Fact Sheet

German Lebanese Technical Cooperation Project Protection of Jeita Spring

Water Supply within Beirut-Mount Lebanon

Protection of Jeita Spring

I. Introduction

- Water Establishment Beirut-Mount Lebanon (WEBML) in charge of:
  - Domestic- and agricultural supply within the Jeita groundwater (GW) catchment;
  - Supply for Beirut.
- Purification at Dbayeh treatment plant.
- Supply within the JSC is based on springs (Assal, Labbane, Afqa, etc.) and Chabrouh.
- Supply in Beirut: mainly Jeita, but also other springs (e.g. Kashkoush, Antelias, etc.).

II. Problem Statement

- High seasonal variation of Jeita's discharge (1-55 m^3/s).
- Water shortage in Beirut between Sep and Nov.
- Water shortage caused by:
  1. Rapid depletion of GW systems after snow melt;
  2. Inefficient tapping of Jeita and water conveyance infrastructure (e.g. 30% loss between Jeita and Dbayeh).
- Dimension of Jeita-Dbayeh canal and tunnel (3.1 m^3/s) and Dbayeh treatment plant (320,000 m^3/d) insufficient.
- Water canal is facing multiple hazards (e.g. drilled wells, infiltrating sub-stances, etc.).
- Old infrastructure (>100 years) is not reliable.
- Treatment in Dbayeh of insufficient operating grade and quality.
- Low trust of citizens in public water supply.

III. Domestic Distribution & Conveyance

Jeita - Dbayeh

Polluted surface water can intrude into Jeita-Dbayeh canal.

- Conveyance of:
  - Jeita spring;
  - Jeita wells (x 2);
  - Kashkoush spring;
  - Kashkoush wells (x 6 wells);
  - Nahr el Kalb surface water-intake at *Mokhada dam.*
- Max. delivery per day: 255,000 m^3 (max. capacity of tunnel).
- Jeita-Dbayeh canal and tunnel is a single-lane conveyor to Dbayeh: No alternative line in case of physical collapse. If damaged, Beirut will not have water for a long time.

Decentralized Supply

Illegal tapping at Afqa spring.

- Local spring water is used for domestic purpose within the GW catchment.
- Quality of spring water depends on landuse practices within the catchment.
- Water trucks deliver water from private owned wells to custom-ers.
- Water vendors sell water gal-lons to households.
- Approx. 700 private wells.
- None of the decentral water sources is subject to govern-mental control!

Chabrouh & Assal Spring

Chabrouh dam supplies Keserwan and Metn.

- Storage volume: 9.3 MCM.
- Main inflow from Labbane spring, small inflow from internal catchment.
- Good water quality due to long residence time of stored water.
- Assal spring: Sufficient and safe supply in Keserwan throughout the year.

IV. Dbayeh Treatment Plant

- The only water treatment plant for Beirut.
- Max. treatment capacity (in full efficiency): 320,000 m^3.
- Treatment steps:
  1. Screening;
  2. Flocculation;
  3. Filtration (rapid sand filters);
  4. Chlorination.
- Poor maintenance has caused deterioration of treatment systems.
- Poorly equipped labora-tory adds uncertainty to the quality of output.

V. Irrigation Conveyance

- Between May & Sep: 60,000 m^3 must be diverted from Jeita-Dbayeh canal for "irrigation".
- Supply system not demand driven (continuous supply).
- Spring water from Afqa, Assal, Hadid, Labbane and Rouaiss.

Council for Development & Reconstruction (CDR)
Water Establishment Beirut & Mount Lebanon (WE-BML)
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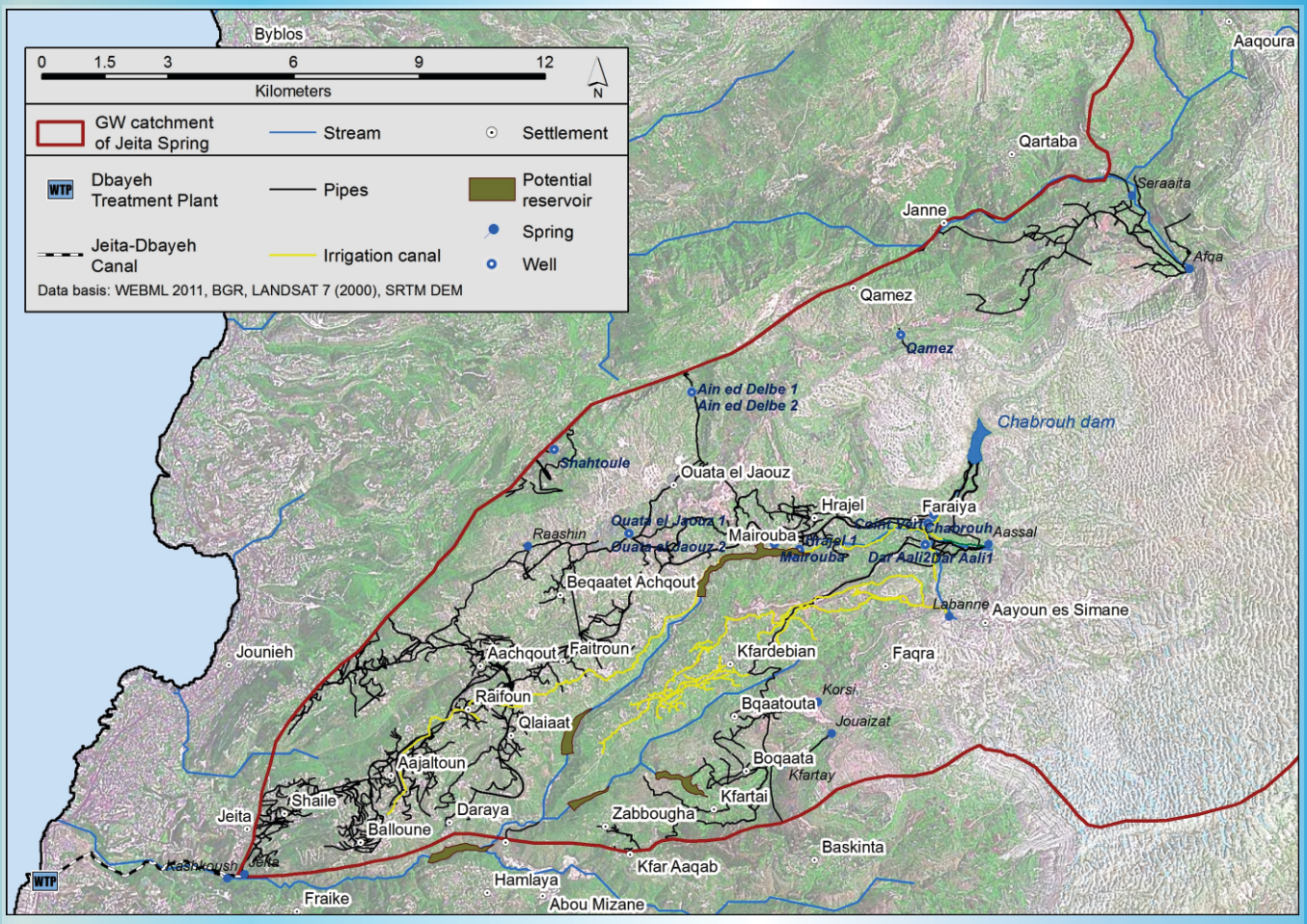

WEBML is in charge of domestic water supply in Keserwan, incl. potential water storage options.

VI. Recommendations

Resources Management

- Establish GW protection zones.
- All springs that are used for domestic supply must be fenced in:
  - Access only granted to WEBML- and ministerial staff;
  - No access to farmers;
  - No access to livestock.
- Construction of additional reservoirs (Nahr es Salib or -Zirghaya) to increase available resources for the period Sep-Nov.
- Establish managed aquifer recharge (MAR) in Nahr Ibrahim to increase resources in Jeita's aquifer.
- Establish a hydrological monitoring system at spring discharges and Dbayeh intake to allow reliable water infrastructure planning.
- Dbayeh:
  - Increase quantitative treatment potential;
  - Introduction of continuous maintenance scheme;
  - Improve laboratory capacity and increase monitoring frequency and parameters.

Rapid sand filter at Dbayeh: frequent back washing is needed to prevent clogging.

Conveyance

- Installation of water meters: only when supply is metered, volumetric pricing schemes should be established - which are the basis for water savings.
- Introduce volumetric block-pricing schemes.
- Establish leak-detection system to reduce physical water losses.
- Improve tapping at Jeita spring to reduce overflow and unaccounted water.
- Renew Jeita-Dbayeh water conveyor:
  - Construction of a two-pipe conveyor (alternative pipe for maintenance and emergency);
  - Conveyor needs to be completely sealed to prevent pollution and illegal connections;
  - Enlarge flow capacity to 400,000 m^3/d.
- Reform agricultural water rights for properties attached to the canal: Since in many cases there is no agricultural activity, irrigation water supply is not justified.
- Introduce demand driven irrigation supply system to reduce wasting of water.
- Establish hydropower generation units along topographic gradients.

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