

CHAPTER NINE

Discussion

General findings from the literature review introduce this discussion and include the theories that specifically relate to this research, identified through the grounded theory approach. The summary and discussion of research findings begins with the analysis of cross national secondary data in previous surveys. Particularly where potable reuse has salience, structural opportunities for building trust have not been taken up by the industry that instead employed a strategic approach to survey consultation on planned water reuse systems. Habermas's (1990) distinction between the communicative versus strategic approaches to communication explain these market research efforts and its theoretical relevance is also identified in the cross-case analysis of potable reuse experience. Discussion of these findings and those of the embedded case studies of non potable reuse establishes the fit between the data and Sztopka's (1999) framework for 'the social becoming of trust'. The cross-data analysis confirms the interrelationship between structural opportunities and communicative action that provides a model for building trust in sustainable water reuse.

Public health risk involved in water reuse aligns with Beck's (1992) risk society whereby solutions to the side-effects of modernity have the potential to reflex on society, producing new or greater risks to public health. The catastrophic potential of contaminated water is acknowledged by both Beck (1992) and Giddens (1991) in late modernity, an era in which less homage is paid to science and technological fixes. Generally, water looks like water and it would require the use of a microscope to detect contamination. The vulnerability of the community to risk arises particularly if the risk is involuntary; for example, if they are unaware that they are using or are exposed to recycled or contaminated water. Several other key characteristics that determine the level of acceptance of technological risk are also important. However, the literature suggests that determinations of acceptability have wider socio-political and cultural influences.

The role of the media shapes perceptions and determines the salience of issues as theorised by Beck (1992), Lash (1994), Giddens (1994c), and confirmed by Szasz (1994) and others. But motivators for taking action are more likely to be found in personalised information conveyed through family, friends, or trusted others. Observation of social cues also stimulates opinion and action and along with prior experience, local knowledge may influence the take up of precautionary behaviour or innovative technologies. Previous experience can either lead to complacency or willingness to change, but local socio-cultural definitions (Douglas 1966, Rinne 1998) categorise the response in a predetermined way that may, or may not be amended over time. In the case of sourcing drinking water from sewage effluent, the cultural hurdle to be overcome is extensive, particularly if considered in relation to the heuristics of availability and representativeness, and the theory of creative, romanticised consumption (Campbell 1987).

The rationale behind the monopoly that science has exerted over risk assessment (for example, Beck 1992, Wartenberg & Chess 1992) is called into question by numerous studies that have contrasted community values to the priorities of experts. Yet, from the literature it would appear that risk managers are still not convinced of the worth of consulting with the lay public. Meanwhile, public concern for insufficient regulation of higher risk technologies remains and trust in risk information provided by government authorities diminishes in response to the manner in which risk issues are handled. Early research into acceptance of higher contact uses of reclaimed water confirm majority opposition, largely explained in the psychology studies by repugnance and concern for the effectiveness of purification technology. This contrasts with the basic trust invested in the expert system of household water supply identified by Giddens (1991), as being one of many abstract systems in late modernity that sustains ontological security in the face of ever present existential risk.

The black-boxed nature of high technology (Pinch 1993) is also discernable in water supply systems. The established cultural convention involves turning on the tap in order to safely use and drink the purified water. Non potable reuse presents a more

elaborate set of user rules for safe use which over time may be established as cultural conventions if basic trust arises from user experience. Sztompka's (1999) theory of trust building process outlines the structural and socio-cultural characteristics of agency that determine such investments of trust. Although Bruvold (1972) did not explain public acceptance of water reuse in terms of trust, he recommended that lower-contact non potable reuse be introduced before higher contact uses were attempted. Public education was also recommended; at that time the institutionalisation of minimum public consultation in relation to environmental risk had not yet taken hold. Perhaps because of its institutionalisation, the recent literature on public consultation reveals a reluctance on the part of policy makers to democratise risk assessment and reports inadequate methods of involving the community. Successful processes relate to the communicative principles of Habermas's (1990) theory which should necessarily involve collaboration between the sciences as outlined by Beck (1992) and Giddens (1990, 1994a) to realise ecological modernisation (Mol & Spaargaren 1993).

Bruvold (1981, 1985, 1988) propositions and hypotheses of acceptability of water reuse based on a review of ten studies, including some of his own work, were explored in the cross-study data analysis of ten Californian surveys and eleven studies conducted in other parts of the USA, UK and Australia (Chapter Four). Only half the Californian and a higher proportion of other studies asked respondents whether they would drink the water and therefore not all responses could be compared with Bruvold's findings. Acceptance of potable reuse policy ranges from 39% in San Francisco to 73% in San Diego which generally mirrors findings elsewhere: 38% in Noosa, Queensland to 74% in Arizona. However, support for drinking the water lies between 16% and 59% in California (again, representing San Francisco and San Diego) and from 13% to 55% (Gold Coast and the UK) elsewhere. When compared to Bruvold's (1985, 1988) findings – 26% to 49% - a slight improvement is indicated. However, the median for each group of studies is very similar: 39%, Bruvold, 39% California and 35% for other survey results, confirming stability in opposition to the concept.

Socio-demographic influences on potable reuse were explored by around half the studies. Acceptance is more likely from males and those with a higher education, corresponding to Bruvold's predictions and the substantive literature on risk. However, there is little investigation undertaken or support for his other socio-demographic predictors of higher socio-economic status and prior awareness. Prior knowledge of potable reuse can be a deterrent. Other variables explored found insufficient evidence for correlations with the presence of children, ethnicity, or political preference. However, residential location in relation to the proposed introduction of potable reuse suggests less support from those to be most affected. This feeds into the issue of salience which will be considered later.

Still fewer studies explore the effect of beliefs or concerns. Belief that the water supply is polluted correlates with less support not more, and the influence of concerns for water shortages is suggested in only two of five studies that investigated this. The more obvious belief in the technology and its ability to overcome health risks suggests a direct association as Bruvold predicts. Environmental concern and willingness to pay produce mixed results with a tendency for environmental activity to correlate with greater acceptance. Three studies, two in Orange County, allowed respondents to articulate why they agree or disagree with potable reuse. Of those in agreement, trust in the technology is suggested by only a quarter or less of reasons given. Another 11% to 30% of reasons are either conditional upon the technology working, or express concerns for health risks or the sewage source. The majority of reasons given for opposition to potable reuse relate to the effectiveness of the technology, the sewage source and health risk controls, accounting for 74% of the opposition in San Jose and 1997 Orange County, and 90% of the opposition in the 2000 Orange County study. The purity of the water and the safety of the technology were also raised in most reasons in response to concerns in the 1998 San Diego and Tampa surveys.

Acceptance of non potable reuse in all surveys that explore this in California and elsewhere confirm Bruvold's (1988) hypothesis that opposition decreases as the degree of likely human contact decreases. Bruvold suggests this occurs when water reuse is

not salient, however, in California this is also the case where water reuse (for example, agricultural reuse, municipal uses) is practised. It is suggested that the likelihood of contact with children more clearly defines the trend. For example, where a comparison can be made (San Jose, Monterey and Irvine), irrigation of golf courses is more popular than other recreational parks, and industrial reuse is preferred over school ground/playing field/residential garden irrigation. Only in the Sydney, Perth and UK non potable reuse results and those for low contact uses in California, can it be said that non potable reuse is 'readily accepted' as Bruvold (1981) suggests. It is proposed that the very high level of acceptance of non potable reuse in the studies outside California is explained by the abstract nature of its consideration.

In theorising salience further, Bruvold (1988) suggests that health, environment, conservation and costs of treatment and distribution will be more important than human contact where water reuse options are planned or experienced. As already noted, closeness of contact determines acceptance of both potable and non potable reuse, and where non potable reuse is salient there is less support. In San Francisco, conservation is considered the main benefit while health risk concerns are the main reason for opposition; much less attention is given to costs and environmental protection. In relation to the salience of potable reuse in Orange County, San Diego, Los Angeles, Tampa and Noosa, few studies report relevant data. Water conservation is cited more often than trust in the technology in the Orange County reasons for support mentioned above. Environmental considerations correlate with acceptance in San Diego (1993), explain the preference for potable reuse at Noosa, and are moderately prominent in the reasons offered in Orange County. As seen above, purity, health risk and effectiveness of the technology represent most reasons for concern in Tampa, San Diego (1998) and both Orange County surveys. Therefore, in the case of potable reuse, trust in the technology and closeness of contact relating to health concerns are more important than conservation, environmental and economic considerations.

Bruvold did not identify trust as a predictor of potable reuse support. Giddens (1991) suggests that trust currently invested in the expert system of drinking water supply

embodies basic trust. It is expected that those who drink water straight from the tap are more likely to trust the expertise behind the system of potable reuse. This 'background level of trust' (Sztompka 1999) is confirmed by only approximately a quarter to a third of respondents where potable reuse has salience. San Diego and Orange County studies find that tap water drinkers are significantly more supportive of potable reuse, however the Tampa survey reports no relationship.

Trust placed in water supply and sewerage agencies represents the prevailing level of trust. When six or more government and other agencies are offered for respondents' consideration, as in the case of San Diego (1993, 1998), San Francisco, Los Angeles, Arizona and Sydney (1995, 1999), water and sewerage providers are among the least trusted. A similar range and result is found in the Tampa survey for the water department which is ranked below the health department. Typically, medical/health agencies, scientists, the EPA and environmental groups are more highly trusted.

Sztompka's (1999) 'revised culture of trust' in the water utilities can be detected following the 'social praxis' involved when respondents consider trust in potable reuse. In the 1997 Orange County data a direct association is confirmed between trust in water and sewerage authorities and acceptance of potable reuse. Four studies report findings that indicate a revision of trust and a withdrawal of trust is found in each. In the 2000 Orange County study, only 13% think the agency should be trusted to go ahead with the project "to make sure we have clean water" without informing all constituents. The San Antonio study detects an underlying mistrust of the motives of the water supplier and quotes several respondents, one reasoning:

Until current problems are resolved, I can't trust water and wastewater treatments to provide good-quality, safe drinking water as part of a recycling scheme. (Foss 1997:53)

In the UK study, trust in the current provision of water supply falls by 20% in consideration of indirect or direct potable reuse processes. Following the 1998 Sydney Water incident, Sydney Water reports a decline in trust which corresponds with lower trust in potable reuse and a 19% fall in agreement that the corporation can be trusted to manage recycled water responsibly.

A main observation at this point, is the strategic nature of the marketing approach to public consultation on potable reuse. Half of the surveys in California and elsewhere avoid the word 'sewage' in survey questions, and half in California refrain from asking respondents whether they will drink the water. Alleviating water supply shortages and curtailing effluent discharges to surface waters are used to justify potable reuse where it is proposed. These benefits can be achieved through non potable reuse, yet this is not offered as an option in six of the seven studies involved; only the Noosa study suggests irrigation of pastures. In the Tampa study, other sources of water are explored and reclaimed water for drinking is the least preferred, reflecting Bruvold's (1972) original finding that desalination is accepted at the same level as traditional sources. Relatively high acceptance of potable reuse of around 50% or more is found in surveys that do not explore non potable reuse. When both potable and non potable reuse is included, as in the UK and San Antonio studies, once respondents are asked to rank preferences, potable reuse is the least preferred.

Existing, proposed and abandoned experience of potable reuse is captured in fourteen case studies presented in Chapter Five. Economic efficiencies drive choices of technology and this is the case for potable reuse. In the Whittier Narrows example of indirect potable reuse which has been in operation since 1962, there are no extra capital or operational costs incurred over and above the usual treatment process. While the capital cost involved in developing more recent Californian examples and proposals is higher, state grants promoting water reclamation, low interest bonds and loans significantly reduce the financial risk involved for the local water agency. These economic considerations underpin the rationale behind the promotion of potable reuse to the exclusion of non potable reuse as an option to solve water supply and effluent disposal problems. Directly reflecting the historical, task-oriented engineering approach to project management, the fact that potable reuse is seen as economically feasible or warranted is both necessary and sufficient to decide that it should be implemented. However, it is suggested that today the decision is also influenced by the pioneering motive associated with being among the first to implement potable reuse with public approval.

Investigation into the level of public consultation undertaken in each of the five case studies where indirect potable reuse is practised in the USA, reveals that the projects have kept a low public profile. Historical factors explain the lack of consultation for the early pioneers because these were established prior to public consultation becoming a regulatory requirement. The level of consultation involved in the El Paso, Texas (1985) and Carson, California (1995) examples is indicated in available public information. Websites for these locations give no indication that the water will supplement drinking water supplies. In Windhoek in Namibia, the site of the only direct potable reuse system in the world, conflicting reports suggest that the water is “readily accepted” (Williams 1997:48) in contrast to the fact that residents “still doggedly oppose its use for personal consumption” (Martindale 2001:41).

In recent surveys that have explored acceptance of indirect potable reuse in Los Angeles and Orange County, no reference is made to the current, local practices at Whittier LA or Water Factory 21 operated by the water and sanitation districts conducting the research. Measured reluctance to reveal instances of existing as well as “unplanned” indirect potable reuse to the public compounds the opaque condition of communication, offering no concrete evidence that indirect potable reuse is sustainable. This may be partly explained by the fact that few epidemiological studies have been conducted to verify the safety of indirect potable reuse. Safety assurances are also compromised by recent evidence of new contaminants of concern such as endocrine disrupters and pharmaceuticals which are now being investigated in relation to their effect on non potable and potable uses of municipal effluent. Disagreement between scientists on the safety of potable reuse are represented in documents such as the recent USA report on the viability of the technology (Committee et al 1998:6). The more scientists disagree, the more it is likely that the issue will be debated in the political sphere (Douglas & Wildavsky 1982).

“Toilet to tap” headlines are an anathema to the water reuse industry not least because they have accompanied the demise of four potable reuse projects in California. The label has recently headed descriptions of the Orange County project, potentially

threatening the Groundwater Replenishment System still due to go on line in 2005. The industry asserts that the public or irresponsible media are ignorant of the treatment processes which converts sewage into drinkable tap water and that the 'toilet to tap' label is being used to mislead the public and ambush potable reuse initiatives. Either way, 'toilet to tap' slogans exemplify the politicisation of the issue. In San Diego, the caption appeared in 1993 at the commencement of the proposal, with no effect. It was not until uncertainty about the safety of the project was inferred by the scientific community's report in 1998 that the slogan made an impact, mobilising political leaders and the African American residents located in the area to receive the supplemental water. Similarly, citizens in San Gabriel, Dublin San Ramon and East Valley who were to be directly affected by the system either took out advertising space themselves or made their opposition known to the media. An industry proponent of potable reuse admits that insufficient consultation has occurred prior to the building of these schemes (Hartling 2001), confirmed by the judicial ruling of the Dublin San Ramon citizen's law suit (Moy 2002).

Citizen's "outrage" (Sandman et al 1987; Beck 1995) not only stems from a lack of information and education on the science behind potable reuse, as some in the industry and the engineering approach (Douglas 1986; Beck 1992) suggest, but other factors come into play. Dependence on technical elites is relevant in the San Diego case where minority group concerns juxtapose that of the expert community behind the project. In Dublin's neighbouring towns, anti-development and anti-growth values shape community opposition. In Denver, preference for Colorado mountain water is suggested and Tampa residents prefer desalination. The lack of public consultation fuelled the outrage of the majority of Noosa residents who were not involved in the 'representative' consultation group and, it is suggested that it is the combination of inadequate consultation and the growing salience of the issue, where the time draws near for the scheme to commence, that incites heightened public interest, awareness, anxiety, and then disaffection.

Potable reuse survey and case study findings map the relevance of Sztompka's (1999) theory of the social becoming of trust. The historical culture of trust is represented in the industry's embedded approach to the community. Historically, solutions to water issues were found within the expert system and implemented without reference to community opinion. Ecological reflexivity and the social movements of the 1960s lead to the institutionalisation of public consultation so that minimal consultation occurred: public hearings were given to environmental impact statements. In late modernity, where public demands for the right to be informed are evident, the current structural context supporting water reuse hinders rather than promotes potable reuse. Sztompka's concepts of normative coherence, stability of the social order, transparency, familiarity and accountability hold contradictions for public awareness of this level of water recycling.

The basic trust invested in the drinking water supply reflects both regulations and the customary norm that assumes water is sourced from the best available raw water supplies. Stability of the social order of water supply is secure because there is generally no information to suggest people should not trust the system; the movement away from drinking water straight from the tap in preference for filtered or bottled water has proceeded in a fairly gradual fashion without seriously threatening the system. Transparency of the social organisation of water supply provision is not evident. The industry is reluctant to disclose that indirect potable reuse has been in operation for some time and they are unwilling to jeopardise trust in the system by broadcasting the fact that unplanned potable reuse exists in many locations. Familiarity with the environment - nature and technology - suggests that acceptance of the proposed change in the water supply will depend on its similarity to the current supply.

Prior conditioning arising from awareness of unplanned and planned potable reuse and through the use of non potable recycling is absent and therefore the idea of drinking water sourced from sewage is inherently controversial. In the manner of 'fateful moments' which mark a break in the normal routine of ontological security, it is suggested the idea will force the individual to "sit up and take notice of new demands

as well as new possibilities” (Giddens 1991:142-143). The response will largely depend on historical conditions and institutional structural supports that build trust in the proposed change. Finally, accountability of supporting institutions is not a given in the case of potable reuse. The institutional framework is still being tentatively developed and is unknown to individuals. Will drinking water quality reports that are currently produced for customers be more detailed and more frequent to accommodate this paradigm shift in water supply?

Without structural supports that induce public trust in water reuse and without the opening up of water supply management and consultation through agreeable ‘access points’ (Giddens 1990), trust in potable reuse is unlikely to change. A viable agency not only requires sound structural opportunities but also a social mood and collective capital that induces a trusting disposition. Personal and collective capital may include shared resources such as a high level of education, knowledge, social networks and wealth that act as insurance if things go wrong. This high order of ‘agential endowment’ will be more readily obtained with processes of community collaboration where ideas as well as power can be shared in the problem and solution identification process. The combination of Sztompka’s (1999) social becoming of trust and processes of public participation that reflect social justice issues provide a workable alternative to the Decide-Advise-Defend (DAD) principles of implementing public engineering projects in an emerging risk society.

The usefulness of these theoretical concepts is more comprehensively demonstrated in the non potable reuse case studies. The findings reflect the theoretical expectation of the case study selection that differences would emerge between the more established residential reuse experience in the two Florida sites, where the water is used for outdoor uses only, and the two Adelaide sites, where New Haven residents have experience of recycling water for toilet flushing as well as garden irrigation and where Mawson Lakes residents are still waiting for the system to go on line. However, other significant issues emerged from the data and were analysed and presented through Sztompka’s (1999) framework, including recognition of the ecological context and prevailing

natural resource conditions that are particularly relevant to environmental shapers of trust in water reuse.

Historical factors have a negative influence on the Adelaide experience due to expressed dissatisfaction with the recent corporatisation and private outsourcing of the water supply and sewerage utility and the association made between the reorganisation and cost increases. This contrasts with the stable historical conditions in Florida where these services are still supplied by government departments keen on keeping the price of water to the minimum. The New Haven context is further hampered by a withdrawal of funding and interest that occurred when the Multi Function Polis 'city of the future' proposal was abandoned. A more positive historical context supports the Mawson Lakes housing development that receives wide media attention, managed by a reputable developer. However, there is some disappointment over delays in the provision of basic community services. The environmental context established the salience of water issues that were expected to effect awareness in participants.

Investigations into the structural context concentrated on the institutionalised support for water reuse. Normative rules guiding the use of recycled water are evident in Florida founded in state regulations. These are acknowledged and reflected in the specific rules for both sites which are detailed in documentation formally provided and acknowledged by each residential user. State guidelines relating to the Adelaide sites are also represented in the permit for the New Haven development, however, details of the rules are not given to residents. At Mawson Lakes, only the encumbrance documents designed for the attention of builders and plumbers set out permitted uses and equipment. Stability of the social order of water recycling is realised in enforcement and adherence to the rules and regulations of use. While these are strictly observed in the Florida cases, ad hoc compliance is observed at New Haven and Mawson Lakes where management does not follow up on out of specification equipment, such as the use of taps at New Haven and the installation of unidentified taps at Mawson Lakes.

Transparency of the social organisation behind the provision of non potable reuse is exemplified at Brevard where council meeting scheduling and attendance is open to the community and meetings are televised locally. The City of Altamonte Springs keeps residents informed of changes in rules such as water restrictions which are published on their website. Brevard County also provides website dissemination of rules, as well as common questions and answers in relation to using the water. Both sites provide newsletters, detailed billing of reclaimed water, conduct tours of the treatment plants, and give talks to community groups such as homeowners' associations. Although intermittent disruptions to the service occur at Brevard, residents are forewarned at the time of connection that the supply of water may be interrupted. An acute contrast exists in Adelaide where no mention is made of New Haven on the council website, council billing is distorted so that residents incorrectly believe the system is being subsidised, and basic and ongoing information is not provided. Management of the system is still being organised at Mawson Lakes.

Therefore, familiarity of the social environment, particularly where change is experienced, is more evident in Florida where the appearance of recycling has become an established norm. Representatives of management at Giddens' (1990) access points to the expert system of water recycling are keen on generating confidence in using the water; with one reported exception in Brevard in relation to priority of supply. The good reputation of the development manager at Mawson Lakes provides a positive access point for some residents with others reporting disappointment in the lack of response. Many residents are unfamiliar with what is entailed in the daily management of recycling water at New Haven, tenants are not informed that recycled water is provided, and there are no public warning signs installed. The lack of on site coordination at the Adelaide sites with respect to recycled water pipes, has lead to confusion for plumbers which increases the risk of cross connections.

The potential of informal access points is observed at all four sites through voluntary residential organisations which provide information to residents. The effect is pronounced at New Haven during problems with the service when three self-appointed

coordinators relay information to the friendly maintenance contractor and keep residents advised of progress. However, as a consequence, the accountability of council management is blurred while, at the other sites, there are clearer lines of responsibility for the safe management of the systems.

A matter of fact attitude towards recycling water is conveyed by Florida participants suggesting that 'basic trust' in this expert system has been established. The engineers involved in managing these sites are enthusiastic and proud of the success achieved in implementing the systems. The mixed feelings at New Haven and Mawson Lakes involve contentment yet disappointment with a lack of progress or follow-through. While there is some doubt about the effectiveness of ongoing management at New Haven, reinforced by council management, there is a sense of optimism at Mawson Lakes. A profile of collective capital indicated by demographics and field observation suggests a higher socio-economic status in the Altamonte Springs sample due to the professional occupations of 35%, followed by Mawson Lakes reflecting white collar/self employed status together with an elite style of housing compared to New Haven and Brevard. Social assertiveness gained through higher education and strong social ties and networks are associated with a more trusting disposition (Sztompka 1996:15).

Experiential shapers of trust are a product of ongoing social praxis between social actors and available structure, including the environment, and these were explored in Chapter Seven. Volunteered salience of water issues is highest at Mawson Lakes and fairly evenly distributed elsewhere. New Haven respondents are the most trusting of tap water. The varying degree of filtration, with minor use of bottled water, suggests a combination of concerns for health and aesthetics: health risk concerns ranged from 5% at New Haven, 10% at Brevard, 20% at Altamonte Springs and 25% at Mawson Lakes, where three participants confirmed a reflexive, preventative measure response to the Sydney Water incident. Mawson Lakes residents are keen on water saving appliances (60%), however, the same proportion at New Haven either use appliances or are sticklers at saving water.

More New Haven participants admit they use more water because it is recycled than other sites and Altamonte Springs conserve more water, corresponding with local water restrictions. New Haven participants agree that businesses should be restricted in using water (80%), a strategy receiving slightly less support elsewhere, and charging more for water to curb usage meets with broad opposition (85% at New Haven to 70% at Altamonte Springs). More than any other question, price sanctions to control the use of water motivate comments following responses. Some think the strategy will be ineffective but 40% of Altamonte Springs residents cited the unfairness of the strategy, followed by New Haven and Mawson Lakes (35% each), with less concerned at Brevard (25%). Concerns focused on the unfairness to families with children and the poor, suggesting an egalitarian philosophy that is linked with risk avoidance.

In relation to recognised benefits of residential reuse, a degree of synergy is found with the five factors hypothesised by Bruvold (1988) where water reuse has salience. Most residents at each site appreciate the cheaper cost of recycled water. However, confusion derived from misleading billing at New Haven leads to uncertainty about the real cost of running the system. Some residents in Adelaide believe others will be reluctant to accept non potable reuse because of the costs involved. Mawson Lakes participants expect cost benefits but are very aware of the high up-front cost of special fittings and extra pipes and are looking for a return on their investment. Residents at New Haven were more forthcoming in acknowledging the benefit to the environment and the conservation of natural resources. A fifth of New Haven and Brevard participants volunteered that residential reuse curbs unwanted discharges to surface waters, with 10% at Altamonte Springs citing this. The fact that recycling means that water is not wasted, that it provides nutritional benefits for the garden and promotes feelings of responsibility is also appreciated to varying degrees at each site.

There is a lack of awareness of possible health risks at the Adelaide sites. At Mawson Lakes, 60% thought the water would be storm water or grey water. Willingness to handle the water suggests trust in water quality and this is evident at Altamonte Springs where 55% handle it and at Brevard, involving 35% of participants. Handling the water

as a measure of trust is more problematic in Adelaide and is more likely to reflect either a willingness to take risks or a lack of awareness. While 45% of New Haven respondents are happy to use recycled water for car washing and hand watering these uses are not permitted in the original guidelines. Similarly, a high proportion of Mawson Lakes participants are considering using the water to fill swimming pools (30%), and half the households interviewed have no outdoor potable tap suggesting they are unaware of the encumbrance guidelines. Without rigorous follow-up and clear lines of communication, as experienced at the Florida sites, residential reuse presents a greater risk to public health.

To gauge the level of health risk several opportunities were provided for participants to volunteer problems. The initial reaction was sustained at Altamonte Springs, with only 15% expressing concerns. At Brevard, the same proportion of participants expressed concern and this grew to 40% when considering children, however, only 25% were concerned enough to seek more information. At Mawson Lakes, high confidence was followed by the realisation that insufficient information was known or had been provided in relation to water source, quality, and rules in relation to taps, so that 80% expressed a need for more information. Only one person was initially concerned at New Haven, but all participants eventually related problems with toilet flushing involving odour, colour, or sediment. A total of 65% describe breakdown events, some in great detail. In total, 40% of New Haven respondents are concerned about the ongoing maintenance of the system and 60% would appreciate more information on safety.

Despite the varying experience of residential reuse, acceptance of non potable reuse is evident at all sites. Florida respondents were not directly asked their level of acceptance due to time constraints and the fact that Florida is the world leader in public access uses and industrial use, and where agricultural reuse is also well established. All but one participant at Mawson Lakes agreed to the water being used for washing cars and watering gardens amongst the Adelaide participants and all agreed to public park irrigation. Industrial and agricultural reuse is also highly approved (95% and 90%). It

is suggested that this level of support is explained by the social praxis between available and weak supporting structure, and the collective social capital established at each site.

Passive acceptance of the poor situation at New Haven is related to the coordinating role of three residents who relay information between the maintenance contractor and other householders. Residents have come to rely on the fact that one of these men will follow the problem through, often before they notice there is a problem. The social network of support at Mawson Lakes derives from the residents' association which is gaining credibility. A more active, reflexive community response is suggested if the quality of the recycled water does not meet expectations.

Social cues and interpersonal communication, in the absence of strong structure, also threaten the sustainability of residential reuse at both sites. Those residents at Mawson Lakes who have no outdoor potable tap, or have ordinary taps installed instead of purple taps, suggest that this is tolerable because others are similarly situated. The fact that a high proportion of residents understood the water would be sourced from stormwater also suggests a sharing of ideas, helped by misinformation published in the media as reported in Chapter Six. A similar distortion of safe practice occurs at New Haven when residents install illegal taps in the back yard because neighbours say that recycled water taps are not allowed "in the front garden". In the absence of public notices in the form of recycled water signs at both sites, there is a higher risk that the water accessed in this way will be mistaken for potable water. Further, the informal communication blurs the accountability of management so there is less likelihood of the structural context being improved to better ensure sustainable, safe practice.

The prevailing culture of trust in recycled water providers in Florida is considerably higher than that indicated in Adelaide. On the ten point rating scale, the mean for the Altamonte Springs sample is 7.7, followed by 7.2 at Brevard. The result for New Haven trails ten points behind (6.2) and Mawson Lakes demonstrates a similar level of trust (6.5) in their local council who will be either jointly or solely responsible for the

system. It should be borne in mind that due to the lack of information and communication from management at both sites, and the reliance on information through informal networks, not all residents are fully aware of the local councils' role as providers of the service. When water and sewerage agencies are rated by Adelaide respondents, the median trust rating falls another ten points.

The reflexive condition of trust, as Giddens' (1994b) 'active trust' where trust is actively negotiated rather than a given as in traditional forms of trust, is also apparent. Of those who voice disapproval of the 'privatisation' of water and sewerage services in Adelaide, roughly half suggest an upwards revision of trust (6+) in SA Water and/or United Water. This is partly explained by a high trust disposition and trust in tap water at New Haven, but at both sites, high trust in science and technology is indicated by these participants and several confirm their appreciation of the basic services provided by one or both of the agencies. For others, their low trust score reflects recent frustration or annoyance, which is also the case for the low ratings at Altamonte Springs (two only) and half those at Brevard (four only, but with three giving a rating of 5).

Acceptance of potable reuse corresponds to these levels of trust at each site for using reclaimed water for the laundry and showering. However, as with previous surveys, support falls when consideration is given to ingesting the water (cooking and drinking), but not at Brevard where the net change increases support. Support is highest at Brevard (79%), followed by Altamonte Springs (47%, falling from 79% for the lower level of contact), then New Haven (45%) and finally Mawson Lakes where much less confidence is indicated (32%). The volatility of trust in higher uses is further indicated in the comments volunteered by participants. As found in open ended responses in Orange County and San Jose, a proportion of those who agree to potable reuse qualify their support such as "if it works" or comment on the sewage source or the need for the water. However, explanations for disagreement are largely represented by concern for the sewage source followed by distrust in the technology, except at Brevard where no comment is made by the four involved.

The positive influences on trust in potable reuse emerge as the salience of water issues, trust in tap water and handling recycled water; citing the unfairness of price sanctions has a negative effect. Men are more accepting of the technology than women at all sites, with the technical exception of Mawson Lakes. Except for Altamonte Springs, agreement to water restrictions for businesses and trust in science and the health department is positively associated. Trust in all water providers is influential in Adelaide, however, this is less clear at Florida due to the small number who distrust the agencies. The self employed align with trust in potable reuse at New Haven and Brevard and being professional is confirmed in the Altamonte Springs sample that has the highest proportion in this group. Longer residency is an influence, explored in the Adelaide sites, along with strong agreement to agricultural reuse. A negative association is confirmed for those who have health risk concerns relating to children at all sites except Altamonte Springs (only two are concerned). Those in Adelaide who cite their disaffection with privatisation, and New Haven residents concerned about the ongoing maintenance of the reuse system, are also less trusting of potable reuse.

An explanation for the marked withdrawal of trust at Mawson Lakes and Altamonte Springs for the drinking level is explored through examination of these influences at the showering level. Being professional or a white collar worker is strongly associated with acceptance of recycled water for laundry and showers. Stronger associations are also found for the salience of water issues, handling the water, agreement to restrictions on business, and trust in science, the health department and water and sewerage authorities. The negative relationships diminish or are lost with being female, unfairness of price sanctions and drinking filtered water. At Altamonte Springs, those who cite water quality concerns are not concerned about this level of potable reuse, but most withdraw support when considering the drinking option. A similar pattern is found at Mawson Lakes with respect to privatisation, the association is weaker at the showering level. These results verify the importance of the main influences when higher risk is considered. They also suggest that for those who withdraw their trust in potable reuse at the drinking level, considerations such as public health, concern for the sewage source, or distrust in the technology to control higher risks are more important.

Illustrations from the interview discussions throw light on why some participants trust potable reuse although they indicate distrust in water and sewerage providers. The enthusiasm of men for science and technology is a strong factor along with trust in tap water. Previous experience is also important, such as rural conservation, or current experience; for example, consulting engineers in Altamonte Springs and roles in managing the system and coordinating information at New Haven.

With a Masters in communication, this mother, who agrees with recycled water technology for drinking at Brevard, reflects on public resistance to potable reuse:

It is going to be a hard sell. The immediate image that comes to mind. People know they have a choice and they won't choose that. They would have to have no other choice to accept it. (B5)

Rather than an irrational response, the rejection of the sewage source is an understandable reflexive reaction. From the literature, Douglas's (1967) cultural ordering of things explains why sewage is out of place in the meanings surrounding the provision and consumption of drinking water. Modern lifestyles and regulatory frameworks have regulated sewage to be disposed of safely and drinking water to be sourced from the best available sources since the link between water borne disease and contaminated water was discovered in 1854. In an emerging risk climate that already questions the safety of tap water, suggestions of change in the expert system of water supply that involves higher risk confront consumers in the manner outlined by Giddens (1991) 'fateful moments', as reviewed earlier. In the absence of information to the contrary, social reflexivity that rejects potable reuse because it is sourced from sewage aligns more with logic than biased emotional affect.

This research confirms that women are more risk averse than men when they are presented with the idea of supplementing the current source of drinking water with reclaimed water. As reported above, men are more enthusiastic about the technology that promises to overcome nature. Women are more inclined to doubt the effectiveness of the technology and to cast sobering thoughts on the possible consequences of tampering with nature. In addition, based on the in-depth interviews conducted at New

Haven and Mawson Lakes, women are less comfortable with the thought of using highly treated sewage effluent for potable uses. Household responsibilities that include cooking, cleaning and caring for children may influence an aversion to using water that technology promises has been cleansed of urine and faecal contamination. Indeed, one male interviewed who assumes these responsibilities while his partner pursues a paid career, clearly states that he has reservations about the idea of washing good clothes in the water (Chapter Eight).

It is argued that the neglect of the gender effect on acceptance of potable reuse will have fed into the active opposition towards implementation of potable reuse systems. Because potable reuse affects every household, and every tap in each household, it is expected that each member of the household will have something to say on the matter and the final word may not rest with the male heads of households. Public consultation strategies that involve targeting ‘community leaders’ that typically include service clubs, local government and commercial interest groups are unlikely to reach an equal proportion of women in these usually male-dominated associations. Further, it is doubtful that any ‘trickle down’ effect will include a fair quota of women and whether the second hand information that reaches them will be enough to allay concerns about public health risk. Instead, a more inclusive approach to provide opportunities for women to be informed and be involved in the decision making process is required.

This research demonstrates that the complex social issues surrounding water reuse will be more readily deliberated in policies reflecting structural opportunities to build trust between providers of non potable reuse and their customers, that incorporate transparency at access points and ongoing collaboration. The model depicted in Figure 9.1 below illustrates the interrelationship between the trusting process and a positive communicative style of public consultation.

Considered in relation to the successful experience at the Florida residential reuse sites, it can be seen that the arrangements in place for structural support and ongoing communication with residential users have a greater chance of “black-boxing the user”

(Pinch 1993:37) than the experience at New Haven suggests. Through monitored and contracted rules, regulations and restricted access to the water (for example, the equivalent of a hose faucet is housed in a locked box), the social praxis between trust-building structure and informed users of recycled water coincides with high trust in water and sewage providers. This inherited trust culture has a flow-on affect in the high acceptance of investment in technologies for showering and laundry at Altamonte Springs and for drinking at Brevard. Greater transparency of managing structure, involving effective use of the media may explain the willingness of Brevard County research participants to trust potable reuse at the highest level. On the other hand, the withdrawal of support at the drinking level at Altamonte Springs could well represent Sztompka’s (1999) “healthy distrust”.

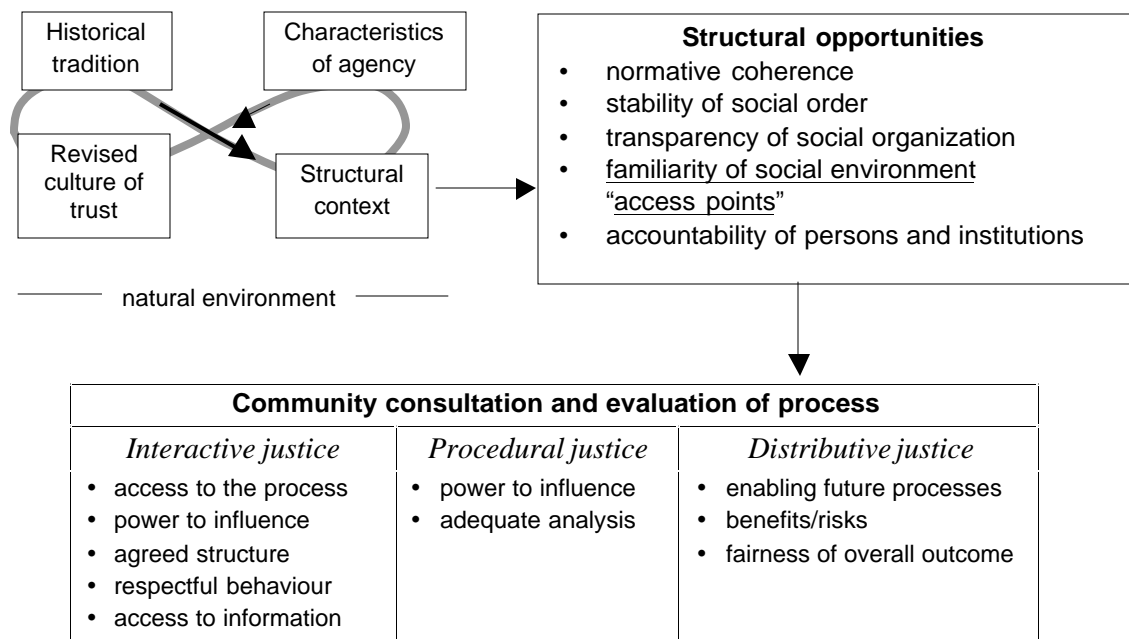


Figure 9.1 Public consultation processes derived from trust building structure informed by Sztompka (1999), Giddens (1990), Habermas (1990), Webler et al (2000), Syme & Nancarrow (2002)

There is room for improvement at all residential reuse sites in relation to communication with residents. Despite the clear stipulation that Brevard County’s system may at times be interrupted, participants demonstrate that prior warnings would

make life easier, and therefore contribute to a more positive relationship between user and provider. There is some confusion over fines and the need for restrictions at Altamonte Springs, suggesting more detailed clarification is required. Therefore, ongoing communication is important and at all sites a proportion of participants indicate they would like to know more about the quality of the reclaimed water.

Principles guiding meaningful community consultation, based on communicative action theory put forward by Habermas (1990) and given practical application by Webler et al (2000), resonate with approaches to community consultation being developed in Australia. Syme and Nancarrow (2002) promote the principles of interactive justice, procedural justice and distributive justice, as set out in Figure 9.1, that allow participation, the power to influence outcomes, and a fair distribution of the resulting benefits and risks. Evaluation of applications of public participation are advocated by Syme and Nancarrow (2002) and Webler et al (2000) to develop ongoing improvements and effectiveness of democratic, deliberative processes.

To enhance public participation in residential reuse, the role of voluntary organisations, such as homeowners' associations, as a conduit of information and feedback could be improved and expanded. The informal network at New Haven is more a crisis management arrangement and a more formal group such as the associations in Florida and the residents' association at Mawson Lakes would be more likely to generate proactive best practice in providers as well as users. Collaboration between such homeowners' associations and those responsible for the operations and management of residential reuse would work to control public health risk as well as build trust in water reuse.

The model illustrated in Figure 9.1 is also applicable to general relations between the community and water and sewerage providers, particularly where water reuse initiatives are being considered. Current conditions are as outlined earlier. The inherited culture of trust arises from the daily, taken-for-granted use of expert systems that engender basic trust in water and sewerage supplies as outlined by Giddens (1990). In the

absence of knowledge of common practices such as unplanned potable reuse and existing indirect potable reuse, the normative coherence of water provision rests on the assumption that drinking water is sourced from traditional water supplies originating from the purest sources available. Therefore, information relating to these practices needs to be shared in the community, but in a way that sustains the stability of the social order. Gradual dissemination of the facts in a manner that acknowledges social justice issues in communication, as set out in Figure 9.1, rather than a strategic education campaign for encouraging support for a predetermined system, would be more successful in building trust.

Transparency and familiarity with the organisation of water supply and sewerage may involve treatment plant tours to open up the black-box of this expert, technological system as part of the community participation process. The provision of information, for example, the different treatment standards aligning with the different types of non potable reuse, would provide greater understanding. Ongoing communication between providers and users to encourage feedback from the community would foster collaborative partnerships. Helpful, friendly access points as modelled in Figure 9.1 promote a better understanding of the process and allow negotiation through a communicative style of community participation. Accountability secures trust in water reuse through knowledge of the responsibilities of the provider, as well as the obligations of users to maintain safe practice. Regulatory follow up is crucial for developing this level of accountability. Therefore, a reshaping of the relevant institutions will be required to ensure effective public consultation, adherence to permitting requirements and user rules; and with particular reference to non potable reuse, the installation of specified attachments and a regular program of cross connection checks.

Sztompka's (1999) agential endowment will also depend on the characteristics of individuals that comprise the social mood and the collective capital of a community. A more trusting social mood at the Florida sites is fostered by enthusiastic leadership and a more open style of governance of water, sewerage and reclaimed water services than

is the experience in Adelaide. Collective capital comprises cultural capital derived from social standing, education and socio-economic status, coupled with the social capital in a community accumulated through individual social roles, social influence and the establishment of social networks that individually and collectively affect investments of trust. Therefore, knowledge gained through strong institutions and interactive structure within the water and sewerage industry will better equip people to make considered judgments in relation to changes in services. Positive and open governance will improve the current levels of trust in providers, shaping the foundation for social interactions that produce progressive rather than regressive or uncertain outcomes.

CHAPTER TEN

Conclusion

Sustainable urban development will be increasingly associated with water reuse initiatives. Therefore, determining factors that influence public acceptance will assist in assessing its potential. Whether current reclaimed water practice involving individual households represents sustainable policy, in terms of health risk management, should also shape the direction of adoption of this technology. With limited, available guidance from published research, this study has used the approach of grounded theory (Glaser & Strauss 1976, Glaser 2002) in analysing the non potable and potable reuse case studies as well as the audit of previous industry based surveys. The work began with embedded case study research at New Haven and progressed iteratively through parallel ethnographic work within the water industry to map the history, scope and scale of water reuse, identify potable reuse and non potable reuse case study sites, and to collect relevant surveys, other archival data and industry documentation. The triangulation of methods also involved participatory observation at conferences and interviews with key people in the industry, mainly in the USA where urban water reuse has been extensively developed.

The substantive literature supplemented by the findings of this study confirms that the principles of ecologically sustainable development underpin the promotion of recycling water sourced from sewage effluent. Water reuse alleviates both environmental pollution from effluent discharges as well as the increasing stress on water supplies and water and sewerage infrastructure. The economic driver of urban recycling is also important. Firstly, recycling water delays the necessity for building new infrastructure to accommodate increasing demands on traditional water and sewerage systems. Secondly, environmental regulatory controls require a higher level of treatment for surface water discharges and the costs of this may be offset by the beneficial reuse of this water. Thirdly, with government subsidies and low interest loans and bonds, as is the experience in the USA, the higher cost of potable reuse can be offset, making it a

comparatively more economical option to the cost of non potable reuse infrastructure which requires a second set of pipes with associated installation and maintenance costs.

It is concluded that the recent drivers for indirect potable reuse in the USA more specifically relate to economic advantages over its alternatives, as well as the challenge of implementing the project with public approval. Potable reuse case study analysis (Chapter Five) finds that initially the industry was not obliged to consult with the public to the extent of current expectations. More recently, there is a discernable reluctance to make the public aware of existing systems as well as the phenomenon of unplanned potable reuse, a condition that is verified in the review of previous surveys (Chapter Four). In presenting potable reuse proposals to the public in locations where systems have either been decided upon, planned, and in some cases built, the non potable reuse option is not thoroughly explored nor offered. Other alternative options for supplementing the water supply are rarely explored in survey consultation. Therefore, a strategic approach (Habermas 1990) to public participation or consultation is confirmed which contrasts with a communicative style. Open communication allows broad, public deliberation of the problem to be solved, identification of feasible options, involvement in risk assessments, and the power to influence the final outcome.

Social-psychological research reported for the industry by Bruvold between 1981 and 1988 reiterates the recommendations of his original study (1972). The industry should implement water reuse at more acceptable lower levels of human contact to condition the public for acceptance of gradually higher contact uses. However, this research data shows that non potable reuse is not fully developed or not yet introduced at the sites where potable reuse has been proposed. The public response to attempts to implement potable reuse has been one of active opposition once the concept becomes salient. Salience represents either a realisation by the particular community that they will be impacted by the proposal or a general concern arising closer to the time of implementation. The issue of salience is also reflected in survey data: support declines markedly once the respondents are asked whether they will drink the water.

Salience of water reuse affects the responses to survey research exploring acceptance of both potable and non potable reuse (Chapter Four). Generally, the observed effect is as Bruvold (1988) predicts, that where water reuse is not salient, opposition diminishes as the degree of likely human contact decreases. However, survey data shows that this also occurs where water reuse has salience; for example, where irrigation of vegetable crops or recreational parks is practised, acceptance is lower than that indicated by respondents who consider these options in the abstract. This may reflect Bruvold's (1988) further hypothesis that where water reuse has salience, the degree of likely contact will not be as important as other issues such as health, environment, conservation and costs of treatment and distribution.

There is some evidence that these five factors may influence acceptance of non potable reuse, but not potable reuse; this is mainly shaped by the fact of ingestion of water sourced from sewage effluent and uncertainty about the technology and concerns for health risks. Also, it is suggested that where ingestion is possible, a degree of control may also affect non potable reuse responses so that household garden irrigation and toilet flushing may be preferred over school ground and recreational park irrigation and factory uses. Less acceptance is also found where household on-site treatment systems are considered, suggesting the effect of both the degree of contact as well as the inconvenience involved. Overall, where non potable reuse is considered through survey research, it is readily accepted as Bruvold suggests, but only for abstract concepts.

However, data from the non potable reuse case studies conducted in Adelaide and Florida (Chapters Six through to Eight) demonstrate that for eighty residents who have experience (or, in the case of Mawson Lakes, expectations of) recycling water for garden irrigation and toilet flushing, acceptance of non potable reuse is very high. Garden irrigation, car washing, irrigation of recreational parks, agricultural and industrial reuse is accepted almost without question by Adelaide respondents (90-100%). Acceptance of potable reuse is also relatively high for the Adelaide sites, in comparison to Australian survey data. In the Florida sites, Altamonte Springs

respondents are agreeable to potable reuse for laundry and showering (79%), and Brevard County respondents have high trust in the cooking and drinking level (79%). Reasons for all these results reflect the institutional structure that supports residential reuse and the characteristics of the communities at these four sites.

Through the embedded case study research, the relevance of Sztompka's (1999) framework for trust as an ongoing, complex process is confirmed. Trust is shaped by social praxis between available structure and social actors. Historical conditions define the inherited culture of trust, being the product of previous social praxis which may result in a trusting or distrusting agency. The shapers of trust are the current structural context and characteristics of actors such as the social mood and collective capital of the community involved. For water recycling, the influences of the natural environment and social impacts on the environment are also important.

Structural opportunities for building trust include normative coherence of regulations and rules set by regulatory institutions, adhered to by management and shared with residential users; stability of the social order through gradual process of change and adherence to socio-legal policies; transparency of the social organisation promoted through information on the functioning of the system or management of the system, including problems that may occur; familiarity of the new environment, so that it resembles the more traditional experience, through interaction with the public via friendly access points; and accountability through a range of institutions that set standards and ensure compliance.

While the environmental influence is similar, with dry conditions being the experience in Adelaide and Florida, historical conditions differentiate the four sites. Altamonte Springs and Brevard County systems are on a municipal scale operated by local government departments, while the Adelaide sites are decentralised, neighbourhood systems operated by the local council in the case of New Haven and possibly by the water authority and council jointly in the case of Mawson Lakes. The main influence on participants in Florida is the stability of pricing for water and sewerage services,

whereas the Adelaide participants are disturbed by the corporatisation and outsourcing of these services and the rise in prices. Altamonte Springs has high trust in the water and sewerage providers, closely followed by Brevard County. This level of trust at both Florida sites far exceeds that confirmed in the general survey data reviewed in Chapter Four. Highest trust is indicated by 67% at Altamonte Springs and 41% at Brevard. This compares to 12% to 24% for water agencies and 9% to 19% for sewerage agencies in other USA findings, and 24% for the Sydney Water 1999 survey. In the Adelaide residential reuse data, 'active trust' (Giddens 1994b) is implied, for half those who are dissatisfied with corporatisation revise their trust upwards for either or both of the agencies, partly due to efficient services provided. Even so, only 18% at New Haven and 30% of the Mawson Lakes sample express high trust in SA Water.

This research finds that the management of residential reuse at the Florida sites reflects strong structural support that encourages confidence in water reuse, while the reverse is the experience in Adelaide. For example, there are strict rules governing the provision and use of the water and participants are aware of their obligations with respect to correct housing of connections and uses of the water. Weak structural support characterises the Adelaide sites. Mawson Lakes is not yet on line but because of ambiguity of information and a lack of adherence to encumbrance guidelines that have not been corrected by management, there is a degree of uncertainty and misinformation in participants' expectations of the water reuse system. At New Haven, formal structural support is arguably non-existent although the water has been distributed for five years. Some residents have taps that are not specified and most are unaware of the original subsurface irrigation rules. There can be little argument with those residents who convert from drip to spray irrigation due to clogging, because the local council responsible for system management also uses spray irrigation in village open spaces.

Routine, basic management is lacking. New Haven residents have experienced system breakdowns due to pipe blockages or damage caused by building contractors. There are no supervisors to oversee the building operations and to accommodate the dual pipe system. Possible cross connections between non-potable and potable pipes are not

checked at the Adelaide sites, whereas this is standard practice in Florida. All New Haven participants describe problems with toilet flushing involving odour, colour or sediment and over half relate particular events that have caused concern. This suggests that the Florida model of outdoor uses may be a more viable option to the combination of outdoor use and toilet flushing. At New Haven, ongoing maintenance of the system is a particular concern for 40% of research participants. Incorrect billing of the water, which suggests the system is being subsidised by government funding, also hampers the level of trust in residential reuse. This results in confusion and uncertainty about the cost and therefore the future sustainability of the service.

Yet all participants at each site appreciate the benefits of recycled water, although there is variation in levels of concern and trust in providers. The reduced cost compared to the price of potable reuse is valued, and the conservation of water resources is acknowledged. New Haven residents have greater recognition of the general environmental benefit and the nutritional value for the garden and the good feeling derived from responsible behaviour. An understanding of the curbing of effluent discharges is found at New Haven and Brevard County (20% each) as well as Altamonte Springs (10%). When health risk concerns are explored, Altamonte Springs residents are the least concerned, followed by Mawson Lakes and then Brevard; New Haven residents express the most unease. Trust in providers of recycled water is strongly demonstrated in the Florida sites where the providers are also the water and sewerage agencies. Lower trust is indicated at Mawson Lakes, and New Haven residents have the least trust in the local council managers of the system.

An explanation for the high trust levels invested in non potable reuse at the Adelaide sites, where the experience has not been conducive to a trusting disposition, is found in the way residents have compensated for weak structural support. The engineering maintenance contractor who operates the neighbourhood plant at New Haven provides a friendly access point for the village through three residents who voluntarily coordinate flows of information when the system fails. Knowing that someone has notified the operator or management generates social stability. Particularly innocuous

events and the occasional fluctuations in quality have become the norm of water recycling for these residents. It is just something they live with; a level of toleration that is also encouraged through the uncertainty of charges where some are concerned that the 'subsidy' may be eventually withdrawn.

A similar, but more formal arrangement is evident at Mawson Lakes. The residents' association is becoming more active and vocal and the data suggests it will be used to ensure that water quality and the system operations will be maintained to the satisfaction of residents. However, social cues and interpersonal communications that build the social capital work against the sustainability of the system at both sites. While illegal taps, hoses and sprayers are becoming the normal appearance of recycling at New Haven, the lack of potable garden taps or the use of ordinary taps instead of specified taps is the standard for some at Mawson Lakes. This informal way of socially adapting and coping acts to lessen the need for management accountability, reducing the likelihood that action will be taken to remedy the situation and keep new residents informed of safe practice. Therefore, trust in non potable reuse, derived from weak formal structure, compensated by the social capital of informal, voluntary structure has the potential for increasing public health risk in residential water recycling.

In relation to potable reuse, it can be seen that the levels of trust invested in water and sewerage providers align with the same level of trust in potable reuse at the laundry and showering level. The volatile nature of active trust (Giddens 1994b) emerges when participants consider the cooking and drinking level, representing one of Giddens' (1991) 'fateful moments'. Brevard participants are the most accepting, as noted earlier. Their confidence is explained by the strong structural support, particularly the high level of transparency of management where county meetings are open to the public and televised locally. However, strong structure is also found at Altamonte Springs where the level of acceptance (47%) suggests that a 'healthy distrust' of ingesting the water is indicated at this site which has the highest socio-economic status (35% professional, 35% white collar workers). Similarly, support from participants at Mawson Lakes (20% professional, 30% white collar workers) falls from 58% for showering to 32% for

drinking. At the laundry and showering level, all professionals and most white collar workers at both the Altamonte Springs and Mawson Lakes sites agree with potable reuse.

The investigation of socio-demographic, belief and experiential influences on trust confirms the importance of several factors at the drinking level. Some of the results can be verified by the few correlations from the audit of previous surveys. A positive association with potable reuse is found for the salience of water issues and willingness to come into closer contact with the water by handling it, for example in car washing. In survey data, there is some indication that higher education and environmental activity are positively correlated with acceptance, but little support is found for the influence of water shortages and pollution concerns. At three of the residential reuse sites, those who agree to water restrictions on businesses are more supportive. Finally, men are more accepting of potable reuse as confirmed in Bruvold's findings, the audit of previous survey results and in all residential reuse case studies, with the technical exception of Mawson Lakes where only three women were interviewed alone.

Trust is also positively associated with potable reuse acceptance by subgroups that drink tap water and those who trust science, health, water and sewerage agencies and recycled water providers. Participants who cite the unfairness of price sanctions are less in agreement and, at three sites, less support is given by residents concerned about the safety of children in relation to water recycling. In the Adelaide sites, a positive association is found with longer residency, the use of water saving appliances, agreement to household restrictions and strong agreement with using recycled water for parks, gardens, industry and agriculture. Less support is forthcoming from those who disapprove of the recent structural changes to the water and sewerage utility. New Haven residents who question the ongoing maintenance of the recycled water system are also less accepting of potable reuse.

Explanations for gender differences are found in the more detailed Adelaide residential reuse data where face-to-face interviews were conducted. Men are either enthusiastic

or at least understanding of the possibility of removing the ‘sewage’ component of effluent water. Women appear to remain more sceptical and are more likely to question the desirability or the need to go down that path. Sociological explanations for the difference rest in the fact that men are more ready to embrace technological control over nature and are generally in a more favourable situation for making investments of trust in uncertain outcomes. The cultural and social capital that favours ‘bets of trust’ (Sztompka 1999) when risk is at issue is more characteristic of male profiles. Higher incomes, full-time careers, professional status and wealth are more common to men who still dominate the fields of science and technology. Social capital is also more achievable through a more active public profile and the establishment of social networks. As Sztompka (1999) explains, this is an asset that encourages trust in risk situations through the confidence of being able to negotiate better outcomes or alternatives if things go wrong.

By contrast, women are more likely to focus attention on their immediate lifeworld that typically entails the nurturing roles of home management and carer in addition to paid occupations and careers outside the home. As such, their main interest is in maintaining the health and wellbeing of the family. Therefore, they are less likely to entertain the idea of introducing risk into what has become a taken-for-granted trust in household water supply. For women, more so than men, the combination of traditionally sourced drinking water with traditionally separated sewage effluent for human consumption represents matter out of place; the ‘cultural discord’ that Mary Douglas (1966) posits as being likely to be rejected and labelled for ease of identification should it reappear in the future. A more equitable share of household responsibilities may spread this concern across the gender divide and this is suggested in the younger Mawson Lakes sample: female partners are more outspoken and one male research participant keeps house and strongly disagrees with potable reuse.

A guiding model to building trust in non potable and higher level uses of recycled water is based on Sztompka’s (1999) framework adapted to include environmental issues and supplemented by Giddens’ (1994b) concept of active trust. This has been

expanded, as illustrated in the previous chapter (Figure 9.1) to include the principles of public participation that exemplify Habermas's (1990) communicative action as opposed to strategic action. The current structural context influencing perceptions of potable reuse frustrates rather than promotes the acceptance and implementation of higher contact uses. Opening up communication channels to keep the whole community informed and actively involved in an ongoing working partnership will work to address water issues as well as ensure the sustainable, safe practice of non potable reuse. Traditional constraints on engineering project management need to be loosened to allow investment of time and financial resources for community consultation that, this research suggests, will provide valuable returns if conducted collaboratively.

The experience at the Adelaide sites, particularly New Haven, present a timely 'worst-case scenario' for small, decentralised recycled water systems. The social mood and social capital of residents there is more positive than would be expected for the adversity and uncertainty that has been their ongoing experience. As discussed, the informal network, particularly the friendly access point provided by the engineering contractor, buffers the structure, but the situation is unsustainable. Both Florida sites confirm the relevance of each of the trust shaping structural opportunities that, in turn, build the collective capital of the community and promote a trusting social mood.

Sustainable, urban water use will be achieved through a community effort of building social capacity in the water and sewerage industry as well as throughout the end-user public. Regulations, guidelines and rules are more likely to achieve sustainable outcomes if they acknowledge and accommodate the social significance of deliberative processes, transparency and compliance. The range of uses for reclaimed water should be a community-wide consideration placed in the context of a full range of alternative or supplementary options to achieve agreed outcomes. Over time, successful public consultation processes and participation in residential reuse will reshape cultural values that are sensitive to the sewerage source, and build the social capital required to accommodate changes to traditional perceptions of modern water supply systems.

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