

**7.6.4 Cost benefit analysis for Water Users Association**

Meeting with relevant stakeholders (CDR, 2012; MoA, 2012; and LRA, 2012) enabled the estimation the costs of these measures as follow:

- Awareness at community level: USD 50,000.
- Lobbying, information diffusion at decision makers’ level: USD 20,000.
- Review of laws, law amendments and elaboration of “water act”: USD 50,000.
- Introducing the WUA and water management concept within university curricula: USD 10,000.
- Elaborating a study for alternative funding mechanism: USD 10,000.

Establishing the water distribution infrastructure (outside farm gate): USD 180/ha for a target area of 5,000ha of irrigated schemes: USD 900,000

Hence the total cost for deploying WUA is USD 1,040,000.

Following the assumptions mentioned above, water availability under the current conditions and by 2040, with or without WUA is expressed in Table 83.

The benefits will be:

- Reduced water losses from 50% to less than 10% with water savings and additional resources available even by 2040 (currently 1 million m<sup>3</sup> and 450,000 m<sup>3</sup> by 2040).
- Improved yields by 15% from water monitoring according to climate demand.
- Enabled use of efficient irrigation system (drip): water efficient use up to 90% on farm level, labor reduced, less energy and labor for weed control, etc. (This will not be accounted in CBA, as we assume the farmer will invest in drip system, and get the benefits of it, independently from the measures).
- Increased revenues by USD 4,000,000/year for 5,000ha with WUA.

Table 83 – Water balance in m<sup>3</sup> with or without WUA under current and future scenario

		Available water (m <sup>3</sup> )	Water used for irrigation (m <sup>3</sup> )	Plant need (m <sup>3</sup> )	Water losses (m <sup>3</sup> )	Water balance (m <sup>3</sup> )
2012	Without WUA	40,000,000	40,000,000	30,000,000	-10,000,000	0
	With WUA	40,000,000	30,000,000	30,000,000	0	10,000,000
2040	Without WUA	36,000,000	36,000,000	31,500,000	-4,500,000	0
	With WUA	36,000,000	31,500,000	31,500,000	0	4,500,000

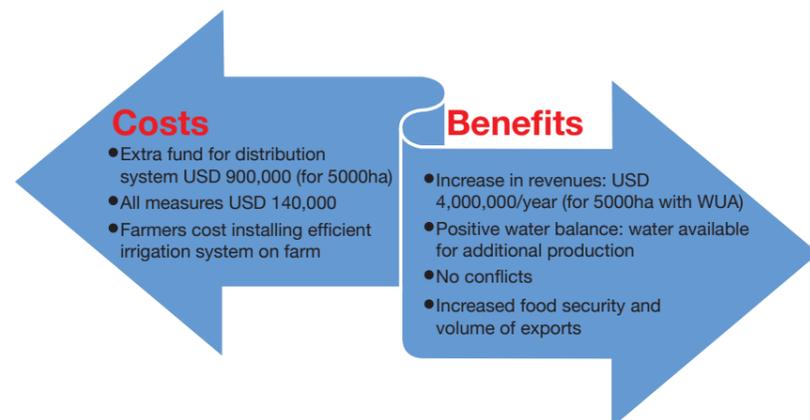


Fig. 73 – Costs and benefits of WUA

Source: Author’s own design

**7.6.5 Technology Action Plan for Water Users’ Association**

**Target for technology transfer and diffusion**

The overall target is to apply the concept of WUA in irrigation schemes totaling 5,000ha between 2015 and 2025. The estimated budget for the deployment of WUA and its diffusion is USD 1.04 million, out of which USD 900,000 are for water distribution and monitoring infrastructure. The technology Action plan for water users association is presented in Table 84.

**7.7 Linkages of identified barriers**

The lack of awareness at different levels of the ladder of responsibilities is the most common barrier for the three technologies, along with the absence of land use planning and zoning and the high cost of land, as land rental for a long term period is difficult under the current land tenure system. Budgetary requirements for the necessary infrastructure for water storage or distribution are also a common aspect between RWHR and WUA. This offers the opportunity of tackling barriers like water pricing and water laws deficiency. The major actors concerned in overcoming these barriers are: the Ministry of Energy and Water, the Ministry of Agriculture, the Ministry of Justice, the Ministry of Public Works and Transport (namely the Directorate of Urban Planning), the Ministry of Finance, the CDR, the Green Plan and the Litani River Authority.

**7.8 Enabling Framework for overcoming the barriers in the water sector**

The prioritized water technologies have different aspects. RWHR which is a public good requires the ownership of the relevant responsible implementing bodies. In the scope of this report, RWHR is addressed with the Green Plan. This institution which implements agriculture roads based on farmers’ demand is fully supportive to adopt the technology, and ensure partial funding for RWHG (for water storage units). Nevertheless, Green Plan capacity to absorb additional projects is limited due to its limited capacity to conduct large projects. Internationally assisted projects as well as the capacity building of the institution are necessary.

RWHG which has a simple market chain reduced to the farmers and service providers could be enhanced by the promotion of the technology as a whole package with the installation of greenhouse and irrigation infrastructures.

WUA is an organizational technology involving different public institutions including MoEP, LRA, CDR and MoA that are acting at different levels (water collection and distribution, water monitoring and water use). A principle milestone is related to the definitions of roles and responsibilities of all actors, through appropriate legislative framework, enabling the creation of WUAs. Further, a participatory top-down approach to ensure social acceptance is a must in order to resolve difficulties related to users organization, water pricing and inherited water sharing rights.

Table 84 - The technology Action plan for Water users Associations

Measures	Priority	Objective	Responsible parties	Beneficiaries	Time scale	Monitoring & Evaluation indicators	Estimated cost (USD)	Donors
Introducing the WUA concept within university curricula after approval by Ministry of Education	2	To ensure qualified technicians in WUA and related fields.	International expert MoEducation	Agriculture and natural resources management faculties (LU, AUB, USJ, USEK); students	Long term	Number of students attending courses related to WUA, water management and related fields	10,000 for the charges of the expert	World Bank Adaptation Fund GEF IFAD FAO Islamic Bank EU USAID Kuwaiti Fund Italian, Spanish Cooperation
Awareness campaign through the organization of workshops and TV programmes	1	To increase awareness and information about WUA as an alternative to water committees; to show the importance of WUA and the positive impact of changes related to water pricing and inherited sharing rights and gain social acceptance.	National and international experts, LRA, FAO, NGOs	MoEW, MoJ, MoA, CDR, MoIM, municipalities, farmers (water share owners and users)	Medium to long term	Number of meetings and attendance of concerned parties to workshops; Number of demands for the creation of WUA by water users	50,000 for the charges of experts, 3 workshops for technicians and decision makers, 10 seminars for water users	
Capacity building of farmers and lobbying at all levels	3	To establish a coordination mechanism leading to the installation of WUA and familiarize all stakeholders with team work and communication.	National and international experts, LRA, FAO, UNDP	MoEW, MoJ, MoA, CDR, MoIM, municipalities, farmers (water share owners and users)	Short to medium term	Number of meetings and attendance of concerned parties; Project law proposal enabling the creation of WUA; Number of effective WUA	20,000 for the charges of experts, 3 workshops and 5 bilateral meetings	

Measures	Priority	Objective	Responsible parties	Beneficiaries	Time scale	Monitoring & Evaluation indicators	Estimated cost (USD)	Donors
Proposing a law for WUA and lobbying for adoption by council of ministers	2	To enable institutional support.	National and international experts MoJ, MoEW, MoA, LRA Parliament	Farmers (water share owners and users)	Medium to long term	Law amendments enabling the creation of WUA; Executive decrees and terms of references the responsible organism for institutional support; regulation of shares of common water sources	50,000 for the charges of the experts and the cost of workshops	
Preparation of feasibility study and financial mechanism for WUA	3	To find an alternative to water pricing for implementing (and maintain) the necessary water distribution infrastructure.	National and international experts, LRA, FAO, UNDP, MoF	Created WUA (water users), MoEW, CDR	Long term	Feasibility study report; budget allocated for the creation of water distribution infrastructure; annual financial report of WUAs	10,000 for the charges of the experts	
Establishing the water distribution infrastructure	2	To enable water distribution, monitoring and water efficient use (outside farm gate).	MoF, CDR, MoEW, LRA	Created WUA (water users)	Long term	Length and capacity of created water distribution infrastructure; area covered under effective WUA	900,000 for a target area of 5,000 ha	