Technology Fact Sheet for Adaptation

K. Rainwater Harvesting from Ground Surface [i]

Technology characteristics	
Introduction	Rainwater harvesting is defined as a method for inducing, collecting, storing and conserving local surface runoff from rain for agriculture in arid and semi-arid regions. Rainwater harvesting could be achieved from ground surface (roads) that constitutes the catchment area where the rainfall or water runoff is initially captured. Surface water flowing along the ground during rain is usually diverted toward a reservoir below the surface. Rainwater harvesting represents an adaptation strategy to climate change for people living with high rainfall variability, both for domestic supply and to enhance crop, livestock and other forms of agriculture.
Technology characteristics/highlights	For rainwater harvesting technology, agricultural roads or regular village roads used in transport could be considered. Equipment needed to implement this technology include the following: 1. drainage canals 2. settling pond where collected water is settled for sedimentation 3. Collection pond: it is recommended to collect water in earth made pond, otherwise from concrete material. 4. Pump: it is only needed if the collected water should to be pumped to the upstream areas. Knowledge Requirements for the Selection of Rainwater Harvesting Technology are the following: - Rainfall quantity (mm/year) - Rainfall amount, pattern and the type of rainfall pattern which prevails will often determine the feasibility of a rainwater harvesting technology. A climate where rain falls regularly throughout the year will mean that the storage requirement is low and hence the system cost will be correspondingly low and vice versa. - Collection surface area (m^2) - Available storage capacity (m^3) - Number of users - Cost - Alternative water sources – where alternative water sources are available, this can make a significant difference to the usage pattern. - Water management strategy – whatever the conditions, a careful water management strategy is always a prudent measure. In situations where there is a strong reliance on stored rainwater, there is a need to control or manage the amount of water being used so that it does not dry up before expected.
Institutional and organizational requirements	- The Government, particularly the Ministry of Interior and the Ministry of Public Works as well as the CDR and Green Plan should be involved for the implementation of this technology.

	- Municipalities could be involved to organize system operation when the catchment area for harvested water is a public domain. - Government and donors could play a key role in providing subsidies for equipment purchases by making the technology accessible to a larger number of farmers, particularly small-scale farmers, who may have problems raising capital investment funds.
Operation and maintenance	Maintenance is required for the cleaning of the reservoir and inspection of the gutters, pipes and taps and typically consists of the removal of dirt, leaves and other accumulated materials. Such cleaning should take place annually before the start of the major rainfall season with regular inspections. In regions with unpredictable rainfall, more regular maintenance and cleaning will be required to ensure that the equipment is maintained in good working order. Cracks in the storage reservoirs can create major problems and should be repaired immediately to avoid water loss. Maintenance of the catchment area to avoid damage by people and animals and to keep it free from vegetation is required.
Endorsement by experts	The technology is successfully applied in different countries. In In the last two decades, interest in rainwater harvesting has grown. Its utilization is now an option along with more 'traditional' water supply technologies, particularly in rural areas.
Adequacy for current climate	Fits well, both for present and expected climate
Scale/Size of beneficiaries group	Several farmers may share one medium to large reservoir. One farmer can have its own small tank if the harvested water is collected from his private land/road.
Disadvantages	- Limited supply and uncertainty of rainfall. Rainwater is not a reliable water source in dry periods or in time of prolonged drought. - Low storage capacity could limit rainwater harvesting potential, whereas increasing storage capacity will add to construction and operating costs making the technology less economically viable. The effectiveness of storage can be limited by the evaporation that occurs between rains. - When runoff is generated from a large area and concentrated in small storage structures, there is a potential danger of water quality degradation, through introduction of agro-chemicals and other impurities.
Capital costs	
Cost to implement adaptation technology	The initial cost of storage container is relatively high. It typically depends on construction quality, reservoir size, reservoir type (cement, plastic, earth) and other factors. A large, high quality storage container can be a major investment for poor farmers. The storage capacity of the container needs to meet the demand for water during extended dry periods. Economies of scale for storage are high; the larger the reservoir the lower the price per cubic meter. Reservoir type is also a determinant factor: prices may vary from 6\$/m^3 for earth excavations to more than 270\$/m^3 for cement reservoirs. the storage unit is the most costly element, and usually represents about 90% of the total cost.

Additional cost to implement adaptation technology, compared to "business as usual"	The cost of the storage is the addition if compared to normal road cost. Additional costs include the distribution network and the system maintenance and cleaning.
Development impacts, direct and indirect benefits	
Direct benefits	Rainwater harvesting and its application to achieving higher crop yields can encourage farmers to diversify their enterprises, such as increasing production, upgrading their choice of crop, purchasing larger livestock animals or investing in crop improvement inputs such as irrigation infrastructure, fertilizers and pest management.
Reduction of vulnerability to climate change, indirect	Reducing pressure on water resources Sustainable water resource management
Economic benefits, indirect Employment Growth & Investment	 Creation of jobs to support construction of RWH systems and to provide training to users Can create investments in production of storage containers
Social benefits, indirect Income Education Health	It can also provide significant savings for farmers that are sometimes forced to purchase water Rainwater harvesting and its application to achieving higher crop yields can encourage farmers to diversify their enterprises, such as increasing production, upgrading their choice of crop, purchasing larger livestock animals or investing in crop improvement inputs such as irrigation infrastructure, fertilizers and pest management. Training elements from capacity building Improved health improves school attendance Increases per capita water availability. Lack of water can have serious health effects and allow for the spread of disease and illness if the reductions continue for even modest lengths of time.
Environmental benefits, indirect	Promotion of rainwater harvesting will enhance groundwater recharge
Local context	
Opportunities and Barriers	Using rainwater harvesting technology therefore offers a real opportunity to increase productivity in regions with low and irregular rainfall. The cost of rainwater storage systems is often cited as a potential obstacle to wider dissemination of this technology. For poor farmers, some form of financing mechanism, preferable accompanied by a subsidy, will be the only way of promoting rainwater harvesting systems. A lack of national policy towards rainwater harvesting could also present an obstacle to widespread implementation, access to funding and technical assistance. Community-owned systems can suffer from lack of protection, care and maintenance.
Market potential	The technology is small to medium-scale, proven and less capital-intensive. It has market potential nationwide.
Status	One pilot project is being implemented with GIZ in Bchaaleh.
Timeframe	Immediate implementation (short to medium term).
Acceptability to local stakeholders	Easy to accept for all involved stakeholders. However, access to water can be sensitive to national policies and investment priorities.

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment Reports For Climate Change Adaptation – Lebanon. You can access the complete report from the TNA project website http://tech-action.org/**