Support to green water financing: landscape, agriculture, domestic

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Lebanon Water Project. Funded by USAID

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The Lebanon Water Project

• Funded by USAID: 65 million dollars

• Time frame: 2015 to 2020
The Lebanon Water Project

• **Result A: Improve service delivery and resource management** by the five public water utilities that are mandated by law to provide water, wastewater, and irrigation management services in Lebanon, and by local municipalities where feasible and appropriate.

• **Result B: Improve civic engagement in water management** and advance citizen perception of the water utilities role in providing a necessary and valuable service.

• **Result C: Improve private sector involvement in water management**
History and context of green financing

- Workshops at Central Bank of Lebanon on Green Technologies by an EU project – 2009
- Development of the Green Circular 83 by Central Bank - 2010
- Creation of the Lebanese Centre for Energy Conservation to finance green energy technology and energy conservation - 2011
The Lebanese Center for Energy Conservation (LCEC)

• Partnered with the Central Bank of Lebanon to promote energy conservation at the beginning through NEEREA

• LWP Partnered with BDL and LCEC to promote water conservation through the development of specific guidelines to be applied in LEA

• Provides very soft loans, supported by BDL, for energy conservation, green energy production and water conservation
Impact of the creation of LCEC

• From 2 companies in green technology to more than 20 at present
• Millions of dollars in projects
• Extended currently in partnership with LWP to cover water conservation in Domestic, landscape an agriculture
Rational for water conservation

• We are below the poverty level in water 796 m3/ca.y (the limit is 1000 m3/ca.y)

• Agriculture consumes 70% of the water in Lebanon

• Domestic use is around 20% of the water budget

• Small savings in water for irrigation will have a high impact on the national water budget
Rational for green financing in water conservation

• Water conservation is a main objective of the LWP project

• Drip systems increase the efficiency of irrigation and reduce energy needs, labor and input requirements

• Hydroponics recycle up to 90% of the used water for irrigation and reduce pollution from agriculture

• Sanitary fixtures are becoming highly efficient with potential water use reductions between 15 to 50%
Rational for green financing in water conservation

• Cost and financing constitute barriers to the adoption of drip systems and hydroponics

• Soft financing through LEA could be the solution to a wider adoption of drip irrigation, hydroponics and efficient household fixtures
Approach in LWP

• LWP provided financial incentives for water conservation

• LWP Partnered with the private sector to promote water conservation

• LWP partnered with BDL and LCEC under LEA to develop guidelines for water conservation using soft loans
  – Domestic guidelines
  – Landscaping guidelines
  – Agriculture guidelines

• The guidelines provided LCEC with a clear and transparent way to assess eligibility for financing
The Guidelines – Structure and Content

• Technical section that describes the methods of calculating water savings, pipe and pump requirements

• An administrative section that describes the requirements of BDL and LCEC to be able to process the file

• Two files are presented for each project: A financial file for the bank and a technical file to be reviewed and approved or not by LCEC
Required savings

• The savings are a comparison between water consumption using surface or sprinkler irrigation with drip irrigation

• For landscaping the comparison is between hose irrigation and a modern irrigation system including drip and sprinklers. Savings should be at least 30%

• For agriculture, the comparison is between sprinklers and drip in most cases. Savings should be at least 10%
Loan file requirements

• The technical file should contain:
  – A description of the project
  – Types of plants
  – Calculation of water needs
  – Sizing of the emitters and pipes
  – Costing of the project based on actual proforma invoices

• LCEC will finance the pipe network and emitters but not the pump
Yes we can calculate plant water needs

Two types of calculators:

– CropWat for agriculture

– Excel based - developed specifically for the guidelines under landscaping

– LEED V.4 for households
Landscaping and agriculture

1. Drip irrigation
2. Hydroponics
Drip Irrigation

• Delivering water and nutrients to the plant root only

• Efficiency in water delivery 90% compared to 40% for flood irrigation and 75% for sprinklers

• Reduced pressure need at the pump from 4-8 bars down to 2 bars

• Improved yield quality and quantity
Drip irrigation

• No need to move pipes and sprinklers around

• Reduces the need for fertilizers and herbicides

• Can be fully automated and remotely controlled

• All the plastic is recyclable
Field experiments

In collaboration with UNIFERT a field experiment was organized in 2018 on two crops in the Bekaa

- The two crops are potato and corn.
- Most planted crops in the Bekaa and Lebanon
- Used to be irrigated with sprinklers (Most common Irrigation Practice is Sprinklers)
## Field Experiment Results - Potato

**Results - Potatoes**

<table>
<thead>
<tr>
<th>Irrigation System</th>
<th>Sprinkler (Conventional)</th>
<th>Drip</th>
<th>Microsprinkler</th>
<th>% Results Drip Vs Sprinkler</th>
<th>% Results Microsprinkler Vs Sprinkler</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water Supply</strong> (m3/Irrigation/Dunum)</td>
<td>805.90</td>
<td>685.60</td>
<td>740.00</td>
<td>-15%</td>
<td>-8%</td>
</tr>
<tr>
<td><strong>Yield (Ton/Dunum)</strong></td>
<td>1.8</td>
<td>2.4</td>
<td>2.5</td>
<td>33%</td>
<td>39%</td>
</tr>
<tr>
<td><strong>Water Productivity</strong> (m3/Ton)</td>
<td>448</td>
<td>286</td>
<td>296</td>
<td>-36%</td>
<td>-34%</td>
</tr>
</tbody>
</table>

3/5/2019
Field Experiment Results - Corn Fodder

<table>
<thead>
<tr>
<th>IRRIGATION SYSTEM</th>
<th>SPRINKLER (CONVENTIONAL)</th>
<th>DRIP</th>
<th>% RESULTS DRIP Vs SPRINKLER</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAYS TO HARVEST (DAY)</td>
<td>113</td>
<td>105</td>
<td>-7%</td>
</tr>
<tr>
<td>WATER SUPPLY (m3/IRRIGATION/Dunum)</td>
<td>1,136.50</td>
<td>805.40</td>
<td>-29%</td>
</tr>
<tr>
<td>YIELD (Ton/Dunum)</td>
<td>5.8</td>
<td>7.5</td>
<td>29%</td>
</tr>
<tr>
<td>WATER PRODUCTIVITY (m3/Ton)</td>
<td>196</td>
<td>107</td>
<td>-45%</td>
</tr>
</tbody>
</table>

DRIP IRRIGATION SYSTEM Vs SPRINKLER IRRIGATION SYSTEM (CONVENTIONAL)

CORN FODDER 120 DAYS SPECIES, SINGLE ROW 70cm, 9100 SEEDLING / Dunum
Hydroponics

- Plants are grown outside the soil in almost inert media under greenhouses
- Water and nutrients are delivered to the medium or in water and can be recycled up to 90%
- Production per m2 can be tripled and even more
- Quality A products up to 80%
Additional demonstrations

• Tensiometers (soil water content sensors)

• Solar pumping

• In greenhouses and grapes
Impact in greenhouses

• Reduction of 50% in irrigation needs

• Reduction in insecticide application 35 sprays

• Increase in yield and improvement in quality
Impact on grapes

- Reduction in irrigation water needs; 53%
- Reduction in agriculture inputs
Domestic
Household fixtures

• Simple devices can save between 20 to 50% water

• Devices include sinks, lavatories, showers and WCs

• Cost is minimal compared to water saving

• Becomes advantageous with water meters
CONCLUSION

• Reduction in water and energy consumption, inputs and labor
• Improved yield quantity and quality
• Improved income for farmers
THANK YOU FOR YOUR ATTENTION