018530 – SWITCH

Sustainable Water Management in the City of the Future

Integrated Project
Global Change and Ecosystems

D6.1.1b Review of the Theory and Practice of Good Governance:

Mapping the field: the landscapes of governance

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Dissemination Level		
PU	Public	**PU**
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

1 Briefing Note

SWITCH Document

Deliverable D6.1.1b Mapping the Field: the Landscapes of Governance

Audience
The document was prepared for an audience both inside and outside the SWITCH consortium, including anyone with a broader interest in the theoretical underpinnings of the concept of governance.

Purpose
The purpose of the document is to review literature on the theory and practice of good governance, and specifically governance in the context of the challenges facing urban water management. The document aims to provide both a synthesis of the key concepts and issues relating to urban water governance, and a comprehensive and wide-ranging review of different disciplinary perspectives on governance, as illustrated in academic debates.

Background
This document contains an extensive literature review which provides the basis for subsequent deliverables relating to urban water governance. There is an extensive list of references informing the review, and in addition a set of bibliographies listing further reading around the main issues relating to water governance. Some of the key points from this literature review were summarised as "Learning Alliance Briefing Notes 14 and 15 ", copies of which follow this document. Power point presentations relating to aspects of urban water governance made by Colin Green and others which develop many of the ideas in this review have been provided to ICLEI, the consortium partner coordinating the production of training materials under D6.1.6.

Issues
The main issue addressed is the need to develop a conceptual framework for the analysis of urban water governance that will inform the task of delivering integration through a fragmented mosaic of institutions. Fragmented power and decision making on water management issues, and the need for theoretical basis to inform effective stakeholder engagement in resolving water governance challenges are among the issues addressed.

Recommendations

Given the complexity of the issue addressed, and the importance of understanding local context, there is need to adopt a "learning approach" to making improvements in water governance. This will involve testing various methods for understanding power relations and for engaging stakeholders in a "conversation" about how to plan and implement improvements.

Mapping the field: the landscapes of governance

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2 Introduction

Governance is a rich and complex field which comprises a number of different 'landscapes':

- As number of different but interconnected ideas.
- Of the number of disciplines, inter-disciplinary fields, and research areas.
- Of the institutions who have to deliver integrated urban water management.

We can call these 'landscapes' because the interpretation in each case depends upon the concept of the whole but each is simultaneously a pattern of local features, the product of the equivalent of the local land form, climate, geology and human interventions, and their interconnections between those local features.

To attempt to describe the 'landscapes' of the disciplines, fields and research areas is a wildly ambitious objective but the attempt has to be made, without expecting to be wholly successful; as has been observed, if a thing is worth doing, it is worth doing badly. Consequently, there will be errors and if the reader could point these out tactfully, this would be kind. It is likely that gross errors have been made, the equivalent of describing the Mediterranean as a mountain and of locating it in Australia. It is necessary to do it because no single discipline covers the field of governance as a whole.

One of the reasons for the current emphasis on governance is the perceived failure of technological advances to translate into improvements on the ground. At the same time, the definition of governance is necessarily contested as those who promote different visions of the future define governance in terms which are consistent with that vision and no other. So, Neo-Liberals define bad governance very specifically in terms of the existence of inadequate markets and excessive government. The problems of governance are to Neo-Liberals limited to removing the problems which prevent the operation of a market based economy and of minimising the role of government. Conversely, others define governance from the perspective of a democratic deficit, defining governance therefore in terms of transparency, accountability and subsidiarity. Consequently, it is necessary here both to recognise that the nature of governance is itself contested (Morello 2005) and to adopt a definition of governance which describes what it is without prescribing what it should be. The most frequently cited definition of governance is thus:

> "*The exercise of political, economic and administrative authority in the management of a country's affairs at all levels. Governance comprises the complex mechanisms, processes, and institutions through which citizens and groups articulate their interests, mediate their differences, and exercise their legal rights and obligations*"(UNDP 1997).

Some alternative definitions are given in **Box 1**. The UNDP definition is essentially what Aristotle (1932) referred to as 'politics'; it can be seen as no more than a re-branding exercise, this exercise being necessary because of the low esteem in which both the practices of politics and politicians are held. Thus, Aristotle's (1962) opening sentence is: "*Our own observation tells us that every state is an association of persons formed with a view to some good purpose.*" The UNDP definition makes it clear that what are essentially political processes are central to human life; the problem is therefore to adopt processes which are, in some sense, 'better' than the existing ones. The alternative to politics as a means of citizens and groups articulating their interests, mediating their differences and exercising their legal rights and obligations is a system of Platonic Philosopher-Kings: a

group of experts deciding what is best for society. The major question is then: who should be the Philosopher Kings? A claimed alternative is the establishment of an entirely marketed based system; in this case, either the structure of the market would determine what are the appropriate outcomes, or the prices would have to be set so as to deliver on those objectives. The first case is to do politics once in establishing a market system and thus to entrench money as the only form of power and thus the only form of politics. The alternative is to set prices so as to deliver on those objectives, whatever they may be, and unless the claim could be sustained that values and hence prices can themselves be determined on purely technical grounds without regard to the definition of the objectives, and this claim obviously cannot be sustained, then price setting is itself a political process, one of governance. In practice, therefore, what is required is better politics both in terms of objectives and processes. Hence, Crick's (1964) 'In defence of politics' and its concluding chapter, 'In praise of politics'.

From the UNDP definition, Governance can be seen to be made up of two elements: processes and structures, or institutions, where the processes are largely articulated through the institutions. Equally, the tasks in governance are two-fold:

1. to decide what to do; and
2. to deliver on that decision.

Here, delivery is through institutions and the key processes articulated through institutions concern decisions as to what to do.

The challenge in this review is to display the nature of Governance in a coherent form, to provide analysis of what it is so as to be able to specify how to do it, rather than to give a simple description, given that the essence of Governance is that it is difficult and complex so that its successful practice is necessarily difficult and complex. A simplistic outline therefore would result in a failure in practice, as indeed many attempts in the governance of water management have failed (Adams 1992). Conversely, Biswas (2004) has questioned whether integrated water management is possible at all, whether it is anything more than mere words. Presenting Governance in both its essential complexity and simultaneously in a simple enough way so as to enable it to be put into practice is thus the challenge of this project.

As an initial review of the field, this report is structured in terms of a general overview, followed by summaries and bibliographies of the insights that come from a series of different disciplines, and cross-disciplinary fields. As it should be hoped, there are some overlaps in areas of concern between these different disciplines and cross-disciplinary areas: for example, concerns with the nature of justice are obviously central to jurisprudence and to philosophy, but also to the work in social psychology on social justice; it is in turn embedded in Social Dilemmas theory. Moreover, whilst much of the work on social justice and in Social Dilemmas theory is concerned with the distribution of resources and contributions to the costs of provision with regard to collectively provided goods and services, there is a concern with management science and organisational theory with setting pay rates, and this is structurally the same problem as those considered with wider social justice models and Social Dilemmas theory.

Given the importance of Governance, it has begun to generate a literature, and there is a growing, specific literature on Integrated Water Management. What is not discussed here as a specific category is the debate about the privatisation of areas of water services. To

avoid confusion, what is meant by privatised water service delivery is the supply of some water service on a for profit basis where those profits accrue either or both to the executives and shareholders of the company which supply the services. Thus, a sharp distinction is drawn between privatised services and Water User Associations, such as farmer managed irrigation systems, in which the profits accrue to the consumers. There are both pragmatic and theoretical reasons for not reviewing this specific literature here. The practical reasons are:

- This debate is covered elsewhere in this project.
- There are currently very few examples of privatised water service delivery across the world.
- The debate has generated an enormous quantity of material.

The more theoretical reasons for not dedicating a section to this topic are:

- Privatisation is a solution in search of a problem: one part of the problem is the capital intensity of water services and hence one of the questions that should be addressed, but generally is not, is: how will privatisation either reduce the cost of capital (and increasing access to capital should simply have the effect of reducing the cost of capital), or how will it reduce the demand for capital?
- From the economic perspective, privatisation is an irrelevance or rather it is, in the English phase, to put the cart before the horse. Economics has focused upon competition as the means of increasing efficiency and has shown that some specific market conditions will produce competition and consequently efficiency. Monopolies of any form are expected to result in inefficiencies; the form of the monopoly simply determining the nature of the inefficiencies. Hence the economic issue is: how to introduce competition when water tends naturally to result in a monopoly?
- To focus on the ownership of capital is to focus upon form and not content. A necessary condition for a competition based approach is that inefficient firms fail and go bankrupt. Those failures should include firms which are insufficiently innovative and adaptive. It is not clear what proportion of firms must fail if competition is to be created but a critical question in considering introducing competition is: competition for what? What are the performance requirements for an efficient water service deliverer?

These specific issues are embedded in another Workpackage. What are discussed in this report are the underlying issues about the nature and form of water service delivery of which privatisation is simply a surface phenomenon.

2.1 What is Governance?

Figure 1 sets out the landscape of Governance. The New Water Paradigm is based in a systems approach and expressed both through new technologies, but also in new or alternative forms of service delivery. We are adopting this approach in order to do ‘better’ than we have in the past, both trying to learn the lessons of past failures but also to take account of the wider and richer set of societal objectives which are now brought to societal choices. In order to do ‘better’, we have first to define what we mean by ‘better’ and consequently to establish criteria against which to test the degree of success achieved. Doing ‘better’ necessarily involves change so it is about learning both from the past and in the continuing present. We have, therefore, to institutionalise a method of promoting

continuing innovation, the discovery of new and better technical means, not least in order to adapt to a changing future.

Box 1 Alternative definitions of governance

"urban governance is the sum of the many ways individuals and institutions, public or private, plan and manage the common affairs of the city. It is a continuing process through which conflicting or diverse interests may be accommodated and cooperative action can be taken. It includes formal institutions as well as informal arrangements and the social capital of cities."
(UN-Habitat 2003). Cited Moretto 2005

Harphan and Boateng define as notion of civil society "public life of individuals and institutions outside the control of the state. Government, on the other hand, is said to consist of those agencies that make and implement laws."

OED "the act or manner of governing, of exercising control or authority over the actions of subjects: a system of regulations."

World Bank (1992): "the manner in which power is exercised in the management of a country's economic and social resources for development." (WB 1992 Governance and Development).

Paproski (1993): "a system of socio-cultural, political and economic interaction among the various actors of the public and private institutions of civil society. The character of the system varies and changes through processes involving the exercise of power and authority with the inherent aim of enforcing the legitimacy of the existing power and authority structures, particularly through selective delivery and distribution of goods and services to the individual and collective groups in civil sociery." (Paproski P 1993 Urban governance systems – another unanalysed abstraction?, Development Planning Unit No 28, UCL)

"Governance, on the other hand, is the sphere of public debate, partnership, interaction, dialogue and conflict entered into by local citizens and organisations and by local government." (Evans et al 2005).

"Governance refers to the patterns of interaction between civil society and government" (Allison 2002).

"Governance as an arrangement of governing-beyond-the-state (but often with the explicit inclusion of parts of the state apparatus) is defined in the context of this paper as the socially innovative institutional arrangements of governance that are organised as horizontal associational networks of private (market), civil society (usually NGO) and state actors" (Swyngedouw 2005).

"Governance is a method/mechanism for dealing with a broad range of problems/conflicts in which actors regularly arrive at mutually satisfactory and binding decisions by negotiating with each other and co-operating in the implementation of these decisions" (Schmitter 2002 cited Swyngedouw 2005)

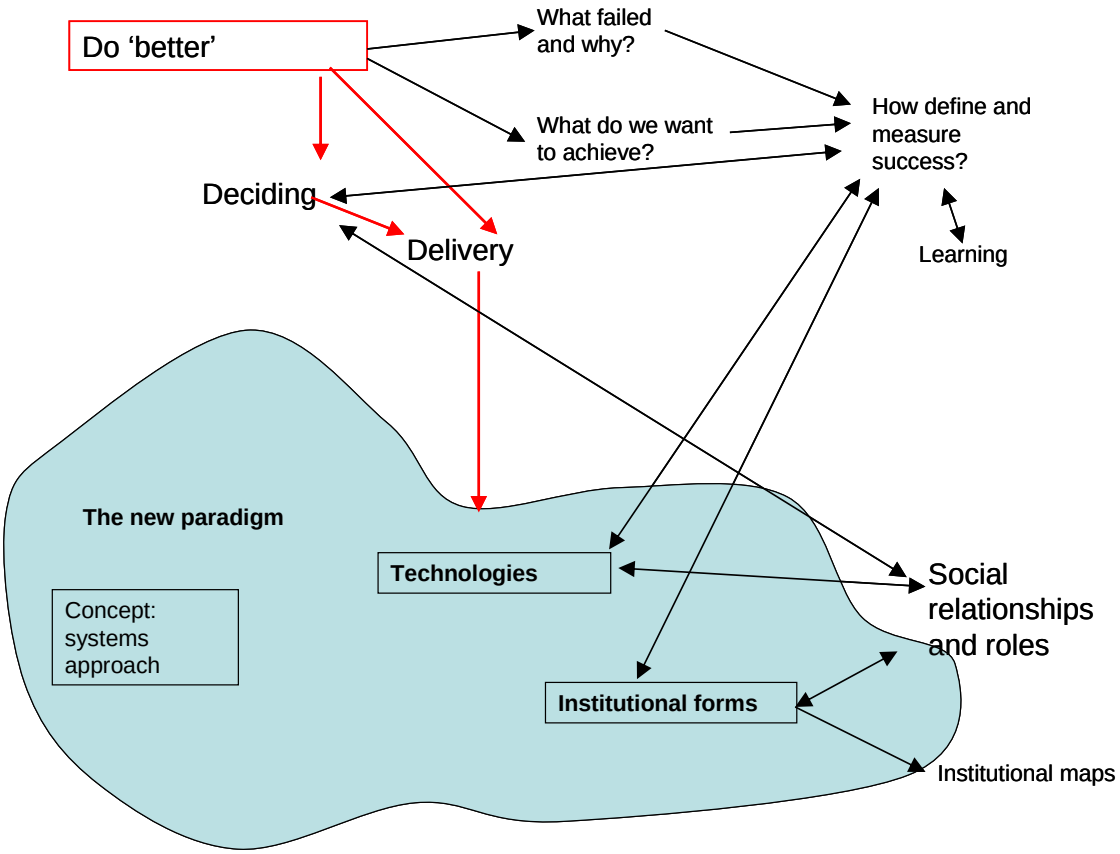
"The newly emerging models of action result from the concerted combination of social actors coming from diverse milieus (private, public, civic) with the objective to influence systems of action in the direction of their interests" (Paquet 2001) cited Swyngedouw 2005

By ‘better’, we also mean both ‘better’ means of deciding what to do and then of implementing those decisions in terms of the better delivery of services. Central to both the decision and the delivery processes are institutions, particularly those manifest in the form of an organisation, such as River Basin Management Council or a water supply limited company. Institutions are defined as systems of rules (North 1990; Scott 1995; Uphoff 1986), either formal or informal, and those rules define the boundaries of any institution. Hence, delivering integration either requires designing new institutions which suit the physical boundaries of the systems to be managed or delivering integration through the co-operation or co-ordination of the existing institutions. The former approach requires that it be possible to design institutions; the latter requires learning how to achieve such co-ordinated outcomes. In the latter case, it also means that these institutions have to measure their success in terms of their ability to influence the actions of others. The starting point for both approaches has to be the development of a local institutional map which identifies which institutions have the power to deliver, fund or otherwise influence the successful take-up of the different technical measures proposed in order to deliver sustainable urban water management.

The second group of stakeholders are those affected by, or with an interest in, a particular decision. In both case, the critical question is: what are conditions for and the best processes to deliver successful stakeholder engagement? For example, studies of trial juries have found that a jury is more likely to reach a verdict based upon the evidence if they begin by defining a timeline and define the critical evidentiary points that have to be proved in order to find the defendant guilty, and use flowcharts, than if the jury simply starts by taking a preliminary vote as to whether or not to find the defendant guilty. The necessary question which follows from seeking to define the conditions and processes that will enable successful stakeholder engagement are: what do we mean by ‘success’ and how, therefore, can we measure the degree of success delivered by a particular process?

Finally, Governance has to be understood to be fundamentally about social relationships and their reciprocal, social roles. If stakeholder engagement is to be meaningful, it is about power: the power of the stakeholders to influence the decision. This is the most fundamental form of social relationship. What is done, how it is delivered, and how the costs are recovered are then also about social relationships. One central change is consequently in the relationship of the water expert to the other stakeholders. Traditionally, water experts have seen their role to determine what the public, and the environment, need; to determine the best means of satisfying those needs; and then to implement that optimum solution. If the final decision was made by politicians, and water experts tended to define any variation on their preferred solution as the result of ‘politics’, as inherently bad and irrational, then experts expected that the decision would be very largely based upon their analysis. The stakeholder engagement model means that instead the role of water experts becomes a supporting role, of helping the stakeholders to discover what are the implications of the different options, and to aid them in inventing new options. In turn, this raises the questions of what tools and techniques are required by the stakeholders to help them in their task?

Figure 1 **A map of Governance**



3 Why does Governance matter?

The purpose of the New Paradigm is to 'do better' than we have in the past. Governance is about turning this objective into practice, and the task in SWITCH is to provide practical guidance as how to deliver good governance. The New Paradigm itself is based upon a systems approach involving integration, and expressed in a range of technologies. This is coupled to proposals for a variety of different institutional forms, notably for delivering water and wastewater services.

We seek to do two inter-related things better:

- To make better decisions
- To deliver water and wastewater services more successfully.

Governance is about how we can do this. The concept of Governance is often used as a rather empty slogan but when it is explored it is found to be a complex of ideas and ones which raise profound questions. We seek to do better than we have in the past; at one level this is a reflection of the failures of the past: we want to avoid these failures in the future. The reasons why we now regard some of those attempts at intervention as failures include:

- Excessively expensive: in England and Wales, for example, the current replacement cost of the water and wastewater infrastructure is approximately £4,500 per capita (Green 2001). Of this, over 60% is accounted for by sewers. The invention and takeup of the Water Closet now looks like the most expensive mistake in the history of water management.
- Technically, the particular system installed failed to work.
- The system did not satisfy the requirements or needs of the end-users.
- The system was technically unsustainable (e.g. the images of trees growing in filter beds of wastewater treatment plants) often because it required skilled staff and assumed a maintenance infrastructure which was not available (e.g. availability of spare parts).
- The system was financially unsustainable. Either no practical mechanism existed to generate the revenue needed to operate and maintain the system (e.g. government bodies have generally tended to be very bad at paying for the water and wastewater services with which they are provided), or the costs were too high for the users to afford.
- The system assumed patterns of social relationships to exist which did not exist e.g. many irrigation schemes assumed (Zwarteveen 1997) that households followed a Western Europe model of joint production and joint resource management whereas household relationships are quite different in, for example, parts of West Africa (Goldstein 2004).
- The intervention was either embedded in a social context in which corruption was common or it promoted corruption. For example, the mayors of some communes in France were bribed to accept contracts to supply water and wastewater services for their commune from particular contractors. At a smaller scale, in Dhaka, it was notorious that the water meter reader would negotiate the meter reading in exchange for a bribe. The practical consequences of these practices were that inappropriate technical solutions were adopted, because the suppliers of those systems offered the largest bribes, and the costs of technical interventions were substantially increased.
- The intervention simply created a problem elsewhere. Given that catchments are systems, any intervention at one point should be expected to have repercussions elsewhere. WCs made the disposal of human waste much more convenient but then required the construction of very large scale sewer networks, and then the construction of wastewater treatment works in order to deal with the pollution problems created.
- A specific perceived problem is the failure to take up innovations which have proved successful elsewhere or the unsustainable costs of promoting innovation and its diffusion.

But, over time, we have also enriched the range of objectives we seek to achieve so that what were seen as successes at the time are now seen as failures. Societies now, notably when setting agendas for sustainable development, define multiple, and often conflicting agendas (e.g. U K Government 2005). Those multiple objectives are also encapsulated in the definition of Integrated Water Resource Management adopted by the Global Water Partnership (2000): " *IWRM is a process which promotes the co-ordinated management and development of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.*"

Those objectives can be described in terms of maximising the achieving some set of goals relative to the use of resources. Goals that are often cited are:

- The achievement of social or environmental justice. Here, social justice is generally taken to include gender issues, and at least some of the following: care for the vulnerable; satisfaction of basic human needs including Human Rights, and specifically including the removal of poverty.
- It is likely to involve process issues including stakeholder engagement, the right to environmental information and a fair hearing, as exemplified in the Aarhus Convention (UNECE 1998).
- Improving the quality and standard of living.
- The creation and preservation of Social Harmony.
- Respect for, and preservation of, the other species living on this planet.

At least since the Brundtland Report (WCED 1987), the importance of using available resources on a sustainable basis has been recognised. What is then regarded as delivering sustainable resource usage is contested but may include:

- Maximising technical efficiency: the ratio of output to inputs.
- Switching to renewable resources away from non-renewable resources.
- Using renewable but depletable resources within the rate at which they are replenished.
- Minimising waste.
- The reuse and recycling of materials.

The distinction between technical efficiency and economic efficiency must be recognised: technical efficiency is the ratio of the achievement of some set of objectives relative to inputs; economic efficiency is a specific and restrictive claim as to what should be the objective of social policy. Economic efficiency is restricted to the maximisation of the satisfaction of the wants of individuals, ignoring all other objectives, relative to resource usage.

3.1 Doing 'better'

If we are to do 'better' than we have in the past, then there are a number of conditions to be met:

- We have to make better choices,
- We need to invent better options and also to adapt to change,
- We need to achieve more successful adoption of options.

3.1.1 Making 'better' choices

To make a 'better' choice we have to address the reasons why that choice is necessary in the first place. Secondly, we have to decide what we mean by a 'better' choice.

3.1.2 Nature of choice

A choice is necessary when there are at least two mutually exclusive options, courses of action, and at least one reason to prefer one course of action and at least one other reason

to prefer an alternative course of action. In short, the two necessary conditions for choice are conflict plus uncertainty (Green 2003a) since if we are confident that one course of action should be preferred to all others, then the choice is made. The options may be mutually exclusive because they are functionally equivalent; given an infinite number of pairs of shoes, it is still only possible to wear one pair at a time and hence it is necessary to choose which pair this should be. As this example illustrates, the mutual exclusivity may exist in time but it may also exist in space: a wetland and an airport cannot simultaneously occupy the same space. The reasons for preferring one option rather than another also create conflict; it may be that against all the different objectives we bring to a choice, no one option happens to be superior to all other options. However, in principle, there might be such an option were we able to discover it. On the other hand, those objectives might be necessarily in conflict so that the achievement of one objective necessarily precludes the achievement of another objective. If no option is superior to all others against all objectives then different individuals, groups and others may, and often do, disagree as to the relative importance which should be attached to the achievement of each of those objectives. Finally, in collective choices, resource scarcity is typically an external constraint on individual choices rather than one of the reasons why the choice must be made. For example, agreement may be reached that education policy A should be preferred over education policy B, and that health care policy M should be preferred to health care policy N, but the scarcity of resources may force the choice been the combinations of policies A plus M or B plus N. The choices between education and health policies are however likely to have been determined by the conflict between objectives, and our disagreement as to the relative importance of achieving each of those objectives.

The second necessary condition for a choice to exist is uncertainty: if all are agreed that one specific option should be preferred to all others then the choice has been made. Uncertainty here is uncertainty as to what to do, ‘doubt’, the inability to select between the options (Green 2003a). Uncertainty is not therefore an inconvenience that makes choices more difficult; it is a precondition for the existence of a choice.

The essence of uncertainty is thus the inability to discriminate between the options; specifically, to decide between the options. Here, all we have to do is select one rather than the others so choice is a process of ordering; all we need to be confident about is that one option should be preferred to all others, we care nothing about the ordering within the unpreferred options.

The most obvious reason why we can be uncertain as to the rank order across the options is that we are unable to resolve the conflicts that make the choice necessary. Indeed, it may be that we should rationally be uncertain: the advantages and disadvantages of two or more options are equally balanced so that there is nothing to choose between those options. The second reason is knowledge uncertainty: doubt as to what are the consequences, and thus the advantages and disadvantages of the different options. In the case where advantages and disadvantages are balanced, the reduction of knowledge uncertainty would not reduce doubt: we would simply be better informed but no less uncertain. Hence it is important to focus upon doubt, decision uncertainty, rather than upon knowledge uncertainty. In turn, there is a question of the extent to which knowledge uncertainty can be reduced at the time a decision must be made, or could in principle be reduced. Thus, a significant theme of the management science literature is the assertion that knowledge uncertainty is irreducible because the future is inherently uncertain (van der Heijden 1996). Thus, Davis (2002), in discussing Shell’s strategic planning approach, stated that: “*We*

need to do this for a future that is essentially unknowable – but not unthinkable." This expresses the term 'uncertainty' in the original sense given by Knight (1921) and Keynes (1937) as something quite different from probability, rather than in the current more prevalent usage in which uncertainty can be treated in terms of probabilities. Indeed, we may be confusing ourselves by assuming that confidence and likelihood can both be expressed in the same mathematical axiomisation, that of probability theory. If uncertainty and probability are two quite different things then the fundamental questions become:

- How should we choose if the future is unknowable; and
- What option should we choose in those circumstances?

Choice is thus a process through which we seek to resolve the conflicts that make the choice necessary in order to become confident that one option should be preferred to all others. Defining choice as a process through which we seek to become confident in the identification of one option as being the best available implies that choice is a learning process, a process during which change occurs. Since choice is always necessarily about the future, choice is an attempt to choose a future, the past is relevant only in so far as we learn from it or are trapped in it. Consistency between choices over time, typically regarded within neo-classical economics as one element of rationality, will only then occur if there is nothing to be learnt or we fail to learn. Rather than consistency of outcome constituting rationality, the everyday meaning of rationality is of the application of reasoning, a process, to choice (Arrow 1987). Here, reasoning might be defined as what Toulmin (1958) defined as argument; a rigorous, analytic and logical process. Central to that process is the discovery, invention or creation of new options; not least because it may be questioned whether anyone can know what they want until they know what they can have.

Hume (1978) argued that reason should be applied to the choice of means whilst the choice of ends, objectives, was given. But in practice any choice is simultaneously a choice of both means and ends. For example, if there are two available options and two objectives, one option performing well against one objective and badly against the other, and the other option performing badly against the first and well against the second, then to make a choice of means it is necessary to weight the two objectives, to make a choice between them. If a third objective is then recognised, as we have recently done in the cases of sustainable development, gender equality and social justice, if neither of the first two options performs well against the new objective, the logic is to discover a new option that does perform well. Again, any objective is irrelevant to a choice unless it serves to differentiate between the available options; an objective only becomes relevant if at least one available option contributes towards the achievement of that objective. If we invent a new option then it may impact upon an objective when none of the existing options do so and that objective now becomes relevant.

Thus, if we want to make 'better' choices, we have to adopt decision processes which address the nature of the particular choice. Choice has to be approached as a learning process through which we seek to resolve the conflicts which make the choice necessary and to become confident that one option should be preferred to all others. Since knowledge uncertainty is inherent, we must decide how to make choices when there is uncertainty and what are the characteristics of the individual option which make it most appropriate when the future is inherently uncertain.

3.1.3 What is a 'better' choice?

We are now in a position to discuss what we may mean by 'better' choices. Firstly, our goal should be modest: it is not to make the optimum choices but simply to do better than we have in the past. The pursuit of optimality is a beguiling goal but both over-ambitious and frequently irrelevant. It is over-ambitious because to do so would require that we knew everything important and did so both relatively accurately and precisely; it is also to assume that there is a single optimum. We are instead faced with the certainty that we do not know everything accurately and precisely, and we do not know what we do not know; whilst gods can make optimal choices, we cannot. We need to discover instead how to best make choices under Knightian uncertainty. Optimality is frequently irrelevant because optimality provides a stopping rule: it tells us what to do last. What we frequently want to know is: what to do first, what to do next. Actions both take time, many years if not decades in the case of water management, and some resources are time dependent: more labour will be along next year but we are unable to use that labour this year. Furthermore, over time both conditions, and hence marginal costs are likely to change, and so too may our objectives. Thus, what might be seen as to the optimum stopping place now is likely to have changed before we approach it.

So, our immediate goal is make 'better' choices. We want to maximize the delivery against our objectives relative to the resource required: the classic and everyday meaning of efficiency. But a key issue is then:

- What should be our objectives?

This question can be answered in two apparently different ways:

- What do I want?
- What should we do?

Economics conventionally adopts the first answer, basing this approach upon consequentialism or utilitarianism. However, the approach runs into Arrow's Impossibility Theorem (Arrow 1963) which is illustrated in **Table 1**. This argues that unless the rank order of preferences of the individuals across the options happen to coincide, there is no means of reaching a choice even by a majority vote. In this example, there are three people and three options and the table gives the rank order of preference for each individual across the three options. It can be seen that there is a 2 to 1 majority against each option being ranked as the best option. In turn, this means that there cannot be a Pareto Improvement in these circumstances.

Table 1 Arrow's Impossibility Theorem

3.1.3.1.1 OPTION	**INDIVIDUAL**		
	A	**B**	**C**
P	1	3	2
Q	2	1	3
R	3	2	1

Arrows' Impossibility Theorem depends upon two assumptions:

1. The individuals cannot negotiate, and
2. They have nothing to negotiate about.

The example given in **Table 1** is the maximum uncertainty outcome: it is impossible to differentiate between the options in terms of preference. **Table 2** is a slightly modified version in which the sum of the ranks is lowest for option R but for individual A, this is the worst possible option. There are then two ways forward in this example:

1. Seek means of improving the outcome of option R for individual A, possibly involving some sacrifice by individuals B and C; or
2. To chain choices together so that in another choice, individual A gets their first preference.

In practice, the first approach is not always possible. For example, in a study of coastal erosion management options, the environmental desirability of the different available options varied by the environmental interest (Green and Penning-Rowsell 1999). Here, the geomorphologists wished to see continued coastal erosion because geomorphologists are concerned to maintain processes; the archaeologists wish to see the existing sites unaffected by either erosion or construction works; the ecologists wished to maintain the existing ecosystems unchanged; and the geologists wanted a limited rate of erosion in order to maintain the exposure of the strata exposed on the cliffs.

Table 2 **Modified example**

OPTION	**INDIVIDUAL**		
	A	**B**	**C**
3.1.3.1.1.1P	1	3	2
Q	2	2	3
R	3	1	1

The alternative approach is to chain choices together; that is, the decision in any one choice is influenced by and influences decisions in other choices. Thus, if a Pareto Improvement is impossible in any single choice, then a Pareto Improvement may be possible across the chain of choices as a whole. For chaining to be possible, the weight then falls upon procedural equity because this is what enables each person to trust that across the chain of choices substantive equity will be delivered. In turn, this means that institutions are critical because this is what delivers procedural equity.

The example above is artificial in that assumes that each individual's preferences are formed entirely without consideration of those of others and without regard to others. In collective choices, all our most important objectives are as to what ought to be the nature and content of inter-personal relationships: justice, liberty, democracy and so on. Those objectives may be derived on the basis of religious considerations; for example, in Islam, individuals have duties towards others and towards other species because all are manifestations of the deity and hence the duty towards the deity is necessarily manifest through behaviour towards others (Hamidullah 1979). They may derived from philosophical considerations such by Kant's (1785) argument that reason results in acting with a duty towards others. Or, they may be derived from a political/ideological argument; for example, the Declaration of the Rights of Man in France in 1789 and the Basic Law in Germany of 1949. Thus, the Declaration of the Rights of Man asserts that: "*Liberty consists in the freedom to do everything which injures no one else; hence the exercise of the natural rights of man has no limits except those which assure to the other members of society the enjoyment of the same rights. These limits can only be determined by law.*" Similarly, the

Basic Law of Germany asserts that "*Every person shall have the right to free development of his personality insofar as he does not violate the rights of others or offend against the constitutional order or the moral law*" (Article 2(1)). Thus, we may call the overarching objective in collective decisions to be justice; a distinction is then usually made between the process through which the choice is made, procedural choice, and the outcome of that choice: substantive or distributional justice. In English, there is little practical distinction between the terms justice, equity and fairness, except that justice is taken more as a principle and equity or fairness refer to a particular instance. Principle and individual instance are clearly interlinked. Equity also brings out one component of justice: that of equality of consideration and consistency of treatment.

Those objectives as the nature and content of social relationships equally apply to the way in which we should make choices, procedural equity, and not simply to the specific outcome chosen, substantive or distributional equity. The two have to be read together so that a general definition of equity is: "a moral principle consistently applied" (Green 2003a). Procedural justice is then important because it affirms the equitable nature of human relationships and the importance of those relationships to society as a whole. Thus, Wenzel (2002) persuasively argues that: "*Justice serves to maintain the status and values of one's group. People strive towards justice, even at the cost of their personal outcomes, because justice strengthens the values of their group and thus contributes to their social identity in terms of that group.*"

The practical problems in making a specific collective choice are:

- What we can achieve in a particular instance is limited by the availability of means so that the choice of means is simultaneously the choice of ends.
- Typically, no one option is superior to all others against all of the many different objectives, where those objectives are essentially moral, that we bring to the choice.
- Those objectives are frequently themselves incompatible; thus, Sen (1992) argues that the problem with equality is that there are many different forms of equality and the achievement of one form of equality necessarily precludes the achievement of another form of equality. In choosing to achieve one form of equality, we have to choose between them.
- We don't agree as to weight that should be given to the different objectives.

The immediate result of these problems is that no single choice should be considered in isolation because there is unlikely to be agreement as to what constitutes substantive justice in that particular case.

Two general conceptualisations for outcome equity can be distinguished: the 'just desserts' model (e.g. 'the polluter pays' and 'the user pays' principles) and as to equality of outcome. These claims as to what is outcome equity are based upon moral, ethical, or religious concepts hence a broad definition of equity is that it is 'a moral claim consistently applied'. An implication of this definition is then that apparent distinction between economic efficiency and equity is dissolved: economic efficiency is no more than another competing moral claim as to what is equitable. Economic efficiency is the moral claim that collective decisions ought to be taken on the basis of maximising some sum of individual wants, irrespective of the distributional consequences of the choice.

In practice, the distribution of the outputs may be considered separately from the distribution of the inputs or the two may be considered together. In everyday life, the two

are typically treated separately, decisions as to what policy should be undertaken being separated from a decision as to who should pay for that policy. But on both sides of the equation, there is a clash between deontological approaches (those based upon some conception of the inherent 'rightness' of the act) and consequentialist approaches, between approaches which seek to derive some moral linkage between the recipient or contributor and the act, and those which simply look at consequences (**Table 3**). The 'polluter pays' principle is an example of a deontological claim; a claim that some people ought to pay for some action because of a linkage between their acts and its consequences.

Table 3 Concepts of outcome equity

	Outputs	
inputs	'just desserts'	Distributional equity
'just contribution'		
equality of sacrifice		

The problem in equity is that the search for a single moral rule which can be applied in all conditions is to misunderstand the nature of equity. Rather than there being a single moral principle, there are several moral principles which appear appropriate in a given set of circumstances where those different principles imply the adoption of different courses of action. For example, Spanish colonial water law (Stevens 1988) sought to take account of a series of different criteria in allocating water between competing uses at any given point in time.

The moral principles that have been proposed as the basis of decisions regarding the provision and allocation of goods, and the allocation of the costs of provision, include (Green 2003a):

- The benefits should be distributed on the basis of the contribution of the individual to the provision of the good or of their wider contribution or importance to the group;
- The benefits should be distributed according to the relative need of the individual or group (Farmer and Tiefenthaler 1995);
- The benefits should be shared equally between individuals;
- The costs should be borne according the value of the resource to the individual or group ('user pays principle');
- The costs should be borne according to ability of the individual or group to pay; or
- That the polluter ought to pay according to their contribution to the problem (the 'polluter pays principle').

These principles in turn may and often do conflict, with quite different outcomes. In the case of flood alleviation, the application of the user pays principle may be argued to require that those who are protected against flooding should bear the costs of providing that protection. However, flooding may equally be treated as an externality of other people's land use in so far as the way in which they have developed that land has changed the pattern of runoff. In this case, the 'polluter pays' principle should be applied and those upstream land users should bear the costs of the downstream flood alleviation scheme. We have in short to argue and determine the moral principle, or principles since one principle may not result in a unique outcome, which is to be applied in a societal decision before we can take that decision. Moreover, of the above six principles, only the first and fourth result in the same distribution of benefits and costs.

The great practical advantage of the efficiency rule in neo-classical economics is that any gain in efficiency would always appear to be desirable. The problems with any equity rule are two-fold:

1. Equity is, by definition, relative so that the direction of action can depend upon the current position.
2. In turn, this means that there is path dependence in decision making: what is the equitable decision in one case can depend upon what decisions have been taken.

The only way in which substantive justice can consequently be delivered is by chaining choices together and considering the outcome of the chain of choices. In turn, that places the weight upon procedural justice since that is what reaches across the chain of choices. What is substantive justice in any one particular case depends upon what decisions are made elsewhere and at other times. Thus, substantive justice exhibits path dependency and consequently the decision that should be made in a number of specific choices can depend upon the order in which they are taken. For example (Green 2004), suppose A starts with 100 units and B with 90 units (**Figure 2**). Suppose there are two possible courses of action; the first results in a gain of 30 to A and a loss to B of 40; the second option results in A losing 35 and B gaining 40. On the economic efficiency rule implies that we should choose the second option which leaves A with 65 and B with 130 units. If we wish to minimise the difference between A and B, we should also choose the second option since the difference between A and B after the choice is smaller with the second option than with the first option.

If we are now faced with a second choice (**Figure 2**), where the first option results in a gain to B of 20 units and loss to A of 10 units, and the second option leaves A better off by 12 units and B with a loss of 5 units, the economic efficiency rule implies that we should choose the first option. However, if we are concerned to minimise the difference in the final positions of A and B, we should choose the second option.

Now consider the same two choices being taken in the opposite order (**Figure 3**). In the first choice (-10/+20 versus +12/-5), the economic efficiency criterion implies that we adopt the first option. If we seek to minimise the difference in the final positions of A and B, we should make the same choice. Having chosen the first option, we are now faced with the second choice: that between +30/-40 and –35/+40. The economic efficiency criterion implies that we should choose the second option but if we want to minimise the final positions of the two individuals, we should choose the first option.

In both sequences of choices, consistently applying the economic efficiency criterion results in the outcome where A has 55 and B has 150 units. However, in the first sequence of choices, the final result of applying the rule of minimising the difference between A and B results in final positions of 77 and 125. In the second sequence of choices, the resulting final positions are 120 and 70. Hence if we apply an equality rule, the sequence in which we make choices can affect the final outcome.

Thus, Mitchell et al (1993) in a somewhat different context remark that: "*Justice is not a stable, well-defined ideal end-state toward which people purposefully move; rather it is a dynamic, ever-shifting equilibrium between the excesses of too little regulation on the one hand and too much on the other*." Substantive justice in short is a balancing act within an ever shifting mosaic of conflicting moral claims and between different interests.

Consequently, what is most fair in any one particular choice cannot be determined by a single rule but only in consequence of the process through which that choice was made.

Figure 2 **First sequence of choices**

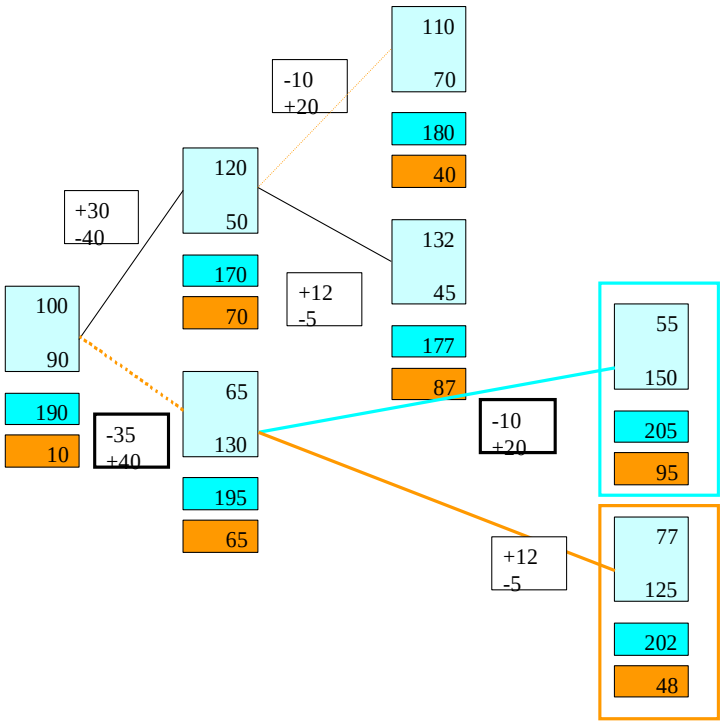
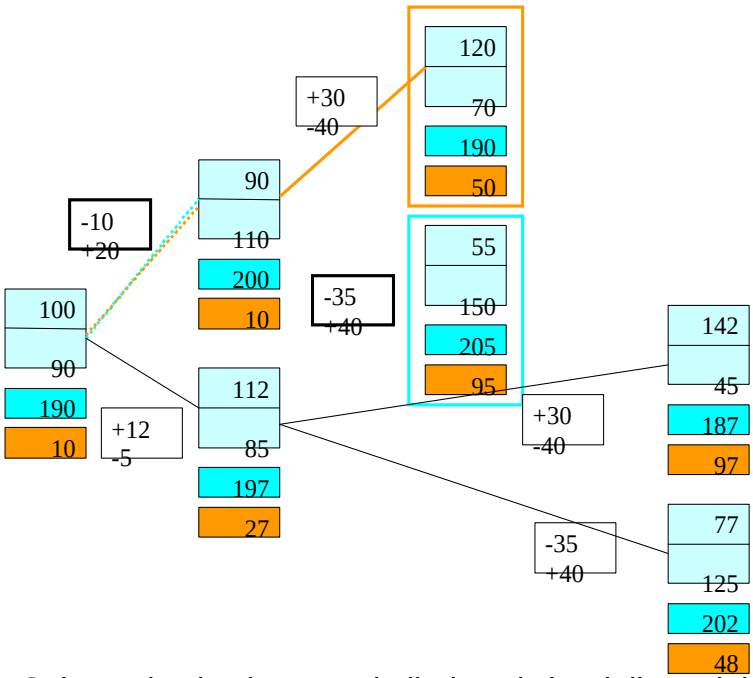


Figure 3 **Second sequence of choices**



Substantive justice can similarly only be delivered through the totality of choices, no single choice can wholly deliver substantive justice. Procedural justice then becomes critically important as do institutions since it is the institutions, and the rules defining them, that

deliver justice. In turn, justice creates justice: the delivery of procedural justice promotes the stakeholders in turn to act with justice. But again concepts of procedural justice can both differ between individuals and between contexts (Wendorf and Alexander nd). Characteristics of procedural justice that have been proposed include (Leventhal 1980; Thibaut and Walker 1975; Tyler and Lind 1992):

- Bias suppression/neutrality – applied in manner which is both unprejudiced and without self-interest.
- Accuracy – the procedures succeed in their own terms and are based upon accurate information.
- Correctability – the opportunity to appeal.
- Consistency – in application across like instances.
- Representativeness – all affected should be considered in the decision.
- Ethicality – the decision should be made according to prevailing ethical standards.
- Voice/Process control – are the interested parties given a full voice?
- Standing – are the interested parties respected as people?
- Trust – legitimacy.
- Decision control – do the interested parties have any influence on the decision?

Other literature stresses the importance that the procedure protects the worth and dignity of those involved in the adjudication (Lind and Taylor 1988).

So the perceived legitimacy of the decision making body is enhanced when people believe that the authorities are honest and competent (Tyler and Degoey 1995). Where individuals are personally involved in a dispute, individuals are likely to believe that they were treated fairly if they have an opportunity to have an input to the decision (Thibaut and Walker 1975). A rather limited amount of research has been undertaken on aspects of procedural equity in regard to water management. That work which has been done (Tyler and Degoey 1995; Syme and Nancarrow 1997) suggests that principles similar to those given by Lloyd (1981) are important to promote compliance with the decision that has been reached (Lawrence et al 1997).

3.1.4 Better options

In order to do better, we have to invent and adopt better options; part of the conditions for a better decision process is then simply to become better at inventing, identifying and selecting that option which is most likely to maximise the achievement of our objectives relative to the resources required. At the same time, it is necessary to adapt to an ever changing future, one of mass migration, changing technologies, the hope of a better quality of life, changing expectations, and of climate change. Consequently, we have to learn to do better, learning from what we try out. One implication, given that it is inevitable that some innovations will not succeed, or only succeed in some circumstances, is that failures are to be expected. If there are no failures, we are not trying anything new. This implies that we require institutions that have failures, we have to expect and accept that there will be failures, and we have not only accept institutions that have failures but to demand that they do. Indeed, we want more successful failures: failures from which we learn so as to be more successful in the future. What is required then is that institutions have a strategy for innovation, accepting some failures in order to learn how to do better.

Secondly, any single choice has to be seen as a learning exercise: we have to learn what intervention should be adopted in that choice. Each choice is a one-off experiment in which we apply what we have learnt from past successes and failures to invent an intervention for the specific context of the particular choice. It cannot be seen as simply picking an intervention strategy off the shelf.

Actions now will have an effect upon a changing future; they partly fix the future and, unless in the expected future we plan to undo the created present, they should do so. The invention and diffusion of WCs fundamentally determined our present as their adoption set off a train of consequences:

- It required a major construction programme for sewers.
- Water demand increased substantially so that toilet flushing typically takes up 30-35% of domestic water demand.
- The existence of sewers lead logically to the expectation that surface water runoff could also be drained via the sewer network. This resulted in the requirement for a major network of trunk sewers to drain the wastewater away from urban centres.
- Once it became unacceptable to discharge untreated wastewater into the environment, it became necessary to construct wastewater treatment works.

Hence, there should be some anticipation of the future in our present plans. For example, how will a condomenial sewer system be adapted to a future in which incomes are higher?

3.1.5 Better implementation

A pre-condition for a better option is that it can be implemented successfully, and the recent history of water management is littered with theoretically superior options that failed in practice. The problem was frequently that the problem was defined in technical terms without a consideration of the users needs and the conditions. In particular, whereas engineers will produce detailed Bills of Quantities for the construction of a system, details and costings of Operation and Maintenance are generally sketchy at best, or quite meaningless as when O & M costs are simply estimated as a proportion of capital costs. Whole Life Costing (OGC 2003; Skipworth et al 2003) is one element of the answer to this problem but the requirements in terms of the availability of labour, parts and equipment also need to be addressed. O & M costs are always the first thing to be cut when money is scarce so the robustness of the performance of the intervention to the lack of designed maintenance and operation is a critical factor. Otherwise, as has too often occurred, after five years an elegant capital investment is no more than a pile of junk.

The discussion above is focused upon one-off interventions, projects, but the same problems exist for delivery systems which are themselves made up of projects (e.g. a pumping station, a water treatment plant, a pipe network).

3.2 How to measure success?

We measure success by change: change from what otherwise would have occurred or that which does occur elsewhere. Hence, measuring success is centred on measuring some form of change and the question is: what are the factors in which we hope to observe

change? Since we want to do 'better', ideally we want to assess the differences in outcomes over the long term. But a problem is that we have to make this evaluation of success in the short term in order either to take corrective action if the particular instance is deemed a failure, or, if it is a success, to apply those lessons elsewhere. This means that it has to be possible to make these evaluations early on and on the basis of quite preliminary assessments when the outcome may be long term. The problem is equivalent to that of setting criteria by which to judge the performance of alternative project appraisal techniques (Green 2003a): one potential criterion is the long term performance of the option identified by each technique, but we normally need to make an assessment before it is possible to judge the performance of that option over the long term.

So, the second way of measuring success is in terms of process. Here, continuity has a claim to be the most important criterion. If, as argued earlier, the only means to deliver substantive justice is by chaining choices together so that that substantive justice is delivered as a whole, then piecemeal approaches will inevitably fail. So, any process of making choices which makes one choice and then is abandoned is a failure. Therefore, its success in any one choice is measured by the desire of the participants to repeat and replicate the process for future choices. This will occur to the degree to which each of the participants felt the process had been a success. Process success is thus important to the extent to which it promotes continuity.

The follow-up question is: how can we observe change? The ideal model would be the controlled experiment in which different processes are allocated to identical choices. This is rarely if ever possible. The three remaining alternatives are:

- Longitudinal analysis
- Cross-sectional analysis
- Comparative analysis

Of these methods, the first would enable change to be observed but within a very restrictive sample of cases. The problem with the other two methods is that of controlling for differences between cases, the difficulty and perhaps impossibility of comparing like with like or controlling for differences before we know what are the critical differences in contexts. Nevertheless, a number of studies have been undertaken. Beierle and Konisky (2001) looked at 43 Remedial Action Plans in the Great Lakes area, each with a stakeholder advisory committee of 20-30 stakeholder representatives. **Table 4** sets out the criteria they developed to test whether stakeholder engagement lead to better outcomes, and the results of the assessment. As processes, they concluded that they largely succeeded, notably in reducing conflict. But the plans largely stalled in the implementation phase: this was attributed to lack of financial resources, withdrawal of lead-agency co-ordination, and the difficulty of the problem rather than to the stakeholder process itself. Those criteria where the study found clear gains from stakeholder engagement are *italicised:*

Table 4 Criteria for measuring potential benefits of public participation

(Source: Beierle and Konosky 2001)

1. *Were public values incorporated into decisionmaking?*
2. Was the technical quality of decisions improved?
3. *Was conflict resolved among stakeholders?*

4. Was trust increased between stakeholders and government?
5. *Were organisations established to implement decisions?*
6. *Did the process influence relevant decisionmakers?*
7. How much of the plan has been implemented?

In a larger study, Beierle (2002) reports on outputs from some 239 projects, plans and policies covering a wide range of issues, all the cases involving stakeholder engagement. Because of inadequate information about the case studies, only a very few cases could be tested against any criteria, but the results provide support for the benefits of significant stakeholder engagement processes: about 50% of the cases (17) where cost effectiveness could be tested were judged to be more cost effective than the alternative, in one case by some $US 2 billion; joint gains were increased in 69% of the cases (70) that could be examined; some innovative ideas were found to have been contributed in 76% of the cases (121) which could be examined; and, in 74% of the 149 cases for which data existed, the stakeholders brought scientific information and expertise to the table.

The World Bank (Warburton, 2001) reports that it expects staff time in the design phase of participatory projects to be on average 10-15% greater than for non-participatory projects, and that months of time may be added to the preparatory phase of such projects as a result of participation. However, the additional investment and time upfront is recouped later in the process as a result of the better decision-making that results from such an approach.

Defining the key criteria as change and the sustainability of the process, then we should be seeking to measure change amongst the stakeholders engagement: the extent and direction of the changes that occurred during the process. Thus, it is appropriate to track over the time, starting before the engagement process begins (Tunstall and Green 2003):

1. The stakeholder's assessment of their own knowledge and skills in relation to the choice
2. Their assessment of the knowledge and skills of the other stakeholders
3. Their assessment of what are the critical issues involved in the choice
4. Their assessment of the attitude of the other stakeholders towards the process
5. Their assessment of the contribution of the other stakeholders to the process
6. Their assessment of what the other stakeholders want out of the process
7. Their attitudes towards each of the other stakeholders
8. Their personal or organisational preference as to the nature of the course of action that should be adopted

Such indicators can usefully be included on a regular basis within the engagement process itself. If the attitudes towards one stakeholder of all the other stakeholders become increasingly hostile over the course of engagement process then either that stakeholder is making very effective use of power to force the other stakeholders to adopt the option preferred by the stakeholder in question, or that stakeholder is being very unsuccessful in changing others in a way that supports their case. If it is the latter, then the knowledge of their failure would offer them a chance to change tactics.
In addition, it is appropriate to seek the stakeholders' evaluation of the process itself:
1. Was the process fair and equitable?
2. Was each stakeholder treated in a fair and equitable way? Were their views given due consideration? Were their contributions valued?
3. Was a sufficient range of options considered?

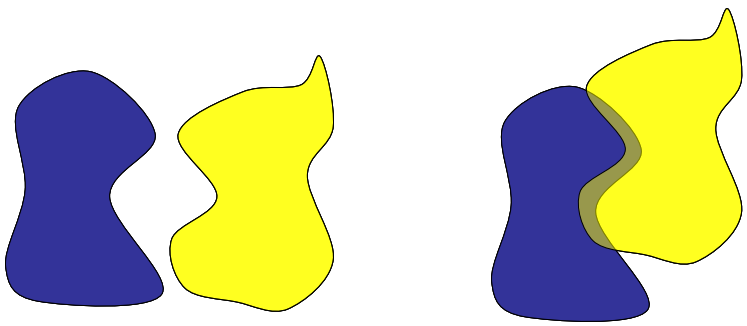
4. Did any individual stakeholder or group of stakeholders impose their views upon the group as a whole?
5. Was adequate technical support and information made available?
6. Did the process result in any change or was the decision effectively already made?
7. Did you learn anything from the process?
8. Did you derive any personal satisfaction or benefits from the process? Would they be prepared to repeat the experience?

3.3 Institutions

The standard definition of an institution is that it is governed and defined by the existence of a set of formal or informal rules (North 1990; Scott 1995). Those rules specify some combination of what it must, it may or it may not do and are necessarily specified in both functional and spatial terms. Those rules may be specified in terms of the institution's objectives, the processes it adopts, and/or the actions it carries out. One reason for defining those rules is to create institutional accountability: for accountability, there must be some test of what the institution can and cannot do against which to assess its performance. A third and important form of rule is that of definitions: for example, in England, the legal definition of a 'sewer' in the Water Industry Act 1991 has been held to exclude some forms of SUDs from adoption. Conversely, the definition of domestic purposes for which the water companies must supply water specifically excludes garden watering. Definitions define boundaries such as the point at which a public water supply pipe becomes a private property.

Necessarily, rules define both spatial and functional boundaries and therefore separate institutions from one another. In turn, those boundaries can leave gaps where no institution has authority for action or overlaps where two or more institutions have some authority for action (**Figure 4**). Those boundaries will not necessarily fall in those locations which result in the least problems. For example, in England where there are two levels of local government, the county councils and the district councils within each county, one county council concluded that it only had authority to clear leaves from the streets when the leaves were wet, and hence a potential hazard, whilst it was the responsibility of the district councils to clear the leaves when they were dry and thus litter.

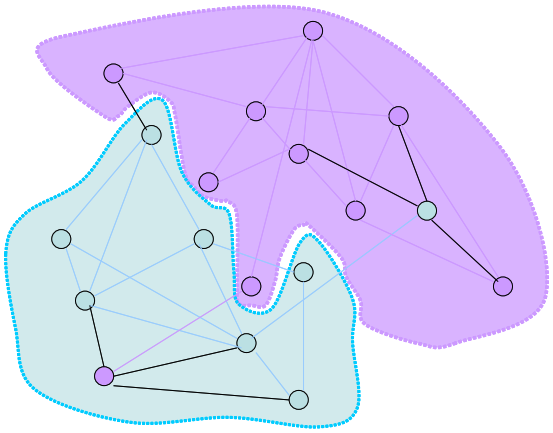
Figure 4 **Institutional gaps and overlaps**



From a systems perspective, ideally, those functional and spatial boundaries will be located in the least connected areas of the network (**Figure 5**). In this illustration, there are two systems, which could be functions of water and land management respectively, which are coupled internally and have some linkages between each other. In order to create rules for the two different institutions, some linkages have to be defined as the connections between

the two institutions rather than internal linkages. If for the example we assume that all linkages are of the same importance, the logic is to draw the boundaries across the least connected regions. In turn, in this example, one element which is part of the land system is included in the institution whose primary role is for water management, and a second element from the water management system is included in the land management system. The water management element included in the land management institution might be building controls over water fittings; the land management element controlled by the water management institution might be the proximity to rivers to which buildings may be constructed.

Figure 5 **Boundary cleavages in closely coupled systems**



3.3.1 Matching the institution to the system

Traditionally, the boundaries were the rivers themselves because rivers were a spatial zone of low connectivity. So, for example, in one port area, the geographical boundary for two fire services was down the helweg and hence potentially the bow of a ship could be in one fire service region and the stern in the other fire service region. This potentially creates a problem of determining who was in command of the fire fighting operation if a ship caught fire in the river.

Those least connected areas are likely to vary from one function to another; there is no reason to expect that the ideal spatial boundaries for an education district will bear any relation to those for a water management agency. The problem is now that the different systems are highly connected; there is an obvious linkage between water and health care, and between both and education as a potential means of delivering education on hygiene

The approach of simply making more inclusive, spatially and functionally more encompassing institutions, simply internalises the problem of boundary setting to the individual institutions. This raises the question of what is the optimum size for an institution in both functional and spatial terms. That scale is likely to be a function of four factors:

1. the extent of physical economies of scale and scope
2. the extent of management economies of scale and scope
3. transaction costs
4. physical parameters

There are often physical economies of scale in water management; for instance, the per unit capital cost of storing water in one large reservoir being less than from storing the same amount of water in several small ones. There are, at the same time, some diseconomies of scale: local reservoirs can respond more quickly to short term changes in demand. The assumed economies of scope are in large part the basis for arguing for integrated water management. At some point, the economies of scale and scope are likely to be overwhelmed by the diseconomies.

There are taken to be management economies of scope; one of the rationales put forward for the multi-utility company (covering, say, water, gas and electricity) is that there need to be only one billing department. There are likely to be diseconomies as complexity increases.

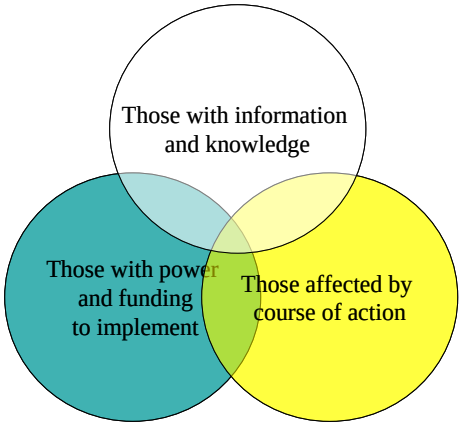
Coase (1937) pointed out that since economics argues for the efficiency of the market, there had to be an economic argument for the existence of firms which created internal functions for those services and resources which they could otherwise buy in the market. He argued that transaction costs were the explanation: that there are costs associated with contracting for goods and services in the market but these costs could be avoided by a firm performing those functions internally.

Physical factors play an important role in determining both the physical form of the system adopted and in the appropriate form of institution to manage it. Where there is readily available groundwater to be used for water supply or irrigation, geographical small institutions can operate successfully. Similarly, while it was possible to discharge sewers directly into the Thames, the different Commissioners of Sewers were able to provide an adequate sewerage system for London (Darlington 1970). When the resulting pollution of the Thames made the construction of interceptor sewers necessary, a new institution had to be established to construct and operate the new system (Halliday 2001). There seems generally to be a necessary relationship between the form of the technical solution and the appropriate institutional form to manage it.

The above discussion has focused upon horizontal integration; vertical integration is also necessary, as expressed in the saying: ‘think globally, act locally’. Local action needs to be related to regional, national or international policy; equally, the implementation of that policy needs to reflect local conditions.

Traditionally, water management agencies and those who worked for those agencies saw their role as to determine what the public needed, to determine what was the best means of satisfying that need, and to provide that means. Hence, the traditional approach to water supply was to determine what the demand would be and construct a scheme to provide sufficient water to satisfy that predicted need. In the new paradigm, there is a shift from provision to influencing; for example, from flood defence to the promotion of land use zone and warning; from water resource development to demand management; and from surface water drainage to source control. Instead of doing things, the role of an institution is increasingly to seek to influence the behaviour of others. Equally, if the boundaries for different forms of service deliver differ spatially as well as functionally, we are forced to seek to deliver integrated management through a fragmented mosaic of institutions. Thus, successful institutions are those that are able to influence the behaviour of other institutions and other stakeholders. Hence, from an institutional delivery perspective, there are three different groups of stakeholders (**Figure 6**).

Figure 6 Stakeholders in decision making



3.3.2 The performance of institutions

If there was no change, then it might be relatively easy to define what we want from the performance of institutions. We would want them to:

- be successful in delivering on the objectives which they were set by society
- maximise the ratio of outputs to inputs (including in that ratio externalities, transaction costs, information costs etc by whomsoever those costs are incurred)
- be accountable

In comparing institutions we would need some means of taking account of the difficulty of the task with which the particular institution was faced. So, for example, everything else being equal, we should expect a water supply institution in an area of high groundwater availability, serving a population with a high income, to have an easier task than one in a water scarce area serving a low income population. In addition, in looking at inputs, and comparing institutions, we would need to take account of the relative costs of inputs so that in one context a high labour input would be more appropriate than a high capital input simply because labour is cheap and available whilst capital is expensive and scarce. The context for another institution may be exactly the opposite.

But, institutions operate in a context of change and we want them to change: to be more successful than they have been in the past, to innovate, to learn. One of the consequences of demanding that institutions innovate is that we must expect and accept failures: without innovation there can be no progress but innovations will not always be successful. Thus, we require more 'successful failures': failures of innovations which provide lessons on how to innovate successfully. In turn, rather than criticise institutions for every failure, it can be more appropriate an institution for not having enough failures. It also means that any institution needs to have a clear strategy for innovation incorporating risk management.

Equally, for innovation, the rules governing the institution must allow for change. Rules are necessary for accountability but can be set at three levels:

- what they must do
- how they must do it
- what they should seek to achieve

Unfortunately, whilst defining the rules in terms of what they must do provides the greatest accountability, as it is easy to compare performance to the rules, this provides the least scope for innovation. Conversely, defining the rules in terms of what they should seek to achieve gives the greatest scope for innovation but also, necessarily, provides the least accountability.

3.3.3 Inventing institutions?

A key question is thus whether it is possible to invent institutions. On the assumption that it is, Ostrom (1990) set out a series of rules which allow the creation of a successful institution. But, conversely, there are a number of reasons for believing that it will not always be possible to invent a new institution to serve a particular purpose. The first and fundamental problem is that of national constitutions. For example, in Germany, water is constitutionally reserved to the responsibility of the Lande, with the Federal government having very limited capacities. Some Lande have then devolved responsibility downwards to the Gemeinde. This has resulted in a number of problems in implementing the Water Framework Directive. In Spain, constitutional devolution of powers has gone further although inter-regional catchments are a national rather than a regional responsibility. Changing responsibilities and creating powers would therefore require constitutional changes, something which is inherently unlikely.

That institutions can be successfully invented and operate is also questionnable on other grounds. Putnam (1993) argued that institutions show path dependency: an attempt at an institutional rupture with the past being both difficult and unlikely to succeed. Cleaver (2000) argues for institutional 'bricolage': institutional arrangements that emerge from the pattern of existing institutions.

Lund (nd) then argues that institutions are engaged in a battle for legitimacy and gain legitimacy by their relative success in having their determinations being taken up rather than those of any other institution. Both Cleaver and Lund focus upon parts of Africa where they see a clash, and a contest, between traditional institutional frameworks, including customary law; the Colonial legal framework; and the emerging new institutions.

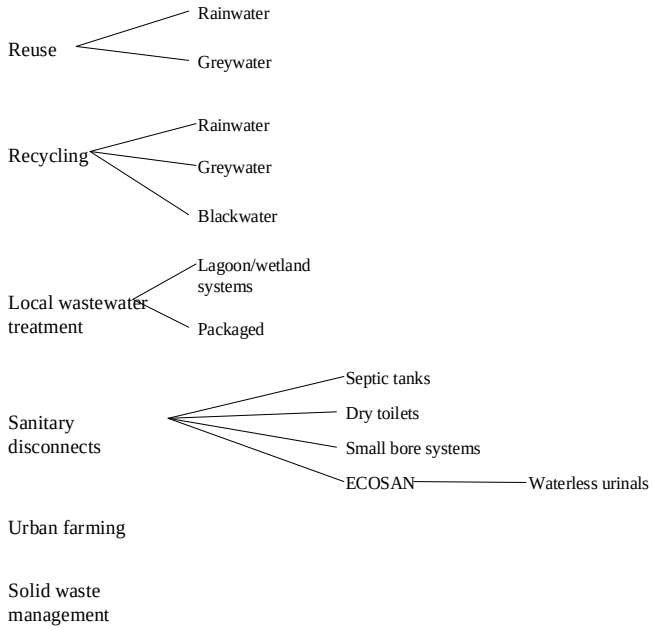
3.4 Institutional maps

Since institutions are defined by rules, and rules create boundaries, then it is necessary to know where the powers and funding to deliver different courses of action reside. Hence, one requirement is to develop the institutional maps for each of the different cities: what institution can do what, has which powers and what funding. The relevant domain of action are all those actions which may be adopted in order to deliver sustainable water management in cities. In addition to the functional and geographical boundaries discussed above, there can be a third set of important boundaries: temporal. Thus, in England for example, there are four forms of plans which are important to the delivery of integrated urban water management:

- Regional Spatial Strategies; these are focused upon land use management issues and are prepared by the Regional Assemblies; which are made up largely of councillors from the constituent local authorities.

- River Basin Management Plans under the Water Framework Directive; programmes to implement the requirements of the Water Framework Directive for good ecological quality of water bodies. The preparation of the plans is the responsibility of the Environment Agency, an agency of central government and responsible to the Department for Food, Environment and Rural Affairs, as the nationally designated 'competent authority' under the WFD.
- Regional Economic Strategies: prepared by the Regional Development Agencies, agencies of central government, each of which is responsible to the Department for Trade and Industry.
- Quinnenial investment plans of the wastewater and water companies. These are approved by OFWAT and set the price regime for each individual company for the next five years as based upon an agreed programme of investment needs.

Figure 7 Technologies to be considered for institutional maps

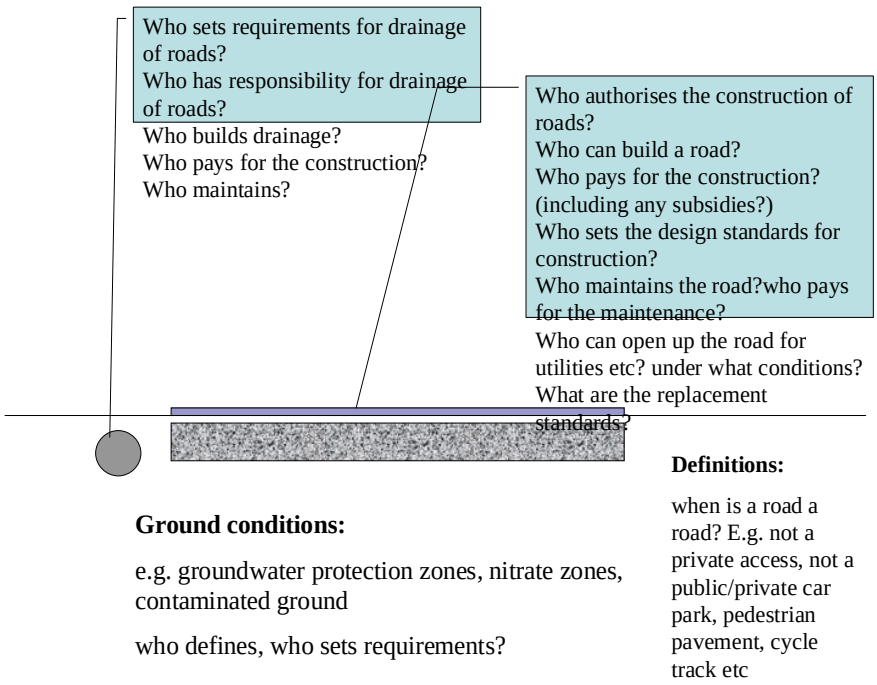


The four sets of plans are thus made by different bodies but also on different time cycles. An important aspect of plans is then their status. In England, that a plan is designated as a 'statutory plan' simply means that there is a legal requirement that one be prepared; it does not require that it be followed exactly.

A further reason for identifying boundaries is that in system terms these are somewhat arbitrary and the problem is then to work out how to deliver integration across these boundaries. For example, in England, a problem in developing integrated urban drainage plans is that the responsibility for surface water drainage lies first with the land owner (except where they have combined to form an Internal Drainage Board) and, for roads, with the Highway Authority. Then for sewers it lies with the privatised wastewater companies. For non-critical watercourses, the responsibility for flooding from rivers lies with the local authority, and for main rivers, with the Environment Agency. In consequence, it has been known, after a flood, for there to be an argument as to whose flood it was.
In consequence, there are a series of institutional maps since each is technology specific.

Figure 8 illustrates the issues that it is necessary to cover when looking at permeable pavements for roads.

Figure 8 **Permeable pavements: aspects of an institutional map**



Geographical boundaries here include:

- Are there different administrative categories of roads for which the construction and maintenance lie with different administrative units (e.g. local government, regional government, national government)?
- What happens at these boundaries and do any administrative boundaries lie down the centre line of roads?

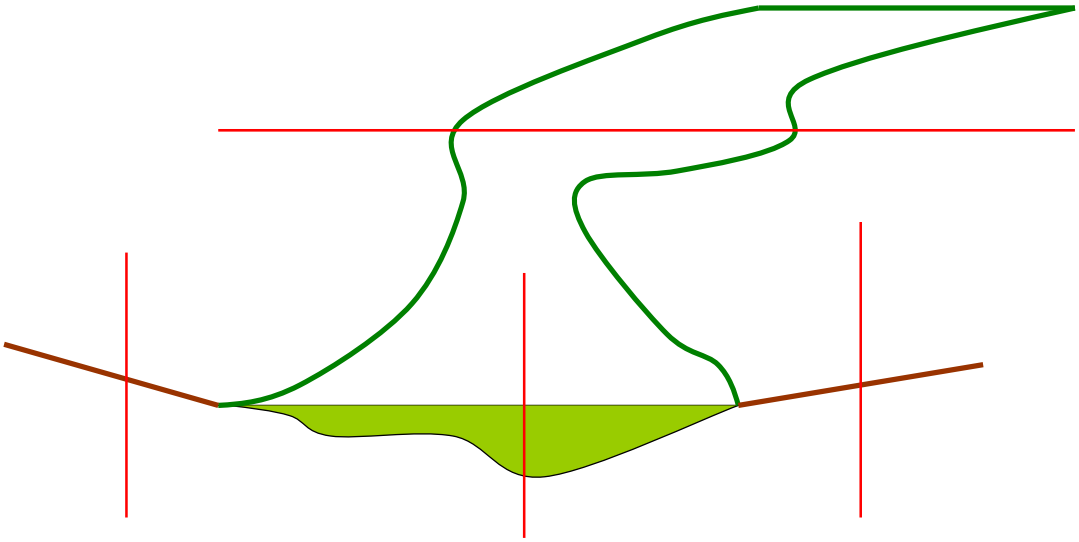
Thus, the problems in introducing permeable pavements for major roads may involve a different set of institutions than for neighbourhood roads. Hence, definitions are important as one function of definitions is to define boundaries (e.g. when does a drain which is the responsibility of the land owner become a public sewer? When does a private access road become a public road? When does a pipe supplying water cease to be the responsibility of the water supply body and when that of the land owner? – so, in turn, when does the responsibility for water quality change?). Definitions also define the functionality of different elements: in England, currently, some forms of SUDS do not comply with the legal definition of a sewer and this inhibits the takeup of these techniques.

One definition that can be critical is that of a 'watercourse' (**Figure 9**). In some countries (e.g. Brazil), both land taken up by a river and the water itself are res commune, administered by the state. In some cases, again including Brazil, that ownership extends beyond the main channel. Conversely, in England, the bed of the river is normally owned by the land owners on each side (the median line forming the land boundary). By that land ownership, the land owner also acquires Riparian Rights: "*….. He has the right to have it come to him in its natural state, in flow, quantity and quality, and to go from him without obstruction, upon the same principle that he is entitled to the support of his neighbour's soil*

for his own in its natural state (Chasemore v Richards 1859 cited in Howarth 1988)." These Riparian Rights are clearly very restricted as they preclude any abstraction or discharge which would impact upon the downstream Riparian rights, or any obstruction such as a dam which would affect upstream or downstream Riparian rights. Riparian rights necessarily do not create any rights of ownership to the water in the river. In both instances, the legal definition of a river matters: in the first case, it is rivers that fall under the Federal rules. Four obvious problems are:

1. Rivers change course so in the case of State ownership, the ownership of land will also change with the course of the river.
2. Flow varies over the year: what defines the river? - average flow, peak flow or what level of flow?
3. Does the river always have to flow in order to be classified as a river? If it does, what happens when abstraction of groundwater or surface water upstream reduces or eliminates the flow, does the river cease to be a river?
4. Do only surface waters count as rivers?

Figure 9 **Defining a watercourse**



In English Common Law, a stream is defined as a flowing quantity of water which runs in a defined course in such a way as to be capable of diversion (R v Oxfordshire (Inhabitants) 1830 cited in Howarth 1988). It is necessary that there is a channel with reasonably defined banks but the water need not flow continuously and the river may be dry for a substantial part of the year (Howarth 1988). The existence of a natural channel is an essential defining characteristic; a second is that the water is flowing. In consequence, underground water can constitute a stream provided that it has both reasonably well defined 'banks' and the water is flowing. In other countries, the water itself, or rather an entitlement to abstract water can be acquired by a private individual. This is notably the case under the Prior Appropriation Doctrine found in the western USA (Wright 1990).

Finally, as with roads, rivers across administrative boundaries so commonly the responsibility for different categories of river rests with different levels of government as is the case, for example, in Germany. Hence, all water management is essentially a transboundary problem.

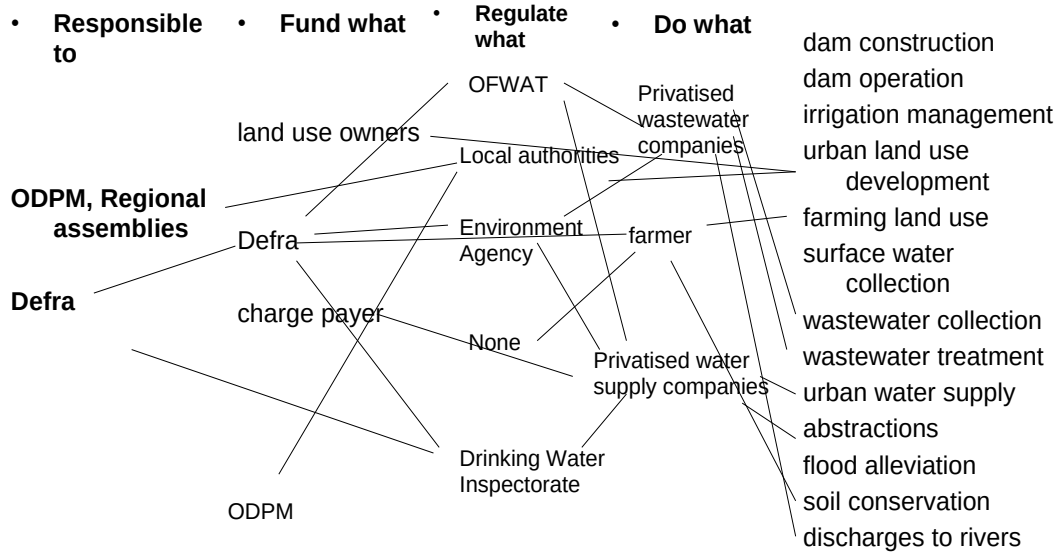
Each different technologies may therefore result in different institutional map; one important question is then when there is a different institutional map. In England, for example, under demand management, there are different responsibilities for setting standards for water fitments (e.g. taps, WCs, showers) and water using appliances (e.g. washing machines), but water using appliances are connected to water and wastewater systems through water fitments. The regulations covering fitments are essentially designed to protect the public water supply from backflows. A third set of regulations, the Building Regulations, set some standards for water efficiency but those in turn are based upon British Standards, developed and promulgated by the British Standards Institution. In turn, those Standards are themselves increasingly being harmonised across Europe and Internationally. Moreover, those Standards may be open to challenge under WTO rules: a standard which, for example, set maximum water consumption limits might be open to challenge as a restraint upon trade – particularly since top-loading washing machines which dominate US production are inherently less water and energy efficient than the front loading machines which dominate the European market. The requirements for industrial uses are somewhat different again, and different mechanisms are in place to subsidise water efficiency improvements in industry than for domestic uses. In the industrial case, water efficiency improvements are often the by-product of efficiency gains in energy usage or waste minimisation and so result from programmes targetted primarily at energy efficiency or waste minimisation. In consequence, there is often a 'free lunch' to be had from water efficiency gains in terms of simultaneous improvements in profitability: the reduction in water usage resulting in reductions: in energy and materials usage, wastewater processing costs as well as in charges for water consumption (Green 2003).

If the adoption of integrated urban water management is to take place, it is then necessary to consider the barriers and incentives to each of the institutional participants to take up these technologies. For example, maintenance is always a problem and increased maintenance costs are likely to be a barrier; or, more realistically, since maintenance costs are always the first budget line to be cut, the technology needs to be able to function satisfactorily when inadequately maintained. Again, a private water company which charges via water metering has a very limited incentive to promote demand management; indeed, since water is a Ramsey good, if it is too successful in promoting demand management, revenue will be inadequate to cover fixed costs and it will go bankrupt. It will, in any case, face problems in a drought for the same reason. Wastewater management companies typically charge consumers on the basis of some mark up on the charge levied for potable water. They consequently lack any incentive to promote water reuse and recycling unless reductions in demand will reduce their costs in proportion to the fall in demand.

Whilst there is likely to be a different institutional map for each technology, we are dealing with systems so as the water/wastewater company example illustrates, it is necessary to identify the linkages between the maps for the different technologies, particularly where these create conflicts. **Figure 10** is an example of a partial institutional map for England and Wales; a more complete but more speculative version was previously given in Green (2003b).
In developing those maps, it is necessary to specify under exactly what legal authority each of those powers for action and for funding reside, as well as to summarise the basic structure of government. For example, England and Wales are highly centralised countries

with only 429 units of local government[1], plus around 450 Water User Associations (WUAs), for a population of some 55 million. This compares to the more than 36,000 communes and around 1900 WUAs, plus regions and departments in France; the 17 Regions, 52 Provinces, 8,101 municipalities, and 6,200 WUAs in Spain; and the 13 Lander, 439 counties, 14,561 municipalities and an estimated 12,000 to 18,000 WUAs in Germany. The voluntary associations of local government, the Syndicats in France and the Verbande and Genossenschaften in Germany, also play important roles in water management in those two countries. The constitutional reserved powers and funding for the levels of local government in France, Spain and Germany, amongst other countries, are also important. 'Interstitial' and semi-formal groups, often will ill-defined powers and responsibilities perhaps limited to liaison, are increasingly being adopted to deal with the problems of working across institutional boundaries. These may play a critical role whilst various forms of voluntary public-private partnerships are increasingly being used in England.

Figure 10 Partial institutional map for England and Wales



The prototype institutional map will be developed for Birmingham and a protocol for developing such maps will be devised based upon that experience. However, that protocol will recognise that there are significant differences between England and other countries. These include:

1. England is highly centralised; only 429 Local Authorities and a maximum of three layers of government compared to 36,500 Local Authorities (LAs) in France plus four layers of government in France; several thousand LAs in Germany and so on. A much more devolved system than exists in England is common across the world.
2. Most countries have a written constitution in which powers (and sources of funding) are reserved to different levels of government.
3. In most countries, Water User Associations are major players: Germany has somewhere between 12,000 and 18,000 (they don't know how many) which provide land drainage, water supply, irrigation and other services. They have much greater independence than the Internal Drainage Boards in England and Wales.

[1] There in addition around 15,000 Local Councils under different names (e.g. Parish Councils) but their powers and funding now appear to be vestigial.

4. England relies in part upon Common Law, law built up on the basis of precedents from previous cases; other countries in Europe use variations of Roman Law or the Napoleonic Code.
5.

3.5 Social relationships and roles

Technologies and institutional forms are social relationships, and their reflection social roles, made manifest. Any form of water or wastewater service makes concrete, often literally, some social relationships, either reflecting current social relationships or implying an appropriate change to those relationships. Technologies and institutional systems are not therefore neutral but have social and cultural meanings.

That this is the case can be seen most obviously in **Figure 11**. Whilst this particular example, is from the Roman Baths in Nice, this was the standard form of public toilet in the Roman Empire and almost identical examples can be seen from the forts on Hadrian's wall in northern England to Athens. Toilets in the Roman civilisations were social places where people went to sit, talk or read, and amuse one's self sociably. Thus, there is a poem by Martial:

> 'Why does Vacerra spend his hours
> in all the privies, and day-long sit?
> He wants a supper, not a shit."

This is in marked contrast to the more culturally dominant view that defecation is a very private activity, demanding visual and acoustic separation for adults, and particularly women.

The latrines, with their supply of running water and drains to carry away the waste products, also demonstrate the high level of social organisation achieved, and required to deliver such services.

Figure 11 **Latrines, Roman Baths, Nice**

(source: colin green)

was originally built for the Grand
eas in west London. The reflection of
technologies in labour patterns has long been recognised; notably the requirement to match the availability of labour to the requirements of the machines, and hence the requirement

for regular shift working. Again, the production of this beam engine in Cornwall and its transport to London required a highly developed system of social organisation, including the ability to raise capital. But, as with many of the nineteenth technological constructions, the engine, whilst a piece of cutting edge technology, was also emblematic of pride: there is a great deal of ornamentation in the form of wrought iron work and brass, along with the maker's plaque and date of construction. These announce the achievement, and when the Crossness pumping station was opened as the symbolic completion of Bazalqette's sewer system for London, it was opened by the Prince of Wales and a banquet was held in the pumping station (Halliday 2001). Consumers paid for water from the Grand Metropolitan, and the other private companies which then supplied London, through a property tax, and, as a licensed monopoly, each company had to be established via an Act of Parliament (Graham-Leigh 2000). The nineteenth century was then characterised by a long battle to municipalise the water companies; John Stuart Mill (Schwartz 1966), for example, arguing that for a private company to run an essential service was nearly as bad as the Government doing so. A similar argument about the quality of the service and the cost of water also took place; the novelist Charles Dickens reported that whilst he paid for water at a pressure to reach the first floor, he did not get it, or indeed often any water at all (Picard 2005). At the same time, the New River company was believed to be the most profitable company in the world (Ward 2003).

Figure 12 **90 inch steam engine, Kew Bridge Steam Museum**

(source: colin green)

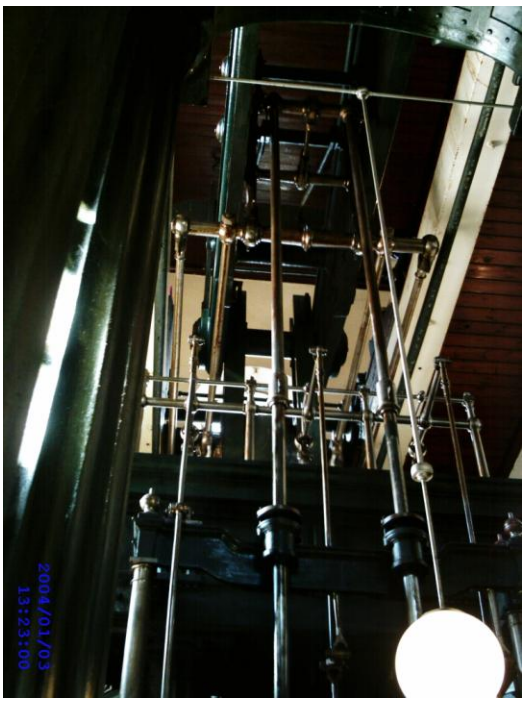


Figure 13 is an illustration of official (as opposed to illegal and informal) water pipes in a slum area of Dhaka. The pipes are lying on the surface of what is essentially a pool of raw sewage. There are some technical questions which might be asked here, notably: why the pipes laid on the surface and why is there a proliferation of small bore pipes rather a larger

diameter pipe? But the fundamental social relationship issued here is that the process of informal development and the search for an official water supply has to be seen as a process and one in which the supply of officially authorised utilities and other services has to be understood in a battle for legitimacy. In informal developments, the residents frequently make equally informal connections to the nearest available electricity power line and water pipe in order to provide some service. But the provision of an officially sanctioned water service then establishes a degree of legitimacy to the land occupation (Kang 2006). Hence, it is in the interest of slum dwellers to seek to obtain such services; conversely, the government may be reluctant to provide such services because development is legitimised and facts are created on the ground. The nature of this process can be quite complicated as exemplified in Bogota (Hamer 1985).

Figure 13 **DWASA, water supply pipes, Dhaka**

(source: Amandeep Kang)

Figure 14 is an example of one of the rainwater harvesting systems found all over Venice. Water drains from the roofs onto the piazza and then into a clay cistern under the centre of the piazza. This requires that the local residents both maintain and clean the area which drain into the system and regulate their use of water from the cistern, as well as funding the cost of constructing the system and its maintenance.

Social relationships are expressed in four ways:

- How decisions are reached
- The form of the institution through which the service is provided
- The physical form in which the service is provided
- How the costs of providing that service are recovered.

Market relationship imply and express quite different social relationships to co-operative relationships: a consumer stands in a quite different relationship to a supplier than does a citizen: a market relationship is fundamentally adversial. One notable difference between a private company and a cooperative venture, such as a muncipality, is that in a private company, votes are bought: voting power is proportional to share holding and voting power

is limited to those who hold shares. Thus, power is assigned purely to those who have wealth. This affects both the decisions that are made and the way in which they are made.

Figure 14 **Rainwater harvesting, Venice**

(source: colin green)

If technologies are social relationships made manifest, those systems may then simply reflect existing inequalities and injustices within the existing system of social relationships. Thus, Flores (2006) argues that the attempted privatisation of the water supply system for El Alto, Bolivia, reflected the existing racism of the political system, a racism which also produced the existing system of income differentials. Similarly, Mehta (1997) has pointed to the way in which rural village water supplies in Gujarat have in embedded in them and express caste and ethnicity differences. Water and sanitation also manifest gender issues in a very concrete way in that not only are women, and girls, those who carry, often literally, the main burdens of inadequacies of water and sanitation, they are also generally denied access to the decision making processes either by cultural norms, because meetings clash with other activities, or because they are simply too tired to take part.

Payment mechanisms are also expressive of a social relationship; the meaning of a monetary transfer depends upon the nature of the relationship expressed. **Table 5** lists a range of labels, and hence meanings, for different monetary transfers. Thus, the meaning of a transfer of, say, 300 Euros depends upon its expression as a social relationship: there is a fundamental difference between a price and a tax.

These labels very clear define both the relationship between the two parties, and its legitimacy, as well as the roles of the two parties; the same transfer can then have different labels depending on the relationship and roles. Payment transforms the nature of a relationship; for example, payment for sex transforms the nature of the exchange: what was potentially an exchange of pleasure becomes merely a transaction wherein pleasure is

exchanged for money. What was of mutual benefit now becomes a one way transfer that can only be brought back into balance by a cash transfer. The introduction of a transfer of money in this instance at least signifies the nature of the relationship and perhaps even transforms it.

Table 5 Different forms of monetary transfer

(source: Green 2003a)

Definition	
Alimony	Inheritance
Bequest	Interest
Blackmail payment	Loan
Bonus	Pay
Bribe	Embezzlement
Capital gains	Payment
Charge	Payoff
Child support	Pension
Christmas box	Performance pay
Compensation	Pocket money
Covenant	Profit share
Damages	Prize
Donation	Repayment
Extortion	Salary
Fee	Smuggling
Fine	Surcharge
Fringe benefit	Tax
Gift/present	Theft
Golden handshake	Tithe
Holdup	Tip
Housekeeping	Winnings
Incentive	

Thus, the form of payment for water and sewage denotes the relationship involved; attempts to change the form of payment imply an attempt to change the nature of the relationship and the roles of the parties involved. Were a water company to demand a tithe of my income, then I would find this a very strange and wholly illegitimate demand because a tithe is a religious duty and the water company is not a religious organisation to which I have chosen to belong. In the long run, water metering is therefore almost a pre-requisite for a privatised water supply system because a charge per property is effectively a tax. Prices are set by suppliers and the consumer can choose whether or not to buy at that price. However taxes are set by accountable forms of government; a private company accountable only to its shareholders cannot be allowed to set a tax. Therefore, if costs are to be recovered through charges, rather than metered prices, then price regulation is almost inevitable.

The assumption in orthodox economics that in perfectly competitive markets prices both fall out of the market and yield the optimum allocation of resources has meant that pricing has been left as black but magical box. Prices are assumed to do three things:

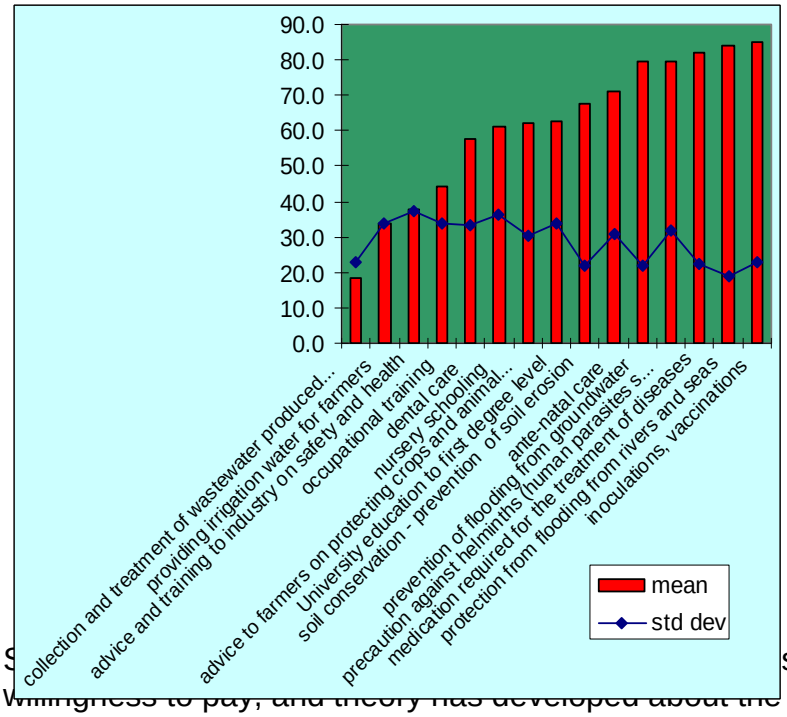
- Yield the optimum allocation of resources

- Recover costs
- Determine the behaviour of producers and consumers in such a way as to yield the optimum outcome.

Conventionally, the assumption has been that marginal cost pricing will perform all three functions. Unfortunately, water is generally a Ramsey good and marginal cost pricing will fail to recover costs. In these circumstances, it may be helpful to consider each of the three functions of pricing separately. Particularly so when pricing appears, in the case of water, to be relatively ineffective in determining the behaviour of producers and consumers (Green 2003a).

The issue of how to recover the costs of water is further complicated by the ideological nature of the debate as to what should be the social relationships between people. To the Libertarian, the market is the only form of liberty and government, however constructed and in whatever form, is oppression. Hence, the so-called 'Washington Consensus' which emphasises individuality and the market, and seeks to redefine social relationships so as to be consistent with those beliefs. This is not an economic argument as to whether competition or cooperation is more efficient but a claim as to what should be the nature of interpersonal relationships. Thus, the new Flood Law in Germany seeks to shift responsibility on to the individual even potentially in those circumstances in which it would be inefficient: "*Within the bounds of possibility and reasonability, any person potentially affected by a flood is obliged to undertake adequate measures to prevent flood-related risks and to reduce flood damage, particularly to adjust the land use to a possible risk created for humans, the environment or material assets through floods*" (Article 31 S2 Act to Improve Preventive Flood Control 2005).

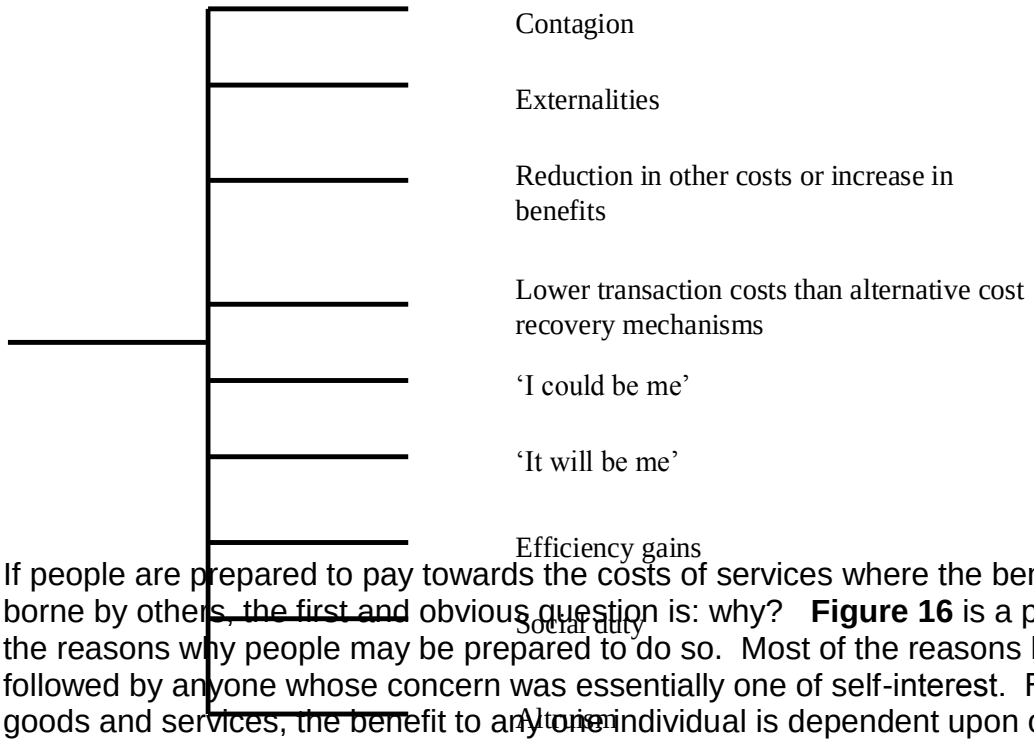
Figure 15 Who should pay for water and other services?



S services in terms of individual willingness to pay, and theory has developed about the supply and demand for priced goods, it might be argued that economics has been applying a Proscutean bed to the provision of services. In turn, as will be discussed later, both Coase and North have argued that orthodox economics is inadequate for purpose, North notably asserting the need for an economics of cooperation. In practice, the economic problem is frequently one of: are

others prepared to pay towards the provision of some good or service, why are they prepared to pay, and how much are they prepared to pay? **Figure 15** summarises the result of a small exploratory study, using a convenience sample (of students sponsored, by the Environment Agency, on a Foundation degree on Flood Risk Management). In this question, they were asked what proportion of the costs of each of the services should be paid by the beneficiary and what by government from general taxation. Since the setting was the UK and the purpose of the exercise was partly pedalogical, the example services are ones which are relevant in the UK. The intention was to include some which nearly everyone would propose should be largely funded out of general taxation and others which everyone would expect to be paid for wholly by the beneficiary. What is then a surprise is that some of the services where the costs are generally be paid wholly by the beneficiary instead attracted a significant degree of support for a proportion of the costs being paid through general taxation (e.g. the costs of treating wastewater from industry and for subsidising irrigation water for farmers). In a previous and much larger study of water consumers in England (Green et al 1992), it was found that differences in the importance individual respondents gave to dealing with different problems with water and wastewater could be explained in part by their Environmental Value Orientations (Green and Tunstall 1996). In other studies, what were termed there 'Environmental Value Orientations' have been called 'Social Value Orientation' (Stern et al 1999; van Liere and Dunlop 1981). One of those Environmental Value Orientations, 'Optimistic Utilitarianism', in particular might be expected to closely associated with a Neo-Liberal political orientation (as well as having those traits assumed of the Rational Economic Person of conventional economics). Whereas Optimistic Utilitarians are less willing to pay in principle for some service improvements than others (Green et al 1992; Green 2003a), there is no difference for sewage flooding even when the particular individual has not been flooded.

Figure 16 Why people may be prepared to pay for benefits which accrue primarily to others



If people are prepared to pay towards the costs of services where the benefits are primarily borne by others, the first and obvious question is: why? **Figure 16** is a possible typology of the reasons why people may be prepared to do so. Most of the reasons listed would be followed by anyone whose concern was essentially one of self-interest. For 'contagion' goods and services, the benefit to any one individual is dependent upon others also receiving the good or service. This is most obvious for vaccinations and inoculations where

the risk to any one individual of catching the disease is reduced as the proportion of the population who also have a degree of immunity increases. Thus, it is generally argued that a vaccination rate of at least 75% is required before a vaccination programme will remove the risk of an epidemic of the disease in question. Similarly, at the time of the 'Great Stink' in London, when the smell of raw sewage in the river Thames made life close to the Thames almost intolerable, cholera was believed to be caused by 'miasma': the smell itself caused the disease (Halliday 2001). In this case, everyone had an interest in eliminating the smell; but, notably, once the nature of cholera transmission was discovered, the case for collective action was much reduced. Once the cause of cholera was discovered, someone could, in principle, protect themselves from the risk simply by avoiding water from suspect sources.

Externalities: a catchment is a system. In turn, individual action is unlike to result in the best outcome for the system as a whole. Similarly, the changes to the Rhine in Germany to both improve navigation and for flood protection purposes have had the consequence of both increasing the magnitude of floods in the Netherlands and reducing the time taken for a flood to reach the Netherlands. Collectively contributing towards the cost of local action then creates power which can be used to achieve the best result for the catchment or coastal cell as a whole.

Thirdly, there are extensive costs associated with any development. In one way or another, whether as charge payers for the utilities, taxpayers for roads and schools, or contributors to pension funds and hence as shareholders in utility companies, those costs are largely borne by the public. The efficient solution is thus one which minimises the total cost to them and if the costs of contributing towards the costs of providing some form of water service in one area are less than the costs of development elsewhere, it makes sense to contribute towards the costs of that service.

Fourthly, the costs of business, transaction costs, constitute a substantial proportion of the economy. Thus, in an ideal economic world, there would be no costs in transferring a good from a supplier to a consumer and hence no transport, warehousing, retailing, financial service or marketing costs. Thus, the transaction costs of delivering water by bottle are obviously substantially higher than delivering it through a pipe, and this is reflected in the relative prices of the two. One element of transaction costs are those of setting prices or charges and recovering those prices or charges. When dealing with a low unit value, bulk product like water, the transaction costs of setting and collecting charges can constitute a significant proportion of the total cost. Hence, it can be more efficient to adopt a simple and cheap means of cost recovery rather than a more discriminating but expensive means.

'It could be me' is obviously the case for disease, accident, and natural disasters. Here, the community acts like a mutual insurance society, as similarly, most of the early insurance provision was through mutual insurance societies whose customers and owners were farmers, ship owners, factory owners or others exposed to some risk which affected each of them. Other forms of insurance, including both accident and life insurance, developed largely through such mutuals rather than through private companies. In the USA, such mutuals still constitute a significant proportion of the provision.

'It will be me': old age and death are the outstanding examples. In the nineteenth century, 'Friendly societies' developed in which the members contributed against the eventual payment of a death benefit and a pension before that. By the end of the nineteenth century,

the greater proportion of working population belonged to such a society and the friendly societies declined only with the introduction of provision by the State. Similar bodies existed before that in Ancient Rome and elsewhere (Gray nd). Early Trade Unions provided similar benefits.

Efficiency gains: whenever there are economies of scale, then contributing towards the cost of providing a collective solution potentially results in a lower cost per household than if each had to provide their own service. In the case of water supply, the gains from collective action are at least a reduction in cost by a factor of four over purchasing water from water sellers; significant gains are also available from piped sewer systems over cesspits. But, it was argued earlier, that substantive justice is only possible across a package of choices and not for any single choice taken on its own. Consequently, in order to secure the long term gain then any individual household has to be prepared to pay towards the benefits for others in a specific choice considered in isolation. In addition, it can be shown that the return to capital will be higher when the consumers fund the capital works than when private capital is involved (Green 2005).

Social duty or social norms: when the individual is prepared to contribute towards the costs of providing goods or services to others because there is a social expectation, a social norm, that they do so, then this is clearly an external influence upon the individual. Any one individual may have internalised that norm, but even then it is the result of socialisation. Many if not most religions regard the giving of charity as a religious duty; for example, the Zakat in Islam (Hamidullah 1979). 'Fair Trade coffee' now constitutes a significant fraction of the market.

Finally, there is the possible self-motivation of altruism. Smith and Sen have both discussed different forms of altruism in terms of the degree to which it is self-interested rather than other motivated: the degree to which people perform altruistic acts because it makes them personally feel good. At the same time, altruism may be self-interested in a second sense: both religions and popular writing have emphasised the principle of 'do as you would be done by' (as opposed to the principle of 'never giving a sucker an even break'). In so far as that principle becomes generally accepted, the individual gains.

If, as apparently they are, people are prepared to contribute towards the costs of goods and services whose benefits are primarily gained by other people, then the two questions that follow are:

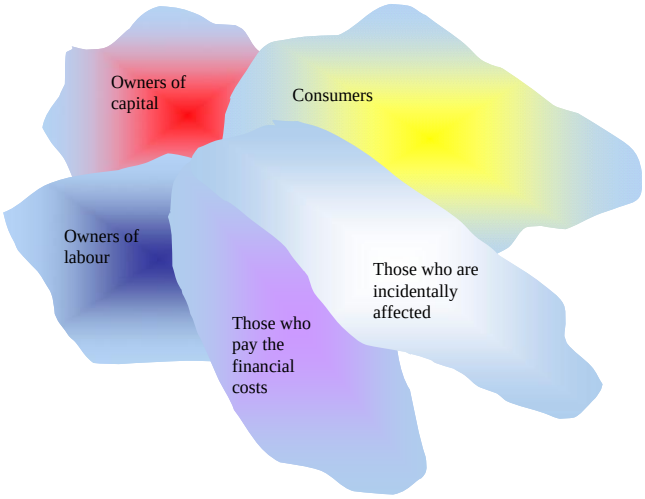
- How much are they prepared to sacrifice?
- What are their priorities, or how do they wish to see it allocated between cases?

3.6 Who are the stakeholders?

One group of stakeholders are those with the power to influence whether or not a course of action is implemented effectively. The second group of stakeholders are those affected by the choices made. **Figure 17** is a reasonably generic model of the different parties having

an interest in a water supply system. Each party has a separate and distinct interest: the owners of capital, for example, want to maximise the return on capital whereas the owners of labour wish to maximise the return to labour. None of those groups is necessarily homogeneous and thus there can be different interests within each party. For example, the owners of different forms of capital (e.g. pension funds, hedge funds, insurance companies, members of the public) may have different interests in terms of their desires for capital growth, dividends, risk and consequently in the length of future across which they think, as the saga of Eurotunnel illustrates. If it is commonly argued that political cycles are incommensurate with the planning cycle required for water management, so may be market cycles, quite apart from the normal economic cycles. Again, employees commonly do not share an apparent single common interest; the interests of the executives can diverge markedly from those of other workers, as well as from the shareholders, as the example of Enron illustrated. Similarly, consumers may be heterogeneous with different preferences as well as income and hence ability to pay.

Figure 17 Stakeholders as holders of interest

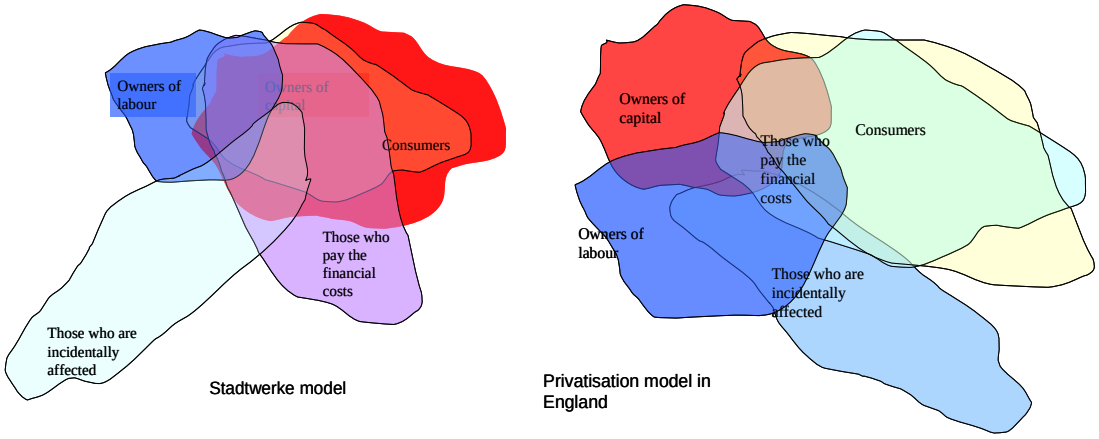


Any household may be a member of two or more of these groups; a consumer may also be an employee of a water management agency as well as a beneficiary of the services provided by that agency. Those households who are members of two or more of the different groups thus face potential conflicts of interest. So, similarly, in England do households who are, on the one hand, a taxpayer and on the other a potential patient in the National Health Service (NHS) face conflicts of interest with regard to the availability of therapeutic drugs on the NHS. As a patient with a particular disease, the individual logically wants any treatment, however expensive and however marginal the improvement over existing treatments, to be made available. But as a taxpayer, they have an interest in setting priorities amongst treatments and with respect to health spending versus all their other expectations as to public spending. Another taxpayer, with a different health problem, has a related interest in that, within any given budget, spending on one course of treatment precludes the use of another treatment on another group of patients of which they are a member.

Both the extent and the degree of overlap between the different groups varies between different institutional forms found in different countries and situations. In the stadtwerke models of the Netherlands and Germany, there is almost an identity between the providers

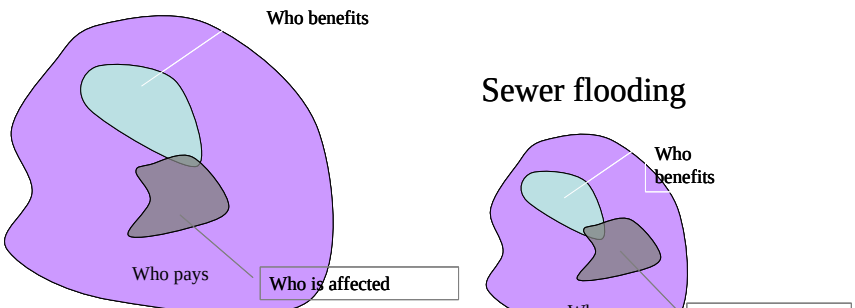
of capital, the local communities; the consumers; and those who pay the costs of the service (**Figure 18**). In the dominant privatisation approach adopted in England, there is a clear separation between the providers of capital and the consumers although the current position in Wales is similar to the stadtwerke model. The concession and affirmage approaches in France can also be represented in this way.

Figure 18 Alternative models of water supply provision



Within a country, different aspects of water management may be represented by widely different relations between different stakeholder groups. **Figure 19** represents the conditions for three aspects of water management in England. The management of flood risk for main rivers is funded through general taxation of the United Kingdom as a whole. Conversely, the management of the flood risk from sewers is funded by the consumers of the wastewater companies which have a regional base. Flooding is only one extreme of the normal variation in river flows; the other is low flows which result from over-extraction of ground water or inadequate runoff. Hence, flooding, drought and water resource management must be managed in an integrated way otherwise the approach adopted to resolving one problem can simply make another aspect of water management more difficult. Resolving the problems of low flows is funded through the consumers of water companies where, in some areas, a single company manages both wastewater and water supply but in other areas different companies manage each aspect. On privatisation, the existing institutions were privatised as they stood rather than any attempt being made to rationalise the structure of the industry by introducing the unified provision of water and wastewater services where there would be economies of scope by doing so.

Figure 19 Stakeholder maps for different aspects of water management in England



Because being deemed to be a stakeholder is to have power in the decision process, to be a stakeholder is to assert some moral claim to involvement in the decision making process. It is not sufficient for a stakeholder to be simply someone who turns up to a meeting or responds to a request for comments. The President of Uganda's question of by what right did the International Rivers Network (IRN) claim to be able to influence the decision as to whether or not Uganda should build a dam is a real one. We may recognise the importance of the IRN's concerns whilst questioning the moral right of the IRN to be involved in deciding whether or not the dam should be built.

Stakeholder engagement therefore raises major questions of justice: what is an equitable distribution of power? And, what are the forms of power that may be deployed? As Foucault has pointed out both language and knowledge are forms of power. What entitlements and obligations are associated with being recognised as a stakeholder?

There is a great danger in romanticising stakeholder engagement; some models imply that it is simply necessary for everyone to get together for a consensus to emerge. But, it may be questioned whether a consensus is always desirable, whether the decision reached by consensus is desirable, whether the consensus was reached by equitable means, as well as why a consensus should be anticipated at all. Some Water User Associations have been found to be governed by the rich and to continue to exclude women from decision making.

3.7 Lessons from practice

Both failure and success can provide useful lessons; each is potentially useful to the extent to which the reasons for, or the conditions that resulted in, success or failure are brought out. A central concern has therefore to be to institutionalise learning within and between the Learning Alliances. In turn, a failure can yield more learning than a success because it may not be clear whether it is the strategy or the conditions which resulted in success. There are already lessons to be learnt from amongst the participating cities. For example, Belo Horizonte has achieved almost 100% coverage for water and sanitation whilst working under the pressures of informal development. In addition, it has adopted the participatory budgeting approach developed in Porto Alegre and now widely seen as a potentially useful model to adopt in other countries.

4 Disciplines which inform governance

The problems of governance in the real world are mirrored in research. If the real-life problem is to integrate across a fragmented mosaic of institutions, the research problem is to integrate across disciplines. The same reasons that result in the fragmentation of institutions also drove the progressive fragmentation of the disciplines: Goethe is reputed to have the last person to have known all of human knowledge. The different disciplines have, in order to refine their knowledge and techniques, become more and more narrowly focused so that each is like a microscope, with a more and more detailed picture of less and less. If there is often said to be a need for 'joined up government', there is the same need for 'joined up science'; the problems echo those of other forms of governance. There are practical problems in the way of joined up science, notably that scientists are rewarded for being specialists and not for working across disciplines. Each discipline also develops its own discourse, its own way of defining the world and its own language to express that definition. One way of approaching these fragmentary and varying discourses is then to approach the problem of governance as if one was holding a kaleidoscope. Each twist of the tube, each shift from one discipline's discourse to another, reveals a different pattern which may produce a new insight. Mansilla et al (nd) point out the very different ways of working in biology and physics and the problems of inter-disciplinary working this creates.

This progressive specialisation, and consequently of fragmentation, means that early writers lie as a source of several disciplines. Bentham, for example, can be read in the context of economics or of philosophy. In this process of specialisation, the disciplines have, in some cases, redefined themselves to exclude areas; for example, both Weber and Veblen considered themselves to be economists but economists now generally regard them as sociologists, as working outside of the boundaries of economics.

4.1 Philosophy

Philosophy was one the first areas of intellectual endeavour and most other disciplines have then split off from it, including economics, politics and sociology, as well as all of the physical sciences. Hence, issues that were originally addressed in philosophy have become core aspects of other disciplines. Thus, for example, Hobbes, Rousseau, Locke and Paine are now part of the tradition of politics as well as of philosophy.

Philosophers have addressed a number of issues which are key to governance:

- What is ethical or moral conduct, and what is justice?
- What is the nature of language, and particularly what is the relationship between words and concepts?
- What is the nature of science as an endeavour, and what consequently defines 'science' as an activity? How then does it differ from other human activities and what distinguishes 'science' from 'non-science'?
- What is the nature of rationality, what constitutes 'reason' and can reason be applied only to the choice of means or should it also be applied to the choice of ends?

Two linked primary concerns of philosophy over the millennia have been:

- How should the individual behave? What is moral or ethical conduct?

- What is the appropriate relationships between the individual and the collectives? What is justice?

These questions are obviously linked because if an individual follows one set of moral principles to guide their life then that individual will expect a consistent set of principles of justice to apply to relationships between members of society. In turn, one is likely to promote the other, as Aristotle (1955) asserted: "*Formation in ethical virtue comes about as a result of habit, which is why the word 'ethical' itself derives from the word for habit (ethos)*". The words used in this area are not clearly differentiated, perhaps demonstrating the validity of Moore's (1966) opening assertion: "*It appears to me that in Ethics, as in all other philosophical studies, the difficulties and disagreements, of which its history is full, are mainly due to a very simple cause: namely to the attempt to answer questions, without first discovering precisely* ***what*** *question it is which you desire to answer.*" But 'ethics' and 'morality' are generally taken to refer to principles which should given the individual's choice of actions. 'Equity', 'justice' and 'fairness' are more generally associated with collective choices and inter-personal relationships. 'Fairness' tends to be expressed in terms of an assessment of some choice against some implicit or explicit criteria, as in the small child's cry: 'It isn't fair'. Hence, it is either an assessment of the degree to which the action complies with some set of criteria or of the equity of the criteria applied. 'Equity' is used as a broader term, referring both the outcome of the choice, substantive justice, and the process by which the choice was made, procedural justice. Hence, a general definition of equity has been given is as '*a moral principle consistently applied*' (Green 2003a). What is then often contended is the moral principle that should be applied or whether a particular instance to which is intended to apply that principle falls within a general class of instances across which consistency is required. Since the principle and class are linked, then the problems arise when a single case can be regarded as lying within two overlapping general classes, to each of which a separate and distinct moral principle is regarded as appropriate. One incidental consequence of the broad definition of equity is that the distinction that orthodox economists seek to draw between equity and efficiency cannot be sustained; economic efficiency is simply another contending claim as to the moral principle that ought to be applied. A sharp distinction consequently has to be drawn between economic efficiency, that the objective in collective choices ought to be to maximise some sum of individual desires, and technical efficiency, the ratio of the achievement of objectives to resources required for that achievement (e.g. the technical efficiency of an aircraft engine can be defined in terms of the power to weight ratio, fuel efficiency, or emissions per kilometre). Economic efficiency is then a specific instance of the wider definition of efficiency.

The core question in each case is: what is right? Philosophy has tended to focus upon substantive or distributional justice and Pettit (1980) categorises the various bases of theories of justice into three:

- proprietary; the natural law model (e.g. Noznick 1974).
- contractual; distributions which the individual would choose if s/he did not know what their initial starting position would be (Rawls 1971).
- consequentialist; utilitarian welfare models following from Bentham (1948).

The first two judge the act upon the basis of the principles of action from which it is based; the last only in terms of the consequences of that action.

Pettit (1980) also notes that what is equitable can be defined either as principle can be used to determine the appropriate outcome or as being a characteristic, or property, of the individual. Sen (1992) shows that these models can further be defined as models of equality of one form or another; all embody some belief in equality, but they differ widely in what it is which is to be allocated equally. Whilst the debate on equality is often defined in terms of income, Sen shows that the libertarian claims about the primacy of individual rights and liberties and utilitarian theory are essentially arguments about equality. Thus, although Bentham described the natural right model as 'nonsense on stilts' and sought instead to derive a principle to select the outcome of a choice, rather than basing choice upon the basis of some property of the individual, the maximisation of welfare assumes that the utilities of all individuals are to be treated equally. Consequently, Sen (1992) points out that the central question in discussing equality is 'equality of what'? whilst almost all approaches to the ethics of societal arrangements are based upon some assertion of the requirement of equality of something. There is, however, wide debate and conflict as to in what respect individuals are to be treated or regarded equally. Moreover, Sen (1992) argues that ascribing one characteristic as the centre of an a claim to equality typically implies that consequentially individuals cannot be treated equally in terms of another property.

4.1.1 The 'wants', 'needs' and 'rights' debate.

The provision of water services can be variously argued to satisfy either a human want, or a human need, or to be a human right (Gleick 1999). The 'want' model is particularly associated with economics; there are no requirements only options, and the individual has the right to determine what are his or her priorities within their available capacity to satisfy those desires. Hence, it necessarily involves trade-offs. The 'need' model was particularly attractive when decisions about the provision of water supply were the domain of technical and scientific experts: it only required that human and environmental needs be determined then the experts could decide what was the best means of satisfying those needs. Confronted with limits to the availability of resources, the response is to impose some hierarchy upon those needs, most famously in Maslow's (1943) 'Hierarchy of Human Needs' so that the satisfaction of less central needs is, if necessary, sacrificed to the achievement of more fundamental needs. The obvious problem is: what quantity of what is sufficient to satisfy the specific need? The third option is a rights or entitlement based approach, most obviously in terms of Human Rights.

The first two approaches are individually centred and determined; the third can also be constructed in that way (i.e. as a Human Right), or, equally, socially constructed: as relationship between the individual and the collective, as being socially negotiated and contracted. Sen's (1981) concept of 'entitlements', the access by the individual or household to resources, can be considered in that way. The 'want' model implies and requirements a different form of social contract: that the individual has an entitlement to decide what to do and an obligation therefore to respect others choices.

Table 6 Wants, needs and rights

	Wants	**Needs**	**Rights**
Where do they come from?	The individual	Technically determined	(a) 'Natural' rights (b) socially negotiated

			and contracted
How much is sufficient?	As determined by the individual?	Technically determined	Legislation
What happens when they conflict?	The individual decides what trade-off offers the best outcome to her; and a legal framework when the wants of different individuals conflict	Technically determined	Courts decide
Is there a societal obligation to satisfy?	To allow the individual to choose	Yes, to satisfy the need	Yes, to satisfy the right

General Comment 15 by the United Nations Committee on Economic, Social and Cultural Rights (2003) affirmed that water is '*… a prerequisite for the realization of other human rights' and 'Human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses*.'

However, the possibility of satisfying wants, needs or rights depends upon the availability of technologies which can satisfy those requirements. For example, piped potable water supply was not available across London 24 hours a day, every day, until the end of the nineteenth century when the original distribution network of wooden pipes had been replaced with iron pipes. Up until this time, the leakage rate had been such that it was not viable to keep the whole network charged with water and it was only with the invention of cast-iron pipes and jointing that it became realistically possible to maintain a network under permanent pressure.

Language can be studied from many different perspectives including in an attempt to answer the questions of: what is it, what does it do, how does it work, and how is it used? The question of the structure of languages has divided off into linguistics (Carroll 19897) and the practice and purpose of language has been a central concern of anthropology (Lakoff 1987). The questions of what does it do and how it is used are discussed later in the section on discourse analysis. But if there is to be co-operation or co-ordination, there requires to be a sharing of some common understanding. Thus, a critical question is: what is the relationship between words and meanings, or words and concepts?

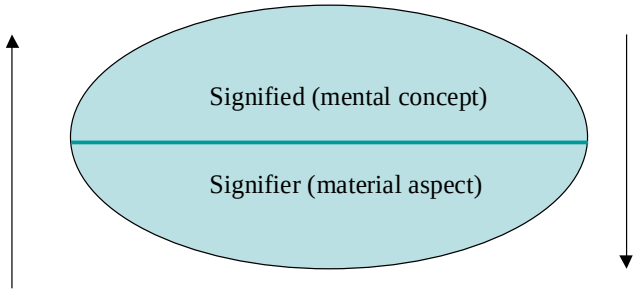
Whilst philosophers have addressed this problem, semioticians (Cobley and Jansz 1999), as a branching off from linguistics, have also been drawn to the problem. At one extreme, Wittgenstein in Tractatus Logico-Philosophicus (1974) argued that all philosophical questions are fundamentally language problems; once language is properly understood, then philosophy has ended. Consequently, having published Tractatus, he went off to do other things.

Wittgenstein (1974) ends Tractatus Logico-Philosophicus with: "*What we cannot speak about we must pass over in silence*"; rather similarly Whorf (Carroll 1967) argued that

language determines what we can think, what we can think is determined for the form of the language in which we think.

In Tractatus, Wittgenstein was concerned to explore the relationship between words and meanings, and treated language as if it were a form of mathematics, of symbolic logic. Thus, for every word there is a true meaning and for each true meaning there is a single word. Once these true meanings are established and the mathematical operations that can be performed upon them are identified, then the problems in philosophy would be revealed as artifacts of improper language use. De Saussure (1983) made essentially the same argument in discussing the relationship between the signifier and signified (**Figure 20**). The importance of this concept is that often appears to be the implicit assumption as to the nature of language by specialists, an assumption that there is one true meaning to any word (e.g. 'risk', 'resilience') which once discovered (and conversely for any one true meaning, the appropriate word must be adopted). Hence, those specialists have known to call for the adoption of a 'definitive glossary of terms'.

Figure 20 De Saussure



But Wittgenstein concluded that Tractatus was ultimately based upon a false understanding of language. In Philosophical Investigations (1958) he proposes instead a model of language which is based upon the capacity of language to be used to provide metaphors, analogies and allusions. Rather than the essence of a word being a single true meaning, the power of a word is its capacity to build bridges, to make connections, particularly from that which is 'known' to that which it is sought to establish. Thus, from the Oxford English Dictionary, the original meaning of 'board' in Old English was a wide piece of wood cut thinly. But by a progressive process of analogies such terms as 'starboard'. 'boardroom', 'cardboard', 'sweep the board', 'board and lodgings', 'switch board' and 'take on board' all hold meanings without the need to invent a new term for each new concept.

Much of the discussion of 'risk communication' and the communication of science more generally assumes that, firstly, the Tractatus model of language is the correct one. Secondly, communication is approached from the gifts bearing model of the scientist but, in this instance, rather than a technology the scientist views the gift as being knowledge; knowledge to which the scientist has privileged access as a result of their expertise and knowledge which is superior to all other forms of knowledge. In turn, communication is seen solely in terms of information transmission. The problem of communication, the failure of their target audience to respond in the ways in which the specialists believe that they ought to do so, is then seen as a problem in finding the right words or teaching the target audience the proper use of words.

This claim to special knowledge leads on to the philosophical questions of what is knowledge and how to we acquire knowledge? Those questions lead on to those as to what is science and what is the practice of science? Epistemology (Dancy 1985) is essentially the study of what do we know, and how or why can we know it. These questions have very practical implications in terms of probability and uncertainty which, in some way, address the questions of what do we expect to happen on the basis of our existing knowledge, and what do and can we know. In turn, the fundamental practical question is: how should we make choices in the face of either probablistic uncertainty or some wider form of uncertainty?

There remains a confusion as to what probability means (Hajek 2003); in practical terms, it is some form of claim as to what we can know and why, and one which is expressible in some form of mathematical axiomisation; conventionally, that of Kolmogorov (1950). One possibility, therefore, is that we are confusing ourselves by treating quite different epistemological claims in a common mathematical axiomisation. Secondly, that we may be further confusing ourselves by expressing claims about the expectancy of events in terms of a mathematical axiomisation of probability in the same form as claims as to our confidence in the truth of some statement. Thus, we can make statements about the likelihood of throwing a 'heads' with a fair coin, but that expectancy depends upon on the truth of the statement that this coin is fair. It is not self-evident that our confidence in the truth of this statement can be expressed in terms of Kolgomorov's axiomisation of probability.

The question of uncertainty and how, therefore, practical choices should be made is, in turn, a reflection of the basic assumption as to the nature of knowledge itself and its acquisition. If knowledge acquisition is seen as accretional, then as we know more, we know better. However, if knowledge acquisition is either evolutionary or revolutionary then as we know more, we know different. In the former instance, what is to be expected is the gain in accuracy, precisely and detail; in the latter cases, some of what we thought we knew will be found to be either false or incomplete or restricted to some areas. How we approach uncertainty, and consequently how we should approach choices, then depends upon which whether we take an accretional perspective or an evolutionary/revolutionary perspective. That Donald Rumsfeld's remark about what we don't know we don't know (a remark previously made in Penning-Rowsell et al 1992) was treated as nonsense suggests a strong human commitment to the accretional model of knowledge.

Whether knowledge acquisition is accretional, evolutionary or revolutionary then informs the question of whether there is an Absolute Truth out there which can ultimately be discovered or whether all knowledge is partial, contingent and provisional. Unless knowledge acquisition is accretional then this question is entirely irrelevant at any prior moment in time. Prior to the discovery of this Absolute Truth all knowledge is necessarily partial, contingent and provisional; some evolutionary or revolutionary change may overthrow all or part of it at any moment in time. This is our practical problem in making choices now. In addition, up until that time when Absolute Truth is discovered, there will also be many knowledges, all of them partial, incomplete and contingent. This is what we see with the different academic disciplines.

A number of different conceptualisations have being put forward by Popper, Kuhn and others (Brown et al 1981; Chalmers 1982; Dancy 1985) as to how we do science, how we

can acquire knowledge or understanding, what practices we adopt. The nature of area of concern of a discipline necessarily influences the nature of the scientific practice adopted so, in turn, those practices differ between what by the individual discipline is labelled as a science. Consequently, the definitions of scientific methodology vary quite markedly; compare, for example, the discussions of the scientific method in the social sciences (Doyal and Harris 1986) with those in economics (Blaug 1992; Hausman 1982). An additional complication is that science is carried out by human beings so what we actually do can be quite different to either what we say we do or to the formal practices deemed to define science.

The nature of the practice of science bears directly upon the Learning Alliances. The rather self-serving conventional model of the conversion of science into practice defines this in linear terms of pure research, strategic applied research, tactical applied research, and finally of consultancy. In this self-conceptualisation by scientists of themselves as gift bearers, we get to do curiosity driven research and this is then turned into practical applications by someone else. As scientists therefore we get do those things which satisfy our curiosity, and assert that since there will be no practical applications without such research we have to be funded to do such research. This model leaves the Learning Alliances as passive recipients of those technologies that are arriving down the conveyor belt from pure research. It gives them no scope for arguing what they would like to see coming down the conveyor belt nor is there apparently scope within the learning process for innovation. A question for the Learning Alliances is consequently how to influence science so that there are techniques and technologies available which address the practical problems on the ground – and to find scientists who are prepared to operate in this way. This depends in part upon the degree to which there is a virtuous circle between theory and practice, since whereas the stakeholders have to address a problem, the scientist wants to study it, and the time scales for the two activities are radically different.

What does characterise ‘science’ in its different forms is the adoption of reasoning by which to reach conclusions. Reasoning, rationality, can be defined is a rigorous, logical process by which to draw conclusions; what Toulmin (1958) described as ‘argument’. Where there is much more debate is as to whether reason can be applied to the choice of ends (Kant 1785), or only, as Hume (1978) and Russell (1958) argued, as to the choice between different means to a given ends.

4.2 Jurisprudence

Jurisprudence is the study of the relationship between, and natures of, law and justice where the two aim to be identical but may not always achieve this identity. Thus, in English law, the law of equity was established to deal with those cases where the application of the law did not result in justice (McCoubrey and White 1999). Jurisprudence has thus devoted an equal amount of attention to procedural equity as to substantive equity. Lloyd (1991) asserts that one aspect of procedural equity is equality of treatment: ‘*all those in the same category shall be treated as equal*’; that is, in accordance with the categories laid down by law and not in either an arbitrary or biased manner. Lloyd also differentiates between formal and substantial or concrete justice where formal justice involves treating in a like way so that there are:

- Rules setting out how people to be treated in given cases;
- These rules shall be general in character; and

- These rules are impartially applied.

Thus, both people and case should be treated in a consistent way; people should also be treated in an appropriate way according to a set of rules so as to avoid arbitrary decisions.

Jurisprudence also includes comparative law (Caponera 1992; Zweigert and Kotz 1992). One condition for water law is then that it works, that it is consistent with the nature and properties of the land-water system (Green 2003a). One element of that condition is that allows the allocation of the available resource to the highest and best use, where both the supply and demand sides of the equation are constantly changing, including technology. The nature of the law then tends to reflect previous conditions rather than matching current conditions. Thus, Riparian law in England developed in a context where there was no need for irrigation and focused upon small scale pollution, diversions for water mills, navigational works and limited abstractions. The Prior Appropriation Doctrine in the western USA (Wright 1990) was ideal for a period of colonisation but fatally flawed when the available water resource had all been taken up and the requirement was to reallocate some of those abstractions to higher and better uses. Again, in most countries, groundwater has been left as a Open Access resource simply because until the invention of electrical and diesel pumps, the effect of the activities of any individual or group of individuals upon the availability of groundwater was trivial.

Comparative law also includes the analysis of alternative systems of law. There multiple different varieties but the four main strands are:

- Anglo-Saxon law
- Roman law/Napoleonic code
- Islamic law
- Traditional law

Anglo-Saxon Common Law is formed upon the basis of the precedences set in previous cases. The virtue of Common Law is that it can adapt to changing conditions (e.g. the shift from the nineteenth century position where people bought goods entirely at their own risk, caveat emptor, to the modern position of consumer rights). Its disadvantage is that it is always to varying degrees unclear what is the law and hence its application in a particular instance. Roman law and the Napoleonic Code in particular have a formal body of law which is expected to cover all conditions under which it may be applied. In consequence, to change it requires re-writing the law itself. Islamic law is centred upon moral principles derived from Islam and much of Islamic law is concerned with working out how to resolve the conflicts between these different principles as they apply in a particular case. Spanish Colonial Law is a mixture of Roman law and Islamic law. Traditional law comes in many different forms but tends to be associated much more with usufructory entitlements and with an emphasis on the importance of resolving conflicts in a way in which maintains social harmony.

Associated with the question of what is ‘right’ is that of ‘who has a right’. In economics it is common to misleadingly refer to ‘property rights’, and frequent reference is made to the necessity to clearly establish ‘property rights’ as a pre-condition for effective water management. For the economist, framing the question in such a way has a number of desirable qualities:

- It implies that there are Natural Rights (Lafarque 1975; Macpherson 1978) associated with the ownership of property and hence the question of whether there are such entitlements is not open to discussion.
- As opposed to Human Rights, rights to the individual, it associates those entitlements and obligations with the ownership or use of property.

In terms of water usage, it both legitimates the Prior Appropriation Doctrine of the western USA (Wright 1990) and promotes it to a hegemonic status: as an approach which should be universally applied. This approach has however three fatal drawbacks:

- As Common (1934), Marx (1981) and Coase (1991) have pointed out, property rights are no more than social relationships articulated and made manifest through the instrumentality of things. 'Private property' simply means that I can enforce some claims upon other people in terms of a particular resource; in the absence of other people, the concept of private property is meaningless.
- There is no universal consensus concerning the nature of the interpersonal entitlements and obligations with regard to water, land or other resources. There are marked differences between the legal traditions with regard to water in, for example, Roman, Islamic and Traditional Law (Caponera 1992).
- One criterion for the success of a system of Water Law is that it works for at least several hundred years in conditions of water scarcity. On this test, the Prior Appropriation Doctrine has failed after less than 150 years to allocate water to the highest and best uses. It is more appropriate, therefore, to look to lessons from those legal systems that have delivered successfully for hundreds of years, notably Islamic water law (Williamson 1990) and Spanish Colonial Water Law (Stevens 1988), itself largely derived from the Islamic and Roman traditions.

Schlager and Ostrom (1992) defined a much more nuanced a hierarchy of entitlements (**Table 7**) that give progressively wider entitlements in terms of the actions to which the holder of the entitlement is empowered. In turn, these entitlements translate into management regimes. Usufructory entitlements are entitlements to withdrawal, whilst alienation entitlements are the classic Anglo-Saxon property ownership entitlements. The two categories in between, management and exclusion entitlements, are then those associated with Common Property Management.

Table 7 Hierarchy of entitlements

(source: Schlager and Ostrom 1992)

Entitlement	Power
Access	To enter a defined physical property
Withdrawal	To gain benefits from that property
Management	To define withdrawal entitlements
Exclusion	To define who will have an entitlement to access
Alienation	To sell or lease withdrawal entitlements

The framing of formal law in terms of justice or in terms of individual rights is itself not the only in which the purposes and processes of law can be framed. Traditional systems of law, and the societies of which they are part, placed a much greater emphasis on the restoration of social harmony (Consedine 1999). The current interest in mediation techniques in western systems of law (Acland 1990) is partly driven by a similar concern.

4.3 Politics

Politics started as an aspect of philosophy and then fractured away to become a separate discipline. The overwhelming bias in the literature is from Western Europe and the European diaspora; from that perspective, any practice from other parts of the world was left to anthropology, often under the rubric of 'primitive government' (Cohen and Middleton 1967). The conventional start of a concern with politics is ascribed to the Greek philosophers, and specifically, the Athenian school, particularly Plato and Aristotle. Whilst Athens had, at some stages, a very participative form of democracy (Barrow 1973) - at least for those who were neither women nor slaves – the natural system of government came rapidly to be seen as a state with a hereditary king. So much so that the nearest equivalent to the Athenian model, that of Switzerland, is now often regarded as being an entirely unworkable as a general model. In turn, all other societies came to be viewed through this prism of the king-state. Both Hobbes and Machiavelli are good examples of such an assumption that a king-state is the basic state of nature. In turn, a central question became what is the relationship between the individual and the king and later the state (Mabbott 1967). A hangover of this approach is the implicit assumption in some neo-liberal writing that the state is some alien imposition on the individual from which the individual must be liberated, rather than the construction of governments having been one of the dominant pursuits of humanity over history. This assumption of the king-state was challenged in the time of the different European revolutions, notably by Locke and latter by Paine. Jefferson's rather idiosyncratic interpretation of Locke then justified the individual centred model adopted in the USA. Much writing on politics continues then to focus upon structures (e.g. that of government, the law and so forth) rather than the nature and purposes of politics; upon the formal manifestations rather than the intrinsic nature of politics.

As a subject of study, the definitions of politics (**Box 2**) differ from the highly cynical (Lasswell's) through the normative (Buchanan) to the general, with the general definitions both harking back to Aristotle's and to the UNDP definition of governance given earlier. The normative model embodied in Buchanan's definition is particularly apparent in the forms of political science, as offshoot of politics, which have been most heavily influenced by neo-liberal economics and which seek to explain politics in terms of 'rational and selfish people' (e.g. Olson).

Two areas of study in politics which bears directly on governance are power and legitimacy. Stakeholder engagement is ultimately about who has to power to make choices, and the forms of power which may be legitimately deployed to make choices. **Box 3** gives a number of definitions that have been used of power. Hence, stakeholder engagement raises a number of questions (Green 2004):

- Who should have power (assuming that power is a zero-sum game so that the gain of power by any one stakeholder is necessarily at the cost of another stakeholder)? Who has an entitlement to involvement, and what creates that entitlement?
- What is a just distribution of power?
- What forms of power may legitimately be used by individual stakeholders in seeking to influencing the choice?
- How representative are those involved?
- What is the relation between unelected stakeholder groups and democratically elected bodies?

- Do the processes through which stakeholders reach a conclusion comply with the requirements of procedural equity?
- What are the obligations that follow from being included in the decision process? In particular, are the stakeholders bound by the decision of the group? What entitlements and obligations follow from a deliberate choice not to participate in the decision process?

A current concern is the role of 'civil society' in decision making, notably the role of NGOs with some definitions of governance focusing on the role of NGOs. This concern is in part a consequence of a lack of a historical perspective; 'civil society' was a central feature of, for example, nineteenth century society in the UK. The role of Friendly societies, Mutual insurance societies, Building Societies and Co-operatives has already been alluded to, as have the importance of Water User Associations in water management. Then, the NGOs were people centred being concerned with such issues as the abolition of slavery, of child labour, the extension of the vote, the emancipation of women, and the introduction of sanitation. The new generation of NGOs both follow on from those traditional concerns and add in a much greater emphasis on environmental issues, although environmental NGOs, such as the National Trust, also existed in nineteenth century Britain. More generally we can define at least three different classes of community:

- communities of place
- communities of interest (e.g. Trade Federations, farmers unions, consumer groups)
- communities of concern (e.g. Poverty action groups, environmental NGOs)

All are potentially stakeholders within decisions but the question as to the legitimacy of each becomes important.

But any group of stakeholders will be a sub-group of society as a whole; the nature of the decision process they adopt is consequently of interest to society as a whole. In particular, if procedural equity is essential to deliver substantive equity and procedural equity is also the means by which collective action, and the benefits thereby gained, is maintained then wider society has a legitimate interest in the procedures adopted by any one group. It also has a legitimate interest in ensuring that the group is not simply conspiring to solve its problems at the expense of the unrepresented others e.g. whether a trade association is seeking to fix prices or prevent the entry of competitors, or whether farmers are simply demanding a further subsidy.

The definitions of power given in **Box 3** are instrumental; anything that can induce change is power. Consequently, there are potentially multiple forms of power that might be employed by a stakeholder in a choice in order to influence the outcome of that choice. These include:

1. the use or threat of the use of force
2. money including bribery
3. reason
4. information/knowledge: hence the claim to have special and authoritative knowledge
5. moral claims (e.g. 'it is not fair')
6. emotional appeals (e.g. 'it will ruin my life')
7. the threat of withdrawal (e.g. threat of legal action, of protest)
8. political influence (e.g. 'I'm a friend of the Minister')
9. social norms (e.g. 'people expect')

The naked use of the first two are generally seen as illegitimate in many contexts. What is important here are that reason and information, if they can influence the outcome of a choice, are both themselves forms of power. Hence, their use highlights the question of what is a just distribution of power since some groups of stakeholders will either be better able to deploy reason or information than others, or have the resources to buy in reason (most obviously in the form of lawyers) and information. Different systems then promote different forms of power to a privileged status, whilst the possessors of particular forms of power then wish to promote that form of power to hegemonic status (Simon 1982). So, for example, an entirely market based system embodies money as power and neo-liberals seek to promote market based systems to hegemonic status.

Box 2 Definitions of Politics

"Who gets what, when and where" (Lasswell cited by Boulding 1970).

"Politics arises from accepting the fact of the simultaneous existence of different groups, hence different interests and different traditions, within a territorial unit under common rule" (Crick 1964).

"Politics, then, can be simply defined as the activity by which differing interests within a given unit of rule are conciliated by giving them a share in power in proportion to their importance to the welfare and survival of the whole community" (Crick 1964).

"…. an activity, a sociological activity which has the anthropological function of preserving a community grown too complicated for either tradition alone or purely arbitrary rule to preserve it without the undue use of coercion" (Crick 1964).

"Politics – as a practical activity – is, in my view, the discourse and the struggle over the organisation of human possibilities. As such, it is about power; that is to say, it is about the capacity of social agents, agencies and institutions to maintain or transform their environment, social or physical" (Held 1989).

"The term "politics" is used to describe the process through which individual and collective decisions are made" (Selby cited in Dunn 2000).

"Because people live together in groups, there is a need to make decisions ……The study of politics is the study of how such decisions are made. It may also be the study of how such decisions should be made (Bentley et al 1995 cited in Dunn 2000).

"comprises any kind of independent leadership" (Weber 1948 – essays in sociology).

"Politics is a structure of complex exchange among individuals, a structure within which persons seek to secure collectively their own privately defined objectives that cannot be effectively secured through simple market exchange" (Buchanan 1986).

Box 3 Definitions of power

"the capacity to intervene in a given set of events so as in some way to alter them" (Anthony Giddens 1985).

"the probability that one actor within a social relationship will be in a position to carry out his own will despite resistance" (Max Weber 1922).

"…. corresponds to the human ability not just to act but to act in concert. Power is never the property of an individual: it belongs to a group and remains in existence only as long as the group keeps together" (Arendt 1970 cited in Haugaard 2002).

"…. Power springs up whenever people get together and act in concert, but derives it legitimacy from the initial getting together rather than from any action that then may follow" (Arendt 1970 cited in Haugaard 2002).

"…. power should be understood as the capacity of one or several classes to realise their specific interests. It is a concept designating the field of their struggle – that of the relationship of forces and of the relations between one class and another; the concept of class interests thus designates the horizon of action occupied by a given class in relation to others (Poulantzas 1978 quoted in Haugaard 2002).

"Power then is generalised capacity to secure the performance of binding obligations by units in a system of collective organisation when the obligations are legitimised with reference to their bearing on collective goals and where in case of recalitrance there is a presumption of enforcement by negative situational sanctions… "(Talcott Parsons 1963).

"Power, therefore, that is to say social power, must be an aspect or a characteristic of a distribution of knowledge, and indeed this is precisely how I propose to define it and conceive it. Any specific distribution of knowledge confers a generalised capacity for action upon those individuals who carry and constitute it, and that capacity for action is their social power, the power of the society they constitute by bearing and sharing the knowledge in question" (Barnes 1988).

4.4 Economic history

Understanding the evolution of the past may provide both an explanation of why the present has occurred or a prescription for the future, of lessons to adopt as well as lessons to avoid. Unfortunately, economics has abandoned economic history – because it has a Theory which provides a complete explanation for everything and hence there is no need to explore the past.

Because water is a necessary condition for human survival, the history of water management is as old as that of humanity. Thus, for example, in the Indus civilisation, cities such as Harappa had water and sanitation systems. Similarly, irrigation began several thousand years ago and the drainage of western Europe was largely completed by the C13th. Hence, the study of water management in history is likely to have lessons for the present. For example, the diffusion of rainwater harvesting in India (Agarwal 2001) has grown out the study of traditional systems of water management (Agarwal and Narain 1997).

Secondly, unlike economics, economic history has a concern for process, of development and change over time. It also free of the assumption in conventional economics that markets are ideal and the answer to everything. Whereas Wittfogel (1957) asserted that large scale irrigation systems were the product of centralised dictatorships, most of water management has been undertaken through collective or communal action rather than through the market or through central government – this has played a supporting role. This communal action has either been mobilised through the towns and cities or more directly. Thus, there are still some 12,000 to 18,000 Water User Associations in Germany (pant 2000), the exact number is apparently not known, providing a variety of single function water services (water supply, irrigation, drainage etc). Again, there are around 6,200 Water User Associations in Spain (Garcia nd) and 1,900 in France (Garin and Loubier 2002). Historically, most of the land drainage across Western Europe was undertaken through Water User Associations (Wagret 1967) and there in the order of 18,000 single or multi-function WUAs in the USA (US Census Bureau 2002). The best known of these Water User Associations are the Waterschappen in the Netherlands (Huisman et al 1998) and the Huerta in Spain (Glick 1970). Two obvious questions are, therefore:

- Why did this become the dominant model of water service delivery?
- How can such communal systems actually work and what are the conditions for success?

These questions are particularly pertinent since the WUAs are being promoted as a service delivery mechanism now. Thus, the promotion of the conversion of government run irrigation schemes to farmer run systems (Bruns and Atmanto 1992). The same pattern is seen in condominial sewerage schemes (de Melo 1985), the Orangi model in Pakistan (Zaida 2001), and rural water supply schemes (Davis et al 1993). The question of how such communal systems can actually work and the conditions for their success has been taken up under the rubric of Common Property Management (see below).

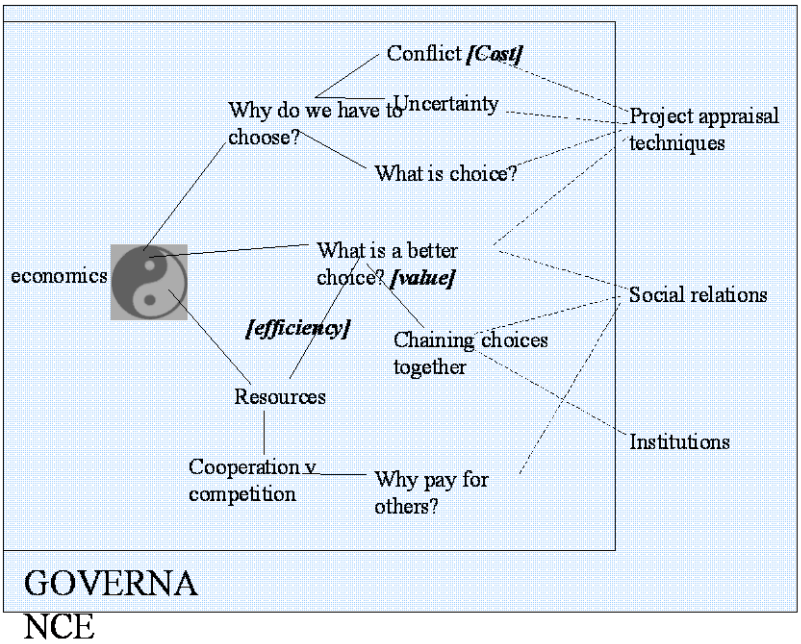
Once urban centres developed, the other primary delivery mechanism through which water services were provided was through the municipalities. In Germany and the Netherlands, the 'Stadtwerke' model (Blokland et al 1997) was prevalent: this in legal terms is a private company but one where all the stock is owned by the participating municipalities. By being a private company, the operation of the company is freed from political interference but it has greater access to the financial markets through the support of the municipalities. One diagnosis (Baker 2002, Kundu 2001, Peterson 2003) of the problems of delivering water services in India, for example, is that whereas cities in North America and Europe had access to well-developed capital markets which enabled them to float capital bonds, there is a lack of a similar market in India, and, unlike China, the savings ratio may be too low for sustained economic growth (Zhang and Wan nd). This emphasis in Europe on municipal provision may in part be because private companies and the modern capital markets developed relatively late, the mid-nineteenth century, as did the generalisation of markets (Polyanyi 2001).

In those countries where there was a high degree of decentralisation of government (e.g. the 36,500 communes in France; the 14,561 municipalities in Germany), the small scale of each promoted the creation of collaborative bodies to deliver water services: the Syndicats in France (Barraque 2003) and the Verband in Germany (Kampa et al 2003).

4.5 Economics

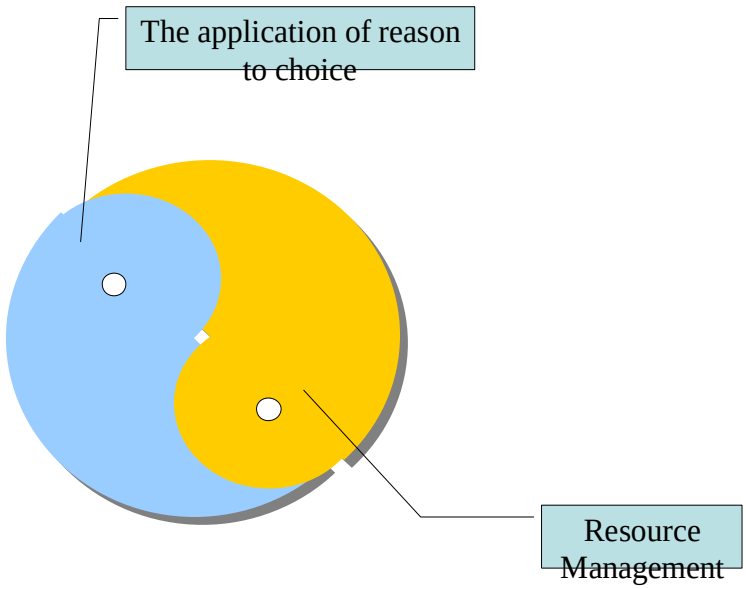
Economics originated in Philosophy as Political Economy and then progressively reformulated and narrowed its focus to become the now dominant economic paradigm of neoclassical economics. This took the C19th science view of the world as clockwork, adopting the cloak of mathematics, just when physics was switching to quantum mechanics, and it sought to claim to be value-free (Robbins 1935) whilst make implicit and very strong moral assumptions. Simultaneously, it started to use words in ways entirely different to their everyday meaning (Arrow 1987). Thus, whilst economics should be central to governance (**Figure 21**), the dominant public view of orthodox economics as boring, intellectually suspect, and at best amoral and worst immoral is not entirely unfair. The challenge is to invent an economics which is fit for purpose.

Figure 21 Economics and governance



Economics can be defined in terms of a Yin-Yang sign (**Figure 22**): of two parts joined into a whole. One component of economics is the 'application of reason to choice'; the other component is the management of resources so as to enable better choices to be made. In conventional economics, the two parts were brought together through perfectly competitive markets. This conjunction solved the problems of a unified theory which combined the elements from the two sides. Thus, 'value' and 'cost' were joined in the 'price' which fell out of the market. Similarly, individual time preference for consumption joined with the opportunity cost of capital in a discount rate which again fell out of the market. The prices which fell out of those markets were then asserted to be such that the optimum allocation of resources was achieved so as to deliver on what was assumed to be the sole societal objective in choice: that of maximising some sum of the preferences of individuals. The practical result of this fortunate assumption was that it was unnecessary to think, for example, what is the nature of resources. In effect, a great deal of intellectual effort was put into the endeavour of creating a concept of perfect competitive markets so as to avoid the necessity for any further thought.

Figure 22 Yin Yang



Unfortunately, this convenient model is no longer viable for a number of reasons:

1. Conventional economics assumes that individuals have determined their values (by some unknown process) prior to addressing any particular choice. Stakeholder engagement is, by definition, a social process during which the stakeholders will argue, debate and negotiate values.
2. Nobel prizes for Economics were awarded to Coase and North for work which destroyed the assumption that a perfectly competitive market is possible which results in the optimum allocation of resources. Both in turn have called for the development of new economic frameworks. Taken together, the necessary abandonment of perfectly competitive markets always yielding optimum outcomes and the social construction of values mean that the two parts of the Yin and Yang of economics are no longer joined in a whole.

In addition, water is not like the goods assumed in economics text books in a number of critical ways (Green 2006):

- We manage water in order to make best use of land.
- Water is commonly available in the wrong place at the wrong time, and often too erratically, for human purposes: storage is consequently critical in water management as is moving the water from the point of availability to the point of need.
- Water is heavy and incompressible; consequently, water is energy intensive and therefore, historically, the preferred option has been to make use of potential rather than kinetic energy. The viability of any water management option still depends critically upon the real cost of energy.
- That means water management has been and still continues to be capital intensive; building reservoirs to store water at high level and aqueducts or canals to convey water downhill the points of demand has been the most efficient means of water management.
- In turn, short run marginal costs are frequently constant and may be negative; therefore it is the ability to fund the capital costs that is the crucial problem. Hence, it is the ability of institutions to raise capital at a low cost, or to reduce that capital cost, which is the primary condition of success in water management. In turn, collective

action has historically been the primary form of water management rather than reliance upon the market. Thus, water is a Ramsey good – one where capital costs are critical and marginal costs either constant or falling – and one where transaction costs are high. In these conditions, the textbook solution of charging on a marginal cost basis does not ensure the recovery of costs (Ramsey 1927). Conversely, Ramsey pricing, which loads costs on to those sectors of the market whose demand is least sensitive to the price, is inequitable if it is the poor whose demand is least price sensitive.

- Because water is managed as a capital intensive good, and also because treatment processes are essentially biological in nature, adjusting to changes in demand takes time and hence water management relies heavily upon predictions of future demand and availability.
- Water is, because of the quantities required to grow crops, necessarily a low unit value, bulk commodity. In turn, both information and transaction costs can rapidly come to dominate the cost of provision. In consequence, water management has been concerned with minimising both the amount of information it is necessary to acquire and the costs of recovering the costs of provision.
- Consequently, transaction costs are high relative to the unit value of water.
- The problem is to allocate essentially fixed amounts of water between competing uses rather than to determine how much to produce.
- Surface water is made available in an individual catchment, the area of land which drains through a network of watercourses to some sink. Each catchment is a complex system which involves not simply the movement of water but also of the erosion of soil and its deposition of sediment, together with the pollutants entrained in that water and soil. It is a system which is dynamic both spatially and temporally, and, in consequence, any action upstream is likely to have consequences downstream. Thus, the economist's 'externality' are a necessary consequence of action within a system rather than an unfortunate and incidental effect. In turn, what is locally an optimal act can be sub-optimal from the catchment perspective. Water, along with air, are the two mechanisms by which the actions of any one land user can impact upon another and so create externalities. Coase (1991) asserted that his article on 'Social Cost' (Coase 1961) was widely misunderstood; that what he was pointing out was the necessity of making transaction costs a central concern of economics when externalities exist.
- Demand is essentially determined by technology rather than behaviour.

Conventionally, economics has focused upon competition; water services have historically been provided through co-operative action. There is little economic theory which bears on the critical questions of when co-operation is preferable to competition (although co-operation against the public interest through oligopoly is recognised), or on the economics of co-operation and collective action more widely. If North (1990) is correct then we have a major problem: "*The theory employed, based on the assumption of scarcity and hence competition, is not up to the task. To put it simply, what has been missing is an understanding of the nature of human coordination and cooperation.*" One aspect of that practice of collective action is the common practice of contributing towards the cost of providing goods or services to others. For example, in the USA, local bonds are commonly raised to fund the costs of providing the cost of flood alleviation, or similar works, for part of the community. Shabman et al (1998) reported on the reasons why those who were not at risk of flooding gave for voting 'yes' in the referendum as to whether the town should issue a bond to part finance the proposed flood alleviation works, where a tax on utilities would be

imposed to fund the bond repayments. McCrae and Whittington (1988), in a study on willingness to pay for rural water supplies in Haiti, includes the comment of one man who was prepared to pay towards the costs knowing full well that he would not gain directly from the supply.

This apparent propensity to pay for the provision of services which partly or largely benefit others has already been discussed. The obvious three questions are:

- Why?
- For what?
- How much?

The 'Yang' side of the equation is resource management: making the best use of resources to achieve the objectives. The assumption of perfectly competitive markets has meant that it has been possible that the markets, whatever they are doing, produce the most efficient result. The result is that theory on resource management is somewhat thin. In addition to the conventional distinction between renewable and non-renewable resources, it is also necessary to distinguish between depletable and non-depletable resources. This gives a four way split. For sustainable development, the appropriate intensity of use of a natural resource depends upon where within this four way categorisation the resource falls:

Depletable/non-renewable – at a rate not greater than the rate at which technical efficiency increases and the rate at which it can be replaced by another resource.

Non-depletable/non-renewable – it would appear that land area is the only such resource and the logic is to maximise the intensity (in the broadest sense) with which it is used.

Depletable/renewable – the depletion rate should not exceed the rate at which it is renewed.

Non-Depletable/renewable – no limits.

These resources are then combined with human resources (time and energy or labour), production durables such as machine tools and roads, to produce the different desires outputs. The overall efficiency ratio of outputs to inputs is critically determined by such factors as institutions and technology.

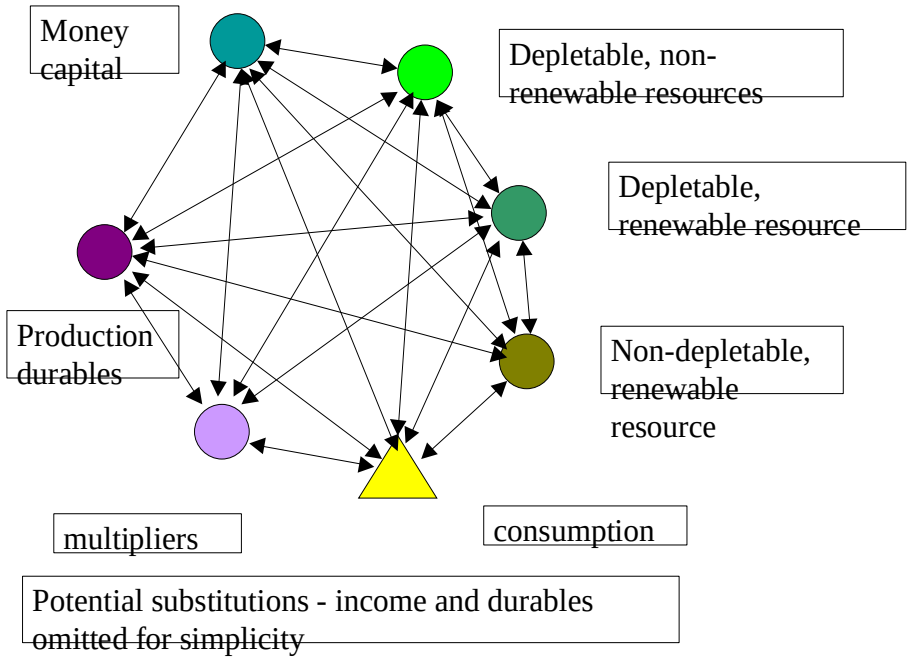
The decisions then have to be made about the utilisation resources within each of the above four resources and between them (**Figure 23**). There are at least three possible relationships that may be involved:

1. Substitution (e.g. labour by production durables, copper by aluminium).
2. Conversion (e.g. timber to paper).
3. Exchange (e.g. timber for money).

The rates at which substitution and conversion can occur are firstly governed by the laws of physics, chemistry and biology. So, for example, timber can be converted to paper but paper cannot be converted to timber, and, whilst copper pipes can be replaced by aluminium pipes, for aircraft wings, copper is not a substitute for aluminium, nor is aluminium a substitute for copper in the production of brass. The properties of an element are a function of its position in the Periodic Table; that this is a table limits the scope for substitution and conversion. For example, the desirable properties of copper are: it is malleable; has high ductility; that it forms alloys, notably bronze and brass; its high thermal and electrical conductivity; and its resistance to corrosion. For chemical compounds there are similar issues; for permeable pavements, storage is provided in an aggregate substrata.

The material to be used for that substrata needs to be: chemically, physically and biologically stable; to have a high crushing strength; available in a variety of grades or sizes; and to be cheap because large quantities are required. It is unlikely that any technological innovation will enable a wood based product to be used instead.

Figure 23 Resource allocation



Secondly, the capacity to make the substitution or conversion is determined by the prevailing technology. For example, timber water pipes could not be substituted by the iron pipes until the technologies for producing cheap iron, producing large diameter iron pipes, and jointing iron pipes had all been developed. Similarly, whilst it is possible to design a building in which all of the forces are compressive (e.g. Roman, Romanesque and Gothic architecture), and thus materials which are strong in compression but weak in tension can be used, it is not possible to design a building in which nearly all of the forces are tensile (unless it is suspended from some helium ballons).

There is an enormous literature on economics and also on water and economics. There is an economic literature on governance which does, however, redefine governance to fit within economic orthodoxy. But whilst this is a great time to be an economist, it is a very bad time to a potential user of economics because, as discussed, the economic shelf is largely bare of useful, plausible and relevant theory. Therefore, the material included in the bibliography do not present answers but useful or insightful questions.

4.6 Sociology

The obvious question when looking at the behaviours of the individual and the group, and the processes through which those behaviours are created, is whether to start with the individual or the group. Traditionally, psychology (and economics) started with the individual and added in the social context of that individual; sociology and anthropology

start with the social context. This is not universally true because Behaviourist Psychology asserted that the individual's behaviour could be determined by environmental and social conditioning. Associated with this question is the issue of the degree to which the behaviours of the individual are determined by the individual, or are produced as a result of social setting of the individual. So, for example, Duesenberry (1960) remarked: "*Economics is all about how people make choices. Sociology is all about why they don't have any choices to make*." The potential power of such socialisation is expressed in the old claim of the Jesuits that given a child until age five, that child would be a catholic for life. Such social processes not only are argued to form social norms, which are themselves a strong influence upon behaviour, but also underlie the nature of knowledge, language and the construction of reality (Berger and Luckman 1967).

Here, the starting point is taken to be the social setting because the individual lives within such a setting and to be successful has to be successful at operating within that setting. Hence, sociology (literally, 'the study of the processes of companionship' and more generally sociology can be taken to be the analysis of social relationships, and their reciprocals of social roles, construed through social interactions) is taken as the starting point. The parallels between the earlier definition of governance and this one of sociology are obvious. Equally, Williams (1963) assertion that culture is "*right knowing and right doing*" obviously has close parallels to Aristotle's claim, quoted earlier, that the formation of ethical virtue is through habit.

Of particular relevance to the problems of governance are then nature of these different systems of relationships and roles, the nature of those roles and relationships, and the extent to which they can be created. A community based water supply system relies upon there being some form of 'community' in the first place, one which is capable of acting as a community. The two most relevant such systems are the household and the community. In both cases, recognising an example of each is much easier than providing a general definition of the concept. Each example of the two different concepts is likely to share one or more, but not all, of a number of characteristics so individual instances can be widely different. For example, even within the UK, the way in which households manage expenditure and control money varies markedly (Pahl 1989).

Sprey 's (1969) definition of a household as a zone of 'cooperative-conflict' has both been widely adopted within market research but also has the potential to be a general model of cooperative action. Sprey asserted that the members of a household do not necessarily share common interests but a household is stable as long as each member gains more from being part of the household than from leaving it. Within that household, each member will logically seek to influence the decisions made in such a way as to maximise that person's own interests, although 'own interests' made be widely interpreted so that a mother may have totally identified with the interests of her children. Within a household, or any social setting, one of the key relationships is that of power. Thus, on the definitions of power given in **Box 3**, more than half are from sociological theorists, notably Weber, Talcott Parsons and Giddens. Of these, that of Giddens is the most general: any capacity to influence the course of events is power. What therefore differs is the nature of power and who has it, the range and limits of action that can be affected by that power, as well as the legitimacy of using a particular form of power in particular circumstances. In particular, knowledge, skills and reason have to be understood as power (otherwise they are defined as ineffective) so raising the question of how such power is distributed: who has access to such power and who does not.

Some forms of power are socially produced (e.g. social norms, the threat of withdrawal); one cluster of power is “Social capital”. This is a complex of concepts from sociology (Portes 1998) that are associated with the work of Bourdieu (1980), Coleman (1988) and Putnam (1993), although none of the ideas are themselves new. There are at least three distinct but related concepts involved:

- Resources that a household can draw upon. A distinction here must be made between those which are spontaneously made available to that household when it is perceived by the wider community as having need of them, and those which the individual household can enforce a claim to. An example of the former is the case of Maria’s son in the village of Pedregal (Nicaragua). When he was bitten by a snake, neighbours ran to the owner of the best mule in the village. Whilst he carried the boy on his mule eight miles to the nearest hospital, other women arrived to take care of Maria’s other five children, another neighbour arrived with his mule to take Maria to the hospital, and a collection was taken to cover the cost of the hospital visit, the medicine required (Anderson 1994). A third category is then help which is made available when asked for.
- Trust in each other. This reduces the cost of transaction in the market (contrast the ‘my word is my bond principle’ with the modern need for a very detailed contract). Early trading networks in the Mediterranean were developed through kinship networks. Similarly, the traditional practice of always leaving the door open is another example of trust.
- Communal solidarity: the capacity for a community to take collective action, including undertaking flood alleviation works.

The oddity of the first and second elements is that they treat social capital as an individual resource whilst social capital is clearly a function of social relationships. The concept of social capital raises the question of whether it is possible to talk of resilient communities rather than resilient households, and perhaps more appropriate to do so.

If social capital is important, then the obvious questions are: how can it be produced? And, what will reduce it? For example, it might argued that the adversial relationships that define a market relationship are destructive of social capital. Conversely, Social Capital appears to be most prevalent in poor and particularly rural communities. At the same time, social capital will not always be seen as desirable by others; for example, the studies on the political ecology of peasants are centred on their ability to achieve land reform in opposition to other interests. So, social capital might enable a community to achieve a flood alleviation scheme when this was undesirable from a wider perspective.

Clearly, economic relationships and exchanges can be examined from a sociological perspective and hence the sub-discipline of “Economic Sociology” has developed.

4.7 Anthropology

Anthropology literally means ‘human study’; here, the concern is with the narrower field of ‘cultural anthropology’. Here, there is a clear overlap with sociology – one might cynically define anthropology as sociology with a good travel agent – but there are some important differences. The first is that the subject of anthropology was always ‘out there’, other cultures, whereas sociology has primarily been constructed through the eye of the European culture. Sociology thus has tended to construct the world in the framework of the

European culture and that of the European diaspora; a view from a particular time and place, notably that of industrialised, urban societies. This has tended to exclude those societies which constitute the majority of the world which are not yet industrialised, urban societies and similarly to exclude those institutional forms which are not seen as typical of the market economy.

Sociology also tended to look for universals whereas anthropology has a much greater interest in diversity. For example, the difficulty in defining a 'household' simply because of the enormous variation across the globe whereas there is otherwise a tendency to treat the conventional European model as a universal. Anthropology also has tended to take 'culture' as the great unifying theme.

Four areas of study in cultural anthropology are particularly relevant to governance:

- The study of traditional resource management - e.g. land, water, fisheries, forest, water management practices (Bromley and Cernea 1989) - and of traditional forms of government more generally. These issues are discussed in more detail in the section on Common Property Management.
- Exchange theory (Davis 1992) of which market transactions are a subset, and the role of money more generally (Perry and Bloch 1990). There is across the disciplines a lack of any clear and generally accepted theory of money (Hart 2005).
- Political Ecology (Anderson 1994; Scott 1995) – the existence and practice of community norms, and the capacity of the community to mobilise.

The fourth area is the symbolic role of water in culture (Bougerra nd). The uses of water may be functional but they are frequently also loaded with symbolic weight; the rapid diffusion of water closets may have been influenced by the symbolism of washing away of the unclean by the archetypical clean: water. Both water as a medium and water as physical forms (e.g. rivers, springs) typically have a cultural importance which has to be taken into account when managing water. Water is normally a symbol of purity and hence the importance of washing in many cultures both before religious observance and after some other activities designated as 'unclean'. Western societies like to think that they are free of such 'superstitutions' but one toilet cleanser used to advertise with the slogan 'it kills 99% of all known germs'. This would be a useful property of a product designed to clean food preparation surfaces but it is entirely irrelevant when considering cleaning a toilet. Similarly, hotels now routinely arrange the end of toilet paper in a triangle shape and in the USA it is common to put a paper strip across the toilet seat as a signal that the toilet has been cleaned. Both practices serve a purely symbolic purpose. Bottled water is similarly very popular although in terms of purity it is frequently of lower quality than tap water and subject to much looser standards and testing. Concerns have been expressed as to the willingness of people to drink directly recycled wastewater. That is, treated water direct from the end of the process rather than the universal practice of drinking water which is recycled after passing through the environment. Again, whilst a shower may be a more efficient means of washing than a bath, it has other functions as well, and a bath can have different purposes – hence, the common development of specialised forms of bathing (e.g. Turkish baths, saunas), which also tend to be a social event.

4.8 Social Psychology

There are four areas of research within Social Psychology which are of particular relevance to governance:

- Theories of attitude formation and behaviour as forming the basis for attempts to introduce sustainable behaviour.
- Economic psychology, the study of choice and action within households.
- Social justice theory
- Small group working: how do they do it? How well do they do it? What helps to improve their performance?

Ajzen and Fishbein's (1975) theory of attitude formation and behaviour has become the conventional model of the relationships between beliefs, attitudes and behaviour not only in psychology but also in marketing and market research. Whilst a rich model, its limitation is that it is not a model of choice; attitudes being held towards a particular thing, or more specifically action, rather than between actions. The model includes both the influence of social norms, found to be important even in such behaviours as the brand of toothpaste bought, but also the knowledge of the beliefs of others. It has been employed in seeking to understand why some people adopt sustainable behaviours (e.g. Kantola et al 1982).

In economic psychology, Sprey's 'cooperative-conflict' model of the household has been particularly influential in studies of choice within households and the use of different forms of power within households; for example, of the tactics used by children to influence the purchasing decisions of their parents (Moschis 1985).

Whereas jurisprudence and philosophy have conceptualised about the nature of fairness, justice and equity, social justice theory has created an experimental corpus of work exploring both what is seen as fair in a particular circumstances, and the reasons why particular procedures or outcomes are seen as fair.

Since stakeholder engagement involves some form of small or large group working, the research on group working is of relevance (Sunstein 1999). As discussed earlier, the work on the processes and their effectiveness adopted by juries in criminal trials is of particular relevance even though the task faced by a jury can be considered to be simpler than that with which a group of stakeholders is likely to be faced.

4.9 Organisational theory and management science

If institutions are systems of rules, they are manifested in terms of organisations, people and activities organised to a common purpose. Furthermore, one set of stakeholders are those with the power to act and an important group of those stakeholders are organisations. In turn, an organisation has to be effective in terms of its own goals and objectives; this requires successful co-ordination or co-operation. Organisational theory can be seen to mirror political theory with early organisational theory (e.g. Taylorism) and its emphasis on line management, task subdivision and central control echoing the Hobbesian emphasis on the requirement for a strong King to prevent society otherwise falling into chaos. Taylorism can equally be seen as the capitalist equivalent of Soviet style central planning economies. The more recent forms of organisational theory, some informed by Complexity Theory (Lewin and Regine 2001), are more akin to Jeffersonian models of democracy.

Therefore, there are lessons, in principle, to be learnt from how organisations function if they are to be successful, both for the specific organisations that operate in the water management field and in the ways in which co-operation and co-ordination can be achieved between organisations. Furthermore, a modern business operates under very similar conditions to those required for successful water management: a very high rate of environmental change which requires both constant innovation and adaptation. Hence, there are potentially lessons to be learnt as to how to do this in other contexts.

Whilst the concept of perfectly competitive markets requires the failure of any firm which is not successful relative to its peers and in its context, economic theory provides no guidance as how a firm can achieve success. Whilst economic theory is descriptive, it provides no help to those who must act within the domain described. Hence, calls for the wider introduction of markets are little better than evocations of magic; unless the firms are successful, then all will fail and so in turn will the market based approach. The marketing literature (Kotler et al 1999) covers the practicalities of setting prices which process is altogether richer and more complex than economic theory suggests.

Again, one of the weaknesses of calls for more market based approaches to be adopted in water management is a tendency to identify such an approach with a rather antique conceptualisation of the modern firm. For example, the privatisation of the wastewater and water industry in England and Wales occurred at a time when the government rhetoric was also about the right of managers to manage. But this hierarchical conceptualisation of leadership was in marked contrast to, for example, Warren Bennis's (1989) discussion of the nature of leadership. 'Ed', Bennis's example of a leadership failure, is close to the example of the sort of manager that was being recommended by the then UK government and indeed being adopted by the then Prime Minister. Equally, by privatising the wastewater and water industry as it stood, simply converting the organisational structure that had historically developed, the UK government did not think about what are the potential strengths of private industry nor the conditions under which those will be demonstrated. Simply changing the capital ownership of a bureaucracy from private to public or vice versa without changing either the operating environment of that bureaucracy or its structure should not be expected necessarily to change anything. More generally, the continuing promotion of wastewater and water privatisation tends to be a solution in search of a problem rather than being grounded in either an analysis of the problem space or in the comparative strengths of a competitive approach. Conversely, there may be lessons to be learnt from such examples of entrepreurnial approaches as:

- Small scale water suppliers in, for example, Paraguay (Solo 1998, Troyano 1999).
- An extension of the current INSET approach in England and Wales (Ernst and Young 1999) where, for example, a private company might offer a wastewater and water management package to an industrial plant or housing estate. The shift to localised water management solutions means that there is no obvious reason why any one company or organisation should supply either water or wastewater across a geographical area, even across a catchment.
- The practice in Paris where, given that water metering occurs only to the level of apartment buildings or complexes, private firms offer the building owners a water audit on the basis of taking a share in the resulting savings (Judd 1993).
- The example of Proctor and Gamble in Mexico. Here, the company moved to a dominant position in the domestic detergent market by recognising both the strong emphasis on clean clothing, and that the prevailing practice for washing clothes was both water intensive and consequently labour intensive (i.e. the water had to be carried

home). They introduced a product which reduced the need for rinsing the clothes and thus reduced water demand and in turn the amount of time women spent fetching and carrying water. In turn, some of the increased profits are used to provide rural water supply systems (Jaramillo 2006).

Too much should not be made of the parallels between the wastewater and water industries and consumer based industries simply because the former is so capital intensive. This makes it what seems like an old-fashioned industry so the parallels to, for example, those industries which must respond and adapt to, and lead, consumer preferences (Semler 1993; Peters 1987) are not strong. The issue is more one of whether the wastewater and water industry can be reconfigured to be more similar, as just discussed. To the extent to which it cannot, then two critical issues will remain the degree to which either capital requirements can be reduced, or the cost of capital can be reduced. But in that case, the parallels with other capital intensive industries, such as the energy industries, will remain. In all capital intensive industries, because responding to positive change requires capital investment and that takes time, it is not possible to respond to the present but only by anticipating the future (Conversely, van der Heijden shows that after the 1973 oil crisis and the resulting stagnation in demand, it was eight years before refining capacity started to reduce to match the new level of demand; it was four years before new orders for oil tankers started to fall).

In confronting the future, the conceptualisations of how to do this differ from those generally adopted by engineers and economists. Thus, van der Heijden (1996) distinguishes between:

- Risks: where there is sufficient historical precedence to enable the estimation of probabilities.
- Structural uncertainties concerning events for which there is no evidence by judge how likely it could be.
- Unknowables, where we cannot even imagine the event.

He argues that in strategic planning, most of the uncertainties are in the structure of the situation so there is no basis for making any probabilistic judgements. The approach he outlines, that previously adopted by Shell International (2001, 2005), is that of scenario planning: exploring the way in which the environment of the business may change and looking to see whether a particular decision will be robust across a range of alternative futures. The obvious two lessons here for integrated water management are:

1. To consider reversals of current trends rather than conventional assumption that growth is eternal.
2. To consider both how to choose and what options should be chosen when confronted with structural uncertainties and unknowables.

Here, whilst there was a period in the 1970s when it was sought to optimise the performance of organisations (Dror 1968), partly by adopting a holistic vision, an approach which failed because it demanded more knowledge and capacity than is possible, the ‘muddling through’ approach described by Braybrooke and Lindblom (1970) can be seen as a response to complexity and uncertainty.

But such a strategic conceptualisation is only part of the response to a changing and unknowable future. Another element of the response is organisational so that Peters (1987) could title his book on successful companies: ‘Thriving on Chaos’. Semler’s (1993) discussion of his own company’s organisational form is set in a particularly difficult business

environment. Both within individual stakeholder organisations and more particularly between those organisations, there may be lessons to be adopted from commercial experience.

Again, and paralleling the Learning Alliance model, there is a literature on organisational learning (Argyris and Schon 1966); since institutions are defined by rules, the problem how one can then learn is obviously challenging. A further parallel requirement is that of innovation and there may be lessons about the promotion of innovation (Henry and Walker 1991), as well as both promoting change and adapting to change more generally (Burnes 1992).

Again, the organisational theory literature covers a large number of nuts and bolts issues which will be common to Learning Alliances and stakeholder engagement more generally. There is a general view that any team should be made up of specialised role members; one short list is that a team needs a Captain, Administrator, the Driver and the Expert (Handy 1999). Again, any Learning Alliance and any organisation involves multiple meetings: there is a corresponding literature on how meetings can be most effectively organised (Keiffer 1988). The definition of the essential roles within a team raises the question of both how people can be identified for those roles and how they can be trained to be better at each of those roles. If the absence of someone with a key role is likely to lead to a dysfunctional team, poor performance by the person placed in that role may be little better. Some of the literature on stakeholder engagement in practice can be seen to reflect either the failure to have a coherent team or failures within the team. There is then an overlapping literature on leadership; it is not, to me, clear whether the call for leadership is seen as a substitute for effective team work or whether leaders are seen to fulfil specific wider roles.
Bennis (1989) argues that leaders share some or all of the following characteristics:

- Vision: a clear idea of what they want to do.
- Passion: a love of what they do and of doing it.
- Integrity: self-knowledge, candour and maturity.
- Curiosity: about everything, to experiment, to learn.
- Daring: including a lack of a fear of failure.

The problem with this list of qualities is that they would seem to represent personality characteristics, or the product of early socialisation including education, rather than skills in which people can be trained. In turn, that raises the question of the extent to which a team can perform better than the individuals who are members of that team, and thus how teams should be organised.

There may be very pragmatic lessons to be learnt from industrial experience, although the danger is always of learning and adopting what worked in the past rather than what will work in the future. For example, Proctor and Gamble has grown to be a very large multinational by taking a customer focus. Thus, those joining the marketing section of the company in South America first have to go and live in an informal development for some weeks and then work in a local store in such a development. They are then expected to spend the majority of each week talking with their customers (Jaramillo 2006). It would be surprising if many senior executives in public administrations spent the same proportion of their time meeting with their ‘customers’. Or, one has to say, if many academics spent a similar proportion of their time with students in equivalent circumstances.

5 Inter-disciplinary research areas

If the deepening and sharpening of knowledge and techniques drives towards specialisation and the ever greater fragmentation of disciplines, the recognition that the world is composed of systems requires synthesis across disciplines. The problem of doing inter-disciplinary research therefore mirrors that of stakeholder engagement; equally some of the lessons that have learnt in studies (Mansilla et al nd; Mansilla 2004; Miller and Mansilla 2004) on how to maximise the productivity of interdisciplinary may also have a relevance to how to organise Learning Alliances specifically and stakeholder engagement processes more generally.

In the research areas discussed below, and the individual pieces of work within them, some are truely inter-disciplinary, others are different discipline based approaches to a common cluster of related questions.

5.1 Stakeholder engagement

Stakeholder engagement is seen as a good thing in itself and as a means to producing better outcomes for the reasons discussed earlier. The two critical questions, as previously discussed, are:

- What is success? And
- How to achieve success?

These questions have to be answered before the questions of how to increase the chance of success, and what tools will help in doing so, can begin to be addressed.

There is a very large literature on stakeholder engagement and Arnstein's (1969) discussion of the different possible levels from informing the stakeholders to engaging with them is often taken as the opening point. At the same time, the literature has tended to shy away from the difficult questions of what is success and how to achieve success, instead focusing upon techniques, such as Citizens Juries.

The danger is that an assumption is made that merely getting the 'stakeholders' together will necessarily result in success. But, as outlined earlier, since if stakeholder engagement is to mean anything it is about the power to influence or determine choices, a fundamental question is: by what moral claim does a particular person or group have a right to power? At the same time, if it is no more than an exercise in power then neither the requirements of procedural nor of substantive justice are likely to be satisfied. Hence, the achievement of success requires a means of articulating the process of stakeholder engagement. In considering stakeholder engagement, what is required is cynical idealism: we have to be idealistical enough to seek 'better' choices and better methods of making choices, but we cannot afford to be naively idealistic in proposing methods for articulating such choice processes.

However, stakeholder involvement does not change the nature of the choice; it only changes who makes the choice. In terms of the choice that must be made, it changes nothing; its virtue lies in procedural equity rather than there being any necessary improvement in the quality of the decision that will emerge from the process. As Birkeland (1999) noted, there is an assumption that if the process is right, then the outcomes will take

care of themselves. Indeed, there is a danger that elected representatives will shift the most difficult and contentious decisions on to a stakeholder involvement process simply because they are difficult and contentious. Thus, that those who are presumably best prepared, and are being paid, to make such decisions, will shift the burden on to the public without necessarily providing the time and resources that we need to take those decisions.

Similarly, a fully participatory approach cannot be assumed to inevitably result in the best choice being made and equally there are likely to be more or less successful approaches to participation. In practice, the literature about the performance of small groups is not particularly encouraging (Brown 1965); a great deal of care is necessary if the outcome is not simply to be the result of the original composition of the group and the dynamics within the group (Sunstein 1999). Simply creating a deliberative group neither necessarily results in a consensus nor in a decision that is better than the decisions the individuals would have taken on their own. Sackman (1975) has stressed the dangers of the pressure within the group towards compliance with apparent social norms.

There is an assumption that consensus is a good thing whilst ignoring the question of whether either the consensual solution is a desirable one in any other sense or whether the process which produces the consensus is a good one. Consensus can grow out of the barrel of a gun. The group process itself has been framed in a variety of subtly different ways:

- Conflict resolution
- Conflict mediation
- Consensus building
- Negotiation
- Problem solving (e.g. Checkland and Scholes 1990)

It would be helpful to know whether framing the issue in a particular way is more useful than the others in a particular context. At a simple level, it would be useful to know when it is most useful to focus upon areas of agreement between the stakeholders, where it is necessary to consider zones of conflict, and when to seek to invent new options. Within some of the framings above, there are further differences in framing. Gaynier (2003) differentiates between facilitative mediation, to solve an immediate problem, and transformative mediation which treats the immediate problem as representing a crisis in interaction, where it is the problem with the interaction that must first be dealt with. Thus, the immediate problem is treated as a consequence of a more deep rooted problem.

Hence, we may differentiate between tools which support the process - of these, the quality of the intermediary, facilitator or mediator is commonly cited as critical – and tools to support the stakeholders in terms of information and processing that information. There are three developing strands in terms of decision aids; the first supports the definition of the problem, supporting debate on the nature of the problem and dialogue on the key issues. Much of this work derives from Checkland's (Checkland and Scholes 1990) 'soft systems theory'. One example of this approach being applied to catchment management is then IdeaMap (Gill and Wolfenden 1998). A second strand is information support; effective stakeholder involvement requires the democratisation of information and a means whereby participants can extract useful information from what may be an overwhelming mass of data. GIS systems are starting to be employed for this purpose (Correia et al 1994). The third strand is of tools to support the discovery and arguing of preferences between the options. This strand is typically composed of variants of Multi-Criteria Analysis (Green 2003a).

5.2 Social dilemmas theory

Social dilemmas theory is not a theory but a body of experimental results where those experiments have largely been carried out by psychologists and sociologists. It arose in response to three claims:

- That individuals in groups would always 'free-ride' in the provision of resources. That is, they would understate their willingness to pay for collective provision. This claim was first made by Samuelson (1954) and rapidly became part of economic orthodoxy.
- Hardin's (1968) paper 'The Tragedy of the Commons': again this paper argued that any collective use of a resource would necessarily result in over-use and the exhaustion of the resource. The problem with this claim was that the English Commons had lasted several hundred years without exhaustion occurring (Cox 1985). In part, the problem occurred because Hardin had confused Common Property with Open Access resources (Ciriacy-Wantrup and Bishop 1973); in the latter case, there is generally agreement that over-use and exhaustion is the expected consequence.
- The development of Games Theory in economics (von Neumann and Morgenstern 1947); this was a mathematical optimisation approach which exposed the dilemma between the potential gains between competition and co-operation.

That Hardin's paper apparently flew in the face of human experience had two results; psychologists and sociologists applied experimental methods to explore how people did behave when either (a) sharing out a resource amongst themselves, or (b) contributing money towards the provision of a collective good. The earliest work, however, sought to address the 'Free-riding' expectation of economists. The fascinating result of that work was that the only identifiable class of people who consistently free-ride are graduate students of economics (Frank et al 1993; Marwell and Ames 1981). It is unclear whether the propensity of economics students to free-ride is the result of a process of socialisation, that they come to behave in the ways expected by conventional economic theory, or whether it is a process of self-selection: those people whose personality inclines to free-riding become economists. The outcomes of the wider experiments have shown that:

- Participants exhibit neither pure self-interest nor pure group interest nor altruism but a mixture.
- The higher the identity with the group, the greater the weight given to group interest.
- Participants punish, even when it means sacrifice to themselves, those whose behaviour departs from the group norms. In particular, those who consider only their narrow self-interest will be made to suffer.

In fact, the outcomes are very similar to the real experience of the oligopolies (e.g. steel, meat, oil, coal) that were widespread in the USA in the nineteenth century. The producers rapidly learnt that cooperation to fix prices and production yielded higher profits than competition – provided that this did not mean forgoing a really profitable deal: "*…. the pools would usually run several years, beget competition by the prosperity they enjoyed, break up into a fight for the survival of the fittest, then come together again, shamefaced, recalling how happy had been the days of restricted competition, to try the strength of union once more*" (Josephson 1962).

These experiments have been undertaken almost exclusively in the context of European culture and that of the European Diaspora. These cultures place a greater emphasis on

the individual than upon the collective than do many other cultures; hence, wider studies in more collective cultures would be useful.

5.3 Common Property Management

Anthropologists in particular responded to Hardin's paper by looking at the examples of Commons management that survived successfully for hundreds of years rather than collapsing as he predicted. Thus, the Commons in England existed for a millennia or two and the reasons why they were converted to private property, and whether there was any increase in agricultural productivity as a result, are contested (Collins 1995; Overton 1985).

Common Property Management is a system in which the resource is managed collectively, and is effectively owned collectively, and it has historically been widespread in forest, fisheries and grazing management (Bromley and Cernea 1989), and, under Islamic law, some land must be managed in this way (Bagader et al 1994). It is the pervasive model for the delivery of water services so, for example, there are around 18,000 water districts in the USA providing irrigation, drainage, water supply, flood alleviation or other water services (US Bureau of Census 2002). Given this experience in resource management, it is not surprising that it became a widespread approach to the provision of financial services in the nineteenth century in the form of mutual insurance companies, Friendly Societies, credit unions and co-operatives. It resolves the conflicts of interest between the owners of capital and consumers of **Figure 17** in that the consumers of the services provided simultaneously own the capital and make the decisions of the organisation. Traditionally, the consumers also provided some of the labour necessary to maintain the system. Two questions to which no clear answers are available are: necessarily, in the past, these systems emerged in long established and predominantly rural communities. Necessarily, because these were the conditions in which the great majority of people lived. How far then are those preconditions for the success of Common Property Management? Secondly, in those communities, the cash and hence market economy was a relatively small part of the economy (Polyanyi 2001); how far does a culture of competition destroy the capacity to co-operate?

The studies into those systems of Common Property Management which have been operating and adapting successfully over the millennia, led Ostrom (1990) to postulate eight rules for success:

- The user group and the resource both have well-defined boundaries.
- The use rules are appropriate to local conditions
- The users can participate in rule modification
- The users themselves monitor compliance
- The users enforce compliance through graduated sanctions
- There are low-cost methods of conflict resolution
- The user groups have quasi-independence from higher forms of government
- In complex cases, the regime is organised in a federal, hierarchical form

The majority of Common Property Management for water services have been single purpose bodies (e.g. irrigation or water supply), being responses to a specific local problem. That they successfully resolve one set of conflicts of interest does not mean that they successfully resolved all of the other conflicts of interest, notably with those incidentally

affected by their actions. Thus, the Waterschappen in the Netherlands used to be called by some the 'Farmer Republics', privileging agricultural interests over all others.

As an institutional model is now being widely propagated in a number of areas of water management, notably in the form of Water User Associations for farmer managed irrigation (Bruner and Atmanto 1992) and for rural water supplies (Davis et al 1993). Condominial sewage systems (de Melo 1985) are centred in Common Property Management, as are such schemes as that in Orangi (Zaida 2001). It would appear that it has a necessary role as part of integrated urban water management. For example, if SUDs are to be provided for a residential estate where the freeholds of the buildings and land are owned by the individual residents, then some institutional mechanism must exist for operating and maintaining the SUDs elements. Similarly, one can see the potential for private contractors competing to offer integrated water management packages (e.g. water supply and wastewater management) to such an estate where economies of scale and scope make the costs lower on this basis than on a private property basis. To gain the benefits of competition in this way, there has to be an institution which represents the interests of the residents. Otherwise, the scope for such approaches is limited to forms of social housing where there is a single landowner; for example, the BEDZED scheme in London.

5.4 Development theory

Economic history and development theory are two sides of the same coin: why development and failure occurred in the past is likely to have lessons for promoting sustainable development for the future. Conversely, in the past development 'happened' (or didn't happen); now we seek to promote some forms of development in some areas of the world. There are questions of scale here: at the household level, the concepts of 'sustainable livelihoods' (Ashley and Carney 1999) and 'household economy' (Save the Children 2000) are dominant. The former is concerned with the different forms of assets that a household can have available to it in order to promote its objective of maintaining or improving its quality of life in the face of a world of multiple and varying risks. The latter focuses upon how a household reallocates its available resources (basically, time and energy) to cope with perturbations in its environment.

A macro-scale, a key question is whether invention can be induced to match need – 'endogoneous growth theory (Romer 1994) - or whether scientific advance and invention is simply, in effect, another perturbation with which a society must cope.

In one critical area, there is something of a disconnect. Whilst much of the world is still going through a massive process of urbanisation through migration, 'rural' and 'urban' development are frequently treated as disconnected. There is, furthermore, very limited understanding of the process of urbanisation as a social process as well as a physical process (Hamer 1985; Rakodi and Leduka nd), particularly as a process through which people acquire legitimate their occupation of the land.

5.5 Innovation

A fundamental aim of Learning Alliances is the adoption and diffusion of innovation, the conversion of invention to practice. There is a literature to be explored on:

1. Organisations that are innovative
2. The process by which invention becomes innovation
3. The diffusion on innovation from group to group as well as within a group.

5.6 Marketing

Integrated Urban Water Management is centred upon change: of changing the behaviour of some, including members of the public. Determining what consumer goods, with characteristics, can be sold to the consumer, and how to influence the choice of consumers to buy those goods is consequently a parallel problem. The related concepts of market research, how to determine what can be sold to the consumer and what price, and marketing, how to persuade them to buy those products, have thus potentially lessons for governance. In particular, a sub-strand of marketing which is closely related to the promotion of Integrated Urban Water Management is the idea of sustainable behaviours (Kantola et al 1982).

As an area of study, it draws heavily upon theories and concepts from psychology, sociology and anthropology; economics has been unable to contribute substantially to the field.

6 Research areas which inform governance and the new paradigm

There are two cross cutting ideas and concepts which have the potential to create unity across the disciplines; of being of a form which can be embodied and embedded in the different disciplines.

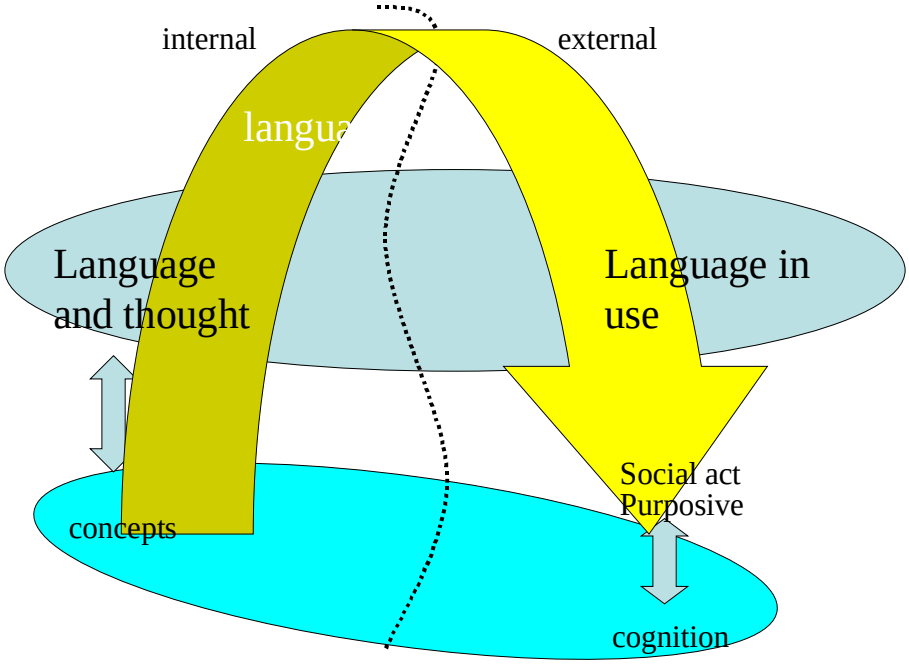
6.1 Discourse analysis

Human beings primarily communicate with each other through language; hence, to be effective stakeholder engagement, as does any form of human activity other than by a single person, depends heavily upon the effective use of language. Therefore, it is important to be conscious of the nature of language and its use. It further necessary to be good at using it. In particular, language is not a neutral, mechanical carrier of ideas. Instead, language has two overlapping purposes (**Figure 24**):

- As a social act.
- As a carrier of ideas.

As a social act, language use is embedded in and reflective of the social context. As a social interaction, conversations are undertaken in the context of social relationships and social roles. That social relationships and roles are articulated and expressed through language is most clearly seen in those languages, which unlike English, have ‘vous/tu’ forms of ‘you’, and those cultures which, for example, expect to address academics in the form of ‘Professor Doctor Doctor Engineer’. Again, in Japanese, there are subtlety different forms to the languages expected to be used by men and women, whilst, in English, the language is still accommodating to non-gendered language in the absence of words for ‘his/hers’ and ‘s/he’. Again, whilst traditionally letters were ended with ‘Yours sincerely’ for

Figure 24 The use of language



informal letters or 'Yours faithfully' for formal letters (and in earlier periods by 'Yours obediently' or 'Your most humble and obedient servant'), it is rare to see any of these terms used in an email where variants on 'best wishes' and various graduations of 'regards' are standard. Again, books for small children are written in a completely different style to those for adults, and for an adult to be addressed as if they were a child is deeply insulting. The terms used for describing a conversation (Tunstall and Green 2003) define it in terms of a social relationship and roles:

- Advocating
- Agreeing
- Arguing
- Asking
- Begging
- Briefing
- Comforting
- Debating
- Disagreeing
- Hectoring
- Informing
- Instructing
- Lecturing
- Negotiating
- Ordering
- Quarrelling
- Questioning
- Reassuring
- Requesting

- Showing
- Telling

That conversations are expressive of social relationships is perhaps more clearly seen in inter-cultural exchanges and in cultural differences in communication (Lustig and Koester 1993). Thus, in Anglo-American English, an essentially linear structure is imposed upon material; essays are expected to have a beginning, a middle and an end, and in that order, with that sequence. A report is expected to have an action plan; a specification of what actions will be undertaken. This may be contrasted with the Chinese practice of slogans. This can seem strange and almost irrelevant to English speakers but the logic of the slogan approach is that if we are agreed upon the principles upon which to act then the each person will know how to act in any individual instance – this is akin to Aristotle's remark cited earlier that ethics are habits. We are now seeing the Western equivalent of the Chinese approach in the Vision and Mission statements prepared by organisations, although these are typically in rather prosaic language. Similarly, Lustig and Koester (1993) summarise research on the Japanese and Indian forms of writing as being both non-linear, that a Hindi paragraph does not develop just one unified thought or idea, but many. The Anglo-American linear approach implies assumptions about the nature of time and of causality that differ from the Hindi approach. More specifically, the Anglo-American approach runs into difficulties when it is necessary to discuss systems, and to show and discuss the relationships between the different elements. Again, there can seem, at least, to be substantial differences in academic writing styles between cultures; compare, for example, across France, Germany and the USA the approaches and styles of sociologists (e.g. Durkheim, Weber and Talcott Parsons) or of philosophers (e.g. Althusser, Habermas and Rawls). For these purposes, it is immaterial whether these differences are the product of the form of language in which the material is conceived and written, or of socialisation in the prevailing cultural academic norms.

The power of these cultural differences is three-fold: firstly, the differences illuminate the nature of the activity itself. Secondly, if the differences are not recognised, a culturally bound approach will be applied in a quite different context and will fail. Thirdly, it cannot be implicitly assumed that the Western cultural approach is necessarily, and definition, superior to all others. Thus, Phillips and Warnasch (2001) discuss the problems for the US business person in seeking to establish relationships with businesses in China. The US model is equivalent of a 'Wam, bam, thank you mam' approach to sex: fly in, agree a contract, and fly out again. The shock that Phillips and Warnasch reports for American business people of experience in cultures where companies expect to build relationships as part of doing business is entertaining. The great limitation of the literature reviewed here is that it is all written from a Western perspective.

But as a social act, language use is also purposive. Its purpose in general is to change the self or the other; one such purpose is informative but as the listing earlier indicates, this is but one of many possible purposes. In particular, Tannen (1991) asserts that whilst men primarily treat conversation as a means of information exchange, women regard the primary purpose of conversation as the building and maintaining of interpersonal relationships. Hence, the potential for confusion between men and women when men, for example, wonder why a woman is telling them information which the man already knows or doesn't feel the need to know. Thus, we can usefully frame stakeholder engagement as a "conversation". It shares five characteristics with a conversation:

1. It is purposive; the intention of a conversation is to change the self or others.

2. It is consequently a learning process.
3. It involves speaking and listening; the feedback from the partner(s) being important to gauging the success of messages it is sought to convey and hence to modifying that message in order to be more successful in inducing the desired change.
4. It is embedded in and expressive of social relationships which in turn define the appropriate forms of conversation.
5. Thus, it is governed by rules and conventions.

Table 8 The Basics of Intercultural Competence

(based upon Lustig and Koester 1993)

Display of respect	The ability to show respect and positive regard for another person.
Orientation to knowledge	The terms people use to explain themselves and the world around them; demonstrating a recognition and respect that experiences and interpretations are personally valid rather than that there necessarily universal truths. Thus, someone else can have a different perspective where that difference does not, by definition, define their views as wrong.
6.1.1.1 Empathy	The capacity to behave as though one understands the world as others do; a displayed awareness of others thoughts, feelings and experiences.
Interaction management	Skill in regulating conversations; promoting turn taking in conversations and skill at starting and ending conversations.
Task role behaviour	Behaviours that involve the initiation of ideas related to group problem-solving activities where task behaviours are highly interwoven with cultural expectations and norms.
Relational role behaviour	Behaviours associated with interpersonal harmony and mediation, maintaining and building interpersonal relationships.
Tolerance for ambiguity	The ability to react to new and ambiguous situations with little visible discomfort.
Interaction posture	The ability to respond to others in descriptive, nonevaluative and nonjudgmental ways.

Each individual stakeholder is seeking to change either themselves or more usually others. What they are trying to change varies but ultimately the purpose of the conversations is to influence the choice of the course of action to adopt by the group or by the individual stakeholder. One implication is that each stakeholder must hold an implicit model of the other stakeholders, and the relations between each, in order to assess which forms of influence are most likely to be successful in changing that other. In particular of which point within that implicit model of the ways in which each other stakeholder shapes their thoughts and behaviour offers the most promising option for intervention. Each stakeholder therefore has an implicit naïve psychological, sociological or political science model of the others and also of the interactions between the others. The success of the conversational gambits attempted by each stakeholder will depend in large part upon the accuracy of their models of the other stakeholders, and hence one purpose of conversation is to improve the accuracy of those models. This model is also reflexive; it is simultaneously a model of oneself and the individual's relationship with others.

One advantage from framing stakeholder engagement in terms of a conversation is that the literature on stakeholder engagement consistently stresses the importance of key individuals at facilitating the process. Hence, shifting to stakeholder engagement processes will require many individuals with the capacity to facilitate the process. If framed in terms of a personality characteristics, this leaves us with little guidance as to how to identify such individuals and how to create a sufficient supply to support stakeholder engagement processes. But if these individuals have specific and identifiable skills, those at holding conversations, then it is both possible for individuals to learn those skills and, equally, to train individuals in those skills.

Secondly, the way in which language works as a carrier of ideas also has to be understood. There is a strong tendency amongst technical specialists to view language as a means of transmitting the specialised knowledge of their discipline to others, as language as a technical act of information transmission. There is an equally strong tendency to lament the failure of others to 'understand', and a search for better ways of making the information understandable. This is to misunderstand both the nature of language and of conversation. In this model, language is implicitly considered as a equivalent to a form of symbolic logic so that words stand in a one to one correspondence with ideas; essentially, the idea of Wittgenstein in 'Tractatus' and of de Saussure's (1983) work on semiotics (**Figure 20**). The problem with the concept of language for the purposes of conversation in which for each concept there is only one correct word and for each word there is only one correct meaning is that these associations must exist before and prior to any attempt at conversation. There is no possibility of constructing the label-meaning relationship in the course of the conversation, nor generally any scope for change and learning. Conceptually, this one to one relationship would only be possible if there were natural categories, a natural ontology, which was universally recognised prior to any attempt at conversation. But it has been demonstrated that there is no universal agreement as to a natural set of categories (Rosser 1994; Lakoff 1987).

Finally, language is used for hegemonic purposes but it also holds the speaker within a particular framing of the world: "*apprehending the world. Embedded in language it enables subscribers to interpret bits of information and put them together into coherent stories or accounts. Each discourse rests on assumptions, judgements and contentions that provide the basic terms for analysis, debates, agreements and disagreements ….*" (Dryzek 1997).

The implications are that it is necessary to be conscious in the use of language, not to treat it as a neutral tool, and to understand speaking as a social act which is expressive of social relationships.

6.2 General Systems Theory

One widely used definition of a system is: " .. *A group of independent but interrelated elements comprising a unified whole.*" Hence, the performance of the system depends upon the interrelations as well as the actions of the individual elements: the behaviour of the system cannot therefore be derived as the sum of its parts. Those inter-relations mean

that the system exhibits dynamic behaviour, and, critically, many of those relationships may be non-linear, and even linear relationship can result in outcomes that are often counter-intuitive. This field of study is variously labelled as 'General Systems Theory' (von Bertalanffy 1968), Cybernetics (Ashby 1964), Complexity Theory (Kauffman 1995), and Chaos Theory (Gleick 1987). Capra (1997) provides a good short introduction to the key concepts.

In summary, the critical points about systems are:

- A system consists of elements and the inter-relationships between those elements.
- In turn, the system is more than the sum of its parts and a system can produce complex behaviours.
- Since a system is defined as a whole, it necessarily has a boundary but most systems are affected by events, or disturbances, occurring outside of their boundary, in their environment.
- Consequently, systems exhibit a dynamic response.
- Natural systems act as if they are goal orientated; we seek to manage human systems, and the natural systems upon which they depend, to achieve goals.

7 Learning what works

A great deal of writing on Governance is either vague, providing little in the way of recommendations on what to do and how to do it. Or it is fluffy, sounding like 1970's hippy invocations that 'all you need is love'; that if we simply come together we will find consensus and happiness. The task is to provide something which gives practical and comprehensive guidance on how to deliver good governance.

In doing this, we face two problems:

- Delivering clear guidance when complexity is the essence of both the task and the required solution.
- That there is likely to be no single model which is applicable in all possible conditions.

One of the failings of the past has been the attempt to impose simple solutions on complex problems; the blind enthusiasm for privatisation is an example of such an attempt. The task instead is to introduce strategies which can cope with the complexity. Those strategies need to be able to deal not only with the existing complexity but to be adaptive and innovative, both responsive to change and driven by a desire to do better.

Simultaneously, we may expect that the governance aspects, as well as the technical solutions adopted, will be reflective of local conditions. Local resource conditions dictate the physical nature of the resource management problem and hence what theoretical management options may be appropriate. There may be cultural differences which are expressed as part of the broader question of social relationships which in turn require to be expressed through both the technical means adopted and the institutional framework, the formal pattern of social relationships, which is used. For examples, in parts of Bolivia the earth is sacred 'Pachamama', literally 'mother earth'; consequently, it is unsurprising that it is culturally unacceptable to dig holes into the earth in order to deposit excreta in those holes (Water and Sanitation Program nd).

We may therefore expect a variety of structures, institutional forms and arrangements, to develop in different contexts. There is a further reason for welcoming some an outcome: it gives us a greater opportunity to learn what works and what does not. The commonality lies in the problems or issues, notably those of justice and power, and in the processes, particularly that which was described earlier as ‘conversation’.

Hence, our anticipated output is:

- What are the issues that generally need to be addressed?
- What are the alternative techniques available with which to address those issues?
- What are the lessons of experience and theory?

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