

# Managed Aquifer Recharge as a Long Term Effluent Disposal Strategy

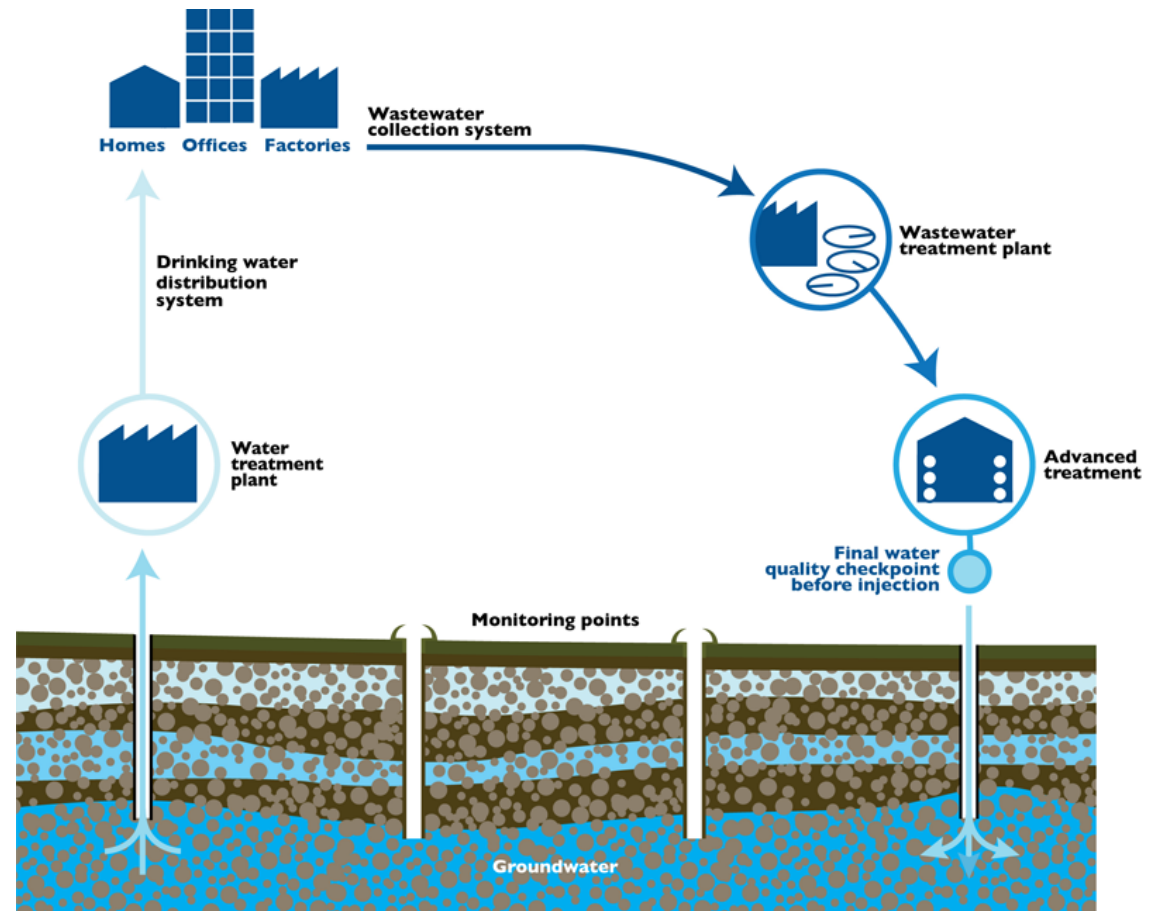
# Managed Aquifer Recharge

## General Principles

- High quality wastewater treatment
- Appropriate aquifer
- Water treatment compliant with National regulations
- Community and stakeholder acceptance

## Primary Outcomes

- Recharge groundwater
- Supplement extracted flows
- Managed effluent disposal

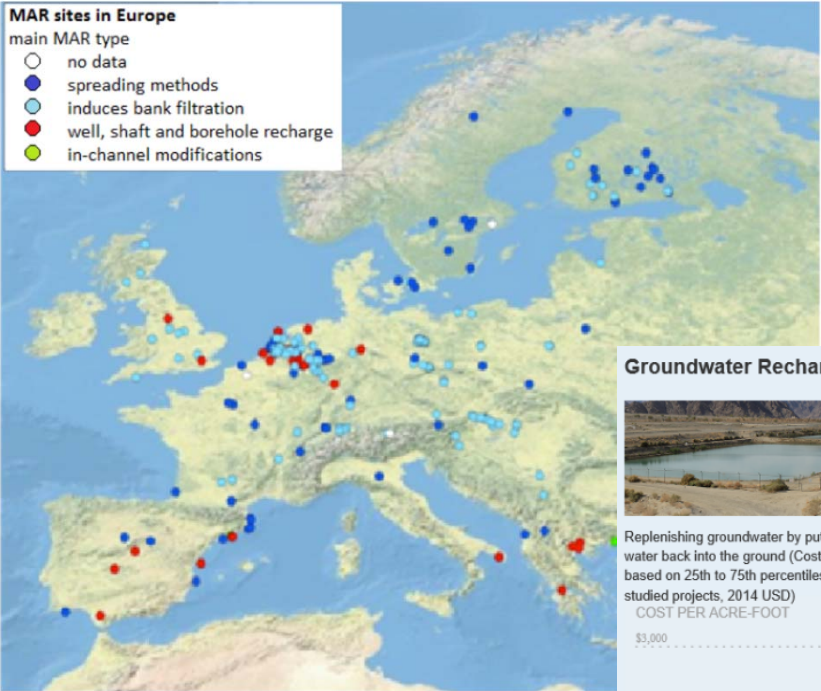


# Why and where is this done?

**MAR sites in Europe**

main MAR type

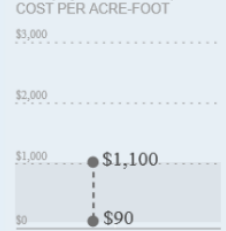
- no data
- spreading methods
- induces bank filtration
- well, shaft and borehole recharge
- in-channel modifications



**Groundwater Recharge**



Replenishing groundwater by putting water back into the ground (Cost based on 25th to 75th percentiles of studied projects, 2014 USD)



Source: *Water in the West*

**Reservoir Expansion**



Raising dams to expand reservoirs, increasing their capacity to store water



Source: *U.S. Bureau of Reclamation*

**Seawater Desalination**



Removing salt from sea — or brackish — water to create a new supply



Source: *Pacific Institute*



# Our Opportunity

## Community

- Gaining community acceptance of effluent disposal is increasingly challenging
- Liveability or Mauri of water is increasingly becoming understood and valued

## Sustainability

- International trends towards replacing or supplementing abstracted flows
- Freshwater as a resource

## Regional WWTP Facilities

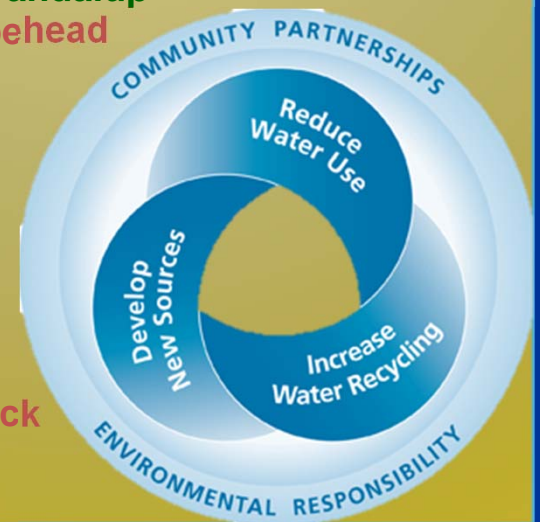
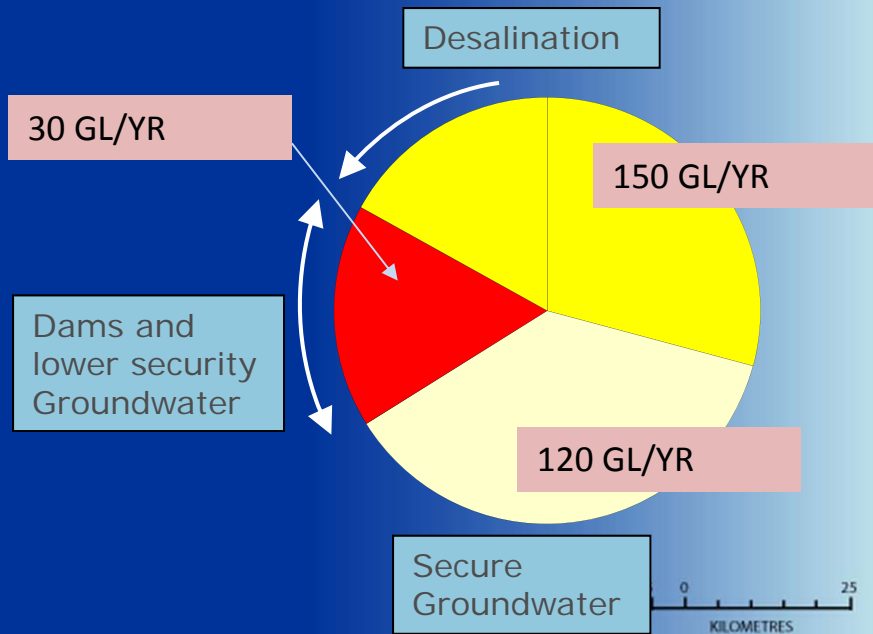
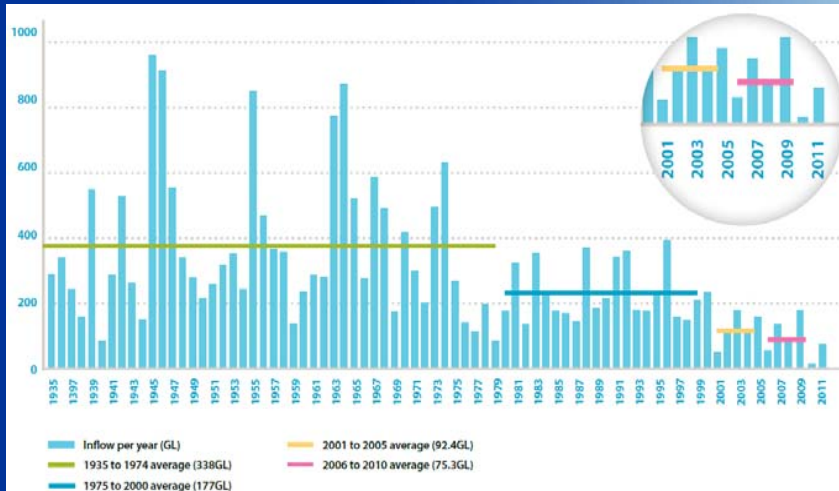
- Number of facilities require consenting under increasingly constraining conditions
- Number of facilities require significance upgrades

## Water Supply

- No current strategy to link with water supply but unlocks the technology as a potential future opportunity



# The Perth Story



# Demonstration Plant



Visitors Centre

Recharge Bore

Monitoring Bores

# Multiple Treatment Barriers

## Wastewater Treatment

- Effluent suitable for discharge to ocean

## Ultrafiltration – Removes:

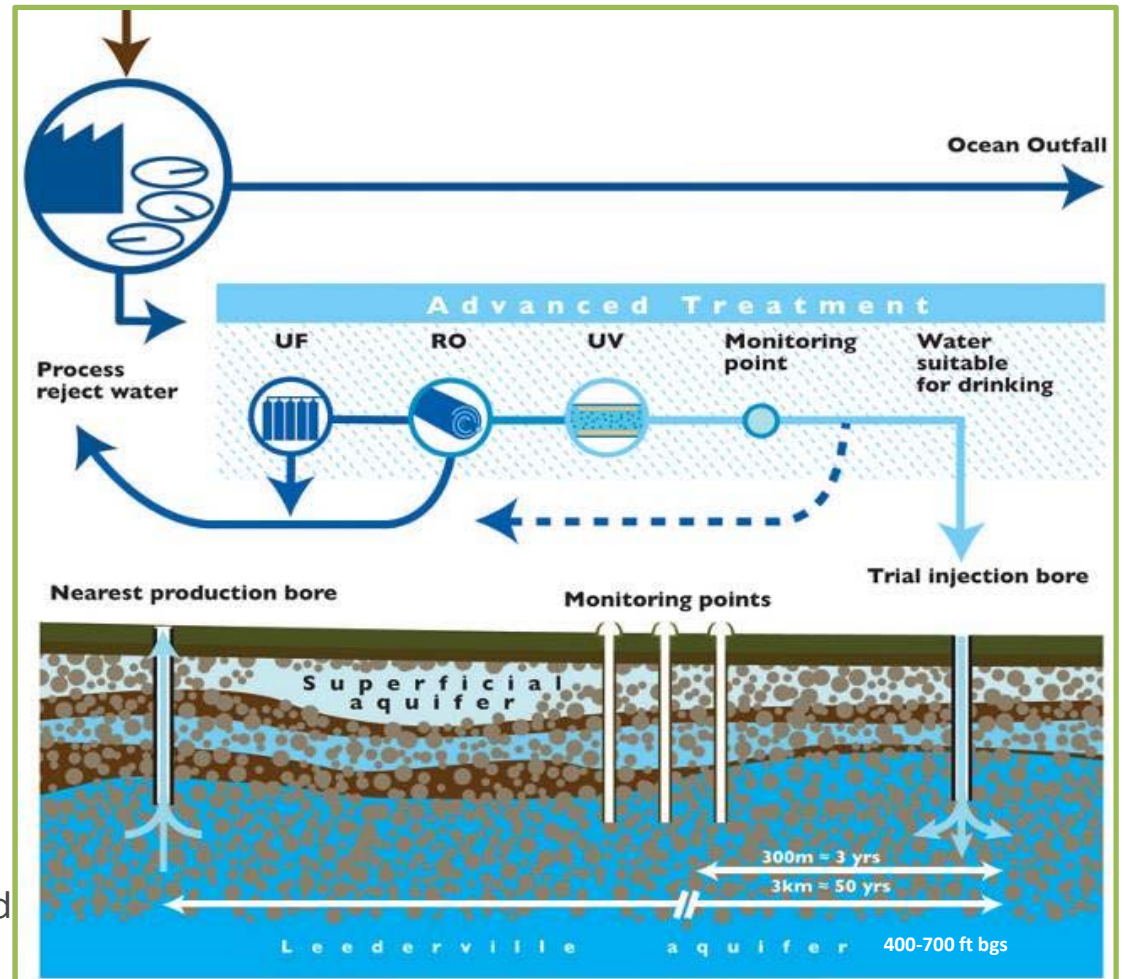
- All suspended solids
- Crypto, giardia, all bacteria
- Viruses (pore size dependent)

## Reverse Osmosis – Removes:

- All viruses
- Inorganics, including nitrogen
- Bulk and trace organics

## Ultraviolet Treatment

- Per current approach to final disinfection
- Inactivation of bacteria, crypto, giardia and viruses



# Southwest Subregion WWTP

## Opportunity - Waiuku, Clarks Beach, Kingseat

- Require long term consenting
- Range of required upgrades
- Appropriate aquifer
- Opportunity to integrate WWTP and AWTP
- Surface water disposal current approach for managing effluent

## Potential Next Steps

- Desktop study
- Pilot trial
- Stakeholder engagement

**Potential applicability to other regional locations (ie Snells/Algies)**





# Community Engagement

