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# What affects public acceptance of recycled and desalinated water?

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ABSTRACT

This paper identifies factors that are associated with higher levels of public acceptance for recycled and desalinated water. For the first time, a wide range of hypothesized factors, both of socio-demographic and psychographic nature, are included simultaneously. The key results, based on a survey study of about 3000 respondents are that: (1) drivers of the stated likelihood of using desalinated water differ somewhat from drivers of the stated likelihood of using recycled water; (2) positive perceptions of, and knowledge about, the respective water source are key drivers for the stated likelihood of usage; and (3) awareness of water scarcity, as well as prior experience with using water from alternative sources, increases the stated likelihood of use. Practical recommendations for public policy makers, such as key messages to be communicated to the public, are derived.



## 1. Introduction

Many countries endure water supplies that are insufficient to meet their present and future demands. Escalating pressure from increased population, along with the uncertainty of water supply conditions due to climate change, amounts to a burgeoning water crisis. While technologies are available to alleviate water shortage, many countries have experienced public resistance to the adoption of much needed water augmentation projects. To address the world's water crisis it is essential that engineers and social scientists work together. Engineers can provide the best, safest and most energy-efficient solutions to augment water supplies, whereas social scientists can facilitate better understanding of the reasons for public resistance to the adoption of water from alternative sources. Social scientists can also suggest ways in which public policy makers may be able to increase acceptance of alternative water sources and find solutions which are most acceptable for the community. The present study represents a social science contribution to this field.

To date a significant amount of empirical work has been conducted to investigate the level of stated public acceptance for recycled water – Bruvold and Ward (1970); Bruvold (1972); Kasperson et al. (1974); Sims and Baumann (1974); Stone and Kahle (1974); Olson et al. (1979); Bruvold et al. (1981); Milliken and Lohman (1985); and Po et al. (2004). Recently, similar studies have been conducted in the context of desalinated water: Dolnicar and Schäfer (2006); Dolnicar and Schäfer

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(2009); and Dolnicar and Hurlimann (2010). Each of these studies has provided an interesting snapshot of the public's sentiments toward alternative water sources at the time of survey. Additionally, a number of other studies identified correlates of high acceptance levels – Hanke and Athanasiou (1970); Gallup (1973); Kasperson et al. (1974); Sims and Baumann (1974); Johnson (1979); Olson et al. (1979); Alhumoud et al. (2003); and Hurlimann and McKay (2004). However to date, a limited number of studies have attempted to include a comprehensive set of potential explanatory variables, and to simultaneously test the effect they have on the acceptance levels of water from alternative sources.

The aim of this paper is to fill this gap, both for recycled and desalinated water. Specifically, we investigate which of the hypothesized personal characteristics are in fact associated with higher or lower levels of acceptance of recycled and desalinated water. Testing is conducted simultaneously for a wide range of independent variables, thus avoiding the over-interpretation of single factors. From the empirical findings we derive key insights and recommendations for public policy makers.

## 2. Literature review

Since the 1970s a significant body of knowledge has developed around the topic of public acceptance of recycled water, providing useful information about general acceptance levels for various uses of recycled water. Most studies investigating public acceptance of recycled water come to the same conclusion – that people are very open to using recycled water for uses with low personal contact, such as watering trees and shrubs in their garden, but are reluctant to adopt recycled water for uses with high personal contact, such as drinking or bathing one's baby. Although it could be argued that recycled water has now been used for many decades, recent studies have shown that the same pattern is still valid – Marks et al. (2006); Dolnicar and Schäfer (2006); Hurlimann (2006); and Hurlimann (2007a,b,c). For example, Dolnicar and Hurlimann (2010) found that 92% of Australian respondents would use recycled water for garden watering, but only 36% for drinking.

Despite the significant research attention that public acceptance of recycled water has attracted, very little social science research has focused on water from other alternative sources. Only recently have comparative studies of acceptance across different kinds of water been undertaken, such as Dolnicar and Schäfer (2006), and Dolnicar and Schäfer (2009). Both conclude that people – in this case the Australian population – clearly discriminate between recycled and desalinated water. Desalinated water was preferred over recycled water for close-to-body uses such as drinking (49% compared to 20% acceptance respectively). Recycled water was preferred over desalinated water, however, for some uses with little body contact, for example, for watering gardens (89% compared to 68% acceptance respectively). Respondents understood that water recycling is more environmentally friendly than desalination which, in turn, was perceived by respondents as less risky from a public health perspective.

More recently, Dolnicar and Hurlimann (2010) conducted a similar comparison, finding that Australians now generally prefer desalinated water: 53% were willing to drink it (as compared to only 36% who were willing to drink recycled water) and 84% were willing to water their garden with it (compared to 86% who were willing to water their garden with recycled water). It is likely that developments since the 2006 study have significantly impacted people's perceptions. Most importantly, Australians in a Queensland country town, Toowoomba, voted against the development of a water recycling plant. Public opposition led by the community group 'Citizens Against Drinking Sewage' dominated national media (for a detailed case study see Hurlimann and Dolnicar, 2010). Possibly as a consequence of the Toowoomba case, many Australian state governments have chosen desalination as the preferred path, thus communicating to the public the benefits of this alternative method of securing Australia's water for the future. It is likely that these developments have led to the shift in public perception observed between the 2006 and the 2009 studies.

While a significant amount of survey research has been conducted to ask respondents directly about their willingness to use different kinds of water from alternative sources, only a small amount of work has attempted to identify which personal characteristics are associated with a high or low level of acceptance towards alternative water sources. An overview of these studies is provided in Table 1. As can be seen, key explanatory factors include trust (in the water provider or public policy makers); knowledge and information; past experience with alternative water sources; and perception of risk. Demographic variables have been explored, but consensus on the nature of the association is low, particularly for age.

The main limitation of this body of work is that most studies investigate factors hypothesized to be associated with acceptance of water from alternative sources in isolation from one another, thus risking that the association is over-interpreted. The possible interaction effects of multiple factors have mostly been ignored to date. To the authors' knowledge only one study, Po et al. (2005), attempted this in the context of the general public's acceptance of indirect potable reuse of wastewater. Statements of intended use were found to be significantly related to positive attitudes towards indirect potable reuse, which, in turn, were influenced by a number of factors: subjective norms, emotions, trust in the authorities, risk perceptions, sense of obligation to protect the environment, and their perceived control over the source of their drinking water. However, this study focused mainly on complex psychological constructs which are hard to assess and are thus of limited value to public policy makers who need to be able to easily target certain segments of the population with educational messages about water from alternative sources.

## 3. Methodology

### 3.1. *Fieldwork administration*

Data was collected online in January 2009 using an Australian permission-based research-only internet panel. 13,884 invitations were sent out to panel members. The final total sample size amounted to 3094 respondents (a 22% response rate); 1495