

Equity and Efficiency Tradeoffs in Water: Prospects for Choice Modelling

Bethany Cooper^{a*} and Lin Crase^a

^aSchool of Business, La Trobe University, Albury-Wodonga Campus, Wodonga, Vic, 3689, Australia. Tel: +61 2 60583834, Fax +61 2 60583833, E-mail: b.cooper@latrobe.edu.au

*Corresponding author.

Key words: Choice modelling, efficiency, equity, urban water, rationality, behavioural economics

1.0 Introduction

Water is both an integral component of the ecosystem and a fundamental social and economic good (Serageldin 1996). Management of this resource is receiving unprecedented attention as demand continues to rise and approach the limits of sustainable supply, particularly in parts of Australia. The acknowledgement that water resources have become critically scarce in Australia has served to sharpen resource managers' focus on how we consume our water.

Since the 1970s the emphasis has shifted from increasing the supply capacity to meet water demand towards demand-control policies (Gracia et al. 2001). Prominent demand policies include pricing measures, regulations, instalment of low-consumption technologies, and educating the public. Watson et al. (1999) argue that the key for any successful water management plan is a strategy for influencing a community's water usage. In other words, an ever-expanding water supply is not a viable option to meet rising demand. Alternatively, measures to reduce residential consumption appear to be more appropriate (Barrett 2004).

Debate surrounds the role of prices (allocation by markets) versus the role of regulatory controls (allocation by governments) in promoting water conservation (Barrett 2004). However, a question emerging from this discussion 'is the appropriate combination or the relative weight placed on price and non-price strategies to achieve desired consumption levels'.

Essentially, it will be the way in which the Australian water consumers respond to these differing policies that will be a large determinant of the appropriate mix that will enable us to reach the desired water conservation levels. Therefore, involving the consumer's perspective in decisions regarding what policies the government should use to encourage water conservation appears to be necessary.

In general terms, our water supply is used at the industrial, commercial and residential level. However, this paper will concentrate on water for domestic consumption for three reasons as in an urban context it can be seen to be essential (OCDE 1999). First, water used in a household context is receiving unprecedented attention under the Australian Nation Water Initiative (NWI) (see, for example, Edwards 2005). Second, domestic or household use is often regarded as 'essential' and requires special attention (OECD 1999). Third, household water behaviour and governance of that behaviour raises important efficiency and equity considerations which provide useful insights into the mechanics of government policy generally.

Traditionally, fairness has not been a focal point in economics, alternatively its primary concern has been the problem of efficiency. However, a new school of economics, termed 'behavioural economics' or 'experimental economics', has emerged postulating that consumers do in fact place importance on fairness (see for instance, Gittins 2003). This paper contends that the challenge in real life is to achieve an allocation of water which rightfully balances the tradeoffs between efficiency and equity. Therefore, identifying their relative importance in the minds of the consumer appears to be of significant value. On this premise, analysis of the complexity of human decision-making in water usage and the identification of a methodology for quantifying individual preferences for efficiency and equity is essential. This paper attempts to offer some insights into the methodological challenges attending this task.

The paper itself is comprised of eight parts. In the following section, we explore the current status of water management in Victoria and the national policy setting that circumscribes the Victorian milieu. A specific focus on the public's perception of the current water situation is included in this section. In part three we present the

theoretical underpinnings of the concept of equity. A discussion of the foundations of economics and the emergence of behavioural economics is included in part four. Part five concentrates on the effectiveness of price and regulations as mechanisms to govern demand. The notion of value and the complexity of consumer decision making is examined in part six. The seventh section identifies the theoretical underpinnings of choice modelling before some brief concluding remarks are offered in the final section.

2.0 The Policy Context of Water Management in Victoria

2.1 National Setting

Notwithstanding the modest early progress in the water sector, water quality, water availability, environmental health and sustainability have now developed into significant political issues (Taylor & Dalton 2003). The need for reform of the water industry to improve its efficiency became apparent in 1991 after a Productivity Commission inquiry into water resources and waste disposal (Productivity Commission 1992). Subsequently, policy drivers were developed, led by the Commonwealth through the Council of Australian Governments (CoAG), forming the *National Water Reform Framework* in 1994. Specifically, this policy framework surrounded urban and rural water and waste water industries and was comprised of environmental, economic and social objectives. In addition, the reform aimed to facilitate water management planning to consider the impact of all water use by industry, environment, agriculture, and households, and to increase the effectiveness and efficiency in the provision of water services.

As a result of the COAG reforms, a framework has been developed to increase the competitiveness of the industry so that prices will more closely mirror the marginal cost of delivery. More specifically, although there are substantial differences across Australian states, regulatory authorities direct the activities of providers and expect transparency regarding the cost effectiveness of their decisions and consequences of those decisions on water prices (MacDonald et al. 2005).

2.2 Elements of the Victorian Legislative and Institutional Framework

Currently, water use in Victoria lies within the scope of the Water Act 1989 and its most recent amendments embodied in the Water (Irrigation Farm Dams) Act 2002. The legislation governing water resource usage in Victoria is at present the subject of intense scrutiny. In April 2003, the Victorian Government released a Ministerial Statement on Water, which provided an outline of the Government's future water policy framework. August 2003 saw the release of the Green Paper titled *Securing Our Water Future*, which provided a more detailed insight into the key priorities that, from the perspective of the Government, should capitalise Victoria's future sustainable management of water resources. Subsequently, these priorities were adopted in the White Paper, *Securing Our Water Future Together*, in June 2004 by the Victorian Premier and the Deputy Premier and Minister for Water.

In November 2002, the State government revealed that the Victorian Water Trust would be formed to fund a range of major projects that protect the ecological health of Victoria's river systems and promote water recycling (Robinson 2004). The Trust later released its Investment Strategy in November 2003. Essentially, the investment strategy acts as a framework for prospective investment from the \$320m Trust. The strategy is designed to ensure the investment is consistent with Trust objectives and the government's long-term policy goals (Robinson 2004).

2.3 Victoria's Current Water Restrictions

Currently, Victoria is under state-wide permanent water restrictions. Non-price measures include a ban on cleaning paved areas by hose; hand watering of gardens and washing of cars to be by use of trigger nozzle only; automatic sprinkler systems must be fitted with rain sensors; and pools cannot be filled without permission from water authorities. From a pricing perspective, eight of seventeen authorities have introduced inclining block tariffs, whilst the remainder have increased existing water use charges and lowered fixed charges. In terms of water-saving measures, two water saving schemes are being extended; water sensitive designs are to be implemented in new urban developments; there is support for water-saving labelling for household appliances; and education and awareness campaigns are progressing (Our Water, Our Future 2004).

2.4 Public Perceptions of Water

The literature suggests that consumers commonly attribute the cause of water shortages to natural events and behavioural issues (Nancarrow 2005). More specifically, natural events refer to instances such as drought, while behavioural issues include concepts such as using excessive amounts of water, having gardens that require high amounts of water, lifestyle, and appliances. Interestingly, consumers perceive themselves as being as much of a cause of water shortages as they do nature. It is only a small portion of consumers who hold mismanagement by authorities responsible for water shortages (Nancarrow 2005).

Since the corporatisation of the water industry, the issue of a perceived 'conflict of interest' has emerged. It can be argued that the Water Corporation has placed a focus on 'selling water' to achieve a profit, which diametrically contrasts with the objective of promoting the conservation of water. If authorities allow our water resources to be depleted primarily to just 'sell' water, then the public may not perceive this as responsible management and this incentive is constrained by the impact of excessive water sales on capital budgets.

In general terms, several quantitative and qualitative studies have revealed that fairness issues are highly salient in the decision making process (Po, Kaercher & Nancarrow 2003). Namely, procedural justice research indicates that social support for developments does not rely solely on the possible impacts on consumers' well-being, but also on their view of the decision making processes (see, for instance, Lind & Tyler 1988). More specifically, if consumers perceive decisions from the authorities as 'equitable' then there is a higher chance of acceptance (Po, Kaercher & Nancarrow 2003). Regardless of the methods employed by the water agencies, it appears that knowledge of society's values and concerns are vital components in the formation of water policies.

3.0 A Closer Look at the Concept of Equity

Equity is commonly proffered to be one of the most important factors in instituting successful regulations (Syme et al. 1999). In the context of policy making in the water sector, where regulation has been historically employed and the general population appears (anecdotally) compliant, consumer perceptions of equity deserve

closer scrutiny. However, given the complexity of equity in this particular context it may prove to be a challenge.

Consumers constantly look for causes of events that occur around them (Sadava & McCreary 1997). As they interpret these events, they make judgements about the motivations of others involved in the activity. Attribution theory describes the processes of explaining events and the emotional and behavioural consequences of those explanations (Sadava & McCreary 1997). For instance, if a consumer feels that the cause of an event, such as being prohibited to fill their pool, is unnecessary and thus unfair to impose, this will cause them to be unsatisfied and they may resist this particular restriction. Alternatively, if the consumer perceived the restriction as fair and saw the value in water authorities banning the filling of their pool then it is not as likely to have such a substantial negative impact on the consumer's utility. Moreover, knowledge that they are reinforcing valued behaviours may add utility. Therefore, the consumer may be more accepting of the regulation.

It is evident that our behaviour reflects that of 'social animals', in that we are significantly concerned about the behaviour of others around us 'how they're faring compared with how we're faring' (Gittins 2003). For example, if our neighbour has a green lawn because they are watering it, why should we try to conserve water and put up with a brown lawn? Alternatively, a householder may be content with having a brown lawn if every other household in their street also has one. Are we hesitant to change our consumption levels because other consumers may not and we perceive it as only 'fair' to be using as much as others?

Existing studies suggest that consumers place such a high level of importance on fairness that they are actually often willing to pay the price necessary to punish consumers whose actions are not consistent with surrounding consumers (Gittins 2003). i.e. those who are contributing less or using more than that to which they are entitled. We can therefore question whether some consumers actually gain more satisfaction from "dobbing in" their neighbours for breaking restrictions than from the future benefits they will reap from all members of society conserving water.

The social psychological theory of equity focuses on the fairness of exchanges between individuals (www.changingminds.org 2003). According to equity theory, people are more satisfied in relationships where the utilities given up and the benefits received by consumers are relatively equal. If one party is receiving too little from the relationship, then not only are they going to be unhappy, but the party who is better off will also be feeling guilty about this imbalance. This is reinforced by strong social norms about fairness (www.changingminds.org 2003).

Put differently, consumers not only maximise their utility through consuming the most they can for their dollar, but from receiving and witnessing a fair deal. Therefore, authorities should consider how consumers perceive their policies and regulations i.e. do they see them as fair? Alternatively, consumers may gain utility from abiding by regulations in that they gain satisfaction from 'doing the right thing'. Moreover, it can be argued that the way in which consumers view the fairness of the exchange can affect current and future behaviour (Blackwell et al. 2002).

Before progressing this discussion, an understanding of the traditional perspective on resource allocation helps to form foundation for further analysis.

4.0 An Insight into Economics: A Traditional and Behaviourist Perspective

4.1 Traditional Approach

The concept of relative scarcity has been seen to be the key factor underlying economics. Consumers' unlimited wants and universally limited means with which to satisfy those implies the need for efficiency in their use (Wallis & Dollery 1999). Efficiency, therefore, is a core consideration in the allocation of our resources.

Essentially, economic efficiency is thought to decrease the economic burden of scarcity across consumers. In the current context, the achievement of economic efficiency is seen as reducing the relative scarcity of water and redistribute the burden of scarcity by controlling the allocation of water between consumer groups.

Economic efficiency can be viewed from three key dimensions. Namely, productive, allocative and dynamic efficiency. Productive or technical efficiency (Farrell 1957)

basically refers to using the ‘best practice’ in production, however, this alone is not necessarily sufficient to address society’s needs. Allocative efficiency concerns the distribution of resources in an attempt to meet consumers’ preferences. It can be argued that allocative and productive efficiency do not encourage economic growth. Thus, economic efficiency has also been defined in terms of dynamic efficiency, which basically considers allocative and productive efficiency in an intertemporal setting.

The neo-classical economic doctrine proposes that the rational consumer will aspire to maximise their utility such that “the consumer should allocate money income so that the last dollar spent on each product purchased yields the same amount of marginal utility” (McIver 2001, p.178). In other words, individuals will seek to make the decision which best serves their self interests at the time. This assumption is also known as the ‘axiom of rationality’ (Andreoni 2001).

Economists of this genre assume that the ‘rational’ consumer will solely serve their self interests. Thus, it pays only scant attention to equity preferring to leave this to other disciplines. Alternatively, an emerging school of thought, termed behavioural economics, recognises that consumers do gain utility from engaging in a fair decision (Gittins 2003). Therefore, a consumer is not necessarily ‘irrational’ if they treat others more generously than assumed or if they prefer a fair deal as opposed to one where they will be better off (Gittins 2003).

4.2 Foundations of Behavioural Economics

Behavioural economics provides some insights into this alternative form of rationality. It “increases the explanatory power of economics by providing it with more realistic psychological foundations” (Camerer et al. 2004, p.8). In essence, behavioural economics is thought to build on the foundations established by economics by incorporating a focus on the underlying psychological cognitions and, in turn, improve predictions of field phenomena and policy. Of significance is the concept of equity that behavioural economics brings to the literature. This concept appears to be of high relevance in the context of developing water allocation policies and implementing regulations.

It is important to note that this differing school of thought does not dismiss conventional economics where equilibrium, efficiency, and utility maximisation are central. From our prior analysis we can see that the traditional approach is useful in that its theoretical framework provides us with refutable predictions. Behavioural economics develops traditional economics in that it offers a greater psychological dimension and often simply relaxes basic assumptions that are not key to the economic field (Camerer et al. 2004).

Therefore, the concepts from behavioural economics are not entirely new, but in fact have been largely overlooked for decades. For example, Adam Smith (1759/1892) observed some of the contradiction in the economic rationale when he noted that “we suffer more...when we fall from a better to a worse situation, than we ever enjoy when we rise from a worse to a better” (Camerer et al. 2004). In the context of urban water, this may help explain why it is such a challenge to persuade consumers to make compromises to their lifestyle and consume less water.

Bentham (in Loewenstein 1999) also addressed the psychological foundations of utility, which have only recently been given increased currency. Once economists started to accept this behaviourist school of thought mid-way through the 20th century advances in psychology provided direction for new theory. Notwithstanding this paradigm shift towards behavioural economics, analysis of pricing and regulation as mechanisms to manage the demand for water warrants discussion.

5.0 Demand-Side Perspective: Price and Regulation

5.1 Price

A number of variables have been identified in the literature as being possible determinants of water demand. These include income (Jones & Morris 1984); weather variables (Jordan 1994); residential population (Arbues et al. 2000); value of the householder’s property (Arbues et al. 2000); residential demographics (Nauges & Thomas 2000); housing characteristics (Nauges & Thomas 2000); frequency of billing and rate design (Kulshreshtha 1996). However, the most prominent determinant appears to be the ‘price’ of water (Gracie et al 2001). Employing price as a mechanism to allocate water enables marginal benefits to be equated with marginal

costs. Therefore, the marginal value of water across users and each use is equal. However, using price as a means to control water consumption raises a number of equity concerns. Specifically, raising prices in order to reduce consumption will plausibly have a greater relative impact on lower-income consumers than on higher-income consumers. Realistically, a marginal increase in price may be indiscernible to higher income consumers. By way of contrast, low-income users are likely to carry the burden of using less water.

Alternatively, there appears to be merit in applying a lower price for 'base' water (water used for necessities) and a higher price for water in excess of the base volume. This could be classified in terms of indoor water use as a necessity (relatively inelastic demand) and outdoor use as extra water usage (relatively elastic demand). Prima facie this is more equitable, in that low-income consumers are not restricted from base water and higher income users can pay the higher price for outdoor water uses i.e. pool and gardens. Notably, the current trend towards inclining block-tariffs is partly premised on this rationale.

5.2 Regulation

Government intervention in the urban water market represents an alternative mechanism for dealing with equity/efficiency tradeoffs. Regulation refers to mandating consumers' water consumption by applying certain restrictions (Edwards 2004). Essentially, regulation can take two forms- it can focus on the quantity of water consumed and/or on the activities undertaken with water. Applying uniform restrictions where every consumer is restricted to using the same amount may be perceived as fair. However, given that different consumer groups will value water to varying degrees equity problems are inevitable. For example, pool owners or people with gardens seem likely to cherish the use of water more highly than those with no garden or pool.

Given the nature of this particular product 'water', prohibiting supply when households reach their quota would presumably be unacceptable on health, social and political grounds. In addition, we can question whether it is 'fair' to force consumers to change their consumption behaviour. From the perspective of social costs,

regulations are generally less efficient the more they deny the preferences of individuals (Barrett 2004).

By way of contrast, regulations that focus on water related activities are attended by a different set of problems. In many instances, it becomes the responsibility of community members to monitor the water usage of surrounding households and employ the notion of ‘dobbing in your neighbour’. That is, enforcing regulations becomes somewhat dependent on a social capital-threatening practice.

A relevant concept is the idea of ‘internal’ trade. That is, the trade of water across activities within a household. During water restrictions, for example, consumers who value the pool experience highly enough are authorized to fill their pool if they make savings in water use in other areas of the household equivalent to the water needed for the pool. Undoubtedly, water usage preferences are going to vary across households.

Water conservation regulations can ensure efficient water use only if the bureaucracy is certain of consumers’ preferences and if demand was restricted to the theoretically correct level. Unfortunately, there is insufficient information to determine the exact level of water conservation that maximises consumer welfare.

6.0 Value and the Complexity of Human Decision-Making

Underpinning the concepts of efficiency and equity is the notion of value. An understanding of the dimensions of customer value is necessary in order to comprehend efficiency and equity as ‘products’ and that consumers often make trade-offs between the two. Essentially, consumers perceive products as bundles of attributes (McColl-Kennedy & Kiel 2000). It is these attributes that form the product’s overall ‘value’.

Value might conceivably be considered from three perspectives. These include consumption value, perceived value, and relative value. Consumption value is basically the degree of value obtained through the consumption experience (Hirschman & Holbrook 1982). For example, although the marginal price of a ‘water-efficient’ item, such as a shower head, may be lower, the experience provided may be

inferior than previously to the water user (i.e. does not feel as good). Perceived value is concerned with the perceptions of quality and the affordability of a product (Zeithaml 1988). For instance, the extra cost of buying a 'water-efficient' item may be seen by the consumer to be greater than any reduction in water use. Relative value emphasises the relativity of competition (Grisaff & Kumar 1998). Given that there are few substitutes for potable water, this concept offers limited scope in this context.

Policy makers not only should be aware of the value that consumers seek from their consumption experience, but also of the complexity of the decision making process in order to identify the processes and trade-offs that consumers make.

Numerous researchers have applied theories from psychology and sociology to markets in an attempt to explain variations in consumer demand for different products, services and brands (see, for instance, Koponen 1960; Tucker & Painter 1961; Evans 1959; Haire 1950; Dichter 1964). Combined with the relationship between value and consumer behaviour, these models provide us with greater insight into the intricacies of consumer behaviour. The complexity of the decision making process can be attributed to the notion that the consumer's ultimate goal of a purchase is to obtain value. Thus, the consumer undertakes a series of tasks to maximise their potential of purchasing a product that provides value. Various analyses from behavioural economics and sociology (see, for instance, Syme 2006) have established that consumers obtain value from both an efficiency and equity perspective. However, the relative importance of each in a given decision context remains a matter of empirical debate. This is particularly the case in the context of the consumer's preferences for efficiency and equity in the water sector.

The problem is exacerbated by the relative dearth of public information regarding the preferences of such consumers for different levels of efficient and equitable water services. Similarly, insufficient attention has been paid to the ways in which the attitudes of consumers vary between these services vary over time or alter depending on the availability of the resource. A way forward would appear to reside in treating the efficient allocation of water and the equitable allocation of water as two products or at least product attributes with the potential to add value to consumers. Moreover,

being able to establish value ascribed to these attributes would give rise to more efficacious outcomes.

7.0 Choice Modelling (CM)

CM is a type of multivariate technique, which is employed to comprehend the nature of the way in which respondents form preferences for products, services, or ideas (Hair et al., 1998). Consistent with consumer decision theory, consumers make decisions based upon a product's attributes (Kaul & Rao 1995). The aim of CM is to statistically unbundle these attributes and assign the part-worth utilities to them. However, this relies upon consumers being able to allocate utility to the various levels of an attribute and subsequently develop a total utility for a specified product or service, which can be real or hypothetical (Cruse et al. 2001).

In the current milieu, CM appears to offer promise as an analytical tool for providing empirical estimates of consumers' Willingness To Pay (WTP) for specific attributes of efficient allocation of water and equitable allocation of water. Subsequently, this could inform water agencies and others of the preferences and capacities of consumers to pay for efficiency and equity and thus enable the determination of the trade-offs between the two. Ultimately, this will assist in prioritising investments that deliver the greatest welfare gain to these communities in an optimal time frame.

Operationalising this technique requires that the product/service/idea be appropriately described, in terms of its relevant attributes and levels, and that respondents are subsequently provided with suitable stimuli (Hair et al. 1998). Therefore, the choice experiment must be composed of those attributes that are able to effectively reflect efficiency and equity and that are relevant to consumers regarding the allocation of water. For instance, attributes such as extra water charges and the choice of whether the consumer would purchase entitlements from other extractive users could possibly reflect efficiency. Alternatively, equity may be reflected in attributes such as preferred frequency of restrictions and improvement of technical infrastructure.

8.0 Conclusion

It appears that water shortages are going to characterise our future. Therefore, effective management and policy development concerning the allocation of water is vital. Analysis suggests that consumer involvement and acceptance of water regulations play a significant role in ensuring successful and effective strategy development. Moreover, our discussion revealed the importance of the concepts of efficiency and equity in this context. Although it is apparent that efficiency and equity are crucial elements underlying human motivation, we do not know the value that consumers place on each or what the tradeoffs are between the two. Employing the statistical technique of choice modelling, where the efficient allocation of water and the equitable allocation of water are treated as 'products', will enable us to identify the relative importance of each in the minds of the consumer and ultimately achieve an allocation of water which rightfully balances the tradeoffs between efficiency and equity.

References

- Andreoni, J. 2001, Philosophy, Psychiatry, and Psychology, International Encyclopaedia of the Social and Behavioural Sciences, Elsevier Science Ltd.
- Arbues, F., Barberan, R. & Villanua, I. 2000, Water Price Impact on Residential Water Demand in the City of Zaragoza. A dynamic panel data approach, paper presented at the 40th European Congress of the European Regional Studies Association (ERSA) in Barcelona, Spain, August.
- Barrett, G. 2004, Water Conservation: The Role of Price and Regulation in Residential Water Consumption, Economic Papers Vol 23, No. 3.
- Blackwell, R., Miniard, P. & Engel, J. 2002, Consumer Behaviour Ninth Edition, Thomas Learning, United States of America.
- Camerer, C., Loewenstein, G. & Rabin, M. 2004, Advances in Behavioural Economics, Princeton University Press, United States of America.
- Changing Minds. 2003, Equity Theory, http://changingminds.org/explanations/theories/equity_theory.htm, 12th August 2003.
- Crase, L., Dollery, B. & Lockwood, M. 2001, Transaction costs Emanating From Policy Flexibility in Water Markets, Water Policy Reform: Lessons from Asia and Australia, ACIAR Proceedings No. 106.

Department of Sustainability and Environment. Victorian Government White Paper: Our Water, Our Future, www.dse.vic.gov.au, 2004.

Dichter, E. 1964, Handbook of Consumer Motivations, McGraw Hill, New York.
Edwards, G. 2004, An Economic Policy Framework for Assessing Options for Achieving Balance in Future Water Demand and Availability in Metropolitan Melbourne, La Trobe University.

Evans, F. 1959, Psychological and Objective Factors in the Prediction of Brand Choice, Journal of Business, Vol 32.

Gittins, R. 2003, Fair-Go Players Triumph Over Efficiency Fiends, <http://www.smh.com.au/articles/2003/10/03/1064988401913.html>, 7th October 2003.

Gracia, F., Valinas, M. & Martinez-Espineira, R. 2001, The Literature on the Estimation of Residential Water Demand, Elsevier Science.

Grisaffe, D. & Kumar, A. 1998, Antecedents and Consequences of Customer Value: Testing and Expanded Framework, Working Paper 98-107, Marketing Science Institute, Cambridge.

Hair, J., Anderson, R., Tatham, R. & Black, W. 1988, Multivariate Data Analysis, Upper Saddle River, Prentice-Hall.

Haire, M. 1950, Projective Techniques In Marketing Research, Journal of Marketing, Vol 14.

Hirschman, E. & Holbrook, M. 1982, Hedonic Consumption: Emerging Concepts, Methods, And Propositions, Journal of Marketing, Vol 46.

Jones, C. & Morris, J. 1984, Instrumental Price Estimates and Residential Water Demand, Water Resources Research, Vol 20 Iss 2.

Jordan, J. 1994, The Effectiveness of Pricing as a Stand-Alone Water Conservation Program, Water Resources Bulletin, Vol 30 Iss 5.

Kaul, A. & Rao, V. 1995, Research for Product Positioning and Design Decisions: An Integrative View, International Journal of Research in Marketing, Vol 12.

Koponen, A. 1960, Personality Characteristics of Purchasers, Journal of Advertising Research.

Kulshreshtha, S. 1996, Residential Water Demand in Saskatchewan Communities: Role Played by Block Pricing System in Water Conservation. Canadian Water Resources Journal, Vol 20 Iss 2.

Lind, E. & Tyler, T. 1988, The Psychology of Procedural Justice, New York: Plenum.

- Lowenstein, G. 1999, A Visceral Account of Addiction. In *Getting Hooked: Rationality and Addiction*, edited by Jon Elster and Ole-Jorgan Skog. Cambridge: Cambridge University Press.
- MacDonald, D., Barnes, Mary. & Bennett, J. 2005, Using a Choice Modelling Approach for Customer Service Standards in Urban Water, *Journal of the American Water resources Association*.
- McCull-Kennedy, J. & Kiel, G. 2000, *Marketing: A Strategic Approach*, Nelson Thomson Learning, Australia.
- McIver, J. 2001, *Microeconomics Sixth Edition*, The McGraw-Hill Companies Inc., Australia.
- Nancarrow, B. 2005, *Regulation and Restrictions: A Community Perspective*, Australian Research Centre for Water in Society, CSIRO Land and Water.
- Nauges, C. & Thomas, A. 2000, Privately-Operated Water Utilities, Municipal Price Negotiation, and Estimation of Residential Water Demand: The Case of France. *Land Economics*, Vol 76 Iss 1.
- OECD. 1999, *Household Water Pricing in OECD Countries*. OECD, Paris, unclassified document ENV/EPOC/GEEI(98)12/FINAL.
- Po, M., Juliane, D. & Nancarrow, B. 2003, Literature Review of Factors Influencing Public Perceptions of Water Reuse, CSIRO Land and Water Technical Report 54/03.
- Productivity Commission. 1992, *Water Resources And Waste Water Disposal*. Report no. 26, 17th July 1992.
- Raymond, W., Murphy, M., Kilfoyle, F. & Moore, S. 1999, An Opportunistic Field Experiment in Community Water Conservation, *Population and Environment*, Vol 20, Iss 6, New York.
- Robinson, A. 2005, Victorian Water Reform Developments, http://www.aar.com.au/services/water/waterref_vic.htm, 7th October 2005.
- Sadava, S. & McCreary, D. 1997, *Applied Social Psychology*, Prentice-Hall, United States of America.
- Serageldin, I. Surviving Scarcity: Sustainable Management of Water Resources. *Harvard International Review* 18(3) (1996)50-53.
- Syme, G.J., B.E. Nancarrow, and J.A. McCredlin. 1999, Defining the Components of Fairness in the Allocation of Water to Environmental and Human uses. *Journal of Environmental Management* 57: 51-770.
- Taylor, M. & Dalton, R. 2003, *Water Resources- Managing the Future*, CD ROM, Australian Water Association 20th Convention, Perth, paper 351, Australian Water Association, Sydney.

Tucker, W. & Painter, J. 1961, Personality and Product Use, Journal of Applied Psychology, Vol 45.

Wallis, J. & Dollery, B. 1999, Market Failure, Government Failure, Leadership and Public Policy, New York : St. Martin's Press.

Zeithaml, V. 1988, Consumer Perceptions of Price, Quality and Value: A Means-End Model and Synthesis of Evidence, Journal of Marketing, Vol 52.