Surface reservoirs

Challenge: Too little water

Adaptation response: Water storage

Description
Surface reservoirs are built structures for water storage that help improve water security for local communities. The types and sizes of reservoirs vary, from damming natural water bodies for storage to ground excavation in low-lying plains fed either by rainwater or diverted rivers. Stored water can be used for numerous purposes, including irrigation, industry, domestic use, hydropower generation and flood control. Surface reservoirs are particularly important in regions with lengthy dry seasons and high rainfall variability, as well as areas where seasonal water availability is predicted to increase as a result of a changing climate. Surface reservoirs are therefore one of the most important adaptation technologies in regions with limited and varying water availability.

Implementation
An environmental impact assessment is usually undertaken to determine possible environmental and socio-economic effects of the construction. It is particularly needed if the planned reservoir is to be connected to, or in any way interfere with, a natural waterway.

Choosing the size and function of the reservoir involves consideration and analysis of community needs. For example, small-scale, local pond reservoirs for collecting rainwater may be well suited for remote and small communities or even households, as they require less complex assessments and construction efforts. Education on health impacts, particularly vector-borne disease threats, would be more relevant in these cases. Larger urban populations and industrial centres are in turn more likely to require larger reservoirs and thus more lengthy and complex assessment processes, as well as socioeconomic impact assessments in some cases. Operation and maintenance for large storage structures, such as multipurpose dams, is also necessary to ensure maintained security and stability, as well as maximum operational efficiency. General maintenance of reservoirs includes sediment clearing, maintenance of pumps, pipes and other equipment, and monitoring of key environmental and socio-economic variables.

Environmental Benefits
- Ensures water security through bridging seasonal (or unexpected) water shortages and stress, reducing pressures on groundwater and avoiding potential depletion.
- Supports the production of renewable energy (usually large multipurpose reservoirs).

Socioeconomic Benefits
- Increases water storage, resulting in increased water security and reliable supplies for socioeconomic activities, as well as sufficient supplies during periods of low water flows and drought.
- Delivers a number of additional benefits such as protecting downstream communities from flooding events, hydropower generation and inland navigation.
- Offers recreational benefits.

Opportunities and Barriers
Opportunities:
One investment can help reduce water scarcity while providing numerous other socio-economic benefits
- Can provide climate change adaptation and mitigation benefits, increasing local community resilience to extreme weather conditions, as well as opportunities for renewable energy generation

Barriers:
- Large scale reservoirs can be costly to construct and maintain
- Smaller surface reservoirs can create habitats for mosquito breeding, which may increase risks of vector-borne diseases such as malaria
- Large scale reservoirs may require displacement of adjacent communities and flooding of some areas in active use, leading to negative socioeconomic consequences and potential conflict
- Creating reservoirs on flowing waterways may impact the natural dynamics of the water systems, with negative effects on aquatic environments and natural ecosystem cycles

Implementation considerations*

Technological maturity: 4-5
Initial investment: 1-5 (depending on size and function)
Operational costs: 2-4
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


Download full publication from: http://www.unepdhi.org/publications