Water recycling and reuse

Challenge: Too little water **Adaptation response:** Alternative water sources

Description

Water reclamation or recycling primarily makes non-potable wastewater useful, thus saving the economic and environmental costs related to establishing new water supplies. Water recycling and reuse is the process of collecting, treating and using wastewater, particularly from municipalities, industry and agriculture. The recycled water can be used for irrigation or industrial purposes, as well as domestic purposes if properly treated. In some cases, treated wastewater is indirectly used for drinking purposes, for example by injecting it into groundwater aquifers to increase capacity and minimize salt water intrusion. Water recycling and reuse is an important adaptation response to climate change as the increasingly unpredictable weather patterns and their effects, for example as severe droughts and sea-level rise, are likely to have negative consequences on freshwater resource quantity and quality.

Implementation

Well-managed institutional arrangements are key to effective water recycling projects. They ensure a coordinated approach between agencies responsible for water treatment and reuse. Awareness raising campaigns on water recycling and reuse often play an important role to ensure public buy-in, who may initially be sceptical about coming into contact with recycled "waste" water. System implementation includes choosing a treatment system (primary, secondary and tertiary), wastewater reclamation tanks and sites, transportation to the treatment facility, transportation to users, and post-treatment water quality testing. System monitoring and maintenance, for example clearing biofilm from reclamation tanks and ensuring pipes are not clogged, and other quality assurance steps, are very important to prevent health risks to people and ecosystems.

Environmental Benefits

- Retains wastewater for reuse, instead of it being discharged into the environment and potentially polluting ecosystems.
- Saves energy otherwise required to extract or transport freshwater to the area.
- Recharges groundwater, avoiding freshwater resource degradation and salinization

Socioeconomic Benefits

- Increases water availability for potentially water stressed or arid areas.
- Provides an easily accessible water source to economic sectors such as industry and agriculture, promoting economic development and food production.
- Improves the quality of agriculture through use of valuable nutrients extracted from the wastewater.
- Diversifies water sources, which increases climate resilience.

Opportunities and Barriers

Opportunities:

- Several climate change adaptation benefits, particularly climate resilience
- Relatively low cost technology compared to alternatives such as extraction and transport
- Small scale and simple techniques are possible at the household level, for example directly reusing household waste water for flushing toilets

- Successful water reuse projects have been established in both developed and developing countries, including very dry regions

Barriers:

- There are health risks to being exposed to inadequately treated wastewater, for example consuming raw vegetables irrigated with it
- Public may be against coming into contact with reused "waste" water
- Unknown contaminants in treated water can pose health risks, and should be addressed in initial phases of the process with a thorough risk assessment

Implementation considerations*

Technological maturity:	2-4
Initial investment:	2-4 (depending on the type and application of recycling system)
Operational costs:	1-3
Implementation timeframe:	2-4

* This adaptation technology brief includes a general assessment of four dimensions relating to implementation of the technology. It represents an indicative assessment scale of 1-5 as follows:
Technological maturity: 1 - in early stages of research and development, to 5 – fully mature and widely used
Initial investment: 1 – very low cost, to 5 – very high cost investment needed to implement technology
Operational costs: 1 – very low/no cost, to 5 – very high costs of operation and maintenance
Implementation timeframe: 1 – very quick to implement and reach desired capacity, to 5 – significant time investments needed to establish and/or reach full capacity
This assessment is to be used as an indication only and is to be seen as relative to the other technologies included in this guide. More specific costs and timelines are to be identified as relevant for the specific technology and geography.

Sources and further information

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