Technology Fact Sheet for Adaptation

I. Rainwater Harvesting from Greenhouse Top [i]

Technology characteristics	
Introduction	The basic concept involves the collection of rainwater incident on the rooftop of greenhouses, storing the collected water, and providing irrigation to the plants using the harvested water through irrigation systems. The water harvested from the roof top is adequate and of acceptable quality for irrigating crops. In areas where the harvested rainwater is abundant, the system could enable the cultivation of horticultural crops using rainwater and without depending on external water resources.
Technology characteristics/highlights	The technology is simple to install and operate. Local people can be easily trained to implement such technologies, and construction materials are usually readily available. Gutters are provided to the sloping roof of the greenhouse to collect rainwater. The harvested water is filtered and stored in rain barrels. Provision can also be made to collect overflow of water from these barrels. Water from the barrels or tanks is fed to the irrigation system through filters. Knowledge Requirements for the selection of rainwater harvesting technology are the following: - Rainfall quantity (mm/year) - Collection surface area (m^2) - Available storage capacity (m^3) - Alternative water sources – where alternative water sources are available, this can make a significant difference to the usage pattern.
Institutional and organizational requirements	No specific institutional or organizational requirements; the system is tailored at farmer's scale.
Operation and maintenance	Maintenance is required for the cleaning of the barrel and inspection of the gutters, pipes and taps which 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.
Endorsement by experts	This is considered as an innovative water harvesting technology and is acknowledged by all experts.
Adequacy for current climate	Fits well, both for present and expected climate, namely in areas where heavy rainfall occurs (i.e. coastal areas) and to a lesser extend inland.
Scale/Size of beneficiaries group	All greenhouse plant growers, especially on the coastal and mountainous areas where enough precipitations are encountered.
Disadvantages	The main disadvantage of rainwater harvesting technology is the limited supply and uncertainty of rainfall. In most cases, rainwater harvesting from greenhouse tops enables to ensure maximum about 10% of the crop

	needs of a greenhouse, to be used in the dry season. Another problem is the limited availability for space to store water in greenhouse exploitations; land tenure system with high rental cost hampers toe allocation of arable land for water storage.
Capital costs	
Cost to implement adaptation technology	The initial cost of storage container is relatively acceptable. It typically depends on the materials used in construction and tank size. The storage capacity of the container needs to meet the demand for water during extended dry periods. The cost of the drainage/gutter as well as the storage tank may vary from 10\$/m^3 (barrels and gutters) to more than 270\$ /m^3 (cement reservoir and gutters).
Additional cost to implement adaptation technology, compared to "business as usual"	If compared to water pumped from wells, there is no additional cost.
Development impacts, direct and indirect benefits	
Direct benefits	Rainwater harvesting from greenhouse tops is convenient because it provides water at the point of use and farmers have full control of their own systems. The technology promotes self-sufficiency and has minimal environmental impact. Running costs are reasonably low. Construction, operation and maintenance are not labor-intensive. Water collected is of acceptable quality for agricultural purposes.
Reduction of vulnerability to climate change, indirect	RWH contributes to climate change adaptation at the agricultural farm level primarily through: - Diversification of agriculture water supply. - Increased resilience to water quality degradation. - Reducing the pressure on surface and groundwater
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 local production of storage containers
Social benefits, indirect Income Education	 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 upgrade their enterprises, by up scaling their exploitation, improving and diversifying their choice of crop…etc. Training elements from capacity building
Environmental benefits, indirect	Promotion of rainwater harvesting will enhance groundwater recharge, reduce the risk of salinity in groundwater and reduce pumping (energy savings and less GHG emission). The storage of rain water will reduce the surface run off and drainage problems under heavy soil conditions.
Local context	
Opportunities and Barriers	Using rainwater harvesting technology therefore offers a real opportunity to increase productivity in regions with low and irregular rainfall, and also in areas where salinity problems are dominant, particularly in the Lebanese coastal area that is widely occupied by greenhouses for vegetable production. It is an opportunity to reduce the dependence of

	polluted waters taken from river downstream and from the lowered groundwater table prone to salinity in summer.
Market potential	The technology is small to medium-scale, proven and less capital-intensive. It has market potential is however limited to greenhouse growers in coastal and mountainous areas.
Status	Some private initiatives have started in Lebanon.
Timeframe	Immediate implementation (short to medium term).
Acceptability to local stakeholders	Easy to accept for all farmers.

[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/**