Can and should the Litani River Basin quench most of Lebanon?

Beirut Water Week, 22 May 2014

Eric Viala, Sr. Water Manager, AECOM
Presentation overview

1. The Litani River Basin today
2. Water Balance of the LRB
3. Legal allocation of LRB water resources
4. Upcoming transfer projects
5. International criteria for basin transfer
6. Conclusion
LRB water issues

1. Pollutions (residential & industrial sewage, garbage, agriculture)

2. Water over-allocation/scarcities (surface and groundwater)

3. Water management issues: weak horiz/vertic. coordination, lack of enforcement (releases), little awareness and demand management (GW), etc.
Availability


• On average, upper LRB receives 1100 Mm3/yr; most evaporates, only 440 Mm3/yr available, only 300 Mm3/yr reaches Qaraoun Dam

• Minimum needs for one human being:
  – 900 m3/yr to grow food
  – 100 m3/yr for domestic/industrial needs
1940s Water Balance

- Precipitation: 1100 MCM
- Evaporation: 660 MCM
- Rain Runoff: 230 MCM
- Groundwater Recharge: 210 MCM
- Baseflow: 210 MCM
- Surface Irrigation: 20 MCM
- Groundwater Irrigation: 0 MCM
- Final runoff: 420 MCM

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1970s Water Balance

Precipitation: 1100 MCM

Evaporation: 660 MCM

Surface Irrigation: 230 MCM

Groundwater Irrigation: 0 MCM

Rain Runoff: 50 MCM

Final Runoff: 390 MCM

Baseflow: 210 MCM

Groundwater Recharge: 210 MCM

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Current (& 1970) Water Balance

- Precipitation: 1100 MCM
- Evaporation: 660 MCM
- Rain Runoff: 230 (230) MCM
- Surface Irrigation: 70 (50) MCM
- Final Runoff: 300 (390) MCM
- Groundwater Irrigation: 130 (0) MCM
- Baseflow: 140 (210) MCM
- Groundwater Recharge: 210 (210) MCM
Human pressures on water resources have increased drastically since 1970s

- Significant decrease of surface flows due to increased withdrawals for irrigation (diversions of springs and direct river pumping)
- Substantial groundwater depletion, due to extensive pumping both for domestic and irrigation needs

Demands are outpacing availability
Litani Waters are already over-allocated

but remember AbulAbed, 2+2 can add up to 5 if not more!!
Allocation decree 14522 of 1970
**Decree 14522 of 1970**

- 45 y old (things have changed since)
- Based on Litani being the only national perennial river
- Supply side: only considers storage (Qaraoun, Khardale) + summer flows
- Demand side: only summer needs, April 15 till end of October
- Assumes that most West Bekaa needs will be satisfied from groundwater

<table>
<thead>
<tr>
<th>Areas</th>
<th>Western slopes</th>
<th>Lower Litani</th>
<th>Khardale</th>
<th>Qaraoun</th>
<th>Bekaa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. Beyrouth</td>
<td>N. Awali</td>
<td>N. Damour</td>
<td>N. Zahrani</td>
<td>W springs</td>
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<tr>
<td>Nahr Beyrouth</td>
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<tr>
<td>Nahr Ghadir</td>
<td>12</td>
<td>5</td>
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<tr>
<td>Nahr Damour</td>
<td>24.5</td>
<td>4</td>
<td>5</td>
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<td>1</td>
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<tr>
<td>Nahr Awali</td>
<td>34</td>
<td>6</td>
<td></td>
<td></td>
<td>1</td>
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<tr>
<td>Nahr Zahrani</td>
<td>40</td>
<td>1</td>
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<td></td>
<td>2</td>
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<tr>
<td>Nahr Litani</td>
<td>71</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
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<tr>
<td></td>
<td>138.5</td>
<td></td>
<td>17</td>
<td></td>
<td>10</td>
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</tbody>
</table>

- W Bekaa      |                            |              |          |          |        |              |          |                         |            |            |          |         |              |        |             |
- Canal 900    | 110                        |              |          |          |        |              |          |                         |            |            |          |         |              |        |             |
- Canal 800    | 30                         |              |          |          |        |              |          |                         |            |            |          |         |              |        |             |
- Potable??    | 52.5                      |              |          |          |        |              |          |                         |            |            |          |         |              |        |             |

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### Decree 14522 of 1970

<table>
<thead>
<tr>
<th>Areas</th>
<th>Generated Waters (Mm3/y)</th>
<th>Allocated Waters (Mm3/y)</th>
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<tbody>
<tr>
<td>Western slopes</td>
<td>75</td>
<td>320</td>
</tr>
<tr>
<td>Lower Litani (incl. Khardale)</td>
<td>125</td>
<td>0</td>
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<tr>
<td>LRB</td>
<td>270</td>
<td>140</td>
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**Basin transfers !**
Recent projects

• Canal 800: transfer from Litani RB to Marjayoun and South, cost $300M +

• Canal Beirut-Awali (Greater Beirut Water Supply Project), cost $370M (+ Bisri Dam!)

• Both approved and started

• Basin transfers
## Allocation of Qaraoun Lake (Mm3/yr)

<table>
<thead>
<tr>
<th>Projects</th>
<th>Today</th>
<th>Min decision 11/10 2011</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Canal 900 (Joub Jenine)</td>
<td>10</td>
<td>10</td>
<td>Used to be 30</td>
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<tr>
<td>Drinking water in West Bekaa</td>
<td>10 (?)</td>
<td>25</td>
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<tr>
<td>Canal 800 (Marjayoun, Tebnine)</td>
<td>0</td>
<td>110</td>
<td>Used to be 95</td>
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<tr>
<td>Kasmie</td>
<td>30</td>
<td>30</td>
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<tr>
<td>Drinking water in Saida</td>
<td>0</td>
<td>20</td>
<td></td>
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<tr>
<td>Irrigation Lebaa (Jezzine)</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Canal 600 (Nabatiye)</td>
<td>0</td>
<td>40</td>
<td></td>
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<tr>
<td>Drinking water Beirut</td>
<td>0</td>
<td>80-120</td>
<td>Used to be 0</td>
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<tr>
<td>Hydropower</td>
<td>200+</td>
<td>200??</td>
<td>Not discussed but will decrease</td>
</tr>
<tr>
<td>TOTAL</td>
<td>250+</td>
<td>326-366</td>
<td>More than available</td>
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Conveniently overlooked/ignored issues

• Canal 900 will not be extended
• Need 326-366 Mm³/yr in Qaraoun while today only 300 Mm³/yr and decreasing
• Big decrease of hydropower, how compensated (+big revenue loss for LRA)
• No drought planning

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What are Basin Transfers?

• Designed to supply water through artificial conveyance to needy areas

• Typically supply oriented engineering measures, engineering works frequently daunting, involving diversion works, tunnels and/or large pumping schemes and reservoirs, with thus large costs

• Often trigger pertinent questions from different interests groups and communities involved and affected.
Are basin transfers justified?

Commonly accepted criteria

1. Current and future needs of donor basin are fully met (there is a real surplus)
2. Receiving basin uses water efficiently (there is a real deficit)
3. Receiving basin has no other alternative sources of water
4. Benefits shared equitably; and costs fairly compensated
5. Environmental impacts minimized
6. Socio-cultural impacts minimized
7. Sustainable project (resilient and/or adaptive to natural and social stresses)
8. Project adopts participatory decision-making and accountable to public
9. Existing (local, national and international) rights & responsibilities are respected
10. Uncertainty and risk, and gaps in knowledge, are adequately addressed
Do Canal 800 and Awali-Beirut meet most criteria?

Your guess!

Canal Awali-Beirut: transferring without compensation from a drier, less developed, water-deficient region to a much wealthier and coastal city where water is commonly wasted.

Canal 800: transferring without compensation from an agricultural plain (Bekaa was a Roman granary) to Marjayoun and southern hills for small-scale farming.

Where will Bekaa get its water?
What project next?

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Does not address the fundamental challenge: who causes water issues (pollutions and wastages)?

Ignorance and Self-interest
Need to adopt (and practice) IWRM-IRBM

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<thead>
<tr>
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<th>Infrastructure</th>
<th>Monitoring</th>
<th>Enforcement</th>
<th>Awareness/Participation</th>
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<tr>
<td><strong>Governance</strong></td>
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<tr>
<td>Urban sewage</td>
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<td>Industrial sewage</td>
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<td>Solid Waste</td>
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<td>Agriculture</td>
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<td>Quantity</td>
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Thank you