

Hazards to GW: Wastes

I. Introduction

- Waste disposal on karstic terrain poses a high risk to GW contamination.
- Municipal waste collection is conducted by a private operator (*Sukleen*).
- According to Municipality Law municipalities are responsible for waste management.
- Special waste, not collected by *Sukleen*, is dumped under municipalities' authority.
- Illegal solid waste dump sites are spread all over the catchment (at present 49 large dump sites).
- Disposal of liquid wastes difficult to trace.
- High GW contamination risk due to the quantity of dump sites, the composition of wastes and the high vulnerability of the karstic aquifers.
- Main sources of wastes include construction, households, livestock and slaughtering, quarries and rock cutting factories, car workshops and tyre shops.
- No dump site can comply with GW protection measurements within the catchment, and thus, can be tolerated.
- Disposal practices of radioactive- and other hospital waste are unclear.

II. Problem Statement

- Insufficient waste collection system:
 - Poor household waste collection facilities impose pollution risks on site;
 - Municipalities either pay high sums to *Sukleen* company or operate their own collection system.
- Municipalities lack:
 - Funds;
 - Auditing procedures;
 - Technical know-how;
 - Proper land-fills or recycling facilities.
- Lack of effective auditing procedures, compliance monitoring & enforcement, as well as skills & knowhow in cleaner production.
- Absence of environmental sound dump sites and recycling facilities.
- Buried dumps (from civil war) impose long-term contamination risk on GW-resources.
- Dump sites often established close to water courses or within dolinas (direct connection to GW).
- Waste incineration increases contamination risk.
- Common use of wastes for levelling of land surface in abandoned quarries.
- Infiltrating rainwater seep into the waste & carry toxic chemicals (metals, pesticides & solvents) to the GW.
- The formation & movement of leachate through the soil & into Jeita Spring GW poses a high risk to human health.
- Common contaminants:
 - Tetrachlorethylene;
 - Trichloroethylene;
 - Polycyclic aromatic hydrocarbons (PAHs);
 - Vinyl chloride.
- Contradictory Lebanese waste market: High production of waste that can be recycled and high demand for recycled waste but absence of collection systems.



Disposal of manure.



Construction wastes mixed with plastics.



Tyres (if not burned) are commonly disposed in the environment.



Disposal of waste in a dolina.



Disposal of household wastes: plastics, pharmaceuticals, chemicals, etc.



Dump site next to a stream.

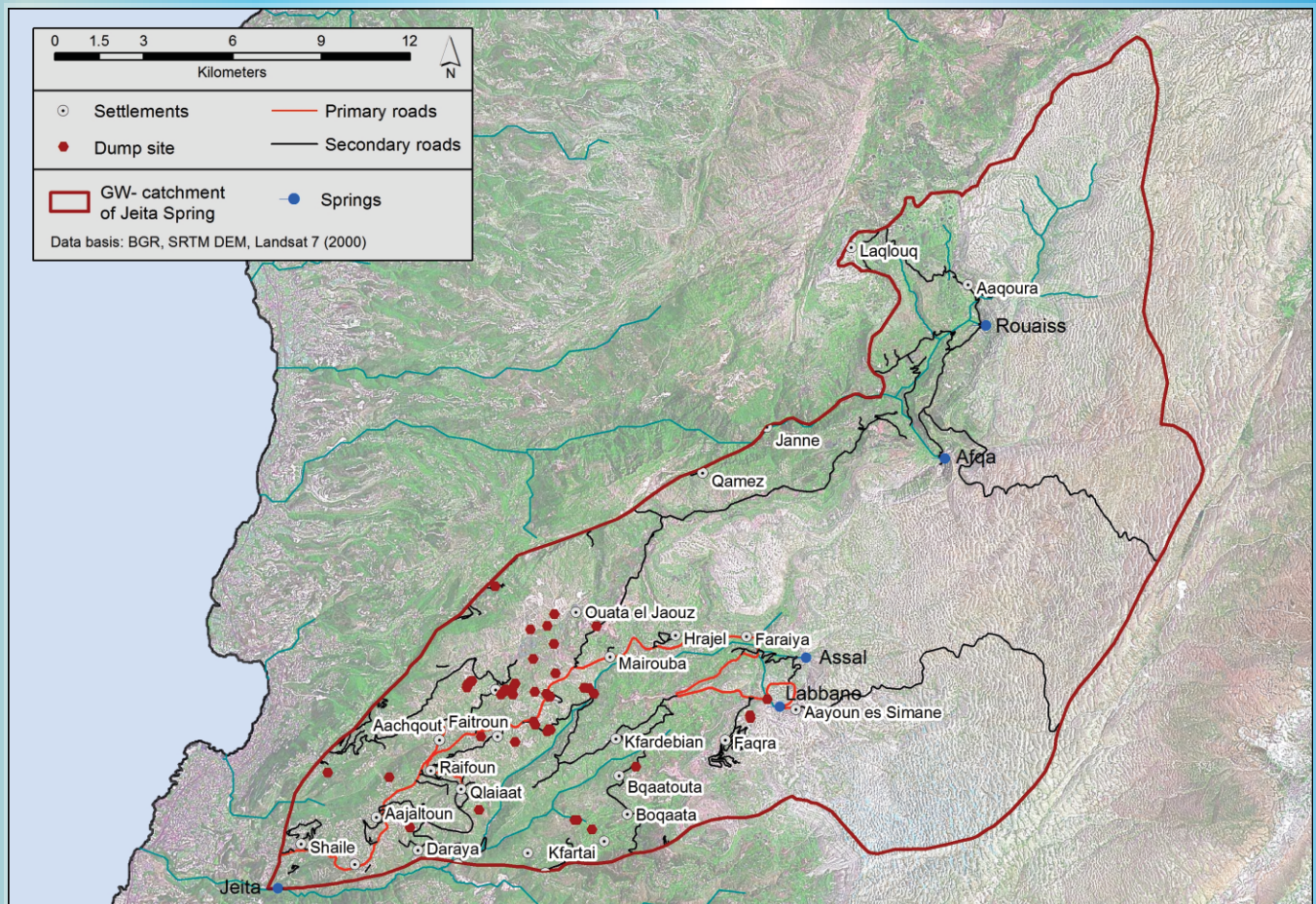
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III. Legal Framework

- Fragmented laws and regulations.
- Regulations not specifically addressed to solid and liquid wastes.
- Legal instruments that deal with solid wastes:
 - Decree 8735 on pollution from solid waste, giving full responsibility for solid waste management to the municipalities;
- Decree 9093 that provides municipalities with an incentive to host a waste management facility;
- Other legal documents address different types of wastes and sources, such as law 387/94 and law 64/88 on Hazardous Wastes.
- Remaining elements either provide authority to different kind of actors to deal with municipalities' waste or address other types of wastes (waste management system deal with specific kind of wastes).

IV. Recommendations

- Reuse, reduce, recycle.
- Guidelines and regulations concerning the geological and technical barrier under waste disposal sites are not yet existing in Lebanon and must be therefore prepared.
- Establish:
 - A long-term national solid waste strategy, incl. collection, treatment, storage, incineration and disposal;
- A separated waste collection system at central points for paper, plastics, metals, glass, batteries and hazardous waste;
- An economically sustainable waste trading system for recycled waste;
- Environmental sound dump sites, considering GW protection zones (GW vulnerability).
- Enforce control measures on the municipal level (environmental police).
- Apply the *polluter-pays-principle*.
- Existing illegal dump sites require risk assessment:
 - Site remedial investigations;
 - Feasibility study;
 - Define clean-up options (relocation; containment; transfer to incineration plant).



Illegal dump sites are commonly existing within the groundwater catchment of Jeita spring. However, highest densities of dump locations occur close to settlements.

