Chapter 8

Guidelines to improve acceptance of water reuse

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Guidelines at a glance

Good practices and adequate technical capacity are not enough to guarantee the success of water reuse interventions. Understanding the issues and concerns around perceptions and acceptance and addressing these with timely, effective communications and stakeholder engagement can significantly help to build trust and improve and support reclaimed water use initiatives. This chapter provides a greater understanding of the issues that hinder acceptance of water reuse across the MENA region, and tools and strategies to overcome them.

To improve acceptance of water reuse, project designers can:

- Encourage public participation and discourse
- Engage proactively in early and continuous communication to build trust
- Select messaging with the right terminology
- Communicate the benefits of water reuse and how risks are mitigated
- Address possible religious concerns
- Facilitate behavior change

8.1. Introduction

Water reuse is becoming increasingly important to water security in arid regions. Technology and good practices already exist to manage reclaimed water projects and meet or exceed health-based targets. However, good practices and adequate technical capacity are not enough to guarantee the success of water reuse interventions in terms of community buy-in. Understanding the issues and concerns around perceptions and acceptance and addressing these with timely, effective communications and stakeholder engagement can significantly help to build trust and improve and support of reclaimed water use initiatives.

A comprehensive communication plan targeting key stakeholders is essential to the success of water reuse projects or policy decisions. This chapter provides a greater understanding of the issues that hinder acceptance of water reuse across the MENA region, and tools and strategies to overcome them.

8.1.1. Understanding barriers for acceptance

Different communities and stakeholders can have very different degrees of acceptance of water reuse initiatives. The level of acceptance depends on many cultural factors but also on the type of use for the reclaimed water. Water reuse can trigger rejection, especially when resulting in a possible direct exposure. In a study in the southeast USA, respondents strongly disagreed with the use of reclaimed water for replenishing surface or groundwater for potable reuse or used within the household (Figure 8.1).

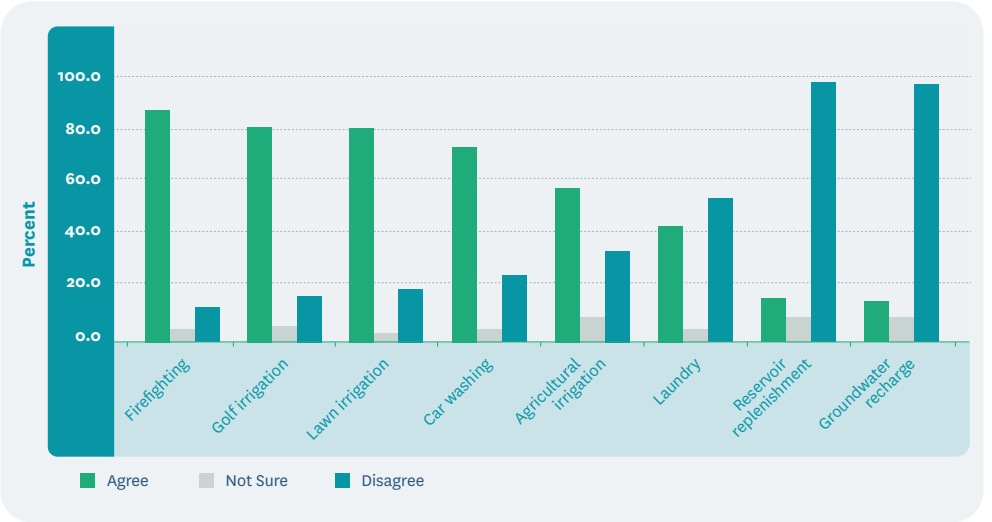

FIGURE 8.1 Attitudes toward water reuse options in southeast United States.
SOURCE: Robinson et al. 2005, cited in WHO 2006.

Irrigation of dairy pastures and edible crops including orchard and vineyard are usually accepted by farmers if agronomic risks are under control, but not necessarily well accepted by end-users of this product. There can also be concerns vis-à-vis import regulations if the produce is exported. Finally, water reuse to irrigate recreational parks, golf courses, gardens or pastures tend to have higher acceptance (Po et al. 2003; Khan and Gerrard 2005; Abu-Madi et al. 2009; Australian Water Recycling Center of Excellence 2014; Wester et al. 2015; Sharma et al. 2019). Direct exposure, social, religious, economic, health, political, freshwater scarcity and institutional framework can affect the acceptance of reuse projects (Al-Kharouf et al. 2008; Drechsel et al. 2015). These and other key factors that influence perceptions of water reuse could be grouped into the following categories:

- Health, environmental and agronomic risks
- Emotional, cultural and religious factors
- Financial implications, costs of technology and capacity to fund initiatives
- Freshwater scarcity
- Public involvement in decision-making

Public acceptance of reclaimed water is often the result of a combination of factors, including attitude, subjective norms, knowledge, trust in providers, perceived risk, cost and availability of alternatives. To improve the perceptions of water reuse, we need to understand, in any specific location, each of the locally expressed barriers to accepting reclaimed water and address these through effective communications.

8.1.2. Health, environmental and agronomic risks

The fear that reclaimed water may still contain even a small amount of pollutants such as pathogens, metals, drug residues and organic toxic compounds may trigger rejection. Both farmers and the public perceive the potential presence of these pollutants as environmental, health or agronomic risks. Even in cases where the risks are negligible or non-existent, the public perception of risk increases depending on the appearance, color and odor of reclaimed water, but can even more be steered by gossip, fear and misinformation. In the Australian case of Toowoomba, for example, public acceptance was strongly influenced by a political campaign building on 'yuck' and 'fear' factors than social and financial arguments by the supporters of the project (Drechsel et al. 2015).

The public tends to be more concerned with the health risks associated with the use of reclaimed water when they perceive that the quality of water is not guaranteed. Moreover, lack of trust in governing institutions and the authorities in charge of reuse safety could explain perceptions of risk resulting from system failure.

Farmers are more concerned with the long-term effects of water reuse and the accumulation of pollutants in soils, particularly when such pollution can affect crop yields or crop selection. They are typically concerned about salinity when reclaimed water is more saline that alternative water sources. Overall, farmers may see the benefits of having a reliable source of water all year round or the benefits of plant nutrients in reclaimed water; nevertheless, they tend to worry about the stigma associated with reuse and fear a potentially lower demand for their products or lower market prices for the same.

The end-users of reclaimed water (for example, farmers) and their decision to use it or not can promote or compromise any water reuse project or policy. The same applies to the consumers of the products who can jeopardize market demand or only show a low willingness to pay.

8.1.3. Emotional, cultural and religious factors

Acceptance of water reuse cannot be achieved simply by adopting technologies able to mitigate environmental and health risks. Water reuse will not be accepted only based on an economic justification (i.e., where the overall benefits of a project are larger than the expected costs). For a water reuse initiative to succeed, community attitudes need to be understood and addressed. It is necessary to consider instinctive and emotional responses that people have toward 'human excreta' and 'sewage.' Many people trust hearsay, or their own impressions of water quality, more than they trust medical and scientific evidence or advice. Once water has been in contact with contaminants, it can be psychologically very difficult for people to accept that it has been purified. Combined, these factors can create mental barriers to the acceptance of reuse water as a source of pure water.

The influence of instinctive responses of disgust against waste derived products is frequently referred as the 'yuck' factor. Connected with disgust are accompanying feelings of fear, which

are often conserved during evolution to protect against risks. The yuck factor could therefore be said to serve a useful purpose. But this reaction of repugnance, distaste or disgust can overcome scientific evidence and rational arguments and become a barrier to water reuse, even when it is proved to be safe and economically justified.

When people are just beginning to learn about potentially controversial ideas, their reaction often depends on where their information comes from and how it is presented. A person who was once repelled by the thought of using recycled water might change their mind if reuse is supported by someone with shared cultural values. Also, not all types of organizations are equality trusted. Most trusted sources are usually scientists who do not have a stake in whether a technology gets adopted or not. The least trusted entities are typically corporations. Terminology and data also matter (see below). It is easier to appeal to sentiments with imagery, than it is to appeal to perceptions with technical information and data. Scientists must communicate so that the public hears and understand what they are saying.

Similarly, there is an association between religious beliefs and respondents' willingness to use treated wastewater. The religious obligation to use water has direct implications for accepting treated wastewater. Even though in 1978 a fatwa was issued decreeing that treated wastewater could be considered pure with proper treatment, some people still object to water reuse on religious grounds. The issue becomes of greater pertinence when there is a large diversity of users and religious beliefs, which when not understood, leads to high levels of resistance and concern. Thus, the design of treated wastewater facilities can make water reuse more acceptable in countries that have religious taboos (i.e., letting the sewage effluent move underground after recharge) (Warner 2001).

8.1.4. Financial implications, costs of technology and capacity to fund and sustain projects

For the farmers and traders, it is important to know if the use of reclaimed water is financially viable from their perspective. In the case of use of recycled water for irrigation, for example, crop acceptance by the consumer (buyer) remains the most crucial criterion. Assuming the source of the crop is known to the consumer, their decision to buy or not to buy a crop produced with reclaimed water is determined by public views, knowledge and perceptions (Drechsel et al. 2015; Abu-Madi et al. 2009).

There may also be significant costs associated with funding, and operation and maintenance of water reuse projects. Equitable distribution of costs among key stakeholders is critical to acceptance, with consideration for their capacity to pay. This should consider the economic benefits of the reuse project in terms of food supply, water savings, health and livelihoods, which should be internalized to justify subsidies. Various subsidies and incentives are required for most water reuse projects as cost recovery through users cannot be guaranteed. Capital investment is financed in most cases with state funds and by international donors. High-income countries are better positioned to subsidize or recover project costs of operation and maintenance.

8.1.5. Freshwater scarcity

Reuse projects can easily fail if there are still alternative water sources. In Tunisia, the willingness of fruit tree farmers to pay for treated wastewater near Ouardanine is mostly undermined by their ability to fall back on groundwater use, which is free of charge if found above a depth of 50 m. However, extraction of groundwater is increasingly unsustainable, and there are now options to regulate extractions such as electricity charges for pumping (Drechsel and Hanjra 2018).

In Windhoek, Namibia, which lacks affordable water alternatives, up to 35% of the city's wastewater is treated and blended with other potable sources to increase the drinking water supply (Lahnsteiner et al. 2013). Singapore, on the other hand, has still enough freshwater; the public has rejected all attempts to use perfectly purified wastewater. As a result, only a small portion (2.5% in 2011) of NEWater has been blended with Singapore's freshwater during periods of drought (Lim and Seah 2013). Where an alternative freshwater source is a crucial disincentive to the adoption of reuse in agriculture, as was reported also for Jordan or Spain (Molinos-Senante et al. 2010; Brahim and Duckstein 2011), restrictions on the use of freshwater could be set and enforced.

8.1.6. Public involvement in decision making

As summarized by Drechsel et al. (2015), a consensus is that to achieve general acceptance of planned water reuse schemes, especially in a social environment with the power to influence the implementation process, it is important to ensure active public involvement from the planning phase to full implementation (EPA 2012; WHO 2006). Public involvement begins with early contact with potential users, and can involve the forming of an advisory committee, and public workshops on reasons, benefits and risks of reuse. The exchange of information between authorities and public representatives should ensure that concerns from perceived health or environmental impacts to lower property values have been shared and addressed (Crook et al. 1992; Helmer and Hespanhol 1997). The two-way dialogue and learning process should build on mutual trust to provide the right climate for negotiation and conflict resolution.

8.2. Practical steps for improving acceptance of water reuse

Initial reactions to new technologies or controversial ideas often depend on where the information originated, how it was presented and who was involved. There are key strategies and tools available to overcome barriers to the acceptance of water reuse, which include:

- Public participation
- Early and continuous communication
- Careful messaging and terminology
- Communicate the benefits of water reuse and how risks are mitigated
- Addressing possible religious concerns
- Facilitating behavior change

Jordan has succeeded in informing its population about the importance of water reuse in agriculture by implementing an active educational campaign with strong community outreach (EMWATER 2004). A program component included the distribution of newsletters and guidebooks, coverage of water issues in newspapers and on television and radio, websites, public educational places and the education of land-use decision makers. Additionally, educational materials were distributed to schools, universities and libraries.

In Jordan, Tunisia and Kuwait religious concerns were expressed but are not among the top reasons for farmers' rejection or hesitation to use reclaimed water for irrigation (Abu-Madi et al. 2008; Alhumoud and Madzikanda 2010). In view of potable water reuse, no fundamental religious objections appear to exist either internationally or locally, as a multi-level survey in Durban showed (Wilson and Pfaff 2008).

The recommendations below assume that the water reuse project is safe for people, crops and the environment, does not pose an economic burden, and benefits the environment and society.

8.2.1 Encourage public participation and discourse

Research confirms that communication and engagement with stakeholders increase acceptance of water reuse (Drechsel et al. 2015). Creating a sense of ownership through public involvement increases that support and involves a series of activities to inform and obtain input, not only a single event. Participation provides the public and stakeholders an opportunity to influence decisions that affect them. Project managers should consider recruiting local advisory councils to allow for comment, tours and open houses (Box 8.1). Site visits to existing water reuse projects have also proven to be a positive influence on acceptance. Studies have shown that although individuals accept experts' opinions on reclaimed water quality, they tend to rely more on their personal impressions and tested benefits (OECD 2002; Ait Mouheb et al. 2018).

8.2.2. Engage proactively in early and continuous communication to build trust

Once a negative narrative on water reuse has been voiced, it is difficult to overcome. Communication on water reclamation projects should begin early to build trust over time and complement the broader resource planning effort. Communication activities should include information to community organizations, the media and local leaders on decision-making processes and benefits; distributing brochures to utility customers; and hosting information booths and sessions at public events. A successful communication plan contains strategies that allow stakeholders to study the evidence and draw their own conclusions, seeing both the decision-making process and the decisions themselves through transparency. Project monitoring and accountability are key. Information on developments, positive or negative, should be first heard from project managers. It should be possible to identify a problem when an incident occurs and be able to trace the root cause of the problem to take early action in the future.

BOX 8.1 Learning alliances, action research and scaling up innovation in water reuse

Learning Alliances are a specific type of multi-stakeholder involvement. The name itself already suggests that learning plays a major role in this format. This refers to both learning in terms of the water reuse issues at stake, and also learning about the interaction between the stakeholders.

The Learning Alliance approach is a response to the failure to address complex societal issues involving natural sciences and technical engineering without incorporating social sciences and learning. Examples of research and action through Learning Alliances can be found in agricultural and urban water management (http://www.switchurbanwater.eu/la_intro.php) (Lefore 2015).

Learning Alliances have many similarities with other stakeholder formats; however, they also have some features that make them stand out, including:

- Key role of research and knowledge organizations, which are often the ones to facilitate the alliance as impartial and evidence based 'honest brokers'.
- Systematic observation of learning process. In parallel to researching actual water reuse issues, the process of interaction between the stakeholders and their progress in learning is also monitored and documented. Their achievements and failures in working together are equally important as improvements in wastewater and reuse management itself.
- Social inclusion. Learning Alliances put strong attention to those stakeholders who are normally not included in the official discourse on public matters. These groups include: women household and agricultural users, small-scale farmers, aquaculture producers, cattle owners, other water users, small- to medium-scale investors, etc.

8.2.3. Careful messaging with the right terminology

The concept of water reuse is relatively new for society. Its value must be presented in simple, compelling terms, avoiding technical language and emphasizing benefits and low risks of reclaimed water. Choice of words and terminology can overcome negative reflexes. Consider each audience as messaging is developed: what may resonate with investors will be different to what moves end-users. Terms like 'reclaimed water', 'recycled water' and 'water reuse' improve acceptance, compared to terms such as 'wastewater.' Water should not be judged by its history but for its quality. Once reclaimed, wastewater is not a waste anymore, and the term 'waste' should be avoided in water reuse projects. Water security for the MENA region is a primary concern and shaping positive messages on alternative water supplies will continue acceptance of water reuse to address serious, long-term water shortage issues. Health and safety should be promoted as the most important concern and highlight the safety record in the region.

BOX 8.2 Participatory simulation of scenarios and role-playing games

When designing a water reuse project, it is important to be able to anticipate potential problems that can occur during its implementation. This feedback can help adapt the project at the design face and prevent issues. To reach common understanding, and potential agreement on reuse solutions, stakeholders (e.g., farmers) must be put in the shoes of the others (e.g., policymakers) and vice versa.

Participatory simulation of scenarios and role-playing games allow a group of stakeholders to simulate an existing or future situation or problem and to explore its potential solutions. Participants are placed in a decision-making situation in a controlled and safe virtual environment. They can play various roles different than their own, explore different scenarios and test solutions. During a debriefing phase at the end of the process, the participants have an opportunity to explain and analyze their choices in order to draw conclusions for real-life situations.

Role-playing games make it possible to simulate complex situations where power asymmetries are central. It's also a reference tool for exploring hidden knowledge (hidden strategies, illegal usages, etc.), since role-playing allows participants to step back in a secure environment.

While inadequate and negative terminology can impede clear communication, positive images and terms that enhance knowledge and understanding of water and wastewater can enhance the likelihood of success (Macpherson and Slovic 2008).

8.2.4. Communicate the benefits of water reuse and how risks are mitigated

Water reuse holds significant benefits for cities and rural agricultural areas and should be promoted. It improves water quality and increases its availability, benefiting the environment, especially aquatic ecosystems. Where possible, benefits for end-users and stakeholders should be quantified and preferably with an economic justification. This will provide tangible targets and set expectations. It is also valuable to communicate risk. A successful communication plan will include details on how risks are being mitigated. Communication between organizations and stakeholders builds trust and has a major influence on the level of support for water reuse projects.

BOX 8.3 Gender and water reuse

Thoughtful safety interventions must be gender sensitive. In many cultures, women carry the main responsibility for hygiene and health, and also with regard to water reuse, as reported in Jordan (Boufaroua et al. 2013), Vietnam (Knudsen et al. 2008) and Tunisia (Mahjoub 2013). The strong connection between water use at a household level and women offers a significant potential for innovative training approaches to improve the social acceptance of safe water reuse as recently demonstrated in Jordan (Boufaroua et al. 2013).

Gaining public acceptance is easier when the public is suffering from water scarcity and the need to conserve high-quality water sources for domestic purposes is established. In a sense, water reuse becomes a solution to a problem, rather than a problem (Fawell et al. 2005). However, good timing alone is not a guarantee of success, as the Toowoomba example showed. It will also require a sensitive approach to avoid a polarization of stakeholders in favor and against reuse.

8.2.5. Addressing possible religious concerns

Religious concerns were mentioned in surveys carried out in Islamic countries. The attitudes of Islam can be considered as an incentive for irrigation with reclaimed water although some farmers and rural dwellers might not be aware of this (Abu-Madi et al. 2009). In 1978, the Council of Leading Islamic Scholars (CLIS) in Saudi Arabia stated that treated wastewater can be used if its treatment included advanced technical procedures that remove impurities related to taste, color and smell (Faruqui et al. 2001). According to Farooq and Ansari (1983), there are three ways in which impure water may be transformed into pure water:

- self-purification of the water (for example, removal of the impurities by sedimentation);
- addition of pure water in sufficient quantity to dilute the impurities; and
- removal of the impurities by the passage of time or physical effects (for example, sunlight and wind).

It is notable that the first and third of these transformations are essentially similar to those achieved by wastewater treatment processes.

8.2.6. Facilitating behavior change

In many cases, increased education and risk awareness will not be sufficient to motivate the desired changes in behavior toward the adoption of, for example, safety practices. Economic incentives might be helpful in motivating farmers who are usually engaged in cash crop production, while consumers might respond better to social marketing, which aims to respond to inner desires, fears and motivations (Scott et al. 2007). Successes with social marketing, trigger studies and nudging have been reported to support the adoption of best practices (Drechsel et al. 2022). The need to change attitudes and behavior calls for a strong integration of social science research and related strategic partners and stakeholders in the

BOX 8.4 Odor and color matter

The physical properties of water are related to its appearance: color, temperature, turbidity, taste and odor. To be better accepted, water must be free from impurities that are offensive to the sense of sight, taste or smell. One very important physical characteristic that should be encountered when discussing water quality is turbidity – the amount of cloudiness in the water.

dialog with communities to balance the strongholds of engineering and public health experts to address possible adoption barriers and opportunities. In particular, these concern:

- public perceptions and group dynamics which can easily jeopardize any reuse project;
- educational levels which might be too low to understand risks and related responsibility; and
- the lack of economic or social incentives for changing practices (Drechsel et al. 2015).

8.3. Conclusion

Figure 8.2 presents a flowchart for establishing programs for stakeholder involvement along four phases of a planned reuse project from the first plan of study to the final implementation. All interactions are two-way communications, where the project is learning in the same way as the community members and have continuously to adapt the training to the feedback received to make this participatory process as successful as possible.

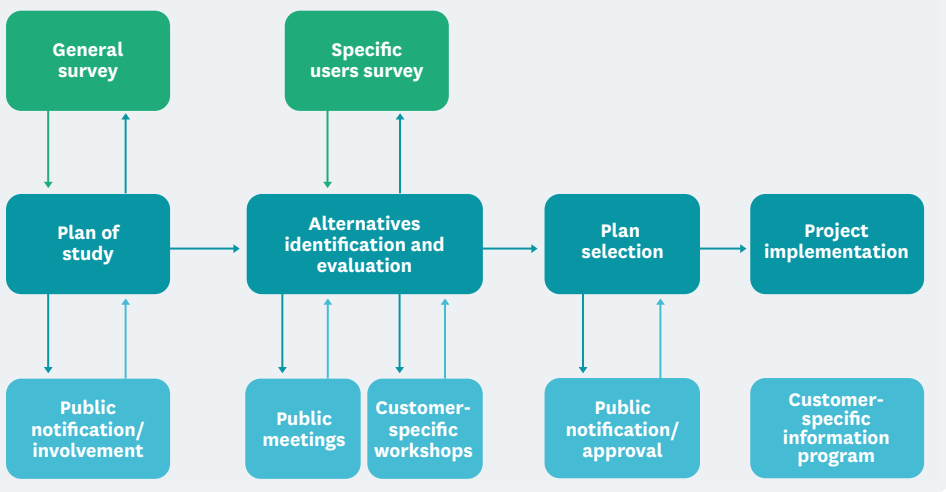

FIGURE 8.2 Strategy for public participation in planned water reuse.
SOURCE: Modified from WHO 2006; based on Crook et al. 1992 and Helmer and Hespanhol 1997.

The participatory process needs to be professionally facilitated. Facilitators may or may not be subject matter experts, but in any case, in their role as facilitators they should suspend their judgment. When facilitators act as water reuse specialists they should avoid providing technical advice on reuse. In the facilitation role, one should demonstrate the total opposite. Even though a facilitator may think to know, they are not supposed to show. Facilitators should ask and show interest in an honest way to get the best knowledge of individual participants in the group, and all of them equally, even though the facilitator may not even feel close to some. Facilitators should:

- adopt a two-way communication process to learn from the community how far adoption barriers can be addressed through information or require more customized approaches; like workshops analyzing, e.g., reasons for certain attitudes and behavior, to address them;
- use a positive terminology showing that reuse is solving community problems and not creating them;
- be sensitive to gender roles and religious arguments; and
- give due attention to national and international research ethics and obtain 'informed consent' from all participants taking part in interviews, focus group discussions or household surveys.

With due attention to research ethics, personal identifiable information should be kept protected and all responses anonymized. This should be explained while obtaining 'informed consent' and allow participants to express freely their thoughts. Thus, any data sharing from interaction with potentially vulnerable community members with third parties or in publications (including videos) is only permitted if the data are anonymized. This can be different for responses from public officials.

Participation and effective communication take time and resources but project designers need consider both when formulating and planning any water reuse project. These short-term investments will result in long-term dividends and lead to better acceptance and sustainability of the water reuse intervention.

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