Pal 2006, 132). They are often

unpredictable and spurred by events that make the status quo inoperable or create public and political demand for change, like droughts or floods, however they may occur more predictably during processes like governmental change or budgetary reviews. Within this framework, the water sensitive cities community is just one of several communities operating in a policy stream, and concurrently with others seeks to promote the utility of that stream by decision-makers through champions and entrepreneurs in policy windows. This puts a premium on timing and political savviness, as well as providing a potential solution to the policy problem, in order to exploit policy windows. However, given the garbage can model, fruitful avenues of influence are also to be found in controlling or manipulating the flow of information within a policy window. In a review of cases of water policy entrepreneurship, Meijerink and Huitema found two successful strategies for this. The first was through winning 'framing contests' to determine how problems were interpreted and understood by the public and policy-makers – amongst many contending explanations of water crises in Hungary and Thailand, it was the successful framing of these as symptomatic of systemic problems that created a demand for water sensitive policies (see Meijerink & Huitema 2010, 29-31). The second strategy involved creating advisor and decision-making forums in which particular view points and influences predominated – in other words, the political stream and decision-making was manipulated to be sympathetic towards a particular policy stream and promote strong information links between some communities and the decision-making arena over others (see Meijerink & Huitema 2010, 30-31).

The multiple streams model thus moves away from narrowly rational bases of action (though it does not deny them) and creates a much larger role for ideology and intrinsic motivators of behaviour in what is an ambiguous and time-dependent policy system. Outcomes of the policy process are, according to multiple streams, highly contingent on factors outside of a process of rational policy development.

The multiple streams theory has been extended by others, and shown as broadly applicable in a number of polities outside its original home in the United States (e.g. Stout & Stevens 2000; Blankenau 2001; Brunner 2008; Ridde 2009), indicating that the method is capable of diverse application and comparative validity. It also continues to stimulate a diverse research agenda (see Lomi & Harrison 2012). However that research agenda has been critiqued on many levels, most consistently due to the low degree to which the theory can be reliably operationalised and the lack of insight it provides into when and how policy windows can be exploited (Mucciaroni 1992; Bendor, Moe & Shotts 2001). Whilst the stages heuristic and the IAD approach provide strong models of how actors act and why certain outcomes occur, the multiple streams approach ties together many different ideas and observations about decision making in organisations but does not leave behind a particularly clear idea of the causality, leaving policy decision-making as a 'black box'. The supposed separation of problems, policies and politics streams has also been the subject of criticism (Mucciaroni 1992, 463-468; Zahariadis 1999, 81-82).

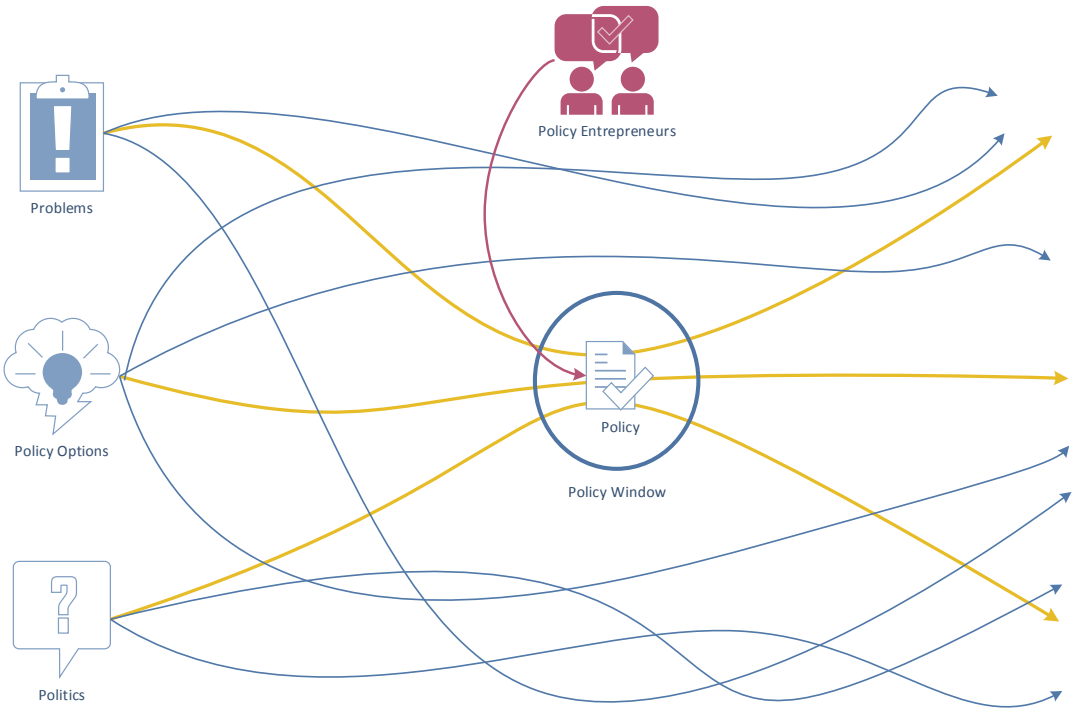

Figure 4: The Multiple Streams Model. (Adapted from Kingdon 1995).

2.2.3 Network approaches

Policy Networks are "stable patterns of social relations between independent actors, which take shape around policy problems"

Networks describe the *systemic interrelationships* between actors that are highly influential over political processes. Yet network conceptions occupy a complex place within political analysis given their seemingly dual nature in both the structure and agency camps (for an overview, see Knoke 1994). Similarly, network conceptualisations of the policy process are less the domain of one particular framework or theory but instead constitute a holistic approach to studying policy processes. The common assumption is that networks are vital to policy-making because policy actors are dependent on one other for the resources to achieve their goals (see Rhodes 2007). Network approaches to policy-study have expanded significantly in scope and ambition since evolving out of inter-organisational theories of the 1970s and were developed most influentially by Rod Rhodes and David Marsh (see Rhodes & Marsh 1992). The approach has engendered a number of off-shoots (see Klijn 1997; Thatcher 1998). However the wide variety of different ways in which the network concept has been employed means the literature is very diverse, and criticism of the approach has targeted its lack of a firm theoretical foundation and its trouble answering questions as to why networks change over time. Yet the development of quantitative methods for analysing networks has been cited as a promising area of research (Börzel 1998; Dowding 1995; Thatcher 1998; Adam & Kriesi 2007).

Policy networks constitute "stable patterns of social relations between independent actors, which take shape around policy problems and/or policy programs" (Kickert, Klijn & Koppenjan 1997, 6). Those examining policy networks in recent decades have identified that these networks are increasingly more useful in describing the policy process as centralised agency control over policy areas weakens and relations between policy actors become

increasingly horizontal, transnational, fragmented, and managerial rather than hierarchical (Rhodes & Marsh 1992; Schneider 1992). How and why policy networks evolve and how they inform the behaviour of individual policy-makers is subject to some debate. Rational choice scholars have attempted to fit network behaviour within their broader school – for example Scharpf uses the concept of 'actor-centred institutionalism' to frame policy networks in the category of 'rules' which shape actor behaviour. Networks are then external structural arrangements that determine means for resource and information exchange that policy-actors must negotiate around to realise preferences; they form a basis for non-hierarchic coordination (Scharpf 1997; Kenis & Schneider 1991, 41-43). However, this adaptation of the network metaphor has not found agreement with all adherents (Marsh & Smith 2000) and there continues to be debate as to how individual policy-maker behaviour can be understood within the context of a network approach. Other approaches, for example, have developed explanations centred on the distribution of power around a policy network and more structural explanations for policy outcomes based on the type and nature of a policy network, putting less stress on individual agential behaviour as the primary locus of analysis.

Applications of network analysis have largely focused on observing and analysing policy networks in order to uncover the nature and distribution of power within those networks as a means to understanding which actors or institutions are involved in policy-making decisions and where they stand in relation to each other. Given that networks are generally found to be highly stable and interdependent, and dominated by a particular culture or orthodoxy of thought vis-à-vis their policy sector, this becomes important in explaining policy stability and the domination of some types of views in particular policy circles. It has also formed an important part of demonstrating and explaining the 'second face' of power in policy-making – that is, how agendas are controlled by policy networks even in the absence of direct power over decision-making itself (Rhodes & Marsh 1992, 182; Rhodes 1997, 34; Richardson 2000, 1006-1008). Attempts to map networks in this way have ranged from the highly descriptive to the highly formal, but there is considerable debate as to whether ultimately much has been learned from applications of network analysis (Dowding 1995; Börzel 2011). Nevertheless, there have been many attempts either descriptively or quantitatively to map the nature and distribution of power in water policy networks, and in many individual case studies this has been determined to be a useful tool by which to explore the policy process (e.g. Richardson 1994; Bressers, Huitema & Kuks 1994; Bressers, O'Toole, Richardson 1994; Menahem 1998).

The major stumbling block for network analysis is that without a more specific theoretical framework it does not provide a means by which to explain change due to its emphasis on the structural nature of networks, unless an actor-centric institutionalism is favoured, in which case the approach can be considered similar to the general framework of IAD and networks simply become 'attributes of community' - an exogenous factor to the action arena. Some have put forward a 'dialectical' approach which does not see either agent behaviour or network structures as static, but rather they influence each other and in that iterative process create change momentum in which both actors and networks evolve together (Marsh & Smith 2000; Hay & Richards 2000). However the most intensively developed theory that tries to explain change through a network approach is the advocacy coalition framework, which is described below.

Comparative study of policy networks and their receptivity to change has led to the development of useful typologies. Policy networks, it has been argued (Marsh & Smith 2000, 8; Adam & Kriesi 2007, 143-145) stand as crucial intermediaries that shape actors' responses to external events and changes within their policy area. Various studies have attempted to classify policy regimes by the capacity of their networks to accept new ideas, actors or policies; or the way in which change occurs within different types of policy networks (for

example, Schneider 1985 in Cawson 1985; Atkinson & Coleman 1989; Boase 1996; Howlett 2002; Provan & Kenis 2008). Such studies have advanced significant conclusions in comparative studies, demonstrating that the ways in which networks are arranged may have a large impact on how change will be received and managed in the network, and if change does occur, how that change is likely to transpire. Synthesising many of these cases studies, Adam & Kriesi (2007) advance a potential categorisation schema of networks with regards to the nature of change.

		Network Response to Potential Change	
	Conflict	**Bargaining**	**Cooperation**
Concentrated Network	Moderate rapid shift	Low – moderate incremental shift	Low change potential
Fragmented Network	High rapid shift	Moderate to high incremental shift	Low to moderate change potential

Network approaches are less common as an organising principle in the lobbying literature; however there are studies to suggest that successful lobbying of the policy process in part rests on the strength of the networks engaged in by those doing the advocating. In the lobbying literature, networks are sometimes described as having either 'strong ties' (more like coalitions and advocacy federations) or 'weak ties' (more like contacts and friendly ears within the issue network). Coalition building and creating strong ties is a critical plank of most lobbying strategies and is described in more detail below, but even weak ties have been found to be important to the success of influencing the policy process.

For example, Esterling, Carpenter and Lazar found that when studying how influence is exercised in health-care policy in the United States, lobbyists' access to decision makers and influence over the decisions ultimately made rested on the breadth of the interest group's 'weak ties'. In short, the access of an advocate depended on the access of other advocates he or she knew (Esterling, Carpenter & Lazar 1998). Other studies have also found that networks and weak ties between influence-seekers and policy-makers were potentially pivotal factors in the success or failure of information diffusion between experts/advocates and politicians/bureaucrats, and ongoing relationships and networks between these groups were likely to provide a durability to the influence of outside parties (Esterling, Carpenter & Lazar 2003; Heaney 2004; Braun 2013; Chalmers 2013). These studies indicate that investing in both strong-tie networks and weak-tie networks were strategically valuable and had an enduring importance for the influence of lobbyists and the quality and type of information to which they had access. Of particular importance is the maintenance of networks with bureaucrats, which are typically long-term and enduring networks between interest groups and policy-makers that provide critical channels of communication and information exchange (Chubb 1983, 36-45).

2.2.4 Advocacy coalition framework

The advocacy coalition framework (ACF) rests on three assumptions. Firstly, that the bulk of policy-making occurs amongst experts and specialists within a policy subsystem, though their behaviour may be influenced by factors outside that subsystem (i.e. political, economic and social factors). Secondly, a model of the individual that has two (often competing) dimensions – one which favours following rules, the other which emphasises maximising good outcomes. All policy participants are assumed to have strong beliefs – strong enough to motivate action to convert those beliefs into outcomes. Thirdly, that the multiplicity of

views and actors involved in a policy subsystem are best organised through 'advocacy coalitions' of like-minded interests.

The ACF in many respects might be classified as a network approach to policy-processes, in that it takes the fundamental assumptions of network theories. But the fact that it attempts to combine these theories together in a way that gives shape to actor behaviours and policy outcomes also puts it within the ambit of entrepreneurial approaches as well.

For ACF adherents, the policy subsystem is a complex structure which brings together a wide variety of actors from researchers and specialists, to politicians, interest group leaders, journalists and other interested parties. Modern policy subsystems are so complex that only those who are specialised in their area have any hope of being influential (Sabatier & Weible 2007, 192). As those subsystems mature, the beliefs and ideologies of participants tend towards stability (not withstanding potential modification through scientific and technical information), thus making major policy change very challenging (Sabatier & Jenkins-Smith 1999, 134-136). Much like the IAD framework, the ACF identifies exogenous factors – such as resources, culture, legalities and so on – that frame the parameters of the policy subsystem and any potential action. It also identifies dynamic external factors that have the potential to impact the subsystem such as socioeconomic conditions (Sabatier & Weible 2007, 193-194). It adds however opportunity structures (like policy windows, political change, crises) as well as mitigating factors between exogenous factors and the policy subsystem, as there might be higher or lower thresholds required for policy action in a particular area, and the policy subsystem may be more or less accessible/open to participation (Sabatier & Weible 2007, 199-200). For example, military and defence policy arenas tend to be dominated by a coalition of like-minded careerists in a setting that often limits participation or even observation by outsiders or potential change agents. By contrast, education policy tends is very visible, relatively open to public interaction, involves many different and fairly evenly matched coalitions of interests, and is subject to frequent modification and revision.

> ACF models stipulate that policy-actors are more influenced by their beliefs and cognitive biases than other factors. Critical to changing policy coalitions is effectively engaging with policy beliefs of actors.

The ACF model of the individual is one of the most complex and rests on the nature of actor perceptions. Advocates of the ACF model identify three levels of beliefs: *deep core, policy core,* and *secondary* beliefs. Deep core beliefs speak to fundamental ideas about politics and the role of government – about human nature, the relative value of concepts like liberty or order, the role of markets, and so on. The left/right scale of politics operates at this level, and such beliefs are unlikely to be changed, as they are rooted in the individuals' socialisation.

Policy core beliefs reach only across the policy subsystem, and concern matters like the normative role and authority of different actors within the system, the nature and seriousness of problems within the subsystem, and so on. These develop into beliefs about certain policy responses as options are formulated and participants line up behind them. Policy core beliefs are also often difficult to change, in part because they usually stem from interpretations or applications of deep core beliefs. Secondary beliefs are narrowest of all and tie into some specific aspect of policy, like the desirability of public consultation on a specific policy question or the right amount of funds to dedicate to a certain line item of a program (Sabatier & Jenkins-Smith 1999, 133; also Putnam 1976; Peffley & Hurwitz 1985). These are the easiest to change and negotiate, and much of the compromise of the policy

process is getting agreement over secondary beliefs, once a coalition of generally like-minded deep core and policy beliefs has been assembled.

This belief structure is important in determining how policy participants respond to new information within the policy subsystem. Because of the inherent complexity of the area, actors must generally relate incoming information through perceptual filters informed by their beliefs and experience (Lord, Ross & Lepper 1979; Munro & Ditto 1997, Munro, Leafy & Lasane 2004; Fielding et al. 2012). This is critical to the ACF structure and diverges from previous models of rational utility maximisation or goal-orientated behaviour specified in the IAD or stage heuristic frameworks. Different perceptual filters amongst actors meant that they interpret new information differently, and that leads to policy debates and conflict within the policy arena. The ACF framework makes another contention: that actors in the policy space are motivated more strongly by their failures as compared with their successes – this leads to a tendency for policy actors to overestimate their opponents and distrust them (Quattrone & Tversky 1988; Sabatier & Jenkins-Smith 1999). Sabatier and Jenkin-Smith label this the 'devil shift' factor.

It is this second dimension of the ACF model of the policy actor that leads to the formation of 'advocacy coalitions' – alliances of participants who share beliefs across the policy subsystem. Participants recognise the need for these in order to translate belief into outcomes, and are driven towards them out of fear of losing to policy opponents. This fear, it is alleged, is sufficient (along with lower transaction costs and the weaker nature of advocacy coalitions) to overcome traditional barriers to collective actions that are considered crucial in the rational choice model of actors (Sabatier & Weible 2007, 196-197). However there has been ample critique of the ACF because of its assumption that disparate actors will easily combine forces and collectively seek policy outcomes, something that in both theory and reality is a lot more complicated that simply having a common goal or enemy (see Schlager 1995).

A critical outcome of the ACF model of the individual is that beliefs, not transactional motivations or rational information processing, become the most reliable predictor of a policy actor's behaviour – and that the most important (i.e. core) beliefs are difficult to change (Sabatier & Zafonte 2001). This means that inertial forces within policy subsystems are strong and pathways to influence participant beliefs and policy change are difficult. The most frequently cited possibilities are shocks, both internal and external to the policy subsystems (not unlike the policy windows identified within multiple streams theory) which open up opportunities for major change. Also possible is incremental learning (prompted by gradual shifts in secondary beliefs, which then may feedback to change policy and core beliefs) and negotiated change (when opposing coalitions negotiate an outcome, often as a result of protracted struggle or mutual detriment arising from a lack of settlement) (Sabatier & Weible 2007, 198-207; also Stewart 2006).

Although there remain many critiques of the ACF approach, in part because its model of the policy actor is diametrically opposed in many respects to well established models stemming from the rational choice/goal-orientated/policy-entrepreneur schools, it has developed a deep bench of empirical application both in the United States and abroad (in Australia for example, see Chen 2003; Pforr 2005; Green 2007). However the activity in the ACF area has also meant its approach and theoretical form has changed frequently over the past decades, having being modified significantly several times, leading some to criticise it as lacking a strength of central formulation that RCI approaches have, or the flexibility of the multiple streams approach.

Most basic texts on lobbying strategy emphasise the importance of bringing together powerful advocacy coalitions for change in order successfully to appeal to politicians and

Scientific disagreements were the primary cause of problems in advancing the implementation of the US Clean Air Act in the 1960s, 1970s and 1980s. These scientific disagreements were not unfounded, but they provided an easy pathway for opponents of change to defeat it or a means of masking competing self-interests amongst individual interest groups through the guise of technical disagreement.

leaders who want to be convinced of broad support in their communities, rather than merely sectional interests (for example Lanham 1999; Fitzgerald 2006, 135; Richan 2006, 25-28; Thomson & John 2007, 111-112; Libby 2012b, 132-137). Even within the context of lobbying the bureaucracy or state-run institutions, there is evidence to suggest that interests that were united in their comments or pursuits were much more likely to achieve favourable bureaucratic decisions than those pursuing interests or advocating policy separately (Yackee & Yackee 2006, 131-135).

Godwin, Ainsworth and Godwin outline the operational reasons why effective lobbying techniques tend to favour small groups of large stakeholders than large groups of small stakeholders, namely: A) two of the most important resources in politics – information and the ability to monitor the policy-making process – are expensive and thus wealthier organisations possess the advantage. Smaller stakeholders lack the resources to generate these ends and thus tend to remain 'rationally ignorant' of policymaker activities. B) In an exchange model of lobbying, larger interests represent a larger threat if ignored or spurned – the same organisations that have the capacity to dedicate resources to securing policy decisions can direct those same resources to creating public pressure or political pressure at other levels. Unless they are well organised and broadly-based, large groups of small stakeholders usually don't pose the same threat (Godwin, Ainsworth & Godwin 2012, 35-36).

However achieving this kind of unity has been intermittent in the scientific community and the inability to maintain unity has soured many a scientifically-backed policy attempt. Scientific disagreements were the primary cause of problems in advancing the implementation of the Clean Air Act in the United States in the 1960s, 1970s and 1980s, and the arguably the damage created by decades of internecine scientific arguments over air quality standards crippled the effectiveness of the Environmental Protection Agency (Jasanoff 1990, 101-122). These scientific disagreements were not unfounded, but they provided an easy pathway for opponents of change to defeat it, or a means of masking competing self-interests amongst individual interest groups through the guise of technical disagreement (for more examples see Nelkin 1979; Collingridge & Reeve 1986).

However, unity between scientists is only one necessary factor to developing an effective advocacy coalition within the policy process – the coalitions must be broad as well as deep. Lobbying literature, relying on case studies, generally draws the conclusion that broad-based coalitions, particularly those engaging with non-traditional allies, tend to be more successful than those with only narrow or sectional coalitions behind them (Robyn 1987, 146-148; Richan 2006, 25; Libby 2012b, 134-135). Again, this poses particular challenges as collective action is most easily brought about through unity of purpose and vulnerability to outcome – large economic stakeholders in the water industry easily and routinely ally on policy issues, and a large number of professional associations exist continuously to do just that. For those committed to reform of the status quo much greater effort is required to forge a unity of purpose and shared understanding of outcomes to incentivise people more strongly to participate in a collectively-wrought outcome than to pursue individual interest. Because

WSUD delivers diffused benefits over a long timeframe, creating broad-based coalitions for the purpose of lobbying policy at a bureaucratic, public or political level is difficult.

2.2.5 Policy diffusion and learning

Jack Walker followed up on the work of the bounded rationalists in 1969 and contended that whilst their general analysis of the constraints on policy-making were correct, they overlooked another vital way in which policy-makers could transform policy under the pressure of scarce time and resources. Namely, policies that had been developed elsewhere could be appropriated. Studies examining this process of learning (see Etheredge & Short 1983; Bennett & Howlett 1992; Rose 1993; Gilardi 2010) have focused on developing models of how information diffuses across a policy network and on what incentives policy-makers have for adopting that information and using it to inform policy choices. In many cases, the underlying logic of the bounded rationalists means that policy-makers are incentivised to take decision-making short-cuts and implement ideas from outside their jurisdiction but from within the issue network (and even occasionally outside that network). In other words, jurisdictions might choose to outsource rational policy analysis to some degree by replicating policy choices made elsewhere. Other incentives for jurisdictions to adopt policy prescriptions from other jurisdictions include competition (Berry & Berry 1990; Volden 2002) or coercion from superior jurisdictions (DiMaggio & Powell 1983). These mechanisms for policy diffusion are not equally effective however in securing long-term policy change – policy implementations that are simply trying to imitate successes elsewhere, or imposed externally upon unwilling jurisdictions, tend not to succeed. Policy learning, or competition between jurisdictions, are alternatively seen as more successful mechanisms for sustainable diffusion of policy (Shipan & Volden 2008).

There are a number of models postulating the pathways and dynamics of policy diffusion, learning and adoption (Freeman 2006, 369-372), such as:

- **Isomorphism:** which argues that policy entities tend to take cues from similar entities within their network, as these entities provide the best sense of how the new policy might play out. Several authors identify 'channels of commonality' which incline diffusion along certain pathways – for example, commonalities in ideological outlook, economic and budgetary characteristics, or geographic and demographic similarities of jurisdictions (Weyland 2007; Grossback, Nicholson-Crotty & Peterson 2004).
- **Top-down:** which proposes that in any given policy area there tends to be particular leaders in policy whose reputation and personnel lead others to watch closely and emulate (Walker 1969, 893-894). Collier and Messnick (1975) for example posit a hierarchy of highly developed leader countries and less developed followers, and social security policies that tend to diffuse from the most to the least developed nations through this hierarchy.
- **Bottom-up models**, which have been proposed as a counter to the 'authoritative choice' discourse that prevails in diffusion studies, and see a major role for diffusion through non-political sectors of the policy sphere like expert communities and NGOs, which have a great capacity to move information and practice across jurisdictions (Stone 2004; 2008). This pathway hints at the kind of diffusion roles scientists and research organisations might play.
- **Proximity models** on the other hand tend to explain diffusion across policy areas by recourse to proximity or frequency of interaction. Various models see

geographical/institutional proximity as a key explanation (Mintrom 1997). Others see the frequency of interactions between adopter and non-adopter jurisdictions, or the frequency of participation in forums in which ideas are shared between jurisdictions, as the key to understanding diffusion (Balla 2001).

Policy diffusion does not offer a comprehensive account of the policy process, but draws attention to the many means and reasons why policy travels across jurisdictions, resting on Walker's fundamental assumption that is it easier, safer and cheaper to learn and adapt from other examples than to engage in a rational-comprehensive development of policy options internally. However, critics argue that policy diffusion is not nearly as consistent and considered as technological diffusion. Policy ideas do travel, but they are often 'translated' in the process to fit with differing ideological or interpretive frames (Freeman 2009; Benson & Jordan 2011). What is more, when policy ideas do travel they tend to take on a life of their own in their new jurisdictions – events and interpretations contort ideas into new policy settings. Some ideas are adopted and some not, and development tends to be uncoordinated and contingent on a variety of factors internal to the new jurisdiction (Duncan 2009). These and other criticisms have led to the development of the policy 'translation' literature which presents a view of how policy ideas are diffused that is a lot more nuanced and idiosyncratic depending on the particular circumstances of the scenario (e.g. Lendvai & Stubbs 2007; Freedman 2009; Peck & Theodore 2010).

Studies of water policy employing models of diffusion and translation find evidence for a variety of mechanisms, from top-down diffusion due to the development of international norms (Holzinger, Knill & Sommerer 2008), to the complexities of water policy translation across boundaries (Swainson & de Loe 2010; Mukhtarov 2014). However, as with all diffusion models, this just seeks to describe one particular aspect of the policy process rather than providing a comprehensive strategic view of it. Nevertheless, diffusion studies importantly highlight the often exogenous factors which influence the development of policy in a jurisdiction, the interconnectedness of the broader issue network, and the mechanisms by which different jurisdictions within an issue network (or even outside it) can influence each other. Policy diffusion often is a core mechanism for justifying and broaching policy change, and both policy-makers and lobbyists routinely share and adopt ideas from other jurisdictions to justify decisions made in their own.

2.3 Incremental analysis

Incremental analysis: constraints in time, information and freedom of thought limit policy development to what is mostly incremental progress – consideration of policy options that deviate only incrementally from the status quo.

Lindblom established the importance of time in limiting policy-making capacities in *The Science of Muddling Through* in 1959 (Lindblom 1959), and refined his ideas over many years, perhaps never more definitively than in his follow up article on the subject in 1979 (Lindblom 1979). Through this work, Lindblom seizes upon the 'bounded rationality' idea and determines that constraints in time, information and freedom of thought limit policy development to what is mostly incremental progress – consideration of policy options that deviate only incrementally from the status quo. Because policy makers lack limitless time and resources, and policy problems involve virtually limitless variables and contingencies, analysis of policy options can never be complete. And given the contemporary limitations on time and resources afforded to policy

makers, policy analysis generally does not even come close to completeness (Lindblom 1979, 517-518).

Incremental analysis becomes most likely because it holds most of the variables as constant and analysis need only cover the relatively small range of variables that are changing. Lindblom did not preclude strategic analysis and long-term aspiration from the policy sphere, but saw them as much less likely in bureaucratic settings. Lindblom also found incremental politics to be another feature of modern democracies; the highly pluralistic and densely populated environment of stakeholders and veto players in the United States constrains major reform (Lindblom 1979, 519-521). The tendency of democratic politics towards the incremental has been reiterated in many studies in the decades since Lindblom (e.g. Light 1995; Rauch 1999; Laing 2012) and Lindblom's basic contention about the policy process continues to attract adherents and to generate supporting evidence (see Hayes 1995), notwithstanding the fierce debate over whether incremental analysis is necessarily the only salve to the purported impossibility of analysis that can be both comprehensive and rational.

Although incrementalism in either politics or policy is not necessarily an ideal state of affairs, theoretical frameworks have emerged that indicate that the greatest challenge for policy change is to manage (and perhaps speed up) the process of incremental change or to identify when and why the occasional moments of rapid change occurs. Incrementalism as a model of policy-making behaviour lends itself to what is usually termed the 'neopluralist' model of lobbying behaviour, in which in any given policy arena there is an ongoing 'tug-of-war' for influence over policy direction and the decisions that are taken. For the most part the sides are generally well matched and as a result the status quo is quite durable and policy movements tend to be slow, small and subject to much contestation. The policy equilibrium created over time is a result of an equitable distribution of power between forces that emerge for or against any given policy. Only when the underlying circumstances shift suddenly – as in the case of elections or disasters – is there an opportunity for significant policy shifts and the policy moves to a new position in which a new equilibrium emerges (Goodwin, Ainsworth & Godwin 2012, 16-17). At any given time and for any round of policy review, it is safe to assume that (absent a major shift in the policy or political environment) policy change of any great nature is unlikely as the status quo represents the distribution of power established in previous rounds of policy-making (Baumgartner et al. 2009, 22-24). Policy inertia thus creates a high threshold for policy change, no matter what the reason for change, unless inaction is now rendered impossible or unpalatable.

This is particularly the case with economic policies, where settings like tariffs and subsidies that benefit particular interest groups will often long outlive their original expiry dates due to the creation of interests tied to the status quo who will lobby for their continuation (Rausser 1992; Krueger 1993; Coate and Morris 1999). This class of policy persistence has salience with respect to environmental policy choices, which often have far-ranging impacts on many different stakeholders and interest groups, and as a result sub-optimal policy settings may endure due to the difficulty of finding consensus for change. As William Brock argues, numerous motives, including the desire for policy makers to avoid ambiguity and the high potential costs of change, make it far easier to justify defence of the status quo or incremental change in environmental decision-making settings; even if as a whole most stakeholders stand to benefit from major change (Brock 2008, 74-77). Even within the bureaucracy, cases involving revision of rules or policy implementation where there was notable contestation about the direction or content of a proposed change saw the maintenance of the status quo was the most likely outcome (Golden 1998). Water policy has an even greater degree of persistence, as water policy generally involves a high degree of infrastructure and sunk costs. Additionally, path-dependency within the technical paradigm

under which policy decisions are made is another major contributing factor to policy persistence and one that is well established in the WSUD literature (see Brown & Farelly 2009; Ingram & Fraser 2008; Brown, Ashley & Farrelly 2011).

Yet there are further issues when the spectre of mutually supporting structures within policy domains comes to the fore. First described as 'iron triangles' by political scientists in the 1950s and 1960s, the elitist tradition of studying political influence finds structures of mutually supporting interests that create a sort of 'influence equilibrium' that might not necessarily result in policy stasis (though it frequently does) but rather limits the degree to which other stakeholders can influence the decision-making process and policy cycle (Jordan 1981, 99-103). The term was very popular for a period in the United States and the existence of these triangles were found across the government, and the US water policy sphere was found to be particularly susceptible to the iron triangle phenomenon, effectively creating a culture of clientelism in water policy where executive, bureaucratic and utility structures became mutually supporting rather than checks-and-balances (Leveen 1972; McCool 1987, 6-13; Howitt & Lund 1999).

Given Australia's similar institutional and political arrangements in urban water management, it's not difficult to imagine iron triangles replicated at similar scales here. Close, mutually-supportive relationships between the water bureaucracy and the water industry are readily observed in the Australian states. If water is a particularly salient issue politically (as it has been in many Australian states in recent decades) the triangle is completed as political sponsors reward the bureaucracy and maintain their sponsorship in return for policy outcomes (such as greater water security and lower prices to consumers) that deliver political dividends. A crude iron triangle of the water industry might be thus drawn between mutually supporting corners of the policy triangle – the politicians, the industry and the bureaucracy. Because these three entities stand to lose the most from major changes in policy, they have the potential to become mutually supportive, and indeed they have been particularly rigid in some areas. Iron triangles may be benign or even necessary in the water industry, as some theoretical examinations of water resource management have contended (Grigg 2012, 309-311), but they nevertheless exert considerable inertial force over the policy landscape, making major reforms even more difficult to introduce.

2.3.1 Path dependency

Although developed as a general tool for exploring historical contingency in the social studies, path dependency has been adopted in a wide variety of policy contexts as a means of demonstrating the domineering importance of what has been previously established in determining what will follow. Early studies used the concept widely in explaining why inefficient and/or sub-optimal technologies had the potential to be 'locked' into economies by virtue of the difficulty of reversing early decisions once they were made (Liebowitz & Margolis 1995; Howlett & Rayner 2006, 5). The emphasis on early events and decisions is regarded as particularly important in both economic and social cases. This is because of a presumption of historical contingency – although the development of a particular technology, policy or application is not entirely deterministic, nevertheless specific events and initial decisions do influence the likelihood that complementary events or decisions will follow. For instance, water policy options depend to some degree on the nature of water infrastructure in a jurisdiction - yet water infrastructure once built is difficult and expensive to change, and if many decisions over time confirm a particular infrastructure route (say a centralised sewerage system for a city), it becomes progressively more difficult to change track (say to a decentralised sewerage system for that same city) as time goes on. This process can repeat and intensify over time until lock-in occurs, at which point it becomes

extremely costly or difficult to depart from the prevailing historical pathway (Mahoney 2000; Pierson 2004). However, applying the concept to policy is not straightforward, and there have been doubts about the direct transportability of the concept to the policy sphere (Peters, Pierre & King 2005). What is more, path dependency does not represent a theory or model but rather an approach to considering stabilising forces in a policy area. As such, its prescriptions and uses are vaguer than more developed models or theories.

Nevertheless, the power of path dependency in providing rich historical explanations of the state of affairs in various policy areas is clear. Numerous studies that have used a path-dependency approach to illustrate the systemic-temporal dimension of policy choice, particularly in policy areas considered particularly resistant to change, such as social security and healthcare (for example, Wilsford 1994; Hacker 1998; Kemp 2000; Pemberton 2003). The path dependency concept has also been applied in studies of water policy (Jordan 1999; Livingstone 2004; Ingram & Fraser 2006), but here its use is generally limited to helping to understand or build better models of the policy process by describing the dimension of historical contingency in policy development. That said, from a strategic standpoint an understanding of path dependency is crucial as part of a broader narrative about the barriers to change that emerge over time, and how difficult changing pathways is as time goes by. This is never clearer than in an area such as water policy, where generally implementation requires long-term investment in infrastructure that, once developed, is costly and complicated to change. Indeed, urban theorists have long recognised the particular power of path dependency in explaining why urban areas get locked into certain (sometimes suboptimal) policy pathways (see Woodlief 1998).

2.3.2 Punctuated equilibrium

Following on from Lindblom's early work on incrementalism, and echoing the path dependency school, political scientists have confirmed a common trend in establishing that public policy generally changes incrementally and that for much of the time any given policy sphere tends towards stability. However this stability is interspersed with periodic bursts of intense activity provoked by a novel issue, problem or demand, which produces a major change or reform within a policy area. That public policy development has this temporal characteristic has been observed repeatedly throughout multiple issue areas across different studies (Baumgartner & Jones 1991; 1993; Jillson 1994). The periodic scramble by policy-makers to address crises or major shifts in the usual policy equilibrium, which may entail the emergence of a new policy paradigm as a means to restore equilibrium, has led to the idea of punctuated equilibrium.

Punctuated Equilibrium: policy is generally stable for long periods of time, but when change does occur it is generally significant and revolutionary rather than evolutionary.

An important starting point for the foundation of punctuated equilibrium is the notion that access to the policy-making agenda in society is not shared equally. The power to control the agenda has long been established as the 'second face' of political power (Barach & Baratz 1962) in public policy. Not only do political elites have the power to direct resources and set rules (subject to the consent of other stakeholders and power-sharing entities) but they also often have the power to determine the agenda – i.e. what is discussed and decided upon in the first place. A slew of in-depth studies have attempted to chart the breadth and depth of elite control over the political agenda in early studies of power in public policy (Schattschneider 1960; Barach & Baratz 1962; Cobb & Elder 1983; Cobb & Ross 1997; Worsham 1998). Effective control over the political agenda by political elites and stakeholders was found in these studies to create conditions where new ideas or challenges

to the status-quo in most policy areas were prevented from entering the political discourse in the first place. Baumgartner and Jones (1991; 1993) saw this as a starting point and the theoretical underpinning of a concept of 'policy monopolies' that emerge in most policy subsystems, centred on paradigm approaches to the area. These paradigms and orthodoxies are consistently upheld by the dominant forces in a policy area and are receptive only to minor, incremental changes that fit within the large established framework of thinking. This idea echoes the earlier work of Thomas Kuhn (1962) on paradigms in scientific thought, and has been adopted to explain stability and change in other areas of politics (Skowronek 1993; Keller 2007). More broadly, the diffuse and divided nature of political institutions has contributed to long periods of stasis – getting consensus amongst the numerous jurisdictions and actors in a policy area (and amongst the wide variety of potential stakeholders) has becoming an increasingly difficult task (Laing 2012).

Similar to Schattschneider's concept of 'widening conflict' as a key indicator of change, so too do punctuated equilibrium theorists see policy change a product of involvement in the policy area by a broadening base of interests and actors, rather than internal development. As an issue becomes more contentious and demands from the public or stakeholders for change increase, the policy elite in the subsystem can only resist change for so long until other actors in the system move into the area. The agenda of the political class then becomes critical here, as entities like Cabinet or the Prime Minister can only focus on certain issues at any one time – they are 'serial processing' institutions (Jones 1994, 180-204; Jones & Baumgartner 2005, 38-40). Without the attention of these higher institutions, policy monopolies generally remain stable and unchallenged, or there are insufficient resources, political capital or momentum to drive change. However when a policy issue is raised onto the macro political agenda, the concentrated attention of the government and senior decision-makers often creates a window of intensive and wide-ranging change in a condensed period of time to satisfy stakeholders and take the issue off the agenda, before a new equilibrium returns and a new policy monopoly forms around the newly established orthodoxy (True, Jones & Baumgartner 2007, 158-160).

Punctuated equilibrium establishes not just a general theory of the nature and timing patterns of policy change, but also posits ideas about organisational informational processing in policy-making. Information inputs into government are constant, but outputs are staggered and occasional. The end result is that government policy and legislation is usually under-responsive and at least in some ways outdated with respect to contemporary challenges in a policy sphere. However at some point, either precipitated by an acute crisis or an accretion of problems with the status quo, policy will change dramatically. Frequently (especially if combined with a crisis) the new policy will be an overreaction and exceed the demands of circumstances (Maor 2012; also Birkland 1997). This pattern is not difficult to find in water policy, where long-standing neglect of future planning and efficiency gaining in state water systems recently combined with rainfall shortages to produce dramatic policy solutions in the form of large desalination plants, the ultimate necessity or scale of which has since been questioned. Such outcomes are aided by 'positive feedback' in the information processing cycle – attention given to a particular issue often snowballs in the media or public discourse, and what begins as a modest case or a relatively isolated incident may turn into a public drive for major reform (True, Jones & Baumgartner 2006, 160-161).

Baumgartner and other punctuated equilibrium theorists have also worked on the implications of this theory for lobbying and influence-seeking within the policy environment, and one of the most extensive longitudinal studies of lobbying – *Lobbying and Policy Change: Who Wins, Who Loses and Why* (2009) – finds ample evidence of the punctuated equilibrium theory across a variety of issues and institutional settings in the United States. As the lead author, Brian Baumgartner, observed: "sixty percent of the time, nothing

happens…what we see is gridlock and successful stalemating of proposals, with occasional breakthroughs. We see a pattern of no change, no change and no change — and then some huge reform" (Burns 2010). A consistent dynamic observed across the 98 issue areas examined in the Baumgartner et al. 2009 review is the emergence of two particular sides in policy debates – one advocating for change and other for the status quo. The most frequent exception to this pattern is the emergence of a crisis, in which generally the status quo has become untenable for one reason or another, and a wide range of policy options might be available. In cases where the status quo and policy reform go head-to-head, the status quo is heavily favoured to win. This result occurs largely independently of other variables like the resources expended, seemingly contradicting the exchange model of free trading of policy preferences for benefits and giving more heft to the neo-pluralist model of interests that sees competing interests as evenly matched and the settling of a policy equilibrium the natural result (see Baumgartner et al. 2010).

Strategically and tactically, the punctuated equilibrium theory highlights even further the importance of exploiting policy windows and periods of crisis when new policy options will genuinely be considered. Subsequently, the Baumgartner et al. study suggest that strategically strongest are the lobbying campaigns (outside of crisis periods) which seek small or moderate levels of change to the status quo, are aggressive in posture, and seek to increase the salience of the issue at hand in the public eye (Baumgarter et al. 2009, 110-165). In other words, the nature of the appeal, the strategic approach and the timing are critical to the successful influencing of policy outcomes.

2.3.3 The multi-level perspective and transition management

Inherently similar in its assumptions to the work on punctuated equilibrium, the transition management literature takes a broad perspective of the policy process and sees regimes and orthodoxies of thought as important factors operating at different levels of a policy arena. Furthermore, it sees policy change as a non-linear phenomenon characterised by short periods of rapid change and long periods of relative stability. However, transition management's theoretical framework deviates somewhat from punctuated equilibrium approaches by focusing on the primacy of activity in individual 'niche' areas of policy and the importance of all actors in a policy area, emphasising long-term policy change as a product of many small-scale actions and events (Kemp & Loorbach 2005, 8-9; Kemp, Loorbach & Rotmans 2007, 4).

Transition management finds its theoretical root in the multi-level perspective, evolving from previous work on technical regimes (Nelson & Winter 1982; Rip & Kemp 1998). Originally employed to describe the multiple technical inputs involved in the long-term evolution of technological paradigms, the concept was extended significantly to take in a much broader base of social, economic and political actors and institutions which support technical regimes and create 'socio-technical' regimes (Geels 2002; 2004; Geels & Schot 2007; Genus & Coles 2008). Socio-technical regimes describe the rules, ideas and practices that are centred on particular technological orthodoxies and dominate thinking in the relevant technical field as applied by industry, experts and practitioners. These technical orthodoxies take on a strong, mutually supporting social dimension as political, economic and social institutions become invested in the technical regime and work to support it. For example, the traditional high-consumption model of water use in the west encouraged by a society that encourages daily bathing and regular washing, and a culture of suburbia with large laws and private gardens, required a technical regime of centralised high-capacity water supply to be built in Australian cities.

Figure 5: The Policy Cycle (Adapted from Althaus, Bridgman & Davis 2013)
Figure 6: The Policy Cycle (Adapted from Althaus, Bridgman & Davis 2013)

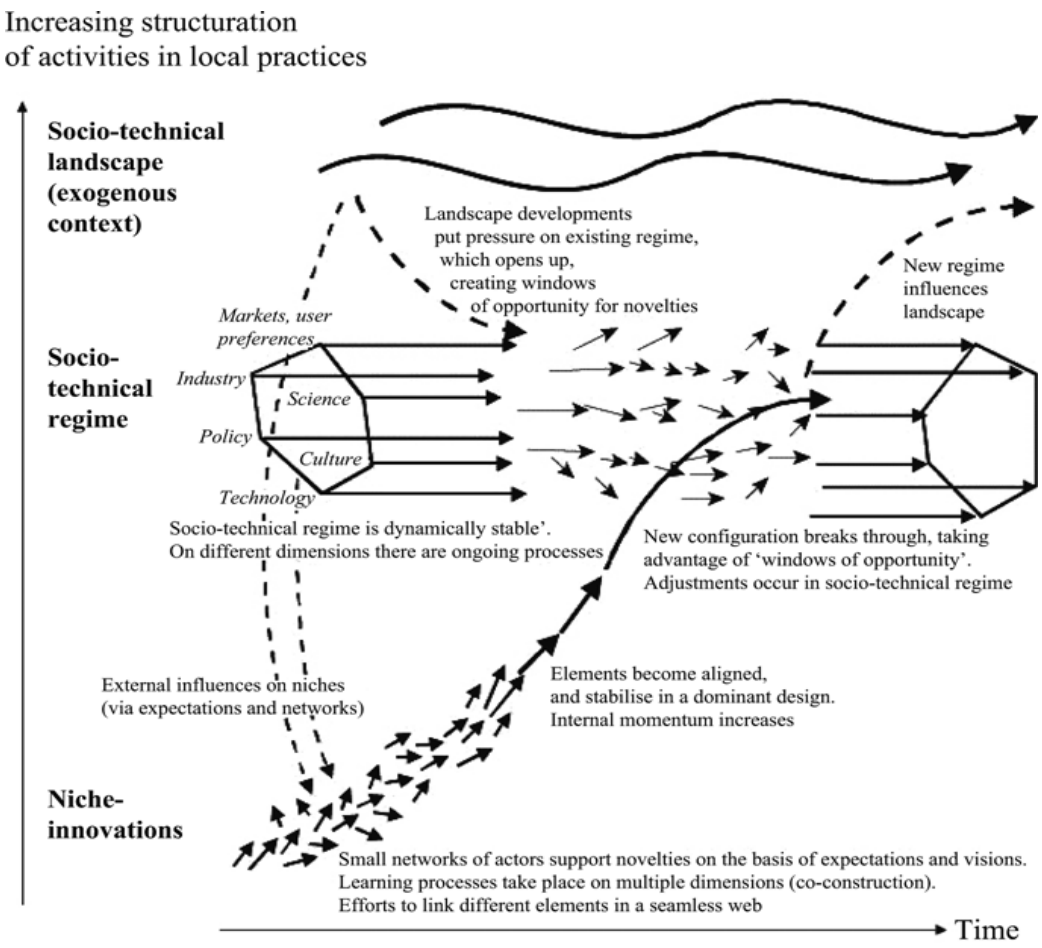

Figure 5: The Socio-Technical Transition. (From Geels & Schot 2007, 401)

Decades of the dominance of this socio-technical regime has made policy change to decentralised lower-consumption pattern as most political, economic and social institutions in water developed to support the centralised high-consumption model (Davison 2008). Policy is implemented at this level and reflects orthodox thinking. The regime then begins to act collectively as a filter in which variation that improves and innovates within the general framework of the regime is adopted whilst dissenting and inefficient suggestions are filtered out (Geels 2002, 1260). Change is incremental – rapid change or suggestions which run against the grain of the socio-technical regime threaten the interests of the regime and are collectively acted against (Geels 2002, 1260; Geels 2004, 910-913).

Given the tendency towards stability at the regime level (also called the *meso-level*), multiple level scholarship finds that significant change or experimentation in policy and implementation occurs only at the niche or *micro-level.* Niches are small fiefdoms within a larger regime that involve limited clusters of stakeholders and institutions, and act as safe environments for innovation and radical change as they can be insulated or ignored by the larger forces that perpetuate orthodoxy at the regime level. Niches are freer to break the rules of the larger regime – for example, non-standard funding or new networks of actors can form which can foster new approaches that would not see actualisation at the regime level (Schot 1998; Geels 2004, 913-914; Geels & Schot 2007). Operating above the regime level is the 'landscape' or *macro level.* Although less intensively described than the regime and niche level, the landscape describes the broadest of factors which influence many regimes and thus niches, such as culture, social and political values, which themselves are far larger than individual institutions and hence beyond their direct influence. Landscapes change more slowly than niches or regimes, and yet do prescribe clear boundaries of

possibility – for example, societal attitudes towards the environment and awareness of environmental problems are critical to the ultimately acceptability of environmental policies (Smith, Voss & Grin 2010, 441-445; also Geels 2002; 2004). Collectively, the three levels within the MLP approach echo the three levels of analysis posited in the RCI approach, with each level constraining and delimiting the behaviour of the level below it (see Kiser & Ostrom 1982; Ostrom 2007, 44-46).

Because of the constraints to action and change at the meso and macro levels, paradigmatic change is largely seen as possible only through the accretion of many small changes at niche level. As niches experiment and adopt new methodologies and ideas, those that are successful influence other niches to adopt similar pathways. This process accelerates as more niches change, increasing the rate of change until sufficient niche change has occurred to start making changes at regime level. A similar process can occur amongst regimes until such point as the landscape starts to change and new equilibriums settle around the new paradigm (Geels 2002; 2004; Geels & Schot 2007). Subsequently, transition management has developed to focus on fostering change based on the perspective that long-term change must be rooted in identifying key niches in which innovation and social learning can be sponsored and sustainable so as to have an impact on the regime and to work towards broader regime-level or landscape-level goals (Kemp, Schot & Hoogma 1998; Rotmans, Kemp & van Asselt 2001; Kemp & Loorbach 2003). Additionally, transition management must take a multi-level approach to the task to coordinate the realisation of goals and speed-up (though not directly manage) transition towards a new equilibrium (Kemp & Loorbach 2003; Kemp, Parto & Gibson 2005, 24; also Kemp, Loorbach & Rotmans 2007).

There is no shortage of water cases in which MLP or transition management theories have been employed to examine the area (e.g. Brugge, Rotmans & Loorbach 2005; Pahl-Wostel 2007; Farrelly & Brown 2011). However critics of this theoretical framework have pointed out the difficulty of operationalising the theory and applying it specifically to political processes and transitioning of political and social rules and values versus simply technological uptake (Smith, Voss & Grin 2010, 446, also Genus & Coles 2008). Furthermore, the theory's tendency towards incrementalism makes it liable to traditional critiques of those policy-theories that have difficulty in accounting for the genesis of major policy innovations and sudden paradigm shift. As yet this literature has little to no interaction with the available literature on lobbying and policy influence, making it even more difficult to operationalise the theory into an advocacy strategy or to draw out clear strategic or tactical insights. Because the process of policy change is broadly based, it's not immediately clear what role any particular individual or group might play in advancing the transition. Perhaps it might be argued that windows and niches are critically important for strategy to address as not all proposals are born equal and only those able to find a receptive niche for uptake will likely survive and make a difference.

The most problematic issue with transition management is that it assumes that niche adoption or regime adoption is an incremental and irreversible process towards an eventual endpoint, and that the norm tends towards finding a stable plateau of adoption. This is where the translation of the theory from technical to social applications becomes difficult, as while technological development is generally progressive and unidirectional, social policy is not necessarily either. Socio-technical regimes have wide latitude to reverse course, or may be locked into an ongoing struggle over values: thus different niches will take on different policies. This is common in many areas of policy where there is a fundamental clash over competing values, competing definitions and public opinion about a problem. In addition, events have a much greater propensity to cause shift across all levels – crises can lead to major and immediate shift across all levels irrespective of ongoing development paths.

3. Scientists and the Policy Process

3.1 How do Scientists Influence Policy?

The proper and most effective role for scientists to influence the policy process is a subject of some debate. As established at the outset there are two streams of thought as to the role that might be played by scientists, each dictated in part by differing conceptions of policy activity. The first sees scientists in a constrained role as insiders within policy development, acting largely as **advisors** to policy-makers. The second envisages a broader role, one that is more akin to the **lobbyist** role that outsiders play in trying to influence the policy process. Scientists have the credibility and the rationale legitimately to play both roles in the system, though it is frequently argued that adopting one role decreases potential effectiveness in playing the other role. Where exactly the line lies is impossible to say, but most discussion favours scientists in the former role rather than the latter. Most scientists have adopted advisor roles within policy development processes rather than acting as lobbyists or combining in interest groups. But has this method been effective?

Scientist Policy Roles

As **advisors** playing a formal part of a policy-making process and exerting influence internally
and/or
As **lobbyists** not formally part of the policy-making process, exerting pressure and influence externally

Measuring policy influence within the policy-making structures themselves is a difficult task; however, there is not a great deal of evidence that scientists are any better at influencing policy decision-making from within the process than outside it. Unfortunately, there is a dearth of information in policy and political science literature examining the impact of scientists and research in shaping policy outcomes on a broad or comparative scale.

From what studies have emerged, the results are often mixed and sometimes contradictory, although more often than not issue studies have found that scientists in reality have less influence than they perceive themselves to have. For example, three studies of the acid rain policy problem in the United States differed in their interpretations of the importance of science and researchers in shaping the final outcome – two major studies found that scientists played only a marginal role compared with other forces (Gould 1985; Yanarella & Ihara 1985), whilst the third felt that scientists played a central role (Zehr 1994). Three studies of the United Nation's Montreal Protocol looked at the role scientists played in securing its adoption and the inclusion of key tenets desired by the scientific community. One examination concluded that the influence of science and the role of scientists was peripheral (Litfin 1994) with two others coming to exactly the opposite conclusion (Haas 1992; Parson 2003). Nevertheless, the literature on the science-policy interface overwhelmingly concludes that there are serious and systemic problems in bringing science across the divide into the policy sphere, and the great majority of normative, system or comparative studies of the science-policy interface found significant problems. They concluded that science and scientists were generally less successful in policy influence than the authors felt they should be (for example Barke 1986; Clark 1998; Gregrich 2003; King 2004; Briggs 2006; Carolan 2006; Weichselgartner & Kasperson 2010).

This is a not a problem specific to scientists – a review by Brian Head revealed that in Australia most public servants and government agencies underutilise non-government and academic research in their work, and whilst there is potential for closer relationships at the moment external sources of evidence for policy is utilised sporadically (see Head 2015). Yet

the fact that scientists (unlike most non-government actors) often play legitimate roles as internal advisors to policy processes might, on face value, seem like they can more easily bypass this problem. However, there is a raft of other problems that seem to appear when scientists take on advisory roles.

3.1.1 Scientists as Advisors

Any apparent lack of influence over policy on the part of scientists comes in spite of the progressive evolution of policy processes throughout the 20th century to institutionalise scientists and researchers into the policy development process, usually in the form of advisors or advisory committees that review and provide input into policy formulation (Gianos 1974; Horning 1987, 11-25; Salomon 1987, 29-36). In Australia too, despite the creation of vaunted positions for senior scientific advisors within governments over the past few decades, their influence over policy still largely relies on their personal relationships with political decision-makers rather than their formal position (Gascoigne 2008, 229-230). And in spite of the apparent centrality of scientific advisory panels to many different types of policy-setting processes, doubts remain about whether such governance inventions have proven effective in creating a more scientifically-rational policy-making process.

There has been significant and ongoing contestation over how science and evidence is used in policy, and the idea that science can be kept separate from politics yet integral to policy seems increasingly illusory (see Brooks & Cooper 1987, 63-69; Jasnaoff 1990, 1-4; Pielke 2007, 9-12). Two comprehensive reviews of the advisory model for scientific influence over several policy areas concluded that, at best, advisory structures will only exert influence and policy debates under certain circumstances, and more often than not they fail to serve the intended purpose of providing clear, usable and impartial advice (Collingridge & Reeve 1986; Jasanoff 1990). As Sheila Jasanoff comments, "if a cardinal function of advisory committees is to take the politics out of policy-making, then a survey of the regulatory scene for the past twenty years casts doubts on their efficacy" (Jasanoff 1990, 1).

These studies conclude ultimately that it is difficult, if not impossible; to create science-policy governance processes that tame natural human self-interest and fallibility (see Jasanoff 1990; Keller 2009). Many well-meaning governance processes, including those explicitly 'evidence-based' and professing an emphasis on research inputs, can be subverted by the interpretive frameworks employed by the decision-makers, be they political or otherwise (Freiberg & Carson 2013; Head 2013; 2014). Despite the imprudence of such actions, political decision-makers have seen few benefits in siding with science if that directly conflicts with political imperatives (Resnik 2009, 12-15). Bureaucrats are also criticised for poorly utilising scientific advice from their own agencies in the implementation of public policy. Generally speaking, criticism has concluded either that bureaucrats are not competent to judge and integrate the scientific advice they receive; or that they are too-influenced by industry or politics to impartially judge and integrate science into policy (Jasanoff 1990, 15).

As Collingridge and Reeve argue, within a policy-making context scientific advice is channelled through processes that are either *under-critical* or *over-critical*. When a process is under-critical, there is no real political debate over the policy course and there is a broad consensus on the proposed outcome. Hence the science advisory process becomes a rubber-stamp for a predetermined course of action, and usually the science is not subjected to scrutiny or debate from contesting viewpoints. The other alternative is that there is no consensus over a policy course and thus the policy-making process can easily become over-critical. In such circumstances the science advisory processes become politicised, and scientists and their views become associated with differing camps warring over the fate of policy decision. The science review process comes under intense scrutiny and is seen to have

lost its impartiality in the process, delegitimising it altogether (Collingridge & Reeve 1986; see also Meidinger & Antypas 1996).

This echoes other concerns about the value of placing science within formal decision-making structures like hearings where they are subject to public participation and political oversight, which by their nature generate adversarial processes that have no sense of an 'impartial' scientific perspective (Nowotny 1987, 65-72). The 'under-critical' environment is perhaps more insidious, as the politicisation of scientific advice structures often results in review panels and technical committees dominated by scientists or specialists hand-picked by government to conform to a particular agenda. The result is usually insufficiently credible to convince detractors and insufficiently rigorous to be of great use to government (Resnick 2005, 5-11). In other words, the value of formal advisory processes and technical committees becomes questionable, as their position both within and yet external to government makes them less able to avoid politicisation and yet not fully trusted within the political arena either.

The value of formal advisory processes and technical committees becomes questionable, as their position both within and external to government makes them simultaneously less able to avoid politicisation yet not fully trusted within the political arena.

Despite these problems, or perhaps because of them, many commentators on the problem of the poor uptake and use of scientific advice have suggest improvements to the structures through which policy is made and have suggested strengthening the institutional role scientists play in policy-making. For example, in the WSUD arena a sizable proportion of the discussion in urban water science focuses on improving the mechanisms for water governance and management through well-travelled concepts like adaptive management, collaborative governance and evidence-based policy. Such studies suggest a structurally-assured role for scientists, experts and practitioners as impartial inputs into the policy process, with prescribed roles as collaborative partners within reformed governance structures (e.g. Pahl-Wostl 2007; Huitema et al. 2009; van de Meene, Brown & Farrelly 2011). More broadly, this research fits into a general series of assumptions about the role of scientists within policy – that is to say that scientists most suitably should act as 'honest brokers' within the policy-making process and the aim of researchers in looking at policy change should be improving *policy-making* procedures to better incorporate research and scientific perspectives.

Evidence with respect to the ability of any such proposed structures to work in practice or deliver the promised benefits are limited (see McLain & Lee 1996; Medema, McIntosh & Jeffrey 2008). Despite the creation of various commissions and advisory panels across the states and territories in the 2000s with the intention of improving the quality and technical rigour of water-policy decision-making in the context of ongoing water scarcity, the results have not necessarily seen an increase in technical rigour relative to political expediency. For example, despite the establishment of the Queensland Water Commission in 2006 as a body to improve and coordinate water strategy in Queensland and to create greater analytical and technical capacity in state policy, the eventual decision by the government that led it to implement desalination, and the (in most respects) lost argument for widespread use of water tanks or recycled potable water, ultimately testifies much more to the adoption of politically expedient solutions in this period than any greater influence on the part of policy researchers and scientific advisors (see Spearritt 2008; Head 2010; Laves et al. 2014). With the Coalition taking office in 2012 and the Queensland Water Commission subsequently abolished in 2013, the period bookended by these developments defies categorisation as one in which scientific evidence had greater influence over the public debate or policy

outcomes than might otherwise be expected, notwithstanding improved access and governance.

3.1.2 Scientists as Lobbyists

Traditionally the prospect of lobbying or advocacy raises problems for scientists, who are often torn between the belief that science and evidence should be an integral part of the policy-making process (and therefore above/beyond the need for lobbying) and their recognition of the reality that science often plays only a marginal role in informing policy outcomes. However scientists occupy a complicated position with regard to policy-making, as they tend to transcend the traditional insider/outsider boundaries of the policy-sphere. Scientists can and frequently do become part of the policy-making establishment and hence do exert influence internally over the direction of policy as invited advisors to government, as part of review panels, as reviewers, and so on. Yet by the same token many often find themselves on the outside of those same processes – scientists may have an interest in a particular policy but may have no formal opportunities to provide input. Furthermore, there is no homogeneity in the scientific community on many issues, and particular camps favouring one scientific position or another may emerge. In those cases it is not unusual for science to become politicised and one camp to become part of the policy establishment while another remains on the outside. Nevertheless the scientific community has some legitimacy in claiming a stake in formal policy development and one that, when it can demonstrate robust empirical validity, arguably supersedes many other interested parties.

This raises a dilemma for most scientists; theirs is a profession that very rarely involves itself in lobbying, and generally assumes that the conventional conception of its influence – that of an impartial provider of evidence within the policy process – should suffice. As one long-time American lobbyist commented at the height of science-policy conflicts during the Clinton administration, "the hardest sell is not between me and Congress, but between me and the scientist…the scientist often thinks that science explains itself and justifies itself" (Smaglik 1998). This phenomenon is widespread within the non-profit sector when it comes to advocacy for public policy. The landmark study *Seen But Not Heard,* which included a comprehensive review of the policy activities of nearly two thousand entities in the non-profit sector in the United States (including research and scientific entities), revealed that despite nearly all entities studied stating that public policy outcomes were essential to their mission, around two-thirds had little to no engagement with lobbying activity (Bass et al. 2007). Subsequent studies have demonstrated similar findings – the non-profit sector routinely relies on the least demanding engagement strategies for policy advocacy, if it conducts any policy advocacy activities at all (Salamon, Geller & Lorentz 2009; Libby 2012a, 6-7). A multitude of reasons are cited, but those most frequently identified are that non-profits generally: a) don't understand the political system and are reluctant, even anxious, about engaging in lobbying; b) worry that policy lobbying may jeopardise a relationship with government, which generally provides the majority of funding for many non-profits; c) lack staff capacity and resources to engage in lobbying; or d) have leaders that do not appreciate the time, resources and difficulty associated with policy change and thus are reluctant to back lobbying over sufficient durations (see Bass et al. 2007). Although a generalised study, all these problems can be applied specifically to research and science non-profits, and to some extent these obstacles are amplified in the case of research organisations (for example, the reliance on government funds).

An additional barrier to lobbying that appears much more saliently in the case of research organisations is the trepidation they experience when approaching the subject of advocacy. Although the debate is fragmented and infrequently addressed in scientific literature, there is a plethora of perspectives from the sciences available that sees lobbying/advocacy as an activity running counter to the core values of science, particularly objectivity. It is not

uncommon for scientists in a range of fields to argue that advocacy of any kind compromises the objective foundations of science (e.g. Tracey & Brussard 1996; Nielsen 2001; Rykiel 2001; Doremus 2008; Ruggiero 2011; Edwards 2013). At stake, it is routinely argued, is not just the compromise of scientific values but a threat to the credibility of scientists in the public sphere (Nielsen 2001; Rykiel 2001; Lackey 2007). "Once policy preferences are rooted in the core of the scientific enterprise, it is not clear… how scientific independence and credibility can survive over the long term" (Lackey 2007, 15). These arguments are frequently posed not just from the perspective of scientists, but from the perspective of the public at large, and in relation to the extent to which we can and should delineate the appropriate role for scientists in our society. One scientist argues this clinical separation of science and advocacy at its purest: "In a perfect world, advocates would be those who spoke or wrote in support of something and scientists would be those who spoke or wrote in support of nothing" (McCoy 1996, 919).

However, despite the popularity of this position and the seeming simplicity of the distinction between science and advocacy (and the warning that scientists cross that boundary at their peril), the central argument quickly runs into trouble from many standpoints. Philosophically and epistemically, some have argued that it is impossible meaningfully to distinguish between 'science' and 'advocacy' in a policy-making context, as science intrinsically employs values and settings in its work that will be reflected in policy-advice and ultimately policy (Shannon et al. 2000). This problem manifests when one considers applying science to policy domains, as most policy-making is founded on politically and socially determined parameters that do not have an objective scientific basis. An 'endangered species' or 'degraded waterway' has no associated objective meaning, but is defined relative to a point a society finds desirable. This type of influence over the policy sphere might be defined as the 'second-face' of power (Bacharach & Bartz 1962) or agenda-setting. By setting the terms in which policy is discussed, there is influence over the range of options available to decision-makers and the frameworks by which decision-makers think about a particular policy problem.

Yet science is routinely employed to determine definitions and applications with regard to policy concepts, thereby at least in some part participating in a definition of subjective values rather than simply as an objective search for 'truth' when it comes to policy arenas (Fuchs 1993; Shannon et al. 2000). However this is not necessarily a problem. Few scientists contest, for example, that scientists have at least some obligation to communicate their research to policy-makers and the public (e.g. Lackey 2007; Scott & Rachlow 2011). But the very process of communicating, "even to merely provide policy-relevant information unavoidably involves interpreting, filtering, and synthesising facts. Although this processing of facts falls within the purview of scientists, it is not a purely objective activity as implied when scientists say they are merely providing facts" (Nelson & Vucetich 2009, 1096).

The scientific literature has gone to great pains to highlight the risks involved with scientists adopting advocate stances over advisory stances. There is no shortage of examples where the involvement or co-optation of scientists into a broader political or policy debate has led to major blows to scientific credibility (Pielke 2002; Gauchat 2012) or has ultimately politicised science to a degree that has undermined the ability of the field to work together cohesively and objectively, for example in whaling (Aron, Burke & Freeman 2002), climate change (Pielke 2004) and abortion (Jasen 2005). The politicisation of evidence in politically contested areas is such that scientists may have no control over the meaning their work eventually comes to have in a policy debate. However others have argued that it is naïve to assume that science can or will speak for itself – if scientists and researchers themselves do not speak for it (and as powerful advocates in that process) then the media, politicians or the public will tend to ascribe their own meanings to it and politicise it of their own accord

(Sarewitz 2004; Likens 2010). "[Scientists have] a naïve faith that the value of science is self-evident and it therefore will be automatically recognised and funded by legislators. Sciences [will] have to come to realise that, just like every other interest, science needs to make its case against competing demands for government funds – hospitals, roads, the war against terrorism..." (Gascoigne 2008, 227).

The water-sensitive cities domain is amongst the more advocacy-orientated areas of science, and hence is likely to engage (either academically or in policy) in a greater degree of activity intended to influence policy. More broadly, the water sensitive urbanism sphere has a particularly strong emphasis on transition management and aims to achieve a paradigm-shift within the water sector, driven by the science of water sensitive urban design (e.g. van der Brugge & Rotmans 2007; Brown & Keath 2008; Wong & Brown 2009). However, even within the area of water-sensitive urbanism, there are varying degrees of interest amongst scientists in engaging in lobbying/advocacy activity and still ample indications of consternation about the role scientists play in the policy-process (Falkenmark et al. 2004).

What literature there is offering advice on how to improve the influence of scientists in policy processes generally touches upon the same techniques and ideas that the lobbying literature draws upon, although these two genres rarely overlap (e.g. Cheng et al. 2008; King 2004; Clark et al. 1998; Jacobs 2002; Pannell & Roberts 2009). Yet lobbying behaviour is the only recourse if scientists are not included in the policy process and find themselves, like most would-be influencers, starting outside rather than inside the tent. And even if inside the process, scientists ultimately have no control over the degree to which they and their research are integrated within any given policy process. Furthermore, scientists may even have a constrained hand when they are part of the formal process of policy-making that they would not have if operating entirely outside the process. If nothing else, there is a strong practical imperative for scientists to engage more rigorously with the lobbying literature and adopt stances and strategies as lobbyists rather than advisors.

The effectiveness of scientists as lobbyists is much harder to discern than their effectiveness as advisors due to the inconsistent treatment of the subject in the literature. Most studies have focused on cases of scientists influencing the policy agenda and campaigning in the public for action on the part of government. The maintenance of biodiversity, for example, is a policy problem for governments that was created in recent decades by what David Takacs describes as advocacy for a particular philosophy as much as an objective scientific rationale (Takacs 1996). Other commentators have pointed out the similarly influential role that scientists may play in creating policy problems and generating policy debates through the scientific soap-box (Zehr 2005; Yearley 1991; Miller & Edwards 1996).

The Wentworth Group of Concerned Scientists, operating completely outside of government and eschewing the role of traditional 'scientific advisors', has been considered one of the great successes in influencing political decision-making on water in recent decades, using strategies much more closely aligned with traditional lobbying than orthodox roles prescribed for scientific advice (Vanclay 2010). In recent decades, battleground issues like the environment have given rise to scientific pressure groups like the Climate Council to agitate directly for better incorporation of science in political decisions. Such groups, along with think-tanks like the Australia Institute, have arguably had equal if not more success in influencing political decision-making than scientific reviews and technical advisory committees to the government. However, there are too few studies measuring the effectiveness of scientists in this context to make a definitive claim either way, normative concerns over scientists playing lobbyist roles notwithstanding.

However the general lack of hard data on the efficacy of tactics and strategies for scientific lobbying undoubtedly stems from the fact that in the context of acting as lobbyists and

influencers of the policy process, science and research organisations are very poorly resourced. A survey of companies in Australia found that some twenty percent of their staff employed within public affairs categories were engaged primarily with the task of monitoring and engaging with government on policy or regulator issues, second only to staff working on public relations (Allen 2005, 345). That same survey found that of all public affairs activities undertaken by companies surveyed, eighty seven percent were related in some way to government relations (Allen 2005, 344). Similar studies of government relations activities for scientific organisations do not exist, however studies of NGOs have revealed a significant majority do not engage in any substantial lobbying/influence-seeking activities at all (Salamon, Geller & Lorentz 2009; Libby 2012a, 6-7). As a result, scientific voices that exert direct influence over the government are comparatively rare in most Western democracies. Although quantifying influence within government is impossible to do with precision, lay attempts to do so readily reveal that in terms of influence over policy or government, Australia has many influential organisations and voices but none of them represent a scientific or research community (Crikey 2011; Warhurst 2007, 34-36). Though science lobbying has on occasion proven to be a successful and enticing strategy, by and large it occurs too infrequently and too haphazardly for there to be much clarity on the dispositions of risks, the most effective strategies that suit the unique position of scientists in society, and how to resolve normative conflicts over the role of scientists as 'honest brokers'.

4. Conclusions

Although this literature review has sought to bring together many of the insights relevant to a review of policy processes, influence, and the role of scientists, in reality there are many different literatures being combined here which do not normally intersect. This is one of the major shortcomings of the literature as a whole, but it is in part due to its lack of a natural home. The question of how scientists can influence policy is most frequently engaged in by scientists themselves, yet they rarely have the experience of and familiarity with political and social sciences to integrate their insights convincingly into the broader literature. On the other side, political and social scientists do regularly look at how policy process and policy influence works, but almost none of that work is tailored to scientists themselves, who have an unusual and unique position in policy in that they can legitimately work either inside or outside the policy tent without any public consternation. The strategically superior choice of which role a scientist should play is thus difficult to discern.

However a synthesis of the major approaches illuminates key principles that should guide influence-seeking behaviour and three crucial ingredients to advocacy campaigns that are fairly common amongst models and well supported by more than one tranche of literature. The key principles relate to the **expectations of rationality,** the **nature of influence-seeking,** and the **role of scientists.** The key ingredients are **entrepreneurs, networks,** and **timing.** The best contribution the literature can make from a theoretical and strategic standpoint is to highlight the importance of these six elements in formulating an approach to scientific influence seeking and a game-plan for improving the uptake of good science in good policy formation.

Expectations of Rationality: A challenge for both scholars of science and scholars of politics is to better understand the others' logic of rationality and find areas of agreement and compromise. Within the context of scientific enquiry, certain structures and expectations of rationality are critically important, yet this logic cannot similarly be applied to political processes. By the same token, politicians and bureaucrats must operate within a different logic of rationality within their own context, one which struggles to understand and interface with that of the scientific world. As Deborah Stone establishes comprehensively within her book *Policy Paradox,* the different logics of rationality which might be used to justify various policy decisions are virtually endless, and policy disputes are most frequently the result of disagreement over which of those logics to employ or emphasise (see Stone 2011). A critical task of A3.3 and for the science-policy community more generally must be to find better ways to translate and communicate across the logic divide, and give individuals the skills and capacity to travel between them and operate effectively within both.

However, our focus is on how scientists (rather than politicians or policy-makers) can make that jump. For scientists looking to operate and be influential within the logic of politics, the great bulk of research into policy processes highlights at least one aspect that does not follow the ideal rules of procedural rationality, whether that be advocacy coalitions, opportunistic leaders or accidents of history. Although some might argue that every outcome has a rational basis somewhere (Matheson 1998), the overall effect is a more chaotic and pluralist process with many different potential pitfalls and advantages for scientists. This is often a problem for scientists, largely because expectations of a strict, procedural rationality in policy processes are present in many of the arguments in the literature detailed in the section on 'Scientists as Advisors'. Implicitly, the normative prescription is that policy-making should be an orderly process of rational review of the evidence that leads to optimal outcomes. However, as so many different policy theories demonstrate, this kind of rationality is rare, and the constraints on policy-making are such that achieving this kind of rationality is extremely difficult even if it is pursued.

To that end, in order to be most effective in pursuing influence over policy processes, scientists need to start from the premise that whilst policy processes always aspire to comprehensive rationality and a strict evidential basis, in reality they fall far short of that. Strategies for influencing the policy process need to be diverse and adaptable to the many potential constraints upon comprehensive rationality that might arise. Consequently, scientists must think much more broadly about the policy-making process and the opportunities for influence rather than waiting for their expertise to be sought. And whilst some of the efforts of researchers in the water sensitive cities area might focus on the various ways in which policy-making procedures might be improved to adhere more consistently to a rational review of scientific evidence, proponents of the water sensitive cities agenda must be prepared to argue their case effectively within processes that are not as rational as these proposals would stipulate. In other words, expectations of procedural rationality need to be lowered on the part of scientists, and preparedness for operating in a process that is not comprehensively rational is paramount if scientists are to claim a bigger stake in policy making influence. This may seem odious to some in the scientific community, however it is simply acknowledgement that the two areas play by different rules and success is equated differently across the scientific and policy contexts. The biggest leap between working in a scientific research field and a policy-making field is that there are different standards, conceptions and expectations of rationality.

Nature of Influence-Seeking: The two broad models of lobbying relationships outlined throughout the review have wide applicability to just about every aspect of the policy-making process and should remain at the forefront of scientist's minds when strategising over influence strategies. Both the *exchange* model and the *pluralist* model of lobbying accurately describe different aspects of the relationship between policy-makers and influence-seekers, and both are important. The exchange model should encourage scientists to think about what it is that they offer that policy-makers *need* or *desire,* and what exactly it is that science and research actually offers policy-makers. The exchange model highlights a deficiency in some aspects of scientific influence-seeking, in that it focuses heavily on what scientists want/believe should happen, with limited regard as to what decision-makers need. Scientific advice is rarely thought of in terms of a 'product' that is competing in a market, but that is exactly how it might be described in certain policy contexts. The fact that science is not used more would indicate the product is simply not competitive or attractive enough amidst other products from other providers in the policy marketplace. This trend has to be reversed. Although this might inevitably impinge on scientific purism, the fact that policy processes are not comprehensively rational means that this must inevitably happen if scientists want to be more influential in policy processes. Research developed and marketed in a scientific realm must be repackaged and reconfigured to be sold in a policy realm. The exchange model encapsulates this basic necessity by drawing attention to the market for influence that exists in policy making.

However, the *pluralist* model must also be accounted for in our strategies. The basic truth here is that major policy change is difficult to create and the status quo most often prevails. For a variety of reasons policy settings are generally durable, and incremental change is much more likely than comprehensive change. Furthermore, in conflicts over policy, forces supporting and opposed to change are more likely than not to be fairly even in power, meaning the policy equilibrium is usually quite stable unless a crisis or event makes the equilibrium untenable. This model becomes increasingly relevant the more public and contentious an issue becomes. In such circumstances, factors like coalitions, timing and tactics become extremely important.

Hence, in developing an effective platform for influencing policy, scientists need to be able to recognise the importance of both models in describing the strategic nature of policy influence and work with strategies that can fit within either.

Role of Scientists: Finally, the third principle is that scientists need to expand their own thinking about their role in order to be influential in the policy sphere. Although traditionally the role of scientists has been as advisors within specific policy processes, when processes are not comprehensively rational and when the nature of policy making privileges either the exchange or pluralist models of influence seeking, the advisory roles are by no means guaranteed to be influential. Furthermore, studies of scientists playing advisory roles (particularly by Jasanoff (1990) and Collingridge and Reeve (1986)) have demonstrated readily that scientific advisory structures are less than ideal as platforms for scientific influence. This is not to say that they are without use, but the general point from much of the literature is that they are insufficient to guarantee a seat at the table for scientists, and arguably strategies pursued by influence-seekers outside the process are better adapted to influencing policy outcomes than the formal advice given by scientists when requested by policy-makers. Scientists thus need to be prepared to take on two hats – either as advisors or lobbyists – depending on the circumstances. Although the scientific literature agonises extensively over this dichotomy and worries about the perceived legitimacy and independence of science, it can be readily contended by dissenting literature that these labels are often arbitrary and that it is very difficult to remove all traces of politics and values from science. Nor is there a compelling case in what literature exists that the kind of independence and legitimacy scientists are concerned about are of concern to the same degree amongst policy-makers. Indeed, we must go back to the differing standards and expectations of rationality across spheres to highlight why being 'above politics' is essential to research in a scientific environment but possibly a handicap in a policy sphere.

Whether scientists choose an advisory stance or a lobbying stance should be a question of strategy rather than philosophy. Advisory stances are preferable if the process is likely to be evidence-based, simple, inclusive and fast, or if the policy problem is not under significant dispute, or if there is a broad consensus over the general direction of the solution. However, if the policy-making environment is political, contentious, irregular or complex (as is often the case in water policy) then scientists have to be prepared to take on the role of lobbyists in bringing their case effectively to decision-makers. Or if scientists find themselves outside of a policy-making process, they should not shy away from the prospect of taking on a lobbying role. This is a role that scientists might not automatically feel comfortable taking on, however the bulk of the work of A3.3 will be directed towards assisting scientists to play this unfamiliar role.

To that end, the literature points us towards three general elements that are essential to understanding success in influencing the policy process and must form the bedrock of any strategy for improving the uptake of science in policy-making – entrepreneurs, networks and timing.

Entrepreneurs emerge as a critical element in many theories, and most theoretical approaches at least recognise the importance individual advocates have in any given policy story. The identification of policy entrepreneurs is commonplace in the story of policy development – as John Kingdon's review famously pointed out, only a very small minority of cases did not feature individual advocates who were critical to the final outcome. The placement of these advocates is important – they need to be sufficiently credible, trusted and enmeshed in policy processes to exert influence, though they need not be 'authorised' in the traditional sense of belonging to the political class. What is more, entrepreneurs form a critical theoretical plank of most political science approaches to this area because of the ever-looming conundrum of the collective action problem. An entrepreneur – someone who

is sufficiently desirous of an outcome (for whatever reason) to invest the time, skills and resources to work towards it and overcome policy inertia – is by the far the most likely element that can break past collective action problems. This is regardless of whether the policy-making individual is assumed to possess bounded or unbounded rationality – the payoff of policy change for an individual right across the non-stages theoretical perspectives is generally low given the political difficulty of policy change, and only someone very invested in the outcome will willingly accept the consequences in light of a particular endpoint. Such motivations will range from the direct utilitarianism of the IAD model to broader goal orientated behaviours, but the end point is the same.

The emphasis placed on individuals as the driving forces of change processes cannot be underestimated, and their role is apparent even in theories that do not see them as the focal point. Most network approaches, including ACF, note the importance of leaders (perhaps 'network entrepreneurs') in assembling and coordinating groups, even though it is the groups and not the individuals that ultimately monopolise influence within the policy landscape. Even processes that appear passive (like knowledge transfer) have come to emphasise the role of individuals in fostering policy diffusion – a sort of knowledge entrepreneur role has emerged in that field.

Thus it seems that a useful strategic starting point for thinking about influencing the policy process is to assume an important role for entrepreneurs in shepherding desired changes in policy, and that one strategic approach to influencing the process will involve identification, recruitment and partnering with these policy actors.

Networks do not denigrate the role of individuals, but simply highlight the importance of the relationships between policy-makers as more crucial than any given individual. Where exactly these networks exist and which individuals they connect varies depending on the approach, however it is clear that they exert powerful influence over the policy process. Any strategic approach to gaining influence over a policy process would need to understand, if not be able to work within or with, relevant networks. However, there are key differences in theoretical perspectives that do change the strategic approach. Classical network approaches in the vein of Rhodes and Marsh (1992) are more descriptive tools that describe a landscape and disposition of power. Ultimately they are best used to identify which individuals or institutions are important to shaping policy outcomes. Indeed, networks in this sense are just a starting point to better understanding who or what needs be influenced/ and what expectations are realistic, for influencing the policy process.

However, ACF and diffusion theories see a more active role for networks, though by very different mechanisms. ACF can in some regards be seen as an extension of basic ideas about policy entrepreneurs, seeing networks of entrepreneurs as being the key transformative drivers in the policy arena. ACF from the standpoint of outside influence-seekers changes the scenario by widening the scope, to include opposition and conflict, thereby making the task of building influence not just that of identifying and recruiting entrepreneurs but also of organising them into larger groups that can effectively marshal their collective resources. Diffusion however adds a critical extra dimension to the importance of networks by observing the interconnectedness of jurisdictions within a policy sphere and the degree to which ideas and policies can move across jurisdictions. Diffusion does not necessarily suggest an active approach to influencing a policy process from the standpoint of the networks themselves, but it does touch upon just about every other theoretical approach in highlighting extrinsic influences over policy environments and their proclivity towards adaptation.

The acknowledgement of networks as a key components to the policy process is not as wide spread as entrepreneurs – indeed there is an implicit assumption against their formation in

rational choice approaches, and several approaches (such as transition management and multiple steams) implicitly seem to see them as more likely to be sources of resistance and stability rather than change. Nevertheless, strategic thinking about influencing the policy process will have to incorporate network concepts, regardless of what role those networks might be perceived to play in any given policy change scenario.

Timing emerges as a critical element in several policy approaches, as the temporal dimension of policy change has been emphasised repeatedly across different theories, and not just those specifically focused on it. Policy windows, punctuated equilibria and socio-technical transitions speak to the same general concepts; however their use of the concept does differ significantly.

A general consensus, however, across theories (with the exception of the stages heuristic and IAD, which do not specifically account for temporality) is that policy change is spasmodic. Policy areas tend to be dominated by long periods of stability punctuated by rapid periods of change, and the punctuated equilibrium thesis is by and large the most popular account of the temporal patterns of policy change. Explanations of how those periods of change are triggered, however, vary widely across approaches – transition management, instrumentalism, policy learning, policy diffusion and path dependency tend to emphasise processes of accretion that create transitional pathways towards certain outcomes. These processes build speed over time in the case of transition management and path dependency, at some point building to a climax where a new policy regime is solidified or a new policy approach becomes widespread. Alternatively, punctuated equilibrium, multiple streams, ACF and policy entrepreneurial approaches tend to emphasise 'policy windows' and moments of alignment between politics and policy-making that create periods in which great progress can be made. These windows must be effectively exploited however, and policy pathways during these processes are far from guaranteed. Furthermore, there is little predictability for when and how such windows open – they might open by virtue of the government agenda, public demands, or with great volatility through events or crises.

Evidence from case studies suggests that periods of policy change may be triggered by either mechanism, although 'policy windows' tend be more powerful (especially if propelled by crisis) in reordering policy priorities regardless of whatever trajectory of policy development previously existed. Regardless, the clear temporal dimension to policy theories highlights that strategic thinking about influencing policy must be based in a framework of temporal assumptions and that very different options for influence exist at different temporal stages.

Although scientists have traditionally cast themselves in fairly limited advisory roles within policy processes, the reality is that the nature and complexity of modern policy-making is such that scientists must be much more flexible, better equipped and more open-minded than that traditional role would dictate if they want to marshal influence. This literature review has sought to capture the sheer diversity of perspectives on the policy process and the pathways to influence within in, and in doing so to highlight the foundations of the approach that scientists might adopt when thinking about influencing policy outcomes. It is not intended to reject out of hand the traditional pathways science has taken, but simply to diversify the schools of thought available and to provide a framework for thinking about the policy influence game. However, as stated from the outset, this literature review merely captures **process studies. Substantive area studies** are the other main research goal of A3.3, based on Victorian, Queensland and Western Australia case studies of water policy reform. Collectively, these will inform the final manual for scientists-as-lobbyists – the core goal and outcome of this project – by going beyond showing why scientists need to be lobbyists and how that might be understood from a theoretical perspective to how it can be pursued and secured from a practice perspective.

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