Sediment siltation: case studies from Lebanon water basins

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Introduction

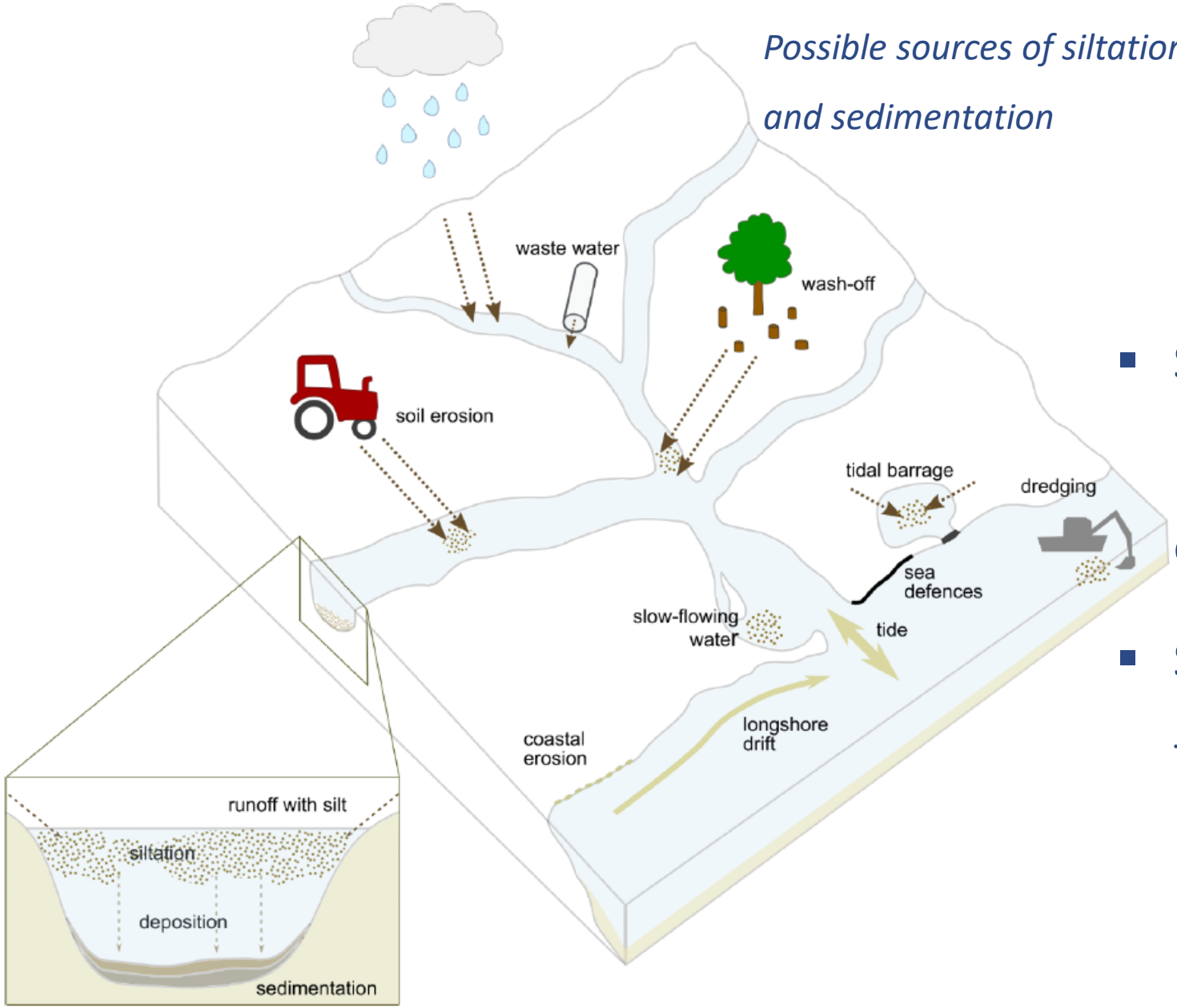
- **Sediments:** solid particles of mineral and organic material that are carried by water's flow.
  - **In lake and rivers** ➔ mostly weathering and erosion of rocks ➔ picked up from the bed of the basin, or washed from the surrounding land.
  - **In coast and estuaries** ➔ also brought from coastal erosion and longshore drift.

- **Siltation:** water pollution due to suspension of sediments, making it look dirty

- **Sedimentation:** particles deposited in water basins bed ➔ make the water shallow.

Introduction

Possible sources of siltation and sedimentation



- Sedimentation is a natural process that will occur in healthy environments.
- Sediment habitats are important for wildlife

Sediment management in harbors

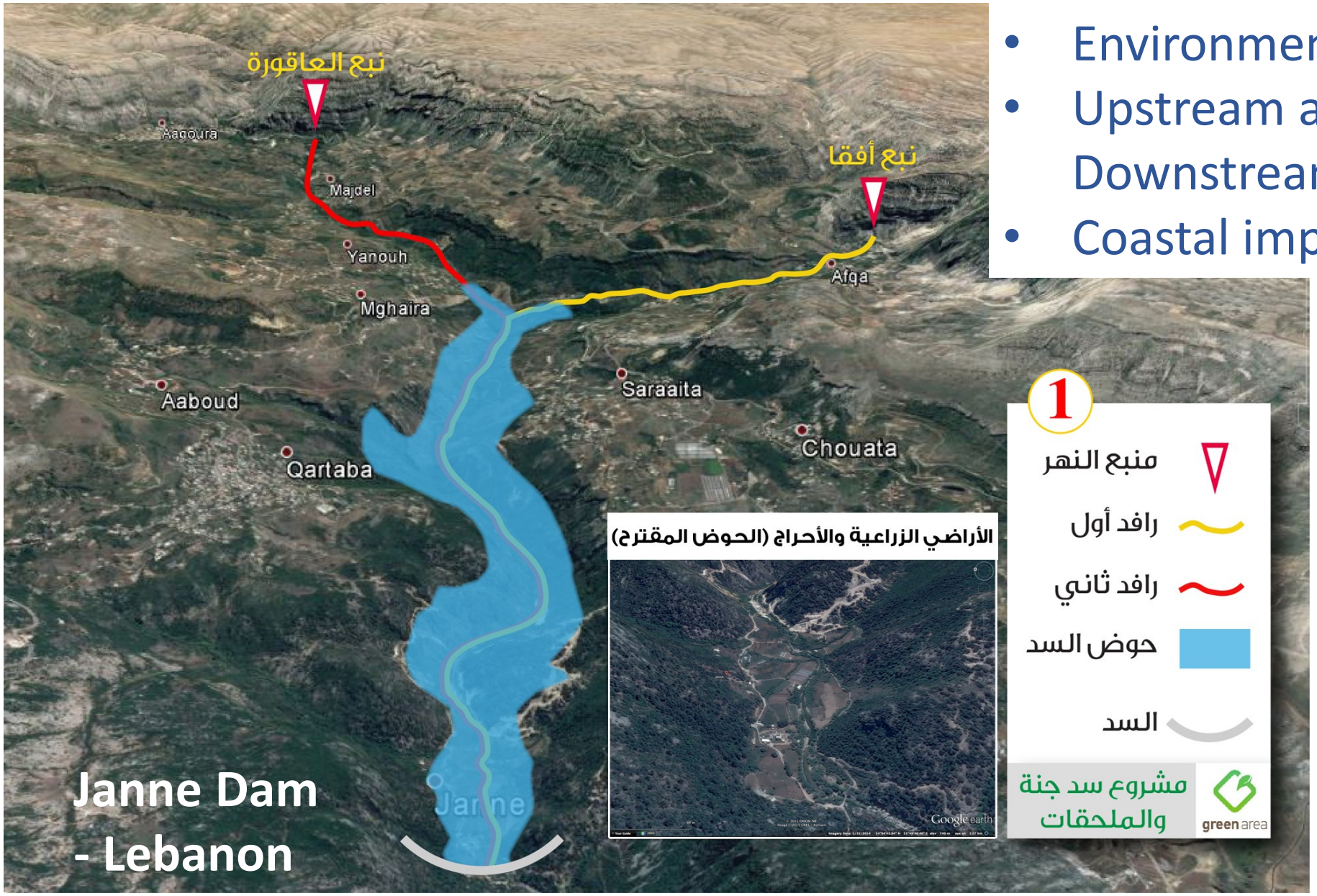
- Safe Navigation ➔ Maintain a certain water depth
- Sediment removal ➔ Dredging or Ejector

Port of Beirut - Lebanon

Sediment management in reservoirs

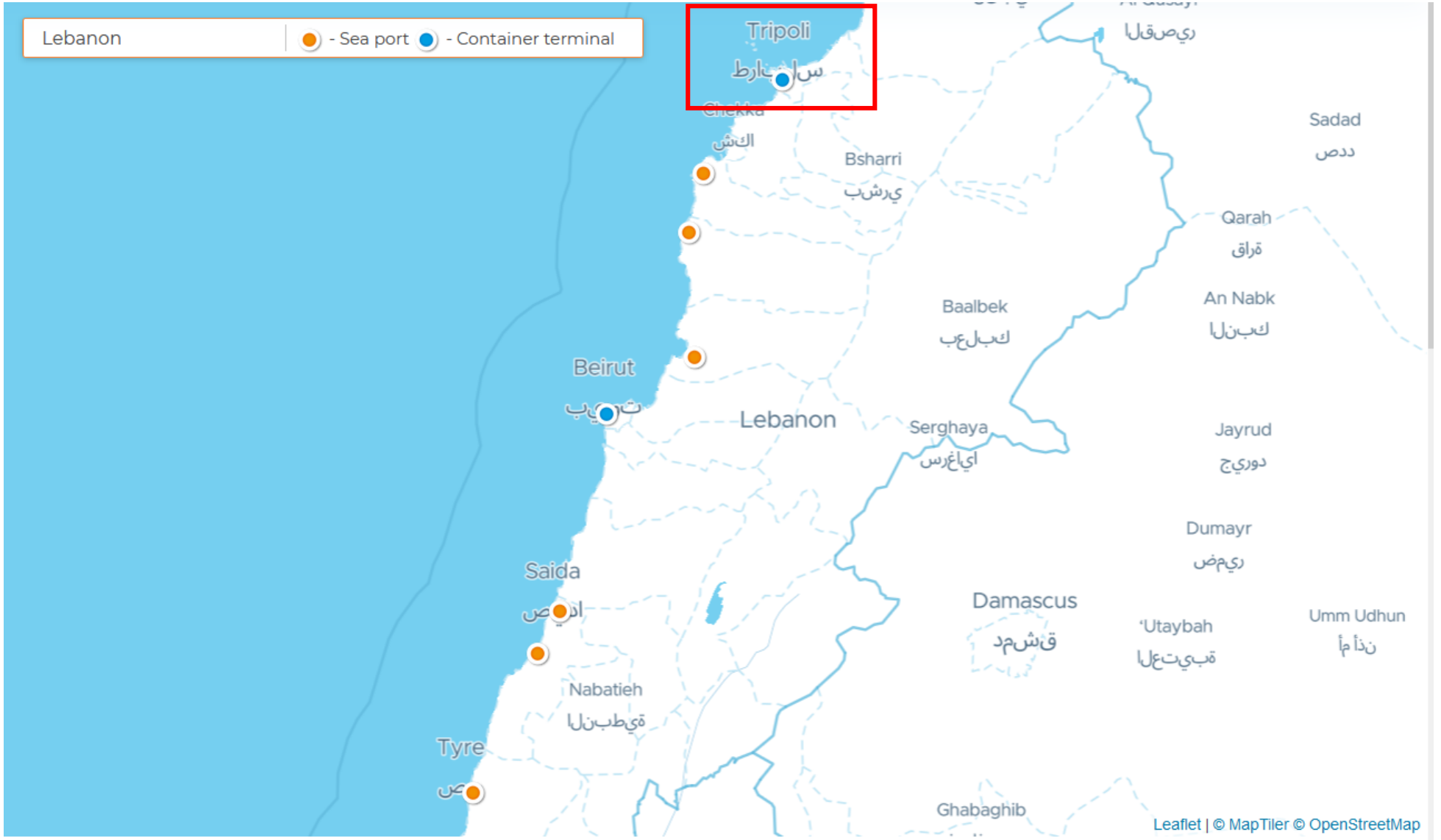
Sediment management in reservoirs

- Environmental impact
- Upstream and Downstream impact
- Coastal impact ➔ erosion



Janne Dam - Lebanon

Lebanon Water Basins



Lebanon Water Basins

- Different dams are constructed or under study:
  - Lake Qaraoun – 1959 – 220 Mm^3
  - Chabrouh Dam – 2007 – 8 Mm^3
  - Qaissamani reservoir – 2018 – 1 Mm^3
  - Mseilha Dam – 2019 – 6 Mm^3
  - Janne Dam – Under execution – 38 Mm^3

- Ejector application to Dams ➔ Diversion pipe to be applied on upstream to downstream.

Ministry of Energy and Water
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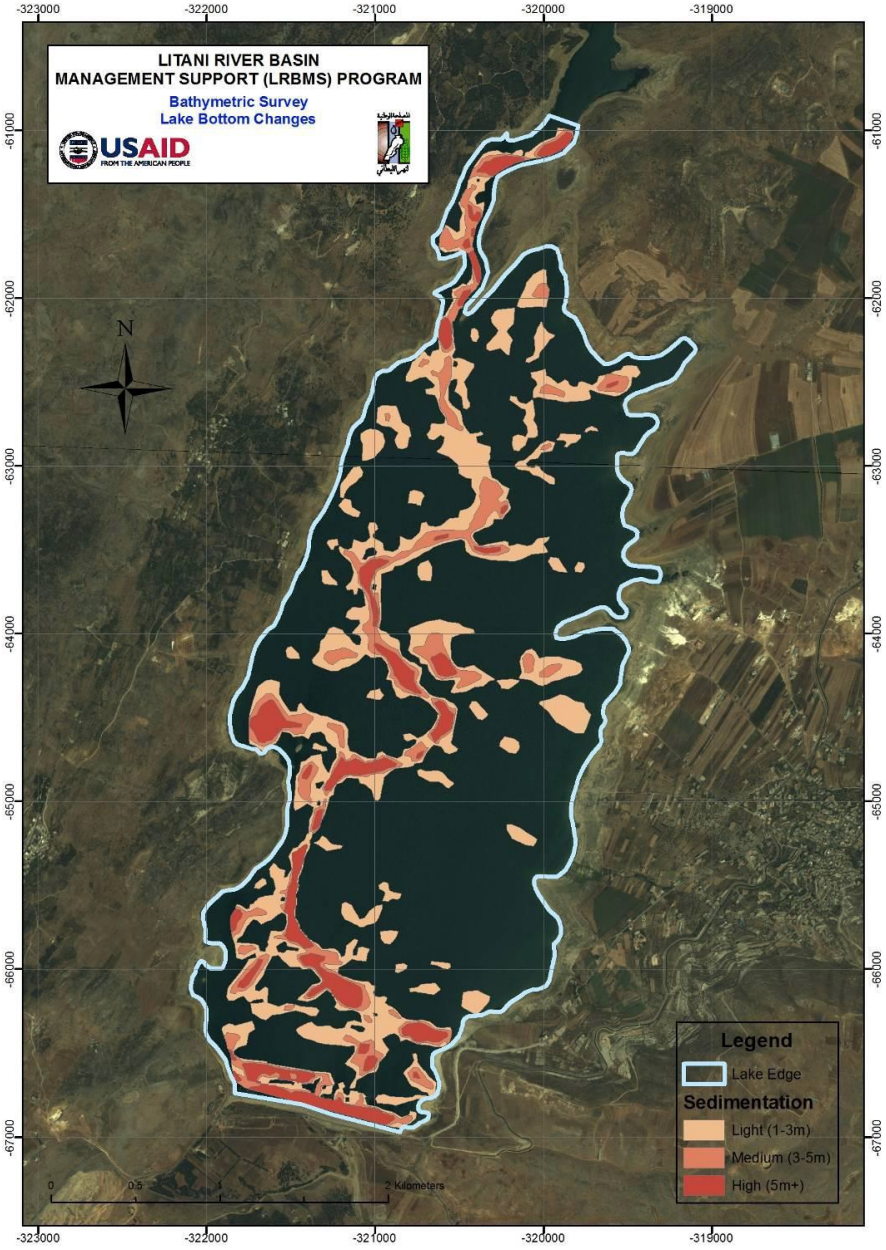
DAMS

Sediment siltation:
case studies from Lebanon water basins

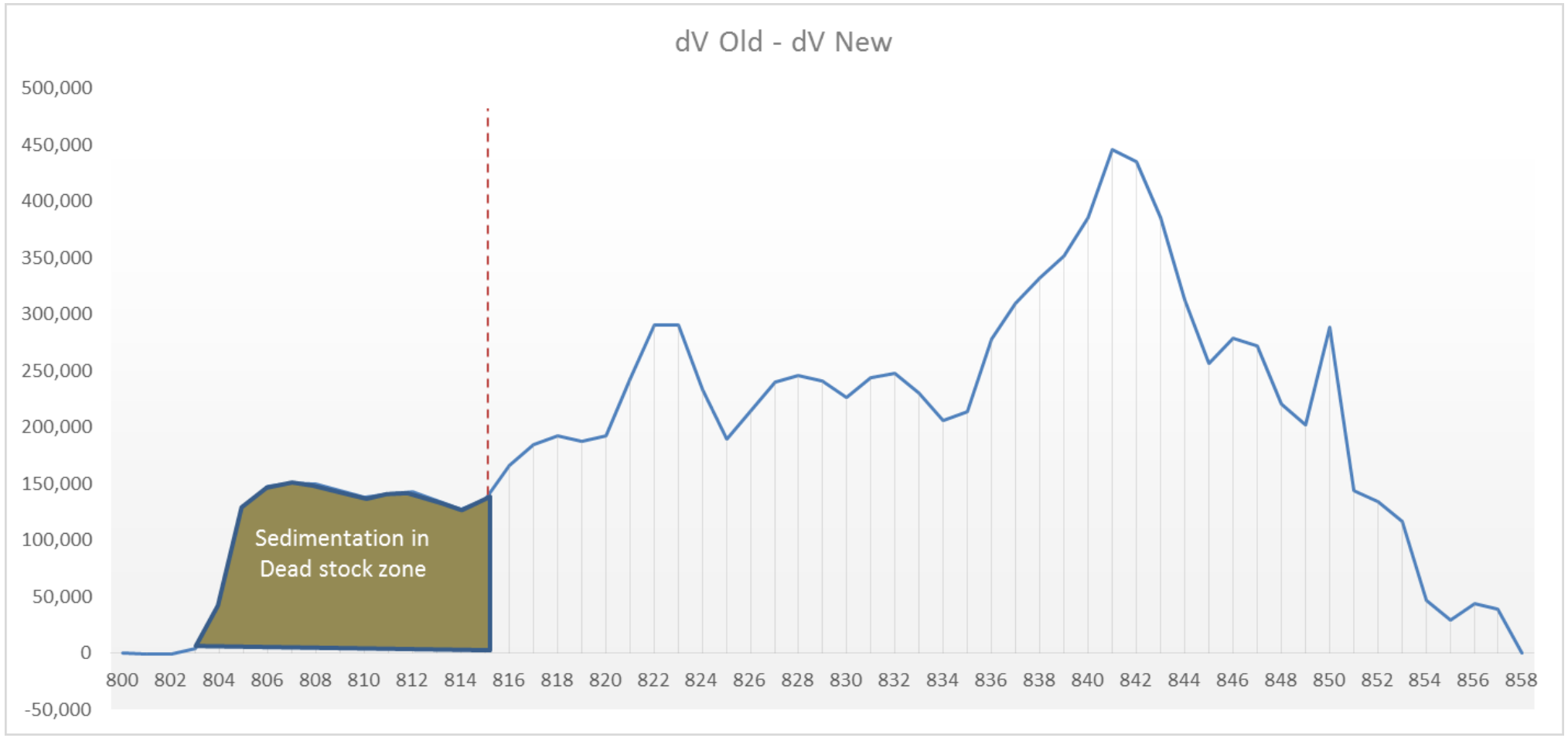
Case Study : Qaraoun Lake

- 30% percent of the country's irrigated land.
- Storage loss 1960 – 2013 ➔ 6.8 Mm^3
- Water needed for 1250 persons / day during 50 years.
- Jannah Dam estimation up to 100,000 m^3/year



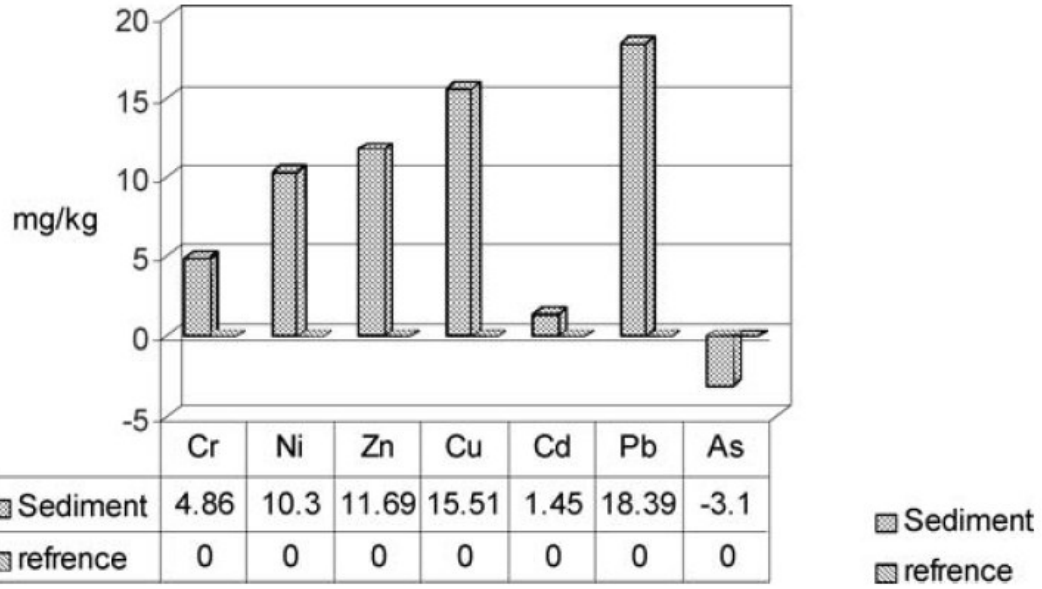
Case Study : Qaraoun Lake

Graph showing the storage capacity loss (volume in cubic meters) in each one meter of elevation *(Litani River Basin Management Support Program, USAID, 2013)*



Case Study : Qaraoun Lake

- Common pollutants ➔ heavy metals.
- Qaraoun reservoir is subjected to enrichment by other sources than its natural setting environment *(Korfali et al., 2006)*.
- Sediments transport of pollutants.
- Perspective ➔ Ejector + treatment process?



	Cr	Ni	Zn	Cu	Cd	Pb	As
Sediment	4.86	10.3	11.69	15.51	1.45	18.39	-3.1
refrence	0	0	0	0	0	0	0

Figure 2. Difference of levels of mean metal content to reference (limestone).


Feasibility study of an ecosystem-oriented plant for sediments management in Mediterranean ports and marinas
ECOMEDPORT
Promoting the adoption of an innovative and sustainable technology for the management of sediments in harbour areas in the Mediterranean Sea

Thank You