Is water different?

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Introduction

There are three fatal problems with neo-classical economics:
1. It does not work;
2. It does not help; and
3. It requires the suspension of disbelief.

Therefore, rather than further lament the failings of neo-classical economics, we need get on with developing an economics that is useful and plausible. Whilst economics is founded in the analysis of choice by individuals it gains its entire force from the recommendations it provides for collective action. Thus, the hatter may have an interest in the demand for hats but economics matters to society only to extent to which it helps us to decide, for example, whether as taxpayers we should pay several billion euros towards the cost of the collective provision of environmental improvements. The fundamental questions which economics must confront are therefore:
1. Why are we prepared to contribute towards the cost of the collective provision of some services even when it is others who gain from that provision? How do we decide how that provision should be funded?
2. When is more efficient to provide services collectively rather than competitively?

Figure 1 Proportion of service costs that should be funded by government rather than the user

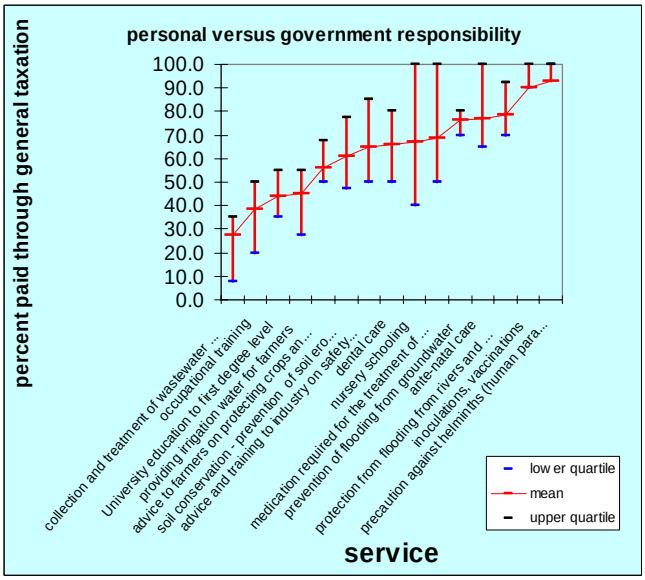


Figure 1 summarises the results from a preliminary exploratory study, using a small convenience sample, which is exploring which services people consider should be paid for out of general taxation. As ever, it is the differences that are most interesting, particularly between services but also between respondents.

Characteristics of water

In addition to the general problems with neo-classical economics, water has a series of characteristics which make it quite unlike the goods and resources assumed in text books of economics:

1. 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.
2. The problem with water is not one of matching supply and demand but of allocating essentially a fixed quantity, either of flow or of stock, between competing demands.
3. Water is heavy and incompressible so that water management has historically been driven by the need to move water using potential energy, gravity, rather than kinetic energy.
4. 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.
5. 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.
6. We manage water largely in order to make the best use of available land, particularly the use of land for crop production. Agricultural land is scarce and the growing of crops is not only by far the greatest user of water – growing the food for one person requires in the region of 1,000 to 2,000 tonnes of water a year as compared to the perhaps 100 tonnes required for urban uses – it is also the primary consumptive use of water: that water is lost through evapo-transpiration. The relative importance of agriculture in the economy and the proportion of household income spent upon food (now down in the developed economies to 12-16% of income as compared to the historic levels of 50-60%) which determines the pattern of water management. Thus, both European agriculture and water management policies are currently premised on the assumption that it will always be possible to buy basic foodstuffs cheaply in the world market.
7. Because of the quantities required, water is necessarily a low unit value, bulk product. 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.

8. Demand is primarily determined by technology rather than by behaviour. In turn, prices are relatively ineffective means of changing demand because this demand change will only occur as a result of investment.
9. 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. 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.

In addition, the assumption behind textbook analyses is that growth is both inevitable and natural. Conversely, as a result of technological changes, demand quantity is falling in some instances although demand quality continues to rise. A consequence of the shift to sustainable water management (GWP 2000) is also to drive down that demand; for example, demand management in urban supply aims to reduce water consumption (Vickrey 2001) and a desired consequence of source control (National SUDS Working Group 2003) is to reduce loads on sewerage systems and wastewater treatment works. The practical problem of pricing is increasing therefore to fund a system under steadily declining quantity demand but steadily increasing quality demand.

Why do we have to choose?

If economics matters to society only in so far as it helps us make ‘better’ collective choices, a fundamental question is: what do we mean by ‘better’? But before addressing that question it is necessary to analyse what is choice and why it is necessary. As definitions of economics from Robbins (1935) to Samuelson (1970) assert, neo-classical economics claims that choices are necessary because resources are scarce. This is neither a sufficient nor necessary condition for the existence of a choice: a choice exists only when there are at least two mutually exclusive options with at least one reason to prefer one option and at least one other reason to prefer another course of action. In short, the two necessary conditions for choice are conflict plus uncertainty (Green 2003). 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. Sen (1992) has notably argued that this is the case for different forms of equality. 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 and M or B and 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 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 2003). Here I am using 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.

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. It may not be possible to become confident that one option should be preferred to all others because the conflicts cannot be resolved. For example, suppose that two objectives are regarded as being equally important and of the two options available each is marginally superior to the other option against one of those two objectives. In this case, the decision maker should be rationally uncertain what to do. Alternatively, lack of knowledge as to what are the consequences of adapting each option, what are the performances of each option against each objective, may create uncertainty. But, in the first case, perfect information would simply confirm the conclusion that we should be rationally uncertain.

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; the neo-classical economic model of choice is instead essentially empty since both options and preferences are determined before each single choice is begun.

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.

What is a 'better' option?

We are now in a position to discuss what we may mean by 'better' choices. Firstly, I imply that our goal is 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. 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; gods can make optimal choices, we cannot. We need to discover instead how to best make choices under Knightian uncertainty. It 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.

So, our immediate goal is make 'better' choices. We certainly seek to achieve better outcomes but most definitions of sustainable development (e.g. WCED 1987) also include specifications as to what would constitute a 'better' process, notably including requirements as to stakeholder engagement, particularly with women. In considering what we may mean by a 'better' outcome, we can use the everyday meaning of efficiency as the ratio of outputs to inputs; we want to get a bigger bang for our buck. We look both to achieve 'better' outputs through the course of action adopted, and to do so whilst simultaneously reducing inputs. Those outputs, the objectives we seek

to achieve, are complex. What those objectives in collective choices should be have been the concern of philosophy (Mackie 1977) and jurisprudence (McCoubrey and White 1993) for millennia. In that literature, 'better' has been understood to be justice, equity or fairness so that we seek to achieve justice through a just process, both being necessary conditions for a justice decision. A key requirement on the procedural side is that like instances should be treated alike, although what defines 'alike' is subject to argument. We then frequently disagree as to what we mean by justice or equity in a particular case or in general, as illustrated by the different views of, for example, Dworkin (1986), Nozick (1974), and Rawls (1971).

Two general conceptualisations for outcome equity can be distinguished: the 'just desserts' model (eg '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 so that a broad definition of equity is thus 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. 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 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 (**Figure 2**). 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.

Figure 2 Concepts of outcome equity

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

The problem in equity may be 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, it may be that there are several moral principles which appear appropriate in a given set of circumstances where those different principle 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.

In addition, taking into account the inputs, resources, required, we seek to achieve justice by the most efficient means. In terms of inputs, the required resources, we seek to do more with less, to improve that ratio. The factors of production can be usefully redefined as the natural endowment (NE) and human inputs (HI) of labour and capital. Hence, output (O) can be expressed as:

$$O = x * (NE * HI)$$

Whilst we seek to do more with less, the condition of sustainable development is that the total resource does not diminish over time. Given that the natural endowment is essential fixed, as is labour, then increased efficiency results largely from improvements in 'x'. Thus, the interesting issue is: what is 'x'? This obviously includes technology but the different varieties of institutional economics (Common 1934; North 1990) have stressed the importance of institutions, and others have stressed the importance of social capital (Bourdieu 1980; Coleman 1988; Putnam 1993). To this has been added the question of governance (UNDP 1997), although there is a great deal of overlap between these three concepts and with the older concept of politics (Dunn 2000).

The input side of the equation mixes stocks and flows and defining efficiency requires distinguishing between capital and income. Hick's (1946) definition of income necessarily implies a definition of capital as that which is not diminished by the particular yield of income. In those terms, machine tools, roads, televisions and so on are not capital but durables as they wear out. Extending the metaphor of money capital and income in all directions in the form of the opportunity cost of capital as a rationale for discounting has led us into all sorts of problems.

Figure 3 Natural endowment and production durables

Depletable	**Renewable**	
	Self-renewable	**Non-self-renewable**
Depletable	Soil (but very, very slowly renewable); fisheries, forests, water for irrigation; labour	Fossil fuels, fossil water, wind turbines, machine tools etc
Non-depletable	Water for potable use; solar energy	

For a resource to count as capital it must be possible to draw some stream from that resource without depleting that resource; its yield. Thus, renewable resources can be differentiated into those which are depleted by use and those which are not, all non-self-renewable resources being depletable and hence not capital (**Figure 3**). Self-renewable resources are capital provided that they are drawn down at a rate less than that at which they are renewed. The acceptable rate of depletion of non-self-renewable resources is such that the O/I ratio remains constant, which is the rate at which depletable resources

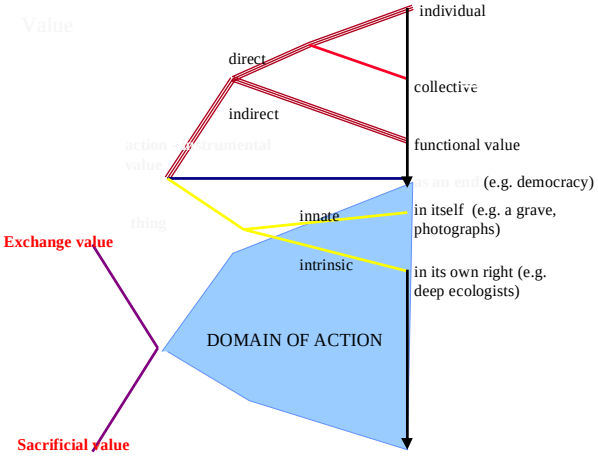
can either be converted into ‘x’ or into durables, including the replacement of those durables.

Value and choice

In neo-classical economics, it has come to be taken as a self-evident truth (Robbins 1937), that the value of some thing is given by an individual’s preference for that thing. Commonly, this preference has now come to be weighted by income so that ‘willingness to pay’ has become synonymous with ‘value’. Of course, it ceases to be a self-evident truth as soon as any significant number of people argue for an alternative definition of value. Thus, the claims by deep ecologists (eg Naess 1993) for the inherent value of species by right of existence mean that the neo-classical economics claim to axiomatic status falls. In collective choices, Kant (1785) argued that the issue is one of what we ought to do rather than of what we want to do.

Therefore, it is useful to seek to define all the possible ways in which value might be construed (**Figure 4**). These would seem to be in instrumental terms, as the contribution to the achievement of some objective; as an end in itself; and as innate or inherent to the action or thing in itself. Of these three main branches, neo-classical economic value is a form of instrumental value. As a definition of value it has a number of apparently unrecognised problems. Firstly, it implies that it is actions and not things which have value and the value of any thing is given by the potential desirability of the actions that can be undertaken with it. So, for example, the value of a cup of coffee is given by the desire to drink it. Similarly, the value of a hat is given by the desirability of wearing that hat. Secondly, any act will have as many values as it contributes to the achievement of different objectives. So, for example, if someone wishes to drink a cup of coffee, and this happens to be the last cup in the pot, then the action of taking the cup of coffee has a second value if they wish to deny someone else that cup of coffee.

Figure 4 **A typology of value**



The second main branch is the value of an objective in and of itself. Boulding and Lundstedt (1988) pointed out that in everyday speech, values refer to ends so that if you are ask someone what are their values, they will reply in terms of having a good time, or justice, or in similar terms.

The third main branch is specific to things, they have a value because of what they are. Deep ecologists claim that other species have such an inherent value. Other things have what might be termed an innate value, sometimes uniquely to some individual or group. So, for example, if you were to suggest to one mother that she should permanently swap photographs of her baby with those of someone else's baby, the suggestion will be seen at best as bizarre. More widely, communities typically attach such an innate value to burial sites and places of religious or cultural significance. To suggest that the Vatican City might be demolished to make way for a car park would be regarded as offensive by large numbers of people, and would not be made less so by a cost-benefit analysis.

But neo-classical economic value is only one twig leading off from the instrumental branch. A second twig is specific to collective choices; those objectives which often become central in collective choices refer to what are or what ought to be the relationships between individuals and groups. Democracy, justice, liberty and freedom are examples of such relationship objectives as more obviously are fairness and equity. Any action may then have values associated with such relationships as well as to those related to more narrowly construed self-interests. Equally obviously, maintaining and enhancing democracy, for example, has costs. Within those objectives referring to relationships might be included social capital in its various forms (Coleman 1988). These objectives are clearly distinguished from altruism in its different forms except in so far as any individual or group believes that altruism ought to be a feature of inter-personal relations. If someone acts altruistically because they want to then this is a purely individual objective; if they act altruistically because they believe that they ought to then this implies that they believe inter-personal relationships should be informed by altruism. A third twig off the instrumental branch is indirect instrumental value including the functional values associated with the environment (de Groot 1987).

These three branches may be simplified with the twig leading to the objectives referring to what ought to be the relationships between individuals and the collective being the dominant branch. Thus, 'values in themselves' very largely, if not exclusively, refer to inter-personal relationships. Some innate values are a human claim as to what ought to be our relationship with other species. Finally, a significant proportion of inherent values refer to inter-personal relationships. For example, our behaviour towards burial sites is simultaneously reflective of our relationship with our forebears but also of our relationship with each other. A parent's refusal to permanently swap baby photographs can be expressive of the relationship between parent and child; if someone would exchange their photographs, then the implication is that they would also be prepared to swap their child.

These values are expressed through action; indeed, unless they are expressed in action, they have little meaning. A particular class of actions are those in a market. For a market or any form of exchange to exist there must then be a difference between the exchange value of some thing to the person currently holding that thing and its sacrificial value to someone else. The exchange value of that thing is the amount of money the individual holding it requires in order to relinquish it; the sacrificial value of that thing is the amount of money someone else is prepared to give up in order to acquire that thing. Similarly, the case of services, the exchange value of a service is the amount of money the person who can offer the service requires in order to undertake the service, and the sacrificial value the amount someone will give up to have the service performed. That in a market both an exchange value and a sacrificial value are expressed does not necessarily imply an identity with the instrumental, innate or inherent values of the action or thing. Nor does it mean that someone's exchange value for something must be identical to their sacrificial value for that thing. One may have a sacrificial value for a kidnapped child without implying anything about an exchange value for that child. Thus, there is a complex relationship between actions, things, inter-personal relationships and objectives.

In neo-classical economics, the definition of cost in terms of foregone opportunities provides a beautifully elegant means of relating cost and value. Unfortunately, it only works for priced resources and consumption. A cost is both undesirable and a necessary sacrifice to obtain something else; that sacrifice may be of some resources which could be used for other purposes, but it may be in the achievement of some other objective. Once the sacrifice can be of an objective and not simply of resources, then the linkage between cost and value is broken and it becomes necessary to define cost as an undesirable consequence.

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.

But, I've already argued that 'economic efficiency' is actually a moral claim as to what the objectives of collective choice should be and as to the basis upon which those choices should be made. We can retain the claim as to the desirability of making the best use of resources but are both forced to lose the claims as to the appropriate objective and that the distribution of sacrifices can be ignored. Similarly, the conventional rule that the benefit-cost ratio should be maximised is true only so long as all the costs are resource costs.

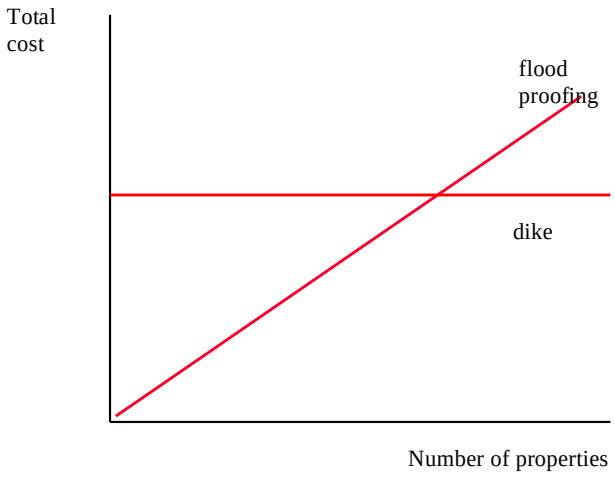
Collective choice

Arrow's Impossibility Theorem (Arrow 1963) implies that collective choices are not possible at all. But underlying the Theorem are the assumptions that the participants cannot negotiate and indeed have nothing to negotiate about. There is no social process involved. In addition, it is assumed that all of the possible courses of action are known before the choice is begun. However, if choices are chained together rather than treated individually in isolation, it becomes possible for the participants to negotiate across the sequence or group of choices. Equally, whilst a Pareto Improvement is unlikely always to be possible within a single choice, it may be possible to achieve a Pareto Improvement over the present situation across such a chain of choices. Inventing new options may also allow such an Improvement. The task of economics is to both inform and aid this negotiating process.

That a Potential Pareto Improvement might be achieved over a series of choices does not mean either that it can be nor that it will be. If all the choices are zero sum choices then no Pareto Improvement is possible over those choices. In practice, there are commonly economies of scale in water management so that a communal action is more efficient than individual action. For example, whereas the cost of flood proofing buildings rises as the number of buildings that are flood proofed, the cost of a flood embankment is in part a function of its length. Given a sufficient density of development within an area which could be protected by an embankment then it will be cheaper to do so than for each property owner to flood proof their property (**Figure 5**).

Figure 5 **Economies of scale in flood risk management**

(Source: Green et al 2000)



That there may be a Potential Pareto Improvement to be gained does not mean that it will be discovered.

Water

The primary goal in any form of analysis to provide insight, to gain understanding, to learn. The result of understanding is often something that then appears self-evident ex post; but ex ante the situation was one of confusion. What is important in economic analysis is not the numbers that may emerge, although numbers are frequently useful means of encapsulating understanding, but the insights gained. Some examples of those insights are:

- A key problem in water management is how much data to collect, given the costs of collecting that data and archiving it in a usable form. Data only becomes information when it can be used to differentiate between alternative courses of action (Shannon and Weaver 1949). Hence, ideally data would only be collected when you know that you need the resulting information. For operational decision making, identifying the required information and hence data is quite straightforward. Unfortunately, capital investments typically require predictions about future conditions where those predictions require a long run time series of data so the problem is to predict what data will be needed in the future. Finally, a key purpose of monitoring is to detect change, particularly unexpected change. Bayesian theory (Davis et al 1972) can in principle be applied to the first two conditions, and to evaluating the benefits of enhanced methods of monitoring; the more interesting problem is how to evaluate the benefits of detecting an unanticipated change (CNS 1991).
- The benefit-cost ratio is typically treated as a 'pass-fail' criterion. In reality, the ratio is a measure of the degree of confidence we can have that the proposed intervention is preferable to the present situation. A benefit-cost ratio of one is the point of maximum doubt as to whether the proposed option should be preferred to the present situation. Conversely, the further away the benefit-cost ratio is from one in either direction, the more confident we can be that the proposed options should, or should not, be preferred to the current situation (Green 2003).
- The problem with the Knightian definition of uncertainty is that it appears to provide guidance neither as to how to choose between options nor a basis upon which to select between those options. For flood risk management I have argued that it is possible to provide such guidance; in particular, that we should apply the principle of seeking to manage all floods rather than just some (Green et al 2000) and its corollary, that of designing for failure (Green et al 1993).
- Historically, most water management has been undertaken through collective action and where competitive approaches have been adopted, the resulting prices are typically higher than those from a collective approach. The economic advantage of the collective solution is that both the consumer surplus and producer surplus return to the consumers who also provide the capital. The real return to consumer is thus higher than

when private capital is used where the owner of the capital can only capture the producer surplus (Green 2005).

- Water metering is typically more expensive than other means of cost recovery whilst charging for water provides both a signal and an incentive to minimise water consumption, where it is the response, if any, to that signal which results in falls in water demand. The economic problem is then when the additional transaction costs of water metering are justified by the response to water metering in terms of demand reductions. The extent to which it is worth metering is therefore determined by the additional cost of metering relative to savings in cost of the water supplied (Green 2003). The rationale for metering is predicated upon the assumption that otherwise demand will rise.
- A central problem in water management is to allocate a fixed quantity of water between competing uses where both the marginal costs of supply and externalities vary between those uses. In addition, the returned fraction of water may be reused by downstream users whilst that return fraction varies between uses (Green 2005).

Conclusions

Neo-classical economics committed suicide in 1952-1953 when Samuelson (1954) argued that only observed behaviour could be relied upon, and thus relegated economics to a branch of history, and Friedman (1953) defined economics as not being a science in any recognisable sense of the term. At the same time, economics degenerated into becoming a very fundamentalist religion, which now gives the impression that it seeks only victory in a self-proclaimed war of annihilation against other disciplines, whilst simultaneously requiring amongst its believers adherence to a creed of beliefs at least as rigorous as the 39 Articles. If economics is to survive, it must be reclaimed.

Since the social justification for the existence of economics is our belief that reason can help us make better collective choice, economics has to centre upon collective choice, perhaps taking household choice (Sprey 1969) as a starting point. A key issue has to be when co-operation is more efficient than competition; any theory of economics which cannot explain the existence of societies is an empty vessel. It has to be relevant to a world where the future is inherently unknowable but where we must act in an attempt to choose the future. This is a world in which transaction costs must be a central concern (Coase 1937), information is often sparse and always expensive, and one where to do better means to learn. Rather than to seek to annihilate other disciplines, economics has to take what it can from those other disciplines. In the new world of transcience, disciplinary parochialism is extinction.

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