

# Willingness to pay for water: The international debates

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## Abstract

The objective in this paper is to furnish a critical analysis of international research concerning the question of "willingness to pay" for water. The majority of existing international studies derives from research work either sponsored by or linked to the World Bank or other development agencies. The paper is divided into four sections of material. First, the significance of understanding "willingness to pay" is emphasised, particularly in terms of the planning of water projects. In the second section, the focus turns to a review of the contributions and validity of rapid reconnaissance surveys concerning informal water vending. In the third section the methodology and findings are reviewed of the cutting edge of "willingness to pay" research, namely contingent valuation studies. The final section draws together key conclusions and findings.

## Introduction

A central element in initiatives for reconstruction and development is the provision of infrastructure and services to ensure that all South Africans enjoy access to adequate basic services (Eberhard and Quick, 1995; Pansegrouw, 1996). It is clear from official statements on water-supply policy that a strong emphasis currently is placed on issues of cost recovery (Schur, 1994; DWAF, 1994; Goldblatt, 1996a; Pansegrouw, 1996). The question of cost-recovery is a highly sensitive and controversial matter particularly against the background of a recent lengthy culture of township rent and service boycotts as political strategy and of the launching of the Masakhane campaign to reverse this culture of non-payment (Goldblatt, 1996a; 1996b). At the heart of local debates concerning cost-recovery is an understanding of the ability and willingness of consumers to pay or contribute towards improved water services (Van Ryneveld, 1995; Goldblatt, 1996a). This crucial issue is now attracting the interest of South African researchers and a number of empirical studies of consumer willingness to pay are in progress (Goldblatt, 1996b). The growing involvement of South African researchers in "willingness to pay" research can be informed and enriched, however, by an examination of an international experience which originated in the period 1981 to 1990, the International Drinking Water Supply and Sanitation Decade. The aim of this paper is to furnish a critical review of the existing international research based outside South Africa concerning "willingness to pay" for water.

## Background context

The International Drinking and Water Supply and Sanitation Decade was characterised by sustained efforts on the part of communities, governments and several international development agencies to expand water supplies and sanitation facilities particularly to the poorest populations in the developing world. It has been claimed that the efforts of development agencies participating in the Decade (spearheaded by the World Bank) were "enthusiastic, often innovative, and sometimes outstand-

ingly successful" (Cairncross, 1992, p. 1). Nevertheless; it is admitted that "some of the more optimistic Decade targets have not been achieved" and "much remains to be done before safe water and sanitation are available to all" (Cairncross, 1992, p. 1). Although the majority of developing world countries and support agencies subscribed to the goals of the Decade, overall objectives were not met (Serageldin, 1994; World Bank, 1996). Especially troublesome was the fact "that improvements in sanitation lagged far behind those in water supply" (Whittington et al. 1993, p. 733).

During the Decade, major progress was made in terms of advancing knowledge in the technological issues surrounding water supply or sanitation provision. Several studies appeared analysing such issues as conventional and non-conventional technologies of water supply or sanitation, including handpumps and ventilated improved pit (VIP) latrines (Ridgley, 1989; 1993; Reynolds, 1992). Indeed, in many respects, it remains that the Decade's "most important achievements have been in the realm of ideas" (Cairncross, 1992, p. 1). Accordingly, it is evident that the principal challenges of the next decade "will not be technological questions - the 'hardware of water supplies and sanitation' - but the 'software' issues", most notably questions relating to the organisation and financing of water or sanitation programmes. One key software issue concerns the issue of household and community "willingness to pay" for water supplies or sanitation. The principal lesson of the Decade is perhaps that progress and continuing success hinge upon the response to consumer demand; a first step in that response is to understand household or user willingness to pay (Cairncross, 1992).

The objective here is to undertake an overview of international debates and research concerning "willingness to pay". Given that user willingness to pay for facilities is often a major element in determining the success of a water or sanitation supply scheme it is remarkable how little detailed literature exists (Cairncross, 1992; McPhail, 1993a). An intensive scan of the international "state of the art" discloses that fewer than 30 substantive studies are either complete or currently in progress on questions surrounding "willingness to pay" (Dzikus and Surjadi, 1995). The majority of research work either has been sponsored by or linked to the World Bank or other development agencies, most importantly the United Nations Centre for Human Settlements (UNHCS). Only recently have there appeared a scatter of

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Studies undertaken by independent scholars or analysts concerning this issue. In synthesising this emerging body of international writings, the paper unfolds in terms of four uneven sections of material. First, the importance of understanding "willingness to pay" is stressed, particularly in terms of the planning of water projects. In the second section, attention turns to review the contributions and validity of rapid reconnaissance surveys of the business of informal water vending; it is argued that such studies can yield valuable insights into community willingness to pay. In the third section the methodology and findings are reviewed of what must be seen as the cutting edge of "willingness to pay" research. More specifically, the focus is upon critical analysis of the methodology of "willingness to pay" or, as is sometimes called, contingent valuation studies (Dzikus and Surjadi, 1995). The final section draws together conclusions and reiterates key findings.

### **Willingness to pay: The significance of the issue**

It is argued by Whittington et al. (1991) that for most water utilities and donor agencies, the actual water supply and sanitation situation in the developing world "is typically something of a mystery" with limited knowledge of the means by which households secure water, its use, cost or how much households might be willing to pay for improved services. Crane (1994, p. 71) avers that information "regarding the demand for water by the urban poor, including the amount they pay, where they find it, and how they would react to change in either prices or supply structures, remains relatively scarce". Nevertheless, this paucity of knowledge has not blocked major investment planning for the water supply sector. Indeed, it is observed that "designs for new systems are generally made and projects constructed with little understanding of household water demand behaviour" (Whittington et al., 1989a, p. 1). Moreover, "the behavioural response to any given policy intervention has only infrequently been incorporated into infrastructure investment and administrative reform plans" (Crane, 1994, p. 71). Instead, "engineers and planners tend to rely on very simplistic assumptions about what determines *per capita* water use and affordability" (Whittington et al. 1989a, p. 1).

The situation in terms of the provision of associated sanitation facilities is equally depressing. One World Bank research study concluded that across the developing world "the practice of sanitation planning has become a kind of routine, cookbook-style exercise that is out of touch with the realities that massive subsidies are unavailable and that the needs of the poor are not being met" (Whittington et al., 1992, p. 2). It was argued that in "traditional sanitation planning, piped sewerage is usually selected as the technology of choice, and the focus of planning is largely on 'supply-side' issues such as estimating the costs of constructing and operating the proposed system" (Whittington et al., 1993, p. 733). These authors continue that little attention is "paid to consumer demand for sanitation because it is typically assumed that either everyone will want to connect to the sewerage system at whatever price is charged or public health benefits are so important to the community and the service will be so heavily subsidised that no one will have reason not to connect" (Whittington et al., 1993, p. 734). The result is that the present planning system for sanitation in many areas of the developing world has produced the "construction of numerous systems that people cannot afford to connect to and are thus not being used" (Whittington et al., 1993, p. 734). What is required are new planning procedures "that consider the demands of the beneficiaries" (Whittington et al.,

1992, p. 3).

If water and sanitation projects in the developing world were usually financial and social success-stories then it could be argued that there is no point in pursuing detailed research concerning household water-use behaviour. Regrettably, this is seldom the case (Lauria and Whittington, 1989; Briscoe et al., 1990; Lovei and Whittington, 1991; Rondinelli, 1991; Bohm et al., 1993; Serageldin, 1994; World Bank, 1996). As argued by one research team: "water supply systems provide a low level of service (usually through public taps or hand pumps); they are heavily dependent on (often unreliable) government investment financing and transfers for operations and maintenance expenses; and the quantity and quality of service are unreliable" (Briscoe et al., 1990, p. 116). Moreover, commonly "the 'improved' systems often do not function; it is estimated that one in four systems is not working at any one time, and that the number of systems being abandoned is approximately equal to the number of systems being commissioned" (Briscoe et al., 1990, p. 116). Even functioning water systems are not always used; for example in Ivory Coast and Kenyan surveys, it was revealed that "only one-third of the population reported to have access to improved facilities actually used them" (Briscoe et al., 1990, p. 116).

For a variety of reasons, water-supply projects commonly fail to reach their anticipated goals (Serageldin, 1994; World Bank, 1996). In cities "water schemes often fail to achieve the goals set for the number of households to be connected to the water system, the amount of water produced, and the proportion of costs recovered - and the gap between expectations and accomplishments is often great" (Whittington et al., 1991, p. 179-180). One of the key factors behind these shortfalls of urban water projects is "lack of adequate data on household water demand" (Whittington et al. 1989a, p. 1). In rural areas of the developing world a similar picture is disclosed (World Bank Water Demand Research Team, 1993). A World Bank team of researchers argue that progress "in improving the quality and quantity of water used by people in rural areas of the developing world has been unsatisfactory in two respects:

- supplies that have been built are frequently neither used correctly nor properly maintained; and
- extension of improved services to unserved populations has been slow" (Whittington et al., 1990a, p. 293).

Once again, it must be cautioned that this poor record of rural water projects is the product of a complex interaction of factors (World Bank Water Demand Research Team, 1993; World Bank, 1996). None the less, "a major impediment to improved performance is inadequate information on the responses of customers to new service options" (Whittington et al., 1990a, p. 293). Indeed, the international experience underscores the fact that there are "obvious dangers in designing rural water supply systems without reasonable information on what services people want and for what they are willing to pay" (Briscoe et al., 1990, p. 117). Moreover, the design of water supply projects in rural parts of the developing world has been overly supply-oriented to the neglect of crucial considerations concerning consumer demand, more particularly, of consumer willingness to pay (World Bank, 1987; Altaf et al., 1992; 1993; World Bank, 1996).

One step in planning water projects, whether in urban or rural areas, is for water utilities, donor agencies and resource planners to determine the percentage of household income that residents are able and willing to spend for individual potable water connections and subsequent commodity charges (Serageldin, 1994; UNDP, 1996). Such information is typically applied to the

planning of water distribution systems, their sizing and to financial planning of projects. As one observer notes, despite the significance of having a reasonable estimate of this percentage to avoid either over- or underbuilding the physical works or setting the water tariffs too high or too low, "there are very few empirical studies that explored the level of household income or expenditures that households will dedicate for improved water service connections and the ongoing volumetric charges" (McPhail, 1993a, p. 963). In many instances, demand for water at different prices "is not considered during the design of piped water systems" (McPhail, 1993a, p. 963). Instead, planning is undertaken on the basis of general sets of assumptions made about the population to be served and *per capita* consumption rates. Tariffs to be charged are calculated so that they cover the necessary, operating, maintenance and percentage of capital costs. Seldom is any consideration accorded to whether tariffs reflect the general community's willingness to spend. In rural projects the behavioural assumptions that underlie most water supply planning are generally crude. Normally, it is assumed "that so long as financial requirements do not exceed 5% of income, rural consumers will choose to abandon their existing water supply in favour of the 'improved' system" (Whittington et al., 1990a, p. 293). The assumptions relating to urban water supply are almost identical; most utilities as well as donors "assume that, as long as the cost of potable water to the household falls below 5% of household income, then it is 'affordable' and the household will make a connection to the system and be able to pay the subsequent recurrent charges" (McPhail, 1993a, p. 963). Water project planning is therefore based on twin assumptions of:

- a very inelastic demand as long as the amount spent on water is below 5% of household income; and
- a very elastic demand if the outlay exceeds 5% of household income.

Experience of water projects undertaken in many parts of the developing world shows that this 'five per cent rule' is often incorrect both in terms of urban and rural areas. In the rural developing world "many of those 'served' by new systems have chosen to continue with their traditional water use practices" (Whittington et al., 1990a, p. 293). In many instances, such as the experience of rural Zimbabwe, "facilities are built for which a community would never pay" (Briscoe et al., 1990, p. 117). Further, in urban areas, another problem is "that many people who desire and are willing to pay for improved water service are not even considered for piped water service because they are mistakenly thought to be indigent" (McPhail, 1993a, p. 963). Commonly, the untested rule-of-thumb method produces different behavioural assumptions on the behalf of donors and governments. For donor agencies eager to promote new technologies or systems, "the temptation is to overestimate the willingness of consumers to pay" (Cairncross, 1992, p. 35) often with staff assuming that the ability to pay a certain amount is equated with a willingness to do so. By contrast, national governments are more likely to underestimate the willingness to pay, particularly of low-income groups. It is conjectured that one possible motivation for this is that in negotiations with donor agencies "it may help to secure a higher level of external funding for the sector" (Cairncross, 1992, p. 36).

In sanitation planning, the general rule-of-thumb is that "if the monthly charges are less than 3 per cent of household income, it is often assumed that the household has the ability (and willingness) to pay for the improved service" (Whittington et al., 1992, p. 2). As is the case with water projects, however, this

simplistic assumption increasingly is being called into question from a range of new investigations (Altaf and Hughes, 1994). Indeed, "evidence is accumulating from developing countries that the traditional kind of master planning exercise is not a productive way to analyse urban sanitation problems or to plan for improvements" (Whittington et al., 1992, p. 2).

Overall, therefore, from the lessons and experience gained from *water and sanitation projects implemented in the developing world* over the past two decades, it is clear that a strong case exists for understanding and estimating user willingness to pay. Project planning based upon guesses about consumer preferences often has led to costly failures. The evidence from several studies shows that it is possible to "replace guesses with better demand information in order to provide what consumers want and are willing to pay for" (Altaf and Hughes, 1994, p. 1774). Empirical research can greatly strengthen the planning and delivery of water and related sanitation projects, especially to the poorer communities in both urban and rural developing world. Accordingly, as stressed by Briscoe et al. (1990, p. 116) an important research challenge is "to identify, under a range of socioeconomic and environmental conditions, the level of service that people want and for which they are willing to pay".

### **Estimating willingness to pay: The contribution of water-vending surveys**

The research of Cairncross (1992), Dzikus and Surjadi (1995) and UNDP (1996) stresses the value for the water supply sector of conducting surveys on how much households are already paying for water. One readily available source of information concerning "willingness to pay" derives from pursuing surveys of organised and informal water-vending activities both in cities and rural areas. It is often forgotten that millions of people in villages and cities throughout the developing world are served by water vendors who take water from an available source and subsequently deliver it in containers to households or fill household containers from their vehicle tanks (Zaroff and Okun, 1984). The poorest urban informal settlers are often driven to rely on water vendors because of the lack of convenient standpipes, itself "often a consequence of government policy not to provide infrastructure in 'illegal' unplanned squatter areas" (Cairncross, 1987, p. 181). Illustratively, in Jakarta, roughly 32% of the city's 8 m. inhabitants purchase drinking water from street vendors (Lovei and Whittington, 1991). Nevertheless, with only a few exceptions, "water vending has received little attention in the published literature" on water issues or in the considerable body of research on the informal economy in the developing world (Whittington et al., 1989b, p. 160). The benchmark study remains the comparative survey of vending practices in Asia, Africa and Latin America which was undertaken by Zaroff and Okun (1984).

The activity of informal water vending has both advantages and disadvantages to poor communities in the developing world. On the negative side, the distribution of water by vendors is expensive, irrespective of whether vehicles are powered by people, animals or engines (Crane, 1994). In addition, it is generally the case that households served by vendors pay higher unit charges for water than those directly connected to a piped water system. In many cases, households pay over 10% of their monthly incomes for vended water as contrasted to figures of between 1 to 5% of monthly income for piped water. In Jakarta, it was concluded that there "can be no doubt that the prices households pay for water from distributing vendors are very high" (Lovei and Whittington, 1991, p. 24). Indeed, it was

disclosed that in some cases, households "purchasing from vendors pay as much as 50 times more per unit of water than households connected to the municipal system" (Lovei and Whittington, 1991, p. 9). Moreover, research conducted in rural Tanzania recorded that villagers in the Newala District must either buy water from vendors at a high cost or fetch water from traditional sources (Whittington et al., 1989c). When they must purchase water from vendors, "some villagers pay the equivalent of up to one day's agricultural wages for a 20 litre bucket" (Rondinelli 1991, p. 421). The high relative cost of water on both a unit and monthly basis was a theme further emphasised in the international comparative survey of Zaroff and Okun (1984). Beyond cost considerations, vending sometimes is also linked to health problems as hawkers may sell from polluted sources or from fouled containers (Zaroff and Okun, 1984). Finally, one should not lose sight of the fact that, in many cities where water vending takes place, the vendors themselves are employees rather than "independent entrepreneurs" and, as has been shown in the case of informal settlements around metropolitan Durban, subject to highly exploitative wage and working conditions (Hill, 1991).

Positive features of water vending are that it furnishes a valuable service for communities in urban and rural areas with no access to piped water; in the latter case, providing some relief from the drudgery of carrying water from often distant sources to the household. Accordingly, the major benefit of water vending to the consumer is "that it provides a significant saving of time compared to fetching water from other sources" (Whittington et al., 1989b, p. 159). Other positive features of water vending as an informal activity concern its labour-intensiveness and job creation impact and the fact that the simple technologies of water vending systems can be readily maintained on a local basis.

Important research conducted for the World Bank on water vending both in Kenya and Nigeria shows that "the scale and magnitude of vending activities in metropolitan areas of developing countries has not been widely realised, nor has the value of information on such vending systems been adequately appreciated by water resource engineers or policy analysts" (Whittington et al., 1991, p. 194). It has been demonstrated that information on water-vending practices may provide valuable inputs to water-supply planning, not least concerning some insight on willingness to pay. This group of World Bank researchers have demonstrated that rapid reconnaissance surveys of water vending can furnish "policy-relevant information to water utility managers in a timely fashion" (Whittington et al., 1989a, p. 1), yielding "valuable information for water supply planning" (Whittington et al., 1989a, p. 25). The findings and implications of the two notable studies dealing with respectively, Ukunda in Kenya and Onitsha in Nigeria will be examined in turn.

The research in Ukunda, Kenya, a village situated some 40 km south of Mombasa, uncovered the workings, organisation and actors in the water-vending system (Whittington et al. 1989b; Whittington et al., 1990b). Essentially, many people in Ukunda obtain water "by purchasing it from direct vendors who are licensed operators (kiosks) or from distributing vendors who buy water from the kiosks (wholesale vendors); vendors carry water in 20 litre plastic containers which are transported either by carts or bicycles" (Whittington et al., 1989b, p. 160). Overall, the research disclosed that water vendors supplied 45% of the total water consumed in Ukunda with annual expenditure *per capita* on water being in the range of US \$30 (Whittington et al., 1989b). More significantly, it was calculated that the average *per capita* water expenditure for vended water "is about 9% of the average

annual *per capita* income in Ukunda" (Whittington et al., 1989b, p. 164).

In terms of the question of "willingness to pay" for water, the research at Ukunda on the magnitude of money and water flows in the water-vending system demonstrates "that most people in Ukunda can afford yard taps or even house connections" (Whittington et al., 1989b, pp. 164-165). At Ukunda "households are paying much more for vended water than would be necessary to provide and sustain a piped distribution system with yard taps" (Whittington et al., 1989b, p. 168). Indeed, the key conclusion is that average annual *per capita* expenses on vended water "can serve as a useful indicator of a community's ability and willingness to pay for a piped distribution system" (Whittington et al., 1989b, p. 165). Moreover, the "fact that yard taps do not already exist throughout Ukunda indicates an inability on the part of the community or water authority to mobilise resources, not an inability or unwillingness of the population to pay the cost of the improved service" (Whittington et al., 1989b, p. 165). Finally, the findings from Ukunda underscore that the methodology of undertaking surveys of water vending can furnish vital planning information in terms of indexing a community's capacity and willingness to pay for a piped system (Whittington et al., 1989b, p. 168).

The study in Onitsha, Nigeria broadly parallels that in Ukunda in terms of approach, methodology and research focus. The city of Onitsha, contains an estimated 700 000 inhabitants, albeit with only roughly 8 000 households connected to a public water supply system. It was shown that the "vast majority of the population obtains its water from the vending system which has been created and is operated by the private sector" (Whittington et al. 1991, p. 181). Moreover, "the city's water vending system is both elaborate and well-organised" (Whittington et al., 1989, p. 4). Once again, as in Ukunda, the researchers sought to estimate the magnitude and costs attached to the water-vending sector, recognising seasonal variations. The water-vending sector in Onitsha displayed certain features that were at variance with observations previously made in other centres. Most importantly, whereas in other areas of the developing world water vending was found to be a competitive industry in which the prices of vended water were determined by market forces, so that vendors were not making "excessive profits", this was not the case in Nigeria. In Onitsha the drivers of water-tanker trucks were found to "be making extremely high rates of return on their capital investment" resulting in high water charges to consumers (Whittington et al., 1991, p. 165). New research from Indonesia confirms that the ability of "vendors to earn excessive profits is limited only by the availability of close substitutes for the services they offer" (Crane, 1994, p. 74). Nonetheless, it was particularly the poorest households in Onitsha who were discovered to be paying most for water "both in absolute amounts and in terms of the percentage of their income spent on water"; the lowest income groups of households were estimated "to be paying 18 per cent of their income on water during the dry season" as compared to between 2 to 3% for upper-income households (Whittington et al. 1991, p. 189). This extraordinarily high figure should be contrasted with the common assumption of rule-of-thumb analysis that households in the developing world would afford only 3 to 5% of their income for improved water supplies.

Again, the Onitsha research underscores the validity of undertaking research on the workings and mechanics of the water vending sector. Indeed, the authors go so far as to claim that the Onitsha findings put "the policy debates over whether the poor can afford water and whether water should be provided as a

subsidised public service in a somewhat different perspective" (Whittington et al., 1989a, p. 23). It is calculated that Onitsha households, who were paying in total an annual amount of US \$7 m. to water vendors, were "already paying water vendors over twice the operation and maintenance costs of a completed piped distribution system, and 70 per cent of the total annual costs" (Whittington et al., 1989a, p. 23). Such findings underscore the important conclusion that "to argue that the population in Onitsha cannot afford to pay for water is clearly erroneous" (Whittington et al., 1989a, p. 23). Lastly, the Onitsha research, once more, reinforces the utility of rapid reconnaissance surveys of water-vending systems to yield valuable policy and planning information concerning willingness to pay for water (Whittington et al., 1991).

### **Contingent valuation surveys: Method and findings**

The leading edge of international research on "willingness to pay" for water services is constituted by a body of works which has applied the methodology of contingent valuation studies. Such research seeks to enhance the concept of "willingness to pay" through a direct survey approach whereby interviewers pose questions within the context of a hypothetical market (Altaf and Hughes, 1994). Essentially, contingent valuation studies "are simply household surveys in which a member of a household is asked a series of structured questions designed to determine the maximum amount of money the household is willing to pay for a good or service" (Altaf et al., 1992, p. xiii).

An essential aspect of the method is use of bidding games to determine willingness to pay. Very simply, consumers are asked in sequence whether they would be prepared to pay say \$10, \$20, \$50, \$100 and so on until a price is reached which they are unwilling to meet (Cairncross, 1992, p. 37). The basic form of the bidding game is to ask "If you were required to pay X per month for a connection, would you choose to connect to the system or would you prefer to use the alternative source?". Each household is asked this question across a range of tariffs with the sequencing of bids starting at extremes (the lowest or highest value to be asked) and then converging inward. Thus, if the prescribed values were R50, R100, R150 and R200, the order would be (for a low starting point): R50, R200, R100, R150.

Until the late 1980s, social researchers generally counselled against the application of such an approach asking users how much they would be prepared to pay using a basket of hypothetical options (Cairncross, 1992). It was suggested that poor and illiterate populations might find it difficult to understand hypothetical situations or biased answers might eventuate if respondents sought to manipulate surveys to their advantage. Indeed, such surveys were deemed widely unreliable "due to the pervasive feeling that interrogated responses by individuals to hypothetical propositions must be, at best, inferior to 'hard' market data or, at worst, off-the-cuff attitudinal indications" (Cummings et al., 1985, p. 50). Most damning was the conclusion of a World Bank review of water-demand studies using such hypothetical questions in the late 1970s, in which it was stated that the approach had been shown as "virtually useless" (cited in Briscoe et al., 1990, p. 119). As other observers, however, point out there was "little empirical evidence to support this conclusion" (Whittington et al., 1990a, p. 294).

The core criticism was that for a variety of reasons "respondents may not answer willingness-to-pay questions accurately and thus not reveal their 'true' willingness to pay" (Whittington et al.

1990a, p. 297). In particular, three problems were isolated with the approach of contingent valuation studies (Dzikus and Surjadi, 1995). First was the issue of hypothetical bias, which arises from an individual's inability to understand or correctly perceive the characteristics of the service being described by the interviewer. Secondly, strategic bias "may arise when an individual thinks he may influence an investment or policy decision by not answering the interviewer's question truthfully" (Whittington et al., 1990a, p. 297). Finally, compliance bias may emerge through respondents giving answers which are influenced by a desire to please the interviewer (Briscoe et al., 1990, p. 119).

Since the late 1980s the methodology of contingent valuation surveys has been experiencing a revival, if not a renaissance in water research. Behind this revival are a set of significant conceptual and empirical advances for conducting such contingent valuation surveys and overcoming their potential pitfalls (Dzikus and Surjadi, 1995). It is now generally "acknowledged that the major sources of bias can be addressed" (Briscoe et al., 1990, p. 119). This point is elaborated by a World Bank team of researchers:

"First, where the hypothetical service to be introduced is not well known to the community (seldom a problem with water supplies) information can be provided through pictures, films and discussions so that the nature of the service is clear. Second, it is possible to assess the magnitude of strategic biases through the use of a variety of techniques, such as choosing settings which would encourage or discourage strategic behaviour, and comparing the effects of, say, family characteristics derived from contingent valuation and 'indirect' methods. And, third, through careful recruitment and training of interviewers, compliance biases can be minimised" (Briscoe et al., 1990, p. 119).

As a result of its wider acceptance as a methodology for evaluating the benefits of environmental improvement, in 1987 the World Bank initiated a multi-country study of willingness to pay for water using contingent valuation surveys. Additional research was sponsored by other development agencies (notably UNCHS) as well as undertaken by independent scholars. Attention turns now to examine the core findings of this international research.

The most important and consistent set of findings in all the studies undertaken across both rural and urban settings relates to the applicability of the contingent valuation survey methodology to the water sector. For example, in research undertaken in rural Haiti, it was asserted that "the preliminary results of this research strongly suggest that contingent valuation surveys are a feasible method for estimating individuals' willingness to pay for improved water services" (Whittington et al. 1990a, p. 309). Further, it was observed that "respondents took the contingent valuation questions, and indeed the entire interview quite seriously" (Whittington et al. 1990a, p. 302). The application of bidding games was seen as particularly fruitful. The World Bank team felt that "we never received wildly unrealistic or 'protest' bids" and that overall, "the bidding-game question format worked better than the direct, open-ended questions" (Whittington et al. 1990a, p. 302). Furthermore, it was argued that interviewees "generally felt more comfortable with the bidding games, and, in fact, our enumerators remarked that the bidding game format was very familiar and easily understood because it was similar to the ordinary kind of bargaining that goes on in local markets of rural Haiti" (Whittington et al. 1990a, p. 302).

In concluding their evaluation of the application of contingent valuation surveys, the authors of the Haitian study were unequivocal in endorsing the validity of this research method.

They stated that "the results of this study suggest that it is possible to do a contingent valuation survey among a very poor, illiterate population and obtain reasonable, consistent answers" (Whittington et al., 1990a, p. 307). The World Bank team expressed the view that the often cited difficulties of contingent valuation studies, such as hypothetical bias, were not a major problem. Less conclusive, however, was the evidence regarding strategic bias; nevertheless, the tests for such bias and the experience of enumerators suggested that it could be discounted. It was admitted that the research could not enable a water agency to determine whether individuals in the villages of rural Haiti would in fact pay the amounts indicated in the contingent valuation survey if the agency actually tried to collect the money. In order to achieve this aim, what would be required would be "to conduct a contingent valuation survey in a village before a water system is built, then resurvey after the system is completed and collection efforts are made, and compare the prior bids with actual behavior" (Whittington et al. 1990a, p. 308).

A second example of the application of contingent valuation surveys to rural water supply questions is that undertaken for the World Bank in the rural Punjab, Pakistan. This study of willingness to pay was carried out in three different environmental settings, viz. a sweet water zone where good quality water is readily accessible and where the official policy is to furnish public facilities; a brackish water zone where groundwater is freely available but of poor quality and where piped water-supply systems with household connections are sanctioned for villages with a population of over 5 000; and, an arid zone where groundwater is of good quality, albeit difficult to access (Altaf et al., 1992; 1993). One of the objectives of this investigation was to determine the willingness of households to pay for improved service levels. The empirical findings showed the validity of contingent valuation surveys as opposed to rule-of-thumb analysis of willingness to pay. Once again, the credibility of the willingness-to-pay bids was tested and felt to be solid (Altaf et al., 1992). The results indicated that the amount of money that rural Punjab households were willing to pay for improved water supplies as a percent of household income was considerably lower than assumed (Altaf et al., 1992). More specifically, spatial variations occurred across the three groundwater zones; in the sweet water zone the mean willingness to pay bid was only 1.1% of household income, in the brackish zone respondents recorded a 2.4% level of household income and the highest figure was for the arid zone (3.5%). The important point is that these estimates are "still well below the 5 per cent rule of thumb often used to estimate how much households will pay for improved water supplies" (Altaf et al., 1992, p. 81). Explanations for these geographical variations in willingness to pay bids were located in the fact that the low bids in the sweet-water zone were "because unreliable public water systems are much less attractive when good quality water is easily available from private handpumps" (Altaf et al., 1992, p. 82).

A third convincing application of contingent valuation surveys to rural water supplies is contained in work on rural Brazil (Briscoe et al., 1990). This particular study demonstrated that surveys on actual and hypothetical water-use practices (applying contingent valuation surveys) can furnish crucial policy-relevant information on willingness to pay, which was revealed as varying according to household socio-economic characteristics and the characteristics of existing and new supplies of water. In greater detail, the findings disclosed that "tariffs for yard taps can be increased very substantially before significant numbers of households would choose not to connect to an improved system"

(Briscoe et al., 1990, p. 133). Such increases in tariffs for yard taps, it was argued, "would both improve the financial viability of rural water supply schemes and reduce the subsidies that the better off receive through highly subsidized rates" (Briscoe et al., 1990, p. 133). Lastly, the study also showed that the rural poor could be protected by provision of free water at public taps without jeopardizing the financial viability of the scheme.

In terms of methodology, the findings of this particular study again reinforce the case for contingent valuation research studies. Initially, it was admitted that the research team "were skeptical of the notion of bidding games but, after a few days of field testing, were convinced not only that the logic of the procedure was understood by respondents but that respondents gave serious and thoughtful answers" (Briscoe et al., 1990, p. 128). This particular study showed that whilst an element of strategic bias might be present in the findings they were confident that no hypothetical bias was indicated. Overall, the authors were certain in the Brazilian study that the "principal methodological question addressed by the study can be answered affirmatively" (Briscoe et al., 1990, p. 133). Specifically, it was strongly asserted that "well-designed and carefully administered surveys of actual and hypothetical water-use practices can provide consistent, sensible, and believable information on willingness to pay for improved water supply services" (Briscoe et al., 1990, p. 133).

Finally, attention turns to the application of contingent valuation methods to urban water research. In urban studies, the pioneer research was that of Whittington and associates who explored the "willingness to pay" of households in Onitsha and compared their bids to actual payments for water vending (Whittington et al., 1989a; 1991). Here, it was shown that the willingness of households to pay for improved water services was "surprisingly high" (Whittington et al., 1991, p. 194). The credibility of the methodology was once more tested and found credible. The research team for Onitsha argued that "the data collected from the contingent valuation survey seem generally consistent with the data from the water vending surveys and we believe the evidence is sufficiently accurate to be useful for decision-making" (Whittington et al., 1991, p. 193).

The most recent and richest application to urban water research of contingent valuation studies is contained in McPhail's (1993a; 1993b) works. The investigation focused on households' willingness to pay for water in Moroccan cities using the approach of bidding games. It is important to note that these were "carefully designed using a pretested two-stage bidding process with high and low starting bids and an open-ended final bid query" (McPhail, 1993a, p. 966). In addition, careful steps were taken to construct the sample of households to avoid potential biases. Illustratively, "neighbourhoods were selected on the basis of:

- no advance warning of the survey (to avoid the chance for strategic answers by the respondents);
- their "typical" nature that was representative of areas without individual house connections in these cities; and
- surveying during the morning and afternoon as well as early evening hours to be sure that the unemployed and those who worked at home were not overrepresented" (McPhail, 1993a, p. 964).

Finally, it should be recorded that several tests were performed to determine the reliability of the willingness-to-pay bids.

The findings from the five-city Moroccan investigation disclosed that "many low income households are willing and able to pay more than 5% of total household expenditures for individual

water service" (McPhail, 1993a, p. 969). In addition, the central research conclusion was that "households, even though they had free and reliable standpost water service, were willing to spend well in excess of 5% of total household expenditures to finance an individual metered water connection and the subsequent monthly commodity charges" (McPhail, 1993a, p. 969). Indeed, in specific terms, "for many respondents the amount bid for this (water) service was slightly more than what they were already paying for electricity and was considered more important than any other household expenditures except food and clothing" (McPhail, 1993a, p. 969).

Finally, as regards the validity and methodology of contingent valuation studies, the Moroccan examples offered the following important set of conclusions. It was argued that the pursuit of "contingent valuation studies that incorporate reliability tests are not easy to execute and are both labour intensive and more expensive than simple water use surveys" (McPhail, 1993a, p. 969). Nevertheless, the research "shows that rapid survey techniques can uncover important and surprising household water use characteristics that could greatly benefit water supply planners, donors and lenders" (McPhail, 1993a, p. 969). Moreover, considering "the cost of the information learned from these surveys versus the investment required for most piped water systems, the use of household questionnaires should become an inherent part of project design and planning undertaken in developing countries" (McPhail, 1993a, p. 969).

### Summary and conclusions

The task in this study was to draw together key findings and arguments of those studies that focus on 'willingness to pay' in the water sector. The issue of willingness to pay is of particular contemporary significance in South Africa against a backdrop of government initiatives for reconstruction and development and of an emphasis in water policy upon considerations of cost-recovery (DWAf, 1994; Eberhard and Quick, 1995; Goldblatt, 1996a; 1996b; Pansegrouw, 1996).

It was argued in this investigation that South African researchers can learn certain lessons from the international literature. The first section of material stressed the relatively limited amount of work that has been undertaken internationally on willingness to pay, given its crucial significance for water-project planning. It was emphasised that for developing countries the question of willingness to pay is an important policy-relevant research issue. Pioneer research on willingness to pay for rural and urban water projects was launched by the World Bank and other development agencies in the 1980s. In the second section, the focus was placed upon the usefulness of conducting rapid reconnaissance surveys of what consumers actually already pay for water services. In this regard, surveys of water-vending practices were shown to yield particularly rich sources of information that can inform water-resource planning. Such research provides a better planning information base than the conventional wisdom of a 5% rule-of-thumb analysis of household willingness to pay.

Finally, the discussion turned to highlight the renaissance of household questionnaire studies on the water sector and especially of the growing acceptance of contingent valuation surveys. It is clear that expectations about the nature of demand for public services can often be mistaken and that demand surveys can disclose useful information about preferences (Altaf and Hughes, 1994). The results of several empirical studies point to the conclusion that, whether dealing with a rural village or informal

urban settlements, "conducting a relatively simple household survey can yield reliable information on the population's willingness to pay for improved water services" (Whittington et al., 1990, p. 308). Criticisms associated with contingent valuation surveys are that they are "not truly participatory" and that they are heavily reliant on "external resources to generate information on households' willingness to pay for water" (Dzikus and Surjadi, 1995, p. 13). None the less, in the final analysis, it must be concluded that contingent valuation surveys offer one viable method of collecting useful information on individuals' willingness to pay for a wide range of infrastructure projects and public services in developing countries, not least in the South African water sector.

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