Main Groundwater Contamination Hazards

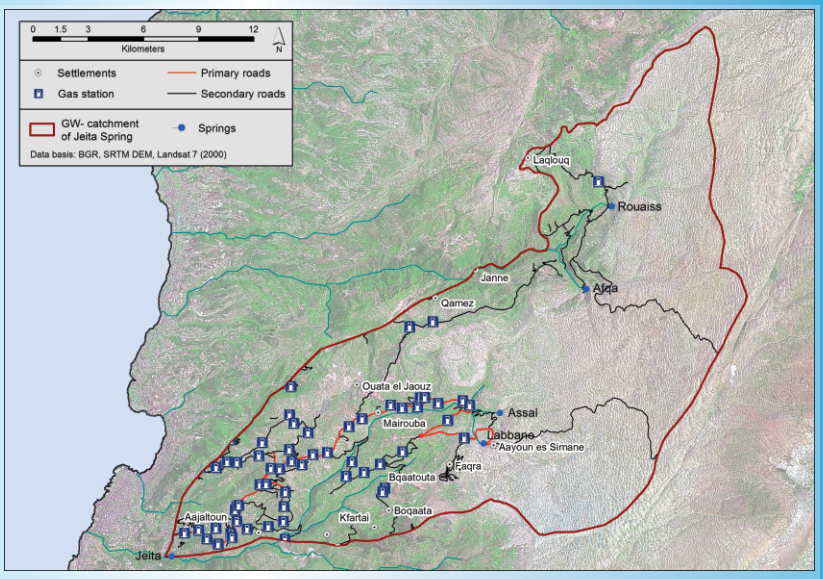
Protection of Jeita Spring

Fact Sheet

German Lebanese Technical Cooperation Project Protection of Jeita Spring

I. Introduction

- Jeita's aquifer is highly vulnerable to contamination.
- The existing hazards threaten the quality of water supply from Jeita spring.
- There is no wastewater collection and treatment system yet.
- Landuse activities are insufficiently regulated and not controlled (gas stations, quarries, waste disposal, etc.).
- Threats: -physical; -biological; -chemical and -radioactive.
- There is a lack of awareness about the relation between human practices and their impacts on groundwater.



High density of gas stations in the lower, highly urbanized catchment are a serious threat for Jeita's groundwater.

II. Problem Statement

- Jeita spring supplies 70% of Beirut's drinking water.
- Spring water is already significantly contaminated (e.g. E. coli).
- Open karst with rapid infiltration due to absences of protecting soil cover, i.e. direct infiltration of pollutants into the saturated zone.
- Fast groundwater flow velocities, i.e. quick response of Jeita spring to pollution events.
- Clean-up of polluted aquifer very problematic (feasibility, costs).
- Absence of control of hazardous landuse practices.
- Insufficient water quality monitoring and laboratory capacity.

Groundwater protection hampered by:

- Improper landuse planning (no consideration of water resources protection needs).
- Absence of environmental risk assessment within permitting process for landuses.
- Absence of groundwater protection zone concept.
- Overlapping governmental responsibilities in permitting, monitoring and applying penalties.
- Permitting systems too complex and fragmented: different principles under too many authorities.
- Insufficient capacity of governmental entities (human, financial, technical resources).
- Deficits in regulatory framework to prevent groundwater contamination.
- Lack of environmental law enforcement decrees (response in case of contamination).
- Absence of executive governmental authority to enforce guidelines and impose penalties (environmental police).
- Lack of environmentally sound waste storage. disposal and treatment sites.
- Lack of awareness about duties and authorities of municipalities.

III. Prevention of Contamination

- Groundwater protection depends on everyone's efforts: government and citizens.

Need to:

- Stop illegal hazardous activities (illegal waste dumps, quarries, etc.).
- Establish sewage network and wastewater treatment plants.
- Regularly empty cesspits & dispose sludge at designated location.
- Establish a collection & treatment system for solid & liquid hazardous wastes.
- Apply the existing, activity-specific environmental guidelines.
- Establish and apply best waste management practices.
- Separate and recycle waste when possible (establish collection points).
- No landuse licensing permit must be granted without Environmental Impact Assessment.
- Limit hazardous activities (industries, gas stations, etc.) based on environment considerations with particular regard to water protection aspects.
- Establish collection system and safe disposal for hazardous wastes.
- In case you notice any environmental violation, write claims to: the relevant municipality or to the Ministry of Environment (www.moe.gov.lb).

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

BGR Federal Institute for Geosciences & Natural Resources

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Hazard source	Generated waste
Agriculture (protected and open field crops production)	☐ Pesticides (e.g. Endosulfan, arsenic, dicamba, atrazine, prometon etc. and even solvents such as carbon tetrachloride) ☐ Fertilizers (e.g. nitrates) ☐ Herbicides (Paraquat, glyphosate, etc.) ☐ Hormones ☐ Aflatoxins ☐ Solid wastes: pesticides containers, packaging and wrapping materials, used Poly Ethylene irrigation pipes & fittings, etc.
Cars reparation workshops	☐ Petroleum products (oils, lubricants, etc + Tires & other vehicles spare parts
Dry cleans	☐ Dense non-aqueous phase liquids (DNAPLs)
Dumpsites (are all Illegal in this area)	☐ Construction wastes: mainly PVC, dioxins, heavy metals, arsenic, lead, chromium and polychlorinated biphenyls ☐ Industrial solid wastes: Sludge, various solid wastes ☐ Slaughtering wastes ☐ Pharmaceuticals ☐ Used tires, plastic containers, etc
Gas stations	☐ Fuel (gasoline, diesel, petrol, kerosene etc.) ☐ Lubricants ☐ Used and/or waste oils ☐ Oily sludge from oil tank cleaning & oil/water separator ☐ Solvents used to clean equipment ☐ Antifreeze ☐ Contaminated spill cleanup materials ☐ Equipment from replacement & decommissioning of tanks & pipe work
Generators	☐ Oil spills, oil containers disposal, Diesel reservoirs leakages
Hotels, restaurants, and residences	☐ Household hazardous wastes
Hospitals & Healthcare clinics	☐ Infectious wastes ☐ Chemicals, heavy metals (e.g. Hg), detergents ☐ Radioactive wastes ☐ Wastewater ☐ Household wastes
Industries (existence of Injection wells, and various chemicals and solid wastes disposal)	☐ Liquid and solid Industrial wastes = Industrial contamination: heavy metals
Livestock farms and Slaughterhouses	☐ Infectious wastes: Manure, animal carcasses, used litters, etc. ☐ Slaughtering wastes (organs, bones, blood, etc.) ☐ Pharmaceuticals, disinfectants
Military training, maneuvers, and exercises	☐ Explosives, Heavy metals, tires, etc.
Municipal solid waste collection facilities	☐ When badly managed they produce hazards similar to those produced by dumpsite
Quarries	☐ Backfills: Cd, Hg, As, Pb, Cu, Zn etc. ☐ Drill and blast operations: explosives, nitrate, etc. ☐ Rocks Processing: Bitumen, Calcareous sludge, etc.
Residential diesel oil heating systems and storage facilities	☐ Petroleum contamination
Sewerage systems (open pits, etc.)	☐ Wastewater = biological contamination = E. coli and other septic coliforms
Stormwater	☐ Urban runoff: in general chemicals, oils, sediments, etc.
Water Wells (Improperly drilled and operated)	☐ Ease all nearby contamination

For further information related to the hazards assessment in the Jeita groundwater catchment contact:
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