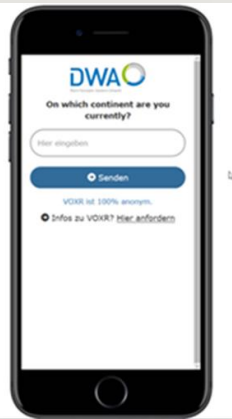
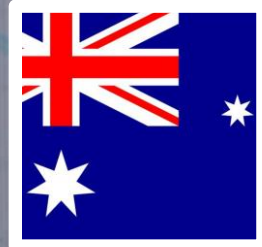


IWA YOUNG WATER PROFESSIONALS **BUILDING BRIDGES** ONLINE EVENT SERIES

CONNECTING YWP GLOBALLY
GERMANY'S INTERNATIONAL ROUNDTABLE 002

IWA YOUNG WATER PROFESSIONALS BUILDING BRIDGES ONLINE EVENT SERIES

CONNECTING YWP GLOBALLY
GERMANY'S INTERNATIONAL ROUNDTABLE 002



Tell us who you are:

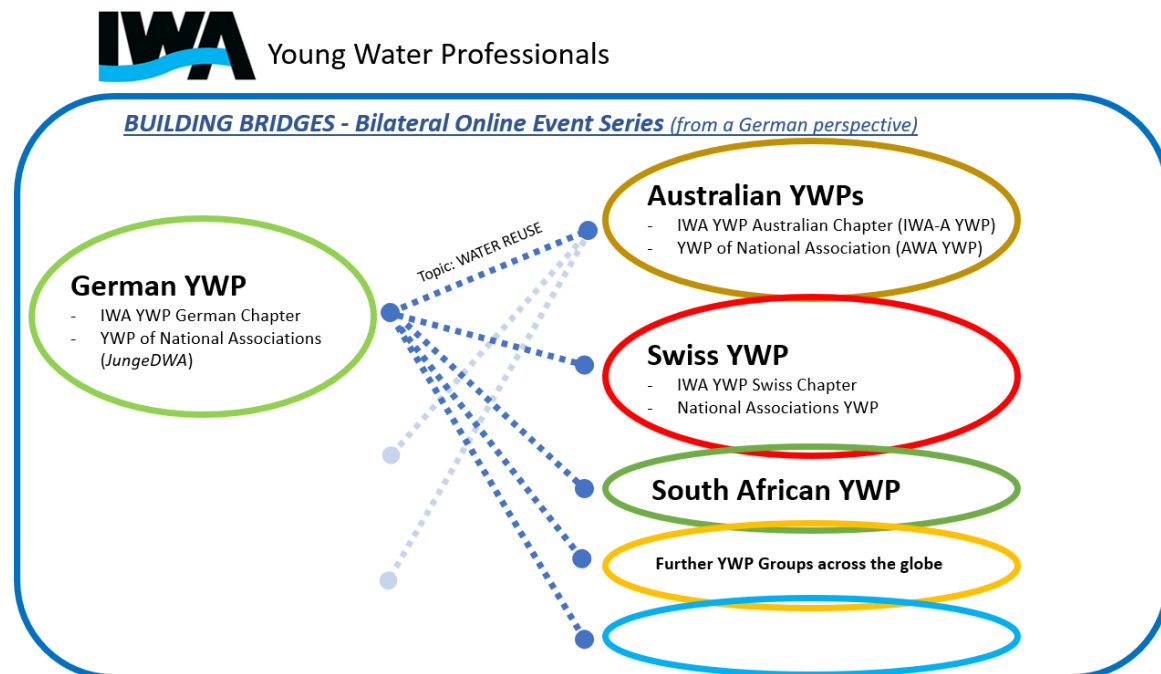
LINK VOXR: <https://voxr.com/dwa>

Question 1: In one word - What's your background (Eng./Geo./Econ....)

BUILDING BRIDGES ONLINE EVENTS

Concept in a nutshell

- International Roundtable of the German YWP
- Part of newly created **Building Bridges Online Event Series**
- Regular Get-togethers (in English language, every 8-12 weeks) connecting YWP across the globe in **bilateral dialogue**
- Platform to network and **engage over a topic** relevant to both countries
- Platform to **empower YWP** to present insights and **learn** from peers



INTRODUCING THE GERMAN ASSOCIATION (DWA/YOUNG DWA)



Young DWA Goals:
Connect Exchange Grow

YOUNG DWA GOALS

Connect - Roundtables



Exchange - Network Meetings



Grow - Circles & Inclusion



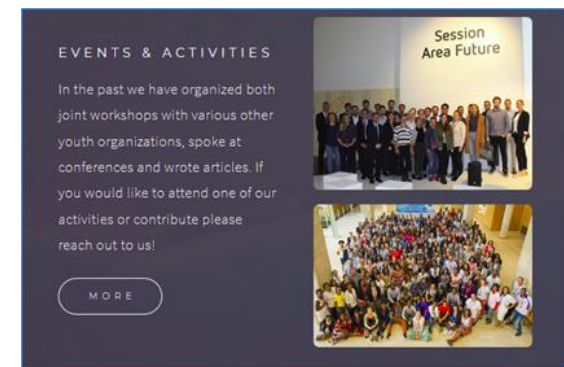
The IWA Young Water Professionals German Chapter



We connect water professionals in Germany with the world and the world with Germany.

Some Activities:

- Roundtables
- Publications (national & international)
- Represent Germany abroad at the IWA and at international conferences
- Connect with other IWA chapters



INTRODUCING THE AUSTRALIAN YWP

Shona Fitzgerald

- Introducing
 - the IWA YWP Australian Chapter (IWA-A)
 - the YWP of the Australian Water Association (AWA)



GUEST SPEAKER – YWP Germany

- **ALEXA BLIEDUNG**

(Former) Research Assistant, TU Braunschweig

REUSE OF TREATED WASTEWATER IN A HYDROPONIC SYSTEM



HypoWave - Use of hydroponic systems for resource efficient water reuse in agriculture

Funding code: 02WAV1402

Funding measure: Future-oriented Technologies and Concepts to Increase Water Availability by Water Reuse and Desalination – WavE

IWA young water professionals building bridges online event series
Germany's International Roundtable 002
21 October 2020
Alexa Bliedung

AGRICULTURAL REUSE OF TREATED WASTEWATER – NEW PATHWAYS

What is hydroponics?

- Agricultural production in a system without soil
- Irrigation with an appropriate nutrient solution

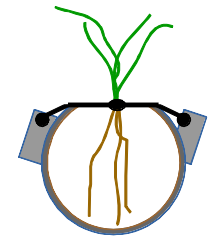


Figure: J. Germer/ UHOH

Objectives of the pilot facility:

- Production of high quality products (→ pollutants and hygiene)
- High resource efficiency (→ water and nutrients)
- High transferability (→ location and scales)
- Wastewater treatment: as much as necessary but as little as possible! (→ determination of the limits of the system)

FIELDS OF ACTIVITY OF HYPOWAVE

Pilot facility

Governance and integration of stakeholders

Feasibility studies

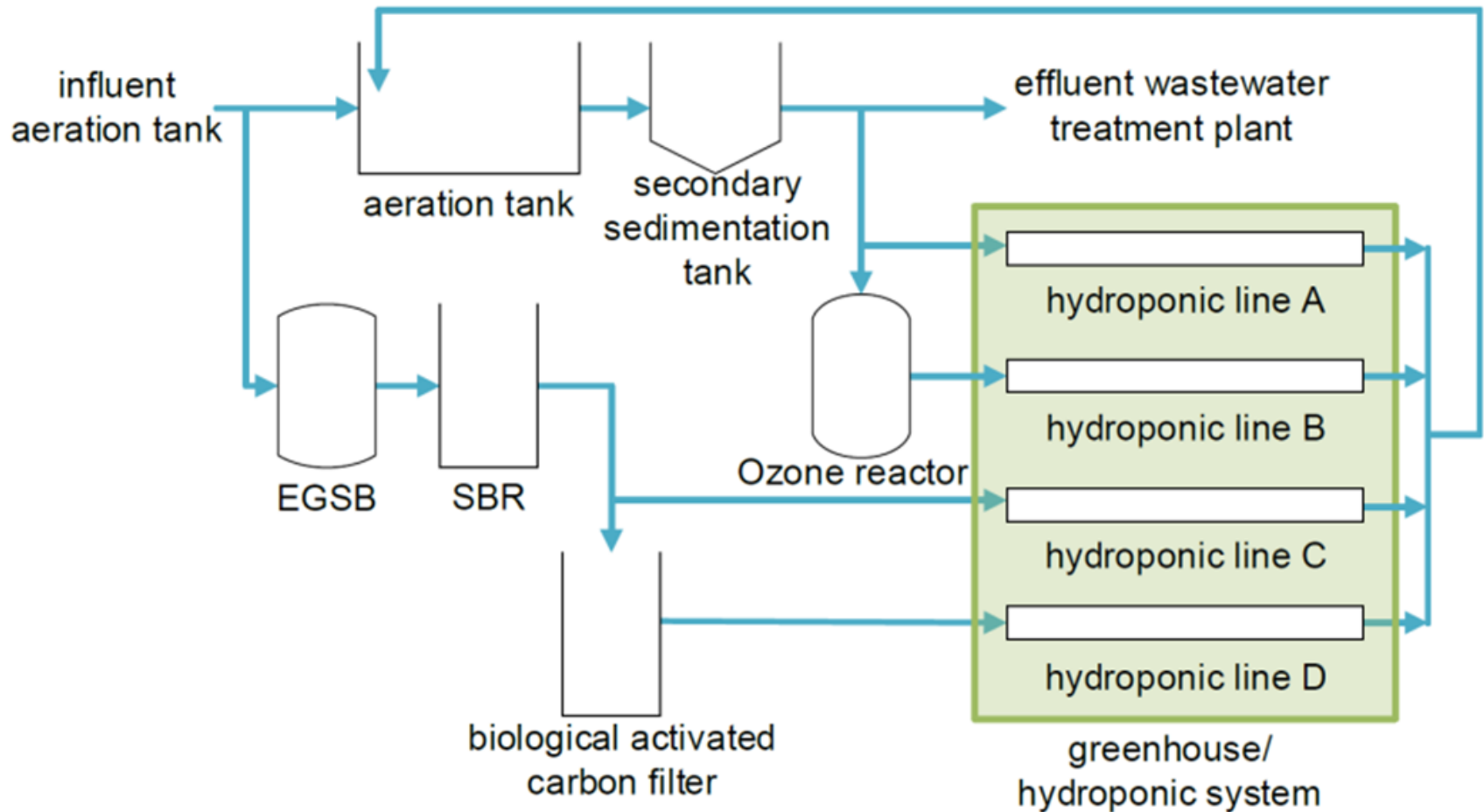
Impact assessment



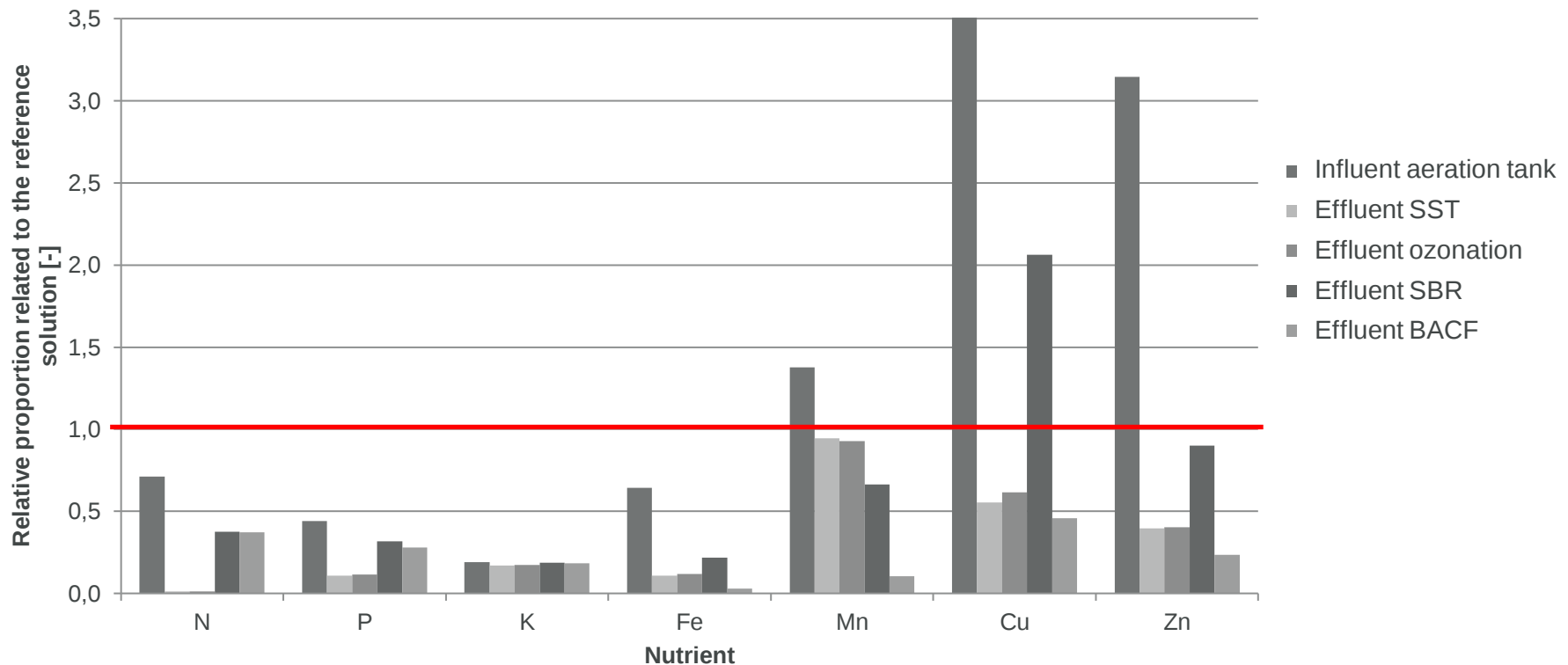
SPONSORED BY THE



PILOT FACILITY



COMPOSITION OF THE IRRIGATION WATER IN REGARD TO SELECTED NUTRIENTS

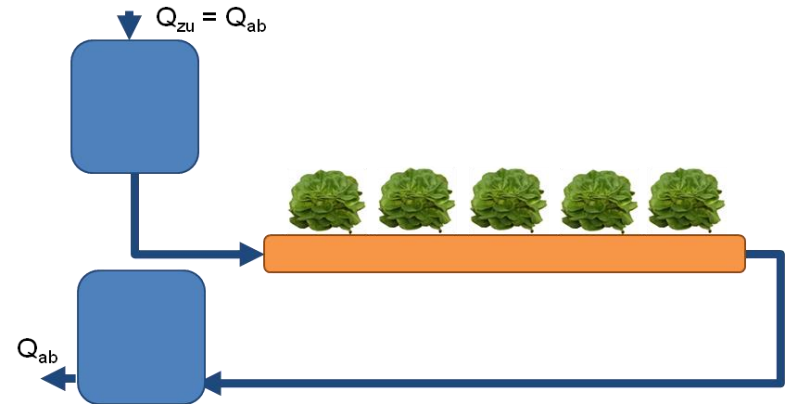


- Reference nutrient solution = adapted Hoagland nutrient solution (Concentration = 50%)
- Results of the analyses (2017-2019)

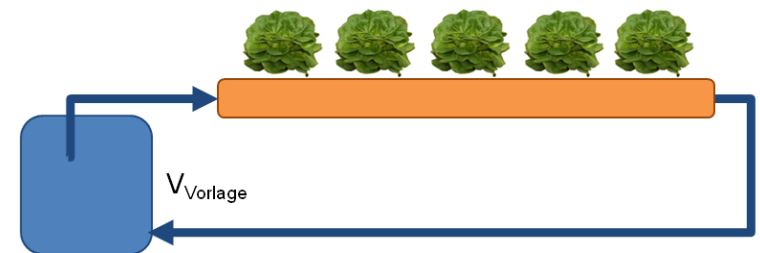
http://www.hypowave.de/fileadmin/user_upload/Ergebnisse/Vortr%C3%A4ge/2_AlexaBliedung_Herstellung-Bew%C3%A4sserungswasser.pdf (online, 12.10.2020, adapted)

MODES OF OPERATION

- 2017
 - Flow-through system
 - Constant flow
 - Irrigation water:
Reference, Effluent SST, Effluent Ozon, Effluent SBR, Effluent BACF
- 2018 and 2019
 - Modified circulation system (Feed & Deplete System)
 - $\text{NO}_3\text{-N}$ → criteria for changing water of the barrels
 - Addition of nutrients
 - Irrigation water:
Reference, Effluent Ozon, Effluent SBR, Effluent BACF



2017: Flow-through system



2018/2019: Feed & Deplete System

Source:
http://www.hypowave.de/fileadmin/user_upload/Ergebnisse/Vortr%C3%A4ge/2_AlexaBl%C3%A4uung_Herstellung-Bew%C3%A4sserungswasser.pdf

LETTUCE PRODUCTION



http://www.hypowave.de/fileadmin/user_upload/Ergebnisse/Vortr%C3%A4ge/IWA_HypoWave_Bliedung_V1.pdf

QUALITY – A SHORT OVERVIEW

- Heavy Metals

- Most values were below the limits of quantification
- Low concentrations in the shoot (e.g. Co and Hg were clearly below the limit values)

- Micropollutants

- Detection of micropollutants in the roots (e.g. Acesulfam, Carbamazepin, Diclofenac)
- Detection of some micropollutants in the shoot (e.g. Acesulfam, Carbamazepin)
- Concentration depends on the treatment train

SUMMARY

- Despite the unbalanced nutrient composition a good plant growth was possible.
- Addition of some micronutrients was necessary.
- Reduction of quality-reducing parameters (e.g. micropollutants, heavy metals) was required.
- Roots can act as a barrier for micropollutants and heavy metals
- Outlook:
Implementation of a feasibility study as a large scale project

SOME RECOMMENDATIONS

- HypoWave-Website (German) www.hypowave.de
 - Presentations in English
 - http://www.hypowave.de/fileadmin/user_upload/Ergebnisse/Votr%C3%A4ge/IWA_Reuse_Mohr_2019_final_b.pdf
 - http://www.hypowave.de/fileadmin/user_upload/Ergebnisse/Votr%C3%A4ge/IWA_HypoWave_Bliedung_V1.pdf
 - http://www.hypowave.de/fileadmin/user_upload/Ergebnisse/Votr%C3%A4ge/2019-06-19_Operator_models_Bjoern_Ebert_16_9_final_harm.pdf
- WavE-Website (German/English) www.bmbf-wave.de/index.php
- Bliedung A., Dockhorn T., Germer J., Mayerl C. & Mohr M. in press Experiences of running a hydroponic system in a pilot scale for resource-efficient water reuse. *Journal of Water Reuse & Desalination*, **jwrd2020014**. <https://doi.org/10.2166/wrd.2020.014>
- Winker M., Fischer M., Bliedung A., Bügrow G., Germer J., Mohr M., Nink A., Schmitt B., Wieland A. & Dockhorn T. in press Water reuse in hydroponic systems: a realistic future scenario for Germany? Facts and evidence gained during a transdisciplinary research project. *Journal of Water Reuse & Desalination*, **jwrd2020020**. <https://doi.org/10.2166/wrd.2020.020>
- Zimmermann M. & Fischer M. in press Impact assessment of water and nutrient reuse in hydroponic systems using Bayesian Belief Networks. *Journal of Water Reuse & Desalination*, **jwrd2020026**. <https://doi.org/10.2166/wrd.2020.026>
- Mohr M., Dockhorn T., Drewes J.E., Karwat S., Lackner S., Lotz B., Nahrstedt A., Nocker A., Schramm E. & Zimmermann M. in press Assuring water quality along multi-barrier treatment system for agricultural water reuse. *Journal of Water Reuse & Desalination*, **jwrd2020039**. <https://doi.org/10.2166/wrd.2020.039>

ACKNOWLEDGEMENT



HypoWave

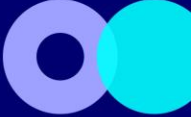
Use of hydroponic systems for resource efficient water reuse in agriculture

Funding code: 02WAV1402



GUEST SPEAKER – YWP Australia

- **MORGAN PAULY**
Strategy Advisor, Sydney Water



All options on the table: Building acceptance around purified recycled water for drinking

Morgan Pauly
Strategy Advisor, Sydney Water

WSAA's All options on the table report

Context

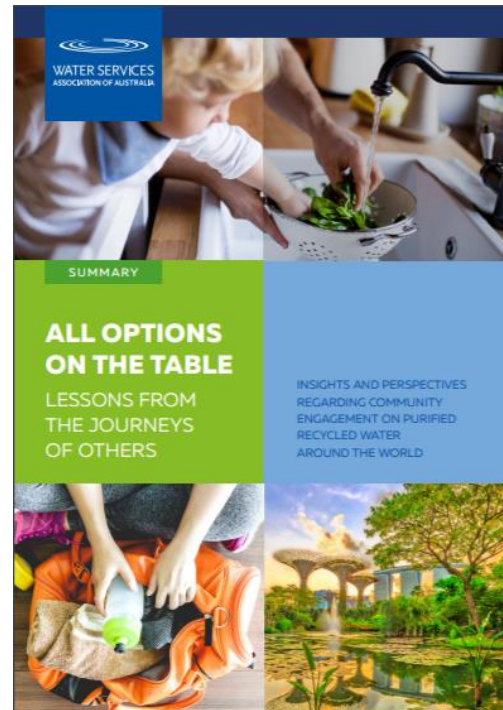
- Climate change and population growth are driving a shift towards rainfall independent water sources
- In the East Coast of Australia purified recycled water for drinking has frequently been positioned as an option of last resort
- Community acceptance is cited as one of the main barriers - how do we overcome the 'yuck factor'

Objective

- Advocate for consideration of purified recycled water for drinking as part of 'all options on the table' for a robust water planning process.

Purpose of this work

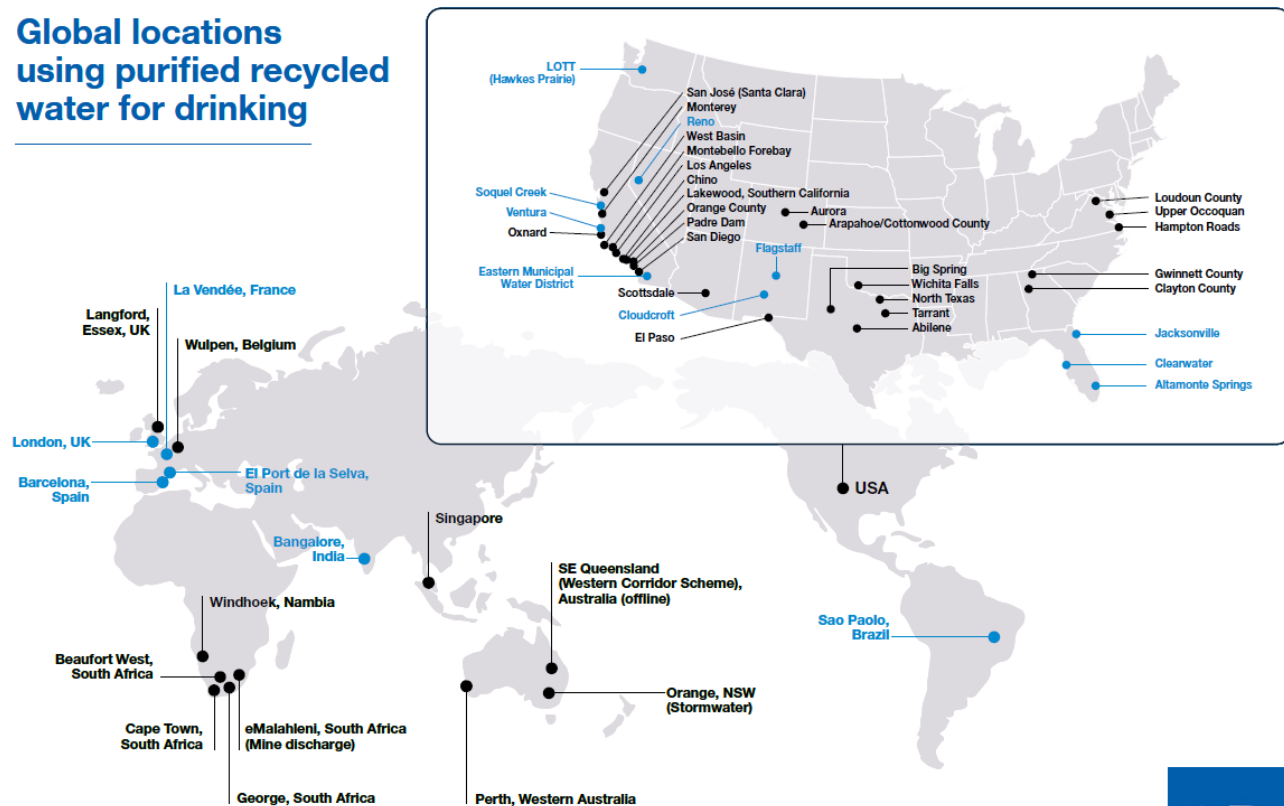
- Understand the factors that contributed to the success (or failure) to secure community acceptance in other cities around the globe.



Available: <https://www.wsaa.asn.au/publication/all-options-table-lessons-journeys-others>

Using purified recycled water for drinking is becoming common practice around the world

Global locations using purified recycled water for drinking



We selected 10 schemes for in-depth case studies:

1. Orange County (California, USA)
2. Perth (Western Australia)
3. NEWater (Singapore)
4. San Diego (California, USA)
5. El Paso (Texas, USA)
6. Toowoomba (Queensland, Australia)
7. Western Corridor (Queensland, Australia)
8. Upper Occoquan (Virginia, USA)
9. Orange (NSW, Australia) - Stormwater
10. San Jose (California, USA)

Lessons from the journeys of others

1

It can be done

Communities around the world have implemented purified recycled water schemes for decades. It could be successfully implemented in Australia, if circumstances warrant.

The three 'T's:

Trust • Transparency • Time

2

Trust is critical for securing support for purified recycled water

Transparency and open information sharing will help to develop and maintain this trust.

3

Establishing purified recycled water is complex and takes time

It takes time – up to a decade. People need to be taken on a journey to be comfortable with it. Rushing or imposing deadlines increases the risk of rejection or backlash.

4

Seeing is believing

Investing in a demonstration plant, visitor centre and tour program for 'place based learning' will greatly improve community understanding and support. It can showcase and prove the reliability of the technology, and pre-empt stigma reactions through calm, engaging learning environments.

The experience should be carefully crafted with sequenced messaging to build overall awareness and understanding, and may include sampling the water.

5

Wording and imagery are critical

This will be somewhat specific for each community, so local research is important. Choose words and branding that resonate and do not alienate. Technical jargon confuses people and doesn't build trust.

6

News media coverage has a profound impact on public acceptance

It can make or break a scheme. Proactively engaging key influencers and the media, leveraging social media, and using expert testimony and third party advocacy can help build trust and transparency.

7

Political support is essential

Political cycles can polarise an issue, and force people to take a side. Good engagement across the full political spectrum, to gain and keep support, is critical.

8

Grass roots education and engagement

Can be more effective than high profile marketing activity or 'above the line' presence.

'Water should be judged by its quality and not its history'

LUCAS VAN VUUREN, SOUTH AFRICA

9

General education around the urban water cycle and context

Will help prevent stigma and encourage acceptance. Provide information on the range of long-term supply options, climate trends and cost.

10

Regulators play a powerful role

They will lead government and community perception, and have the authority to determine whether purified recycled water can proceed. It is their role to take a conservative approach to risk management, so it may take a long time for them to become comfortable and produce a regulatory framework. Good regulatory engagement, and high

**As young water professionals
what can we do?**

Lessons from the journeys of others

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**All water on earth is used and
reused in an endless cycle
– the water cycle.**

**We have been recycling water for
along as humans have settled
alongside rivers.**

**We have the treatment technology
available to remove anything that
is mixed in with water.**

All drinking water, regardless of its source, is treated to strict guidelines to ensure that it is clean and safe to drink.

**More than 35 cities around the globe
rely on purified recycled water as an
efficient, sustainable and safe
component of their drinking water
supply.**

**(And if you've been to Disneyland in Anaheim you've
probably drunk purified recycled water.)**

**Drinking purified recycled water is
common practise around the
world.**

Let's help to normalise!

Any questions?

Global locations
using purified recycled
water for drinking

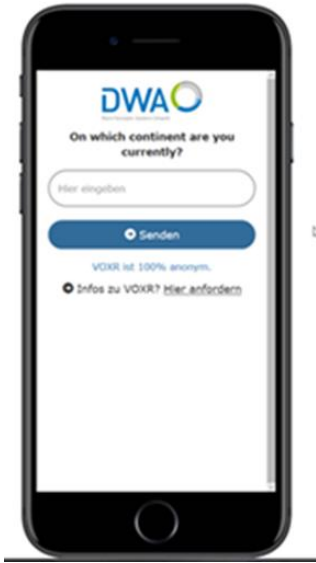
Unacknowledged
Reuse

*Work in
progress:*



Feedback

Link VOXR: <https://voxr.com/dwa>

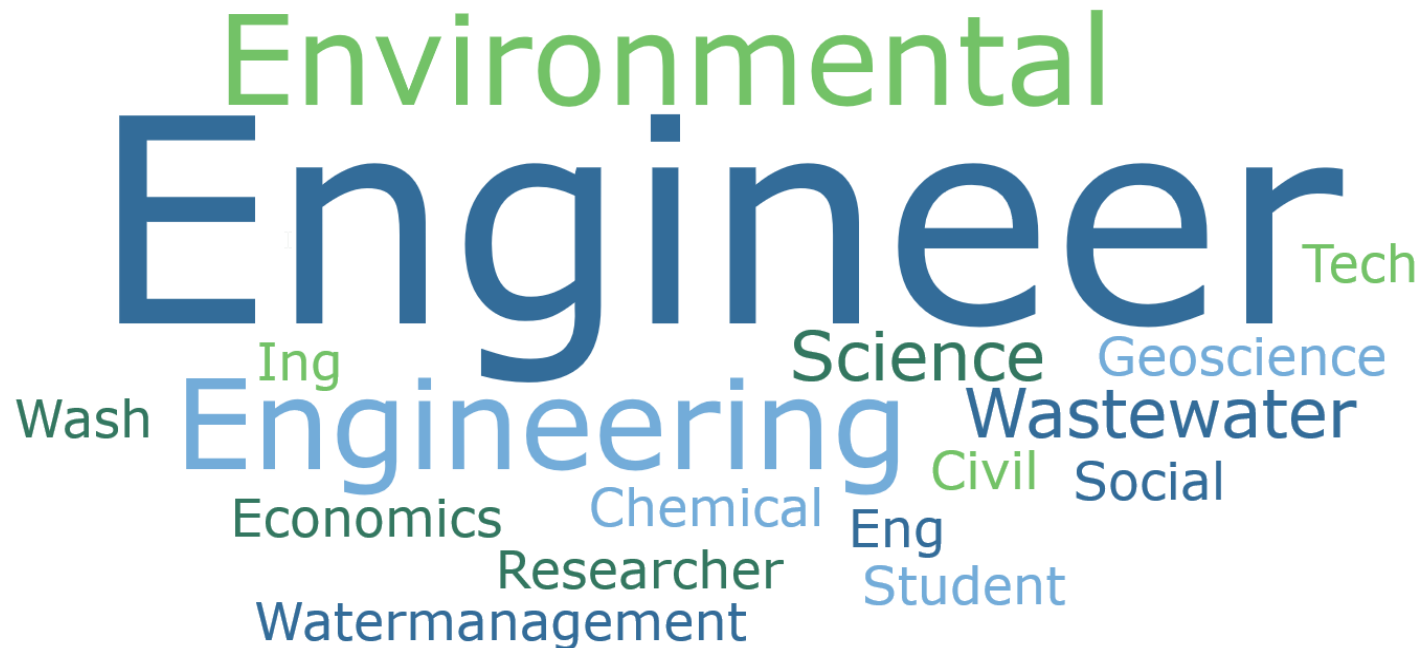


Question 2:

Presentations - which word(s) stuck?

VOXR Results

In one word – What's your background? (Geo./Ing./Social)



VOXR Results

From the presentations – which word(s) stuck?

