Scotland's water reuse potential: barriers and opportunities

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Scottish Government gov.scot

Hydro Nation Scholars Programme

Scottish Funding Council
Comhairle Maoineachaidh na h-Alba

GCU Glasgow Caledonian University

The James Hutton Institute

Acknowledgements
This project is supported by the Hydro Nation Scholar Programme. Special thanks to my supervisors.

1 - Research

1.1 - Background

Current and future challenges
- Future increase in drought risk
- Rising domestic water consumption and some water consumptive sectors economically growing
- Key sectors at risk due to changing water availability

Non-conventional water usage
- High domestic and industrial share
- Low agricultural share due to low level of irrigation

Representation and perceptions
- Less research on scarcity
- Scarcity-related risks are poorly perceived by the public

How to foster the water reuse potential in Scotland?

1. Drivers, benefits and barriers to water reuse and their relevance in Scotland **—> Literature review**
2. Discussion of the water reuse potential through the case of Murcia **—> Case study** (Section 2)
3. Opportunity mapping for water reuse **—> GIS** (Section 3)
4. Public (or community) perceptions over water reuse **—> Workshop(s) or focus groups**
5. Discussion of key water reuse policy strategies by stakeholders **—> Workshop(s)**

1.2 - Duckett et al., 2024 [1]

- Call for new drivers to water reuse: climate justice, water justice and circular economy.
- Call for a Yum factor, a positive factor expressed by the feeling of being environmentally responsible, must be triggered in contrast with the Yuck factor.

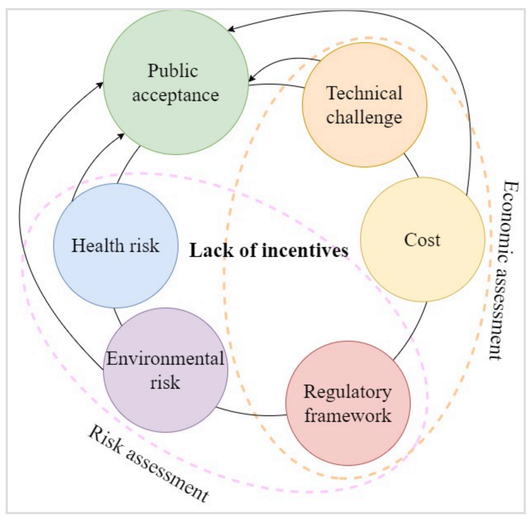

Figure 1: Interlocking barriers to water reuse

2 - Murcia: European leader in water reuse

2.1 - Methodology

- Prior review of literature in English and Spanish.
- Nine semi-structured interviews with eleven stakeholders (see Table 1)

Figure 2: Area of study

- Analysis of stakeholder's perceptions of the barriers, practical solutions and challenges associated with reclaimed water.

Table 1: Stakeholders' information

Organisation	Department
University of Murcia	Applied Economics
Irrigation Community of Campo de Cartagena	NA
Region of Murcia	Water Department
Murcian Institue for Agricultural and Environmental Research and Development	Sustainability and Horticultural Quality
Entity of Sanitation and Purification of Wastewater	Operation
Region of Murcia	Water Department
Polytechnic University of Cartagena	Agricultural Engineering
Higher Council for Scientific Research	Food Science and Technology
Centre for Soil Science and Applied Biology of the Segura	Irrigation
Region of Murcia	Water Department
Hydrographic Confederation of Segura	Hydrological Planning

2.2 - Results and discussion

- Some aspects can be generalised, as they are dependent on the concept of water reuse but not on the context.
- A pilot study in Scotland would be essential to assess: the investment and the cost of treatment and supply, the level of social acceptance and the perceptions associated with this resource.
- "New solutions come with new problems." Other solutions must be prioritised before reuse: higher water efficiency, higher level of information and behavioural change.

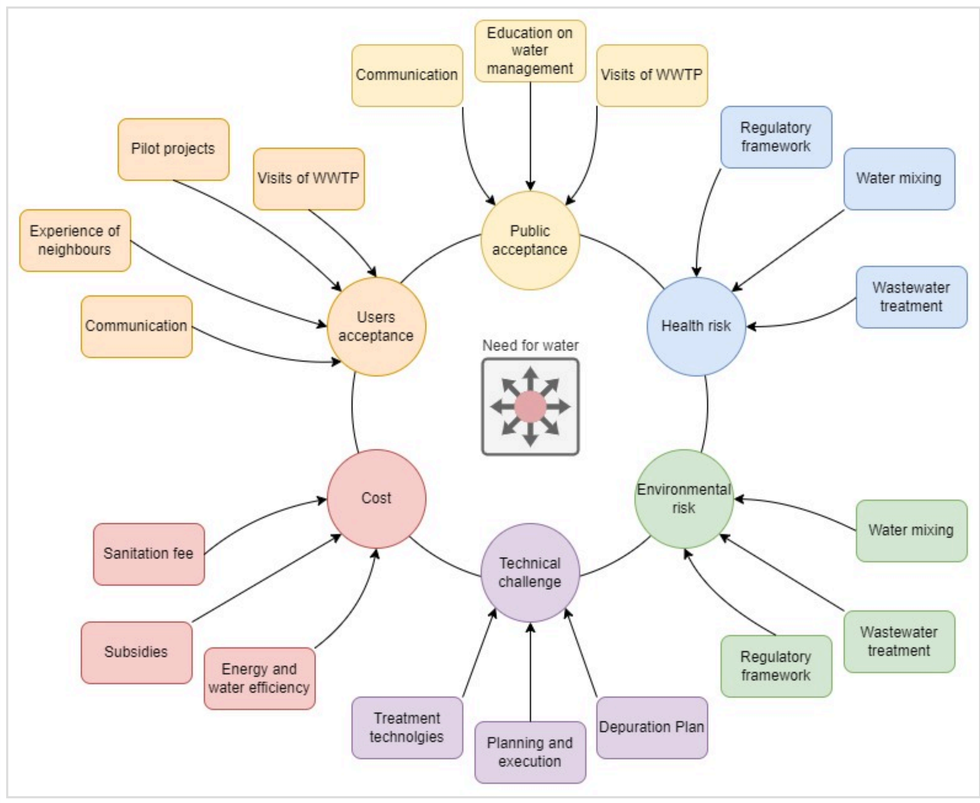

Figure 3: Prior barriers to reclaimed water in Murcia and their solutions

3 - Mapping of centralised and decentralised reuse

3.1 - Study area and users selection

- East of Scotland as it presents characteristics detailed in Section 1.1.
- 1,036 potential users identified fit for reuse
- Two SEPA datasets were assessed to identify the users fit for reuse with the most potential. [2] [3]

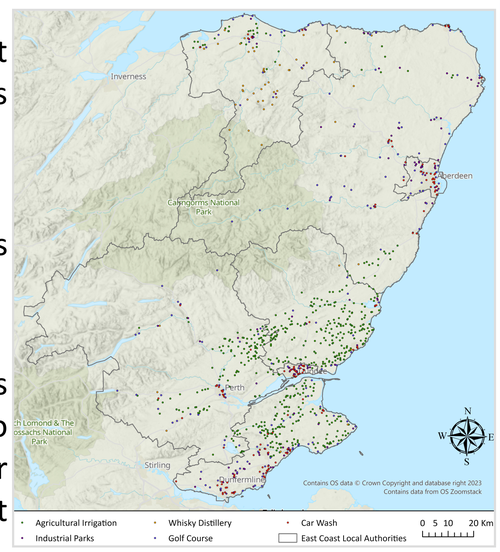

Figure 4: Potential users

3.2 - Centralised and decentralised

- Both are assessed as distance from the treatment facility is key.
- Prior selection for decentralised sites based on Hama et al. (2019). [4]
- The analysis is mainly based on two datasets. [5] [6] Facilities are then classified based on three criteria.

Table 2: Criteria for the classification of treatment facilities

Criteria	
Centralised	**Decentralised**
Treatment capacity	Total users in a close distance
Treatment available	Size of the site
Type of discharge	Local density of population

3.3 - Mapping under different scenarios

- Different scenarios are established based on existing or potential policy strategies to overcome the barriers to water reuse in Scotland.
- The aim is to identify opportunities for reuse and potential competing objectives by comparing different scenarios.

Table 3: Important criteria under different scenarios

Criteria	Scenarios				
	High level of cost-efficiency	Low level of health and environment risk	Low energy requirements and GHG emissions	High level of preservation of the water environment	High level of acceptance is prioritised
Distance from treatment facility	✓		✓		
Elevation difference with treatment facility	✓		✓		
Source of supply		✓	✓	✓	✓
Capacity to pay					✓
Vulnerability to water scarcity				✓	✓
Human exposure to contaminants		✓			✓
Water demand	✓			✓	
Variation in water demand	✓			✓	
Reclaimed water quality	✓	✓	✓		✓

Sources

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