

## Water Matters to Consumers; What They Think Matters to Your Nursery

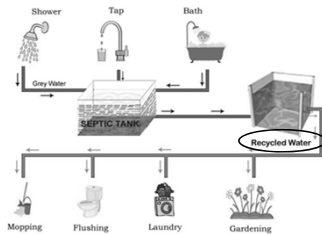
Bridget Behe, Nikki McClaran, Tom Fernandez, Patricia Huddleston



## Consumer perceptions are reality



We want people to use water again and perceive that it is relatively safe for certain uses.



Perceptions will affect (re)use of water.



## Yuck, disgust, "poop" factor

- Disgust is the most commonly cited and significant factor determining the support for recycled water (Po et al., 2003, Schmidt, 2008). The false perception that recycled water contains feces or other toxins (yuck factor or toilet to tap) consistently appears as a barrier to reuse of water.
- 70% of Australian respondents believed recycled water to be purified sewage and 60% believed it contained human waste (Dolnicar and Schafer, 2009).
- The revulsion to recycled water negatively influences a person's willingness to use recycled water for both potable and non-potable uses (Dolnicar and Hurlimann, 2010).
- While only 2% identified disgust as an important factor in their decision to use (or not) recycled water, the psychometric measure of disgust was their strongest predictor of their decision (Wester et al., 2016).

## Methods

- Our goal was to see which was the more preferred term (recycled or reclaimed) and to quantify the effects of priming messages. We aimed to determine which word and priming message yielded the most favorable perception.
- We conducted two online surveys (IRB X17-1129e) in September, 2017.
- First, asked about their water source, how risky they perceived their water source to be (1=extremely risky and 5=extremely safe). Then, asked about one of two terms (recycled water, reclaimed water). What was in the water (free response)? Then, given a list of contents, asked if that item was in the water.
- One survey version used the term "recycled" while an identical survey version used the term "reclaimed".
- In each survey version, one-third of the subjects were primed with the words "recycled/reclaimed from a plant production nursery or greenhouse" and one third were primed with the words "recycled/reclaimed from residential use" while one third received no priming message.

### Methods

- Data were collected from 12-18 September 2017.
- Obtained 1259 completed responses (passing four quality assurance checks to be sure each subject was reading every question).

### Demographic Characteristics

Characteristic	Reclaimed	Recycled	p value
Number	n=632	n=627	
Age	46.8 years	43.9 years	0.003*
Household Income	\$77,485	\$81,374	0.166
Percent Caucasian	82.9%	84.1%	0.249
Education	3.86 (some college)	3.81 (some college)	0.501
Number of adults	2.25	2.34	0.090
Number of children	0.64	0.69	0.387

Two samples (recycled/reclaimed) were similar, demographically, except for age. Subjects who saw "recycled" were 3 years older, on average.



Wordle of terms used to describe reclaimed water.

Wordle of terms used to describe recycled water.

What words would you use to describe what is in recycled/reclaimed water?

### What is in water (percent who agreed)?

Found in water	Reclaimed	Recycled	p value	Sig?
Chlorine	44.4	43.6	0.408	No
Disinfectant	26.5	24.4	0.210	No
Dyes	20.1 a	14.6 b	0.006	Yes
Harmful bacteria	36.3	31.9	0.052	No
Harmful chemicals	34.2 a	26.6 b	0.010	Yes
Heavy metals	27.6 a	22.7 b	0.024	Yes
Helpful bacteria	15.5	14.4	0.327	No
Human waste	31.8 a	26.5 b	0.022	Yes
Herbicides	33.8 a	26.1 b	0.002	Yes
Insecticides	29.2 a	24.1 b	0.023	Yes
Minerals	30.8	34.2	0.107	No

P value from Chi-square test; Bonferroni method used to adjust p values (significant at p < 0.05).

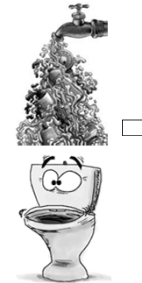
### What is in water (percent who agreed)?

Found in water	Reclaimed	Recycled	p value	Significant?
Nothing harmful	12.3 a	18.4 b	0.002	Yes
Plant nutrients	17.1	15.5	0.254	No
Pathogens	22.4	19.7	0.126	No
Sanitizers	22.4	23.1	0.408	No
Vitamins	10.6	10.0	0.398	No
Hormones	18.6 b	14.6 a	0.031	Yes
Prescription drugs	17.9 b	15.2 a	0.018	Yes
Pesticides	33.2 b	25.7 a	0.002	Yes
Salts	29.7	28.7	0.369	No
Animal waste	29.4 b	23.5 a	0.010	Yes
Composted plants	17.2	14.1	0.074	No
Composted animal waste	24.3 b	17.3 a	0.001	Yes

P value from Chi-square test; Bonferroni method used to adjust p values (significant at p < 0.05).

### What is in water?

- Generally, a higher percentage of Americans perceived harmful substances were in reclaimed water (compared to recycled water).
- In this study, 31% of the participants believed human waste was in reclaimed water (compared to 26.5% in recycled water).
- The "yuck" factor is alive in the minds of many Americans.



Results: Risk perceptions (before priming): How risky do you believe it is to use recycled/reclaimed water for the following uses?

Use	Reclaimed n=632	Recycled n=627	p value	Sig?
Cooking	2.61	2.77	0.009	Yes
Drinking	2.44	2.52	0.179	No
Bathing/showering	2.99	3.14	0.016	Yes
Flushing toilet	3.97	4.10	0.020	Yes
Watering lawn	3.77	3.92	0.003	Yes
Washing car	3.86	3.97	0.049	Yes
Fire fighting	3.93	4.02	0.079	No
Irrigate public park	3.72	3.85	0.016	Yes

Extremely safe = 5, Safe = 4, Not Sure = 3, Risky = 2, Extremely Risky = 1. Higher mean value indicates "safer" perceived water.

Conclusion: Recycled water had a lower perceived risk compared to reclaimed water.

- For 6 of 8 potential uses, recycled water was perceived as safer (less risky) compared to reclaimed water.
- For the remaining 2 (drinking and fire-fighting) the risk level was similar.
- For all of the personal indirect uses in this study (e.g. bathing, showering, flush toilet, water lawn), recycled water was perceived as safer (less risky).
- We found mixed perceptions (as safe as or safer) for the personal direct (e.g. cooking, drinking) and public (fire-fighting).

Results: Effects of priming messages

- Priming messages are like priming a water pump. The message is intended to make you think (differently?) about a situation.
- One third received a nursery priming message, one third received a residential priming message, and one third received no priming message (control) and all three groups answered subsequent questions.
- Hypothesis was that the nursery priming message would improve safety perception over the residential message.
- What did we tell them?
- "Depending on where you live, recycled/reclaimed water is regulated to be of a certain quality when it is ready for reuse. Here, we use the word recycled/reclaimed water to mean that the water is reclaimed from a **plant production nursery or farm/residential use** and meets the state's standards for safe use to grow more plants. Using this definition, how risky do you believe it is to use recycled water for the following uses?"

Results: Effects of priming messages overall

Use	No prime (control)	Primer 1 (nursery)	Primer 2 (residential)	p value	Sig?
Cooking	2.01 (0.943)	2.66 (1.098)	2.02 (1.027)	0.000	Yes
Drinking	1.90 (0.991)	2.39 (1.112)	1.86 (0.998)	0.000	Yes
Bathing/Showering	2.42 (1.093)	3.01 (1.141)	2.45 (1.193)	0.000	Yes
Watering lawn	4.05 (0.919)	4.04 (0.895)	4.10 (0.888)	0.583	No
Flushing toilet	4.13 (0.907)	4.12 (0.852)	4.20 (0.821)	0.285	No
Washing car	4.15 (0.795)	4.01 (0.871)	4.13 (0.877)	0.034	Yes
Watering ornamental plants	3.97 (0.948)	3.98 (0.844)	3.85 (0.969)	0.046	Yes
Water edible plants	2.93 (1.187)	3.45 (1.026)	3.07 (1.229)	0.000	Yes
Fire fighting	4.11 (0.871)	4.04 (0.870)	4.11 (0.871)	0.333	No
Water public park	3.94 (0.861)	3.95 (0.916)	3.94 (0.861)	0.996	No

Higher mean indicates higher perceived safety (less risk on a 5 point scale).

Conclusion: Nursery priming message reduced risk compared to residential/no priming

- Compared to no priming message, indicating the water was from a **plant production nursery or farm** and meets the state's standards for safe use to grow more plants" was perceived as safer over no priming message, especially for personal direct uses (e.g. cooking, drinking).
- For personal indirect uses (e.g. watering ornamental/edible plants, washing car, bathing) we found either a similar level of risk or reduced risk (improved safety) with the nursery priming message.
- For public use (e.g. watering park, fire-fighting), we found no change in relative risk or perceived safety.
- The nursery primer improved perceived safety (reduced perceived risk) for several items over the residential primer.

Implications

- Research has produced evidence to support that some consumers are willing to pay a price premium for horticultural products produced in an environmentally-friendly or sustainable manner (Behe et al., 2010; Behe et al., 2013; Khachatryan et al., 2014).
- Evidence of this outside the horticulture industry is abundant.
- Nurseries recycling water from their facilities should indicate this sustainable practice and indicate that the water is recycled from the nursery itself and used for additional plant production.
- When all else is equal, the water conservation message may tip purchases in favor of the nursery that promotes that message.



## Implications

- Findings are being prepared to submit to the Journal of Environmental Psychology.
- We believe these results can influence policy, especially with regard to terminology and marketing efforts to encourage water reuse.

Thank you for your attention!



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