

Name of Technology	Water Conservation
Sector	Water Resources
Sub-Sector	Community Water Supply
Introduction	Improvement of freshwater availability can be achieved through reduction in water losses, decrease in water demand and effective management of water supply systems using Village Water Committees (VWCs). Water losses in community water supply systems can occur during storage, transmission, or delivery through evaporation, leakage (often due to aging infrastructure), or improper, illegal, or uncontrolled use. The losses are substantial, and they are likely to increase with rising temperatures.
Technology characteristics	Water loss reduction is a suitable approach in almost any environment, but especially in locations with impervious soils that are facing water shortages. It is also an important technology to consider in areas with aging water distribution infrastructure. Water losses can be reduced during distribution by implementing an active leak detection program; identifying illegal taps and connections; installing or calibrating water meters; reducing main breaks by rehabilitating and replacing water mains; and developing an “asset management” strategy for maintaining and improving existing infrastructure. Reducing water losses will increase water available for use and reduce abstraction from surface water and groundwater supplies. Improvement of freshwater availability technologies can be supplemented by several existing technologies and policy tools for reducing water demand. Demand for water can be reduced and the efficiency of water use by households and commercial entities increased with the help of new technologies (e.g., no- or low-flow toilets, low-flow showerheads, reformulated manufacturing techniques), as well as policies (e.g., water tariffs, reduction of non-revenue water, integrated water resources management).
Costs, including	
cost to implement adaptation options	A major source of water loss is aging infrastructure, which is costly to repair or replace. Leak detection and repair can also be costly, depending on the size of the system. Cost assessments should be made to evaluate the economic losses from leakages versus the resources required to reduce the water losses. Covering or lining

	storage facilities to reduce evaporation is most cost-effective for small facilities. Lining canals is efficient but expensive, although costs vary from concrete linings, the most expensive option, to colmation, the least expensive. In fact, this method is rarely used, despite the significant reduction in water losses that it can achieve, because of the expense involved. While water is typically undervalued, climate change will affect the availability of water, thereby increasing its value and the economic benefit of strategies for reducing water losses. The market for water loss reduction depends on the costs of water and the distribution of incentives for addressing losses.
cost of not modifying the project	Not modifying or adopting improvement of freshwater availability would mean higher cost of monitoring and maintenance of infrastructure as climate changes.
Potential financing and markets:	Where water loss reduction offers financial benefits to the owners of water storage and distribution infrastructure. Significant market potential exists for investment in materials and infrastructure for reducing water losses. Business entities can forge partnerships with the national water utility (NAWEC) for financing and maintaining some of the components of the water distribution systems such as leak reductions and through the partnerships the business entities receive a percentage of the profits and savings from the water utility.
Potential development impacts, benefits	Reducing water losses can produce a number of co-benefits. In some circumstances there may be indirect environmental impact from the construction associated with building or repair work.
Economic	Reducing the amount of water lost in transmission means that less water has to be pumped to deliver the desired volumes to the user locations. Energy will be saved in the process. The technology supports employment at the community through ensuring availability of water for off season farming activities. The technology requires low investment for capacity building of Village Water Committees. There will be reduced public and private expenditures on climate related disaster management through its support to building community resilience.
Social	Minimizing leaks in water distribution systems means that less pathogens and other contaminants can enter potable water supplies. Adequate water pressure is also maintained at water hydrants used by Fire Fighting Services to provide protection against fires. Reducing large-scale leaks will keep water tables from rising and causing damage to building foundations and other critical infrastructure, or creating seepage areas where mosquitoes and other disease-spreading pests may breed. Using Village Water Committees for provision of effective management of the water supply systems provides extra income for farmers' groups through increasing water availability for production and through improved management of water resources that supports improvement in water quality. The savings accrued are used to reduce health risks within communities. The VWCs also develop market cooperatives that ensure effective marketing of members' produce and create opportunity for increased group and individual earnings at group and community level.
Environmental	Minimizing water losses means less pumping, reduced energy use and reduced GHG emissions. Reducing residential and commercial water use can ease pressure on ecosystems that provide surface water and create a number of other environmental co-benefits.
Status	Expansion and modernizing community water supply systems are well advanced in The Gambia. However, management of the water supply systems by Village Water Committees needs improvement by building the capacities of members in financial management, including planning. Suppliers of materials and the mechanics responsible to the monitoring and maintenance of the infrastructure also need further training and better resources (for mobility) for effectiveness in their operations.
Barriers	Aging water distribution infrastructure, the limited resources for O&M, and limited control against illegal connections call for priority attention. Among the biggest barriers to water loss reduction is the paucity of research into losses due to aging water distribution infrastructure, unauthorized access and illegal connections, cost-benefit analyses of repairs, and proper building or repair technologies. It is important to maintain accurate utility and customer meter data. Split incentives, in which the party that finances the mitigation measures does not benefit from the reduced losses can serve as disincentives and hinder the implementation of the measures. A weak Village Water Committee poses the risk of poor management performance. Undue political influences and bias to a particular political party also limits the effectiveness of the Village Water Committee members in the execution of its duties.
Acceptability to local stakeholders and Feasibility of implementation	Most of the community water supply in The Gambia comes from boreholes with piping to tap heads. Strategies for limiting water losses in distribution networks requires improving O&M as well as replacing aging infrastructure. Recently, metering has been introduced for effective monitoring of usage and detection of wastage due to leakage. Stakeholders appreciate the introduction of some of these strategies
Endorsement by experts	Experts in The Gambia have long term expertise in implementing community water supply systems using borehole and wells that have solar-powered pumping and pipe-borne reticulation systems. The use of Village Water Committees has been found to be appropriate for effective management of water resources as a climate change adaptation measure.
Timeframe	Pipe-borne reticulation systems for one to three districts can take about 3 years to install.
Institutional capacity	Number of technicians to maintain the reticulation systems will need to be increased substantially due to large number of retirees from the public service. Village Water Committees need capacity building on leadership roles and responsibilities, and financial management rules and procedures. These must be supported by an operational manual for leadership accountability and financial auditing. Public-private-partnerships need to be established and to encourage investment by the business sector.
Adequacy for current climate	The technologies to improve availability of freshwater supplies to communities are adequate for current climate. With some improvements (e.g., increases in the depth of boreholes, wells and reservoirs) climate change impacts such as decreasing water tables due to reduction in recharges can be accommodated.
Size of beneficiaries group	Water loss reduction measures and technologies to improve freshwater availability can be implemented at all scales, from the household to the community and regional levels. The technologies to improve freshwater availability for communities are of two types. One well with one or two Hand Pumps is installed for a beneficiary population of about 500 persons. More than 500 persons, a Borehole with a pipeborne reticulation system is installed. The size of the borehole and the number of tap heads installed depends on the size of the beneficiary population. Water-efficient technologies can be adopted at the household and community levels. Water-pricing schemes and water-use efficiency policies, on the other hand, are likely to be adopted by

communities and municipalities. The technology has the potential of increasing access to water resources for multiple user groups and over longer periods.

Water leaks and wastage are common in The Gambia due to old and broken infrastructure. This example is at the Bartej Junction in Serrekunda

