

# Erosion and sedimentation studies in the Wadi al Arab catchment/north Jordan – Alternative method application and first results in a data scarce environment.



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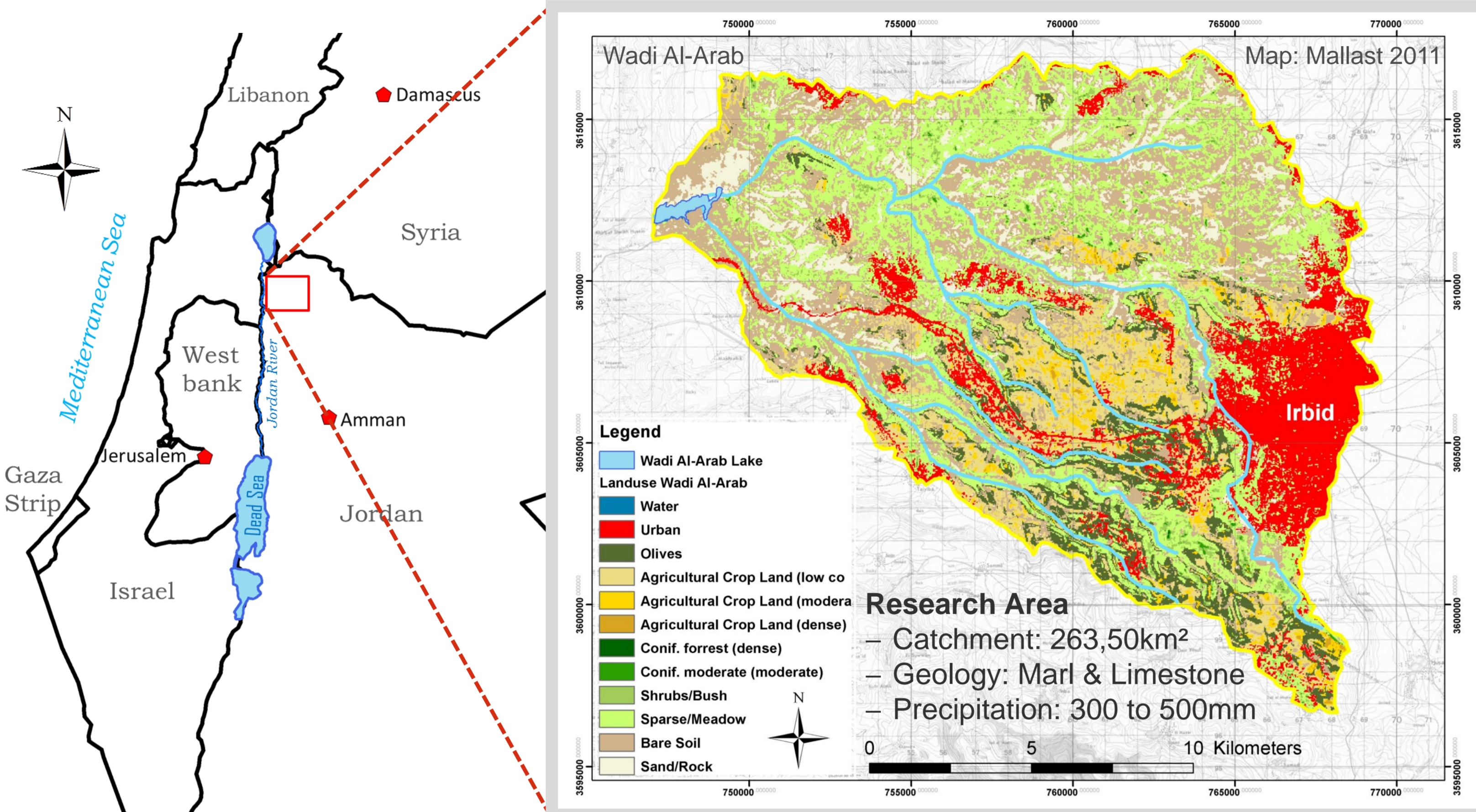
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## Why soil and erosion studies in Jordan?

**PROBLEM:** Jordan has a quantitative and qualitative water problem in combination with a growing demand by population increase (2.3% in 2009, CIA 2009).

**AIM:** The SMART project (= Sustainable Management of Available Water Resources with Innovative Technologies) aims at developing an integrated water resource management for the region.

**IMPORTANCE:** The soil layer and its physical integrity is a key player to slow down runoff, safeguard infiltration, buffer and filter pollutants AND important for artificial recharge basins and hydrological models.



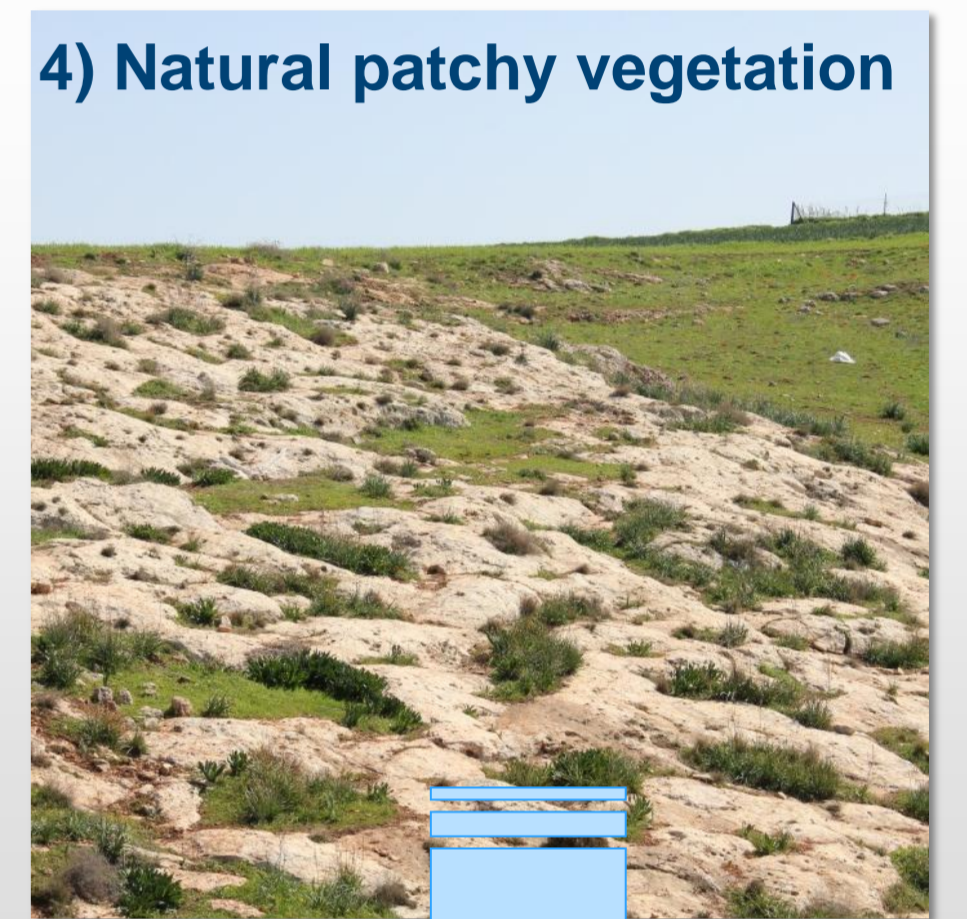
## Erosion Measurement

Common erosion measurement methods include model simulations and plot experiments. However, these methods need appropriate data input, are time limited, suffer from boundary conditions and depend on "the big event" to happen to get reasonable results (Montgomery 2008). This method compilation covers longer time periods AND includes all specific erosion processes:

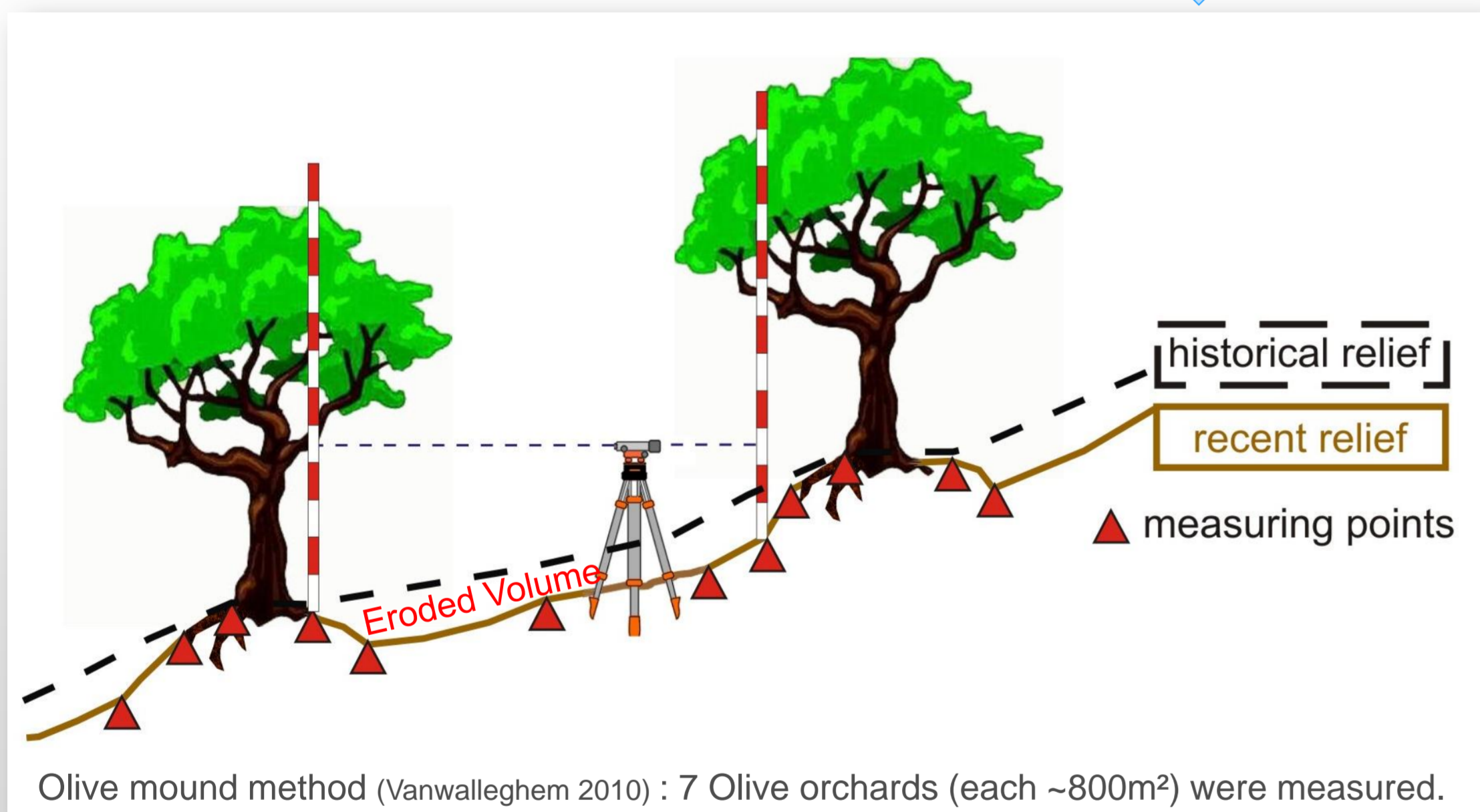
- 1. Field measurement** in the land units erosion was observed  
=> To understand what happens in the landscape
- 2. Analysis of the sink – Wadi Al-Arab lake**  
=> To know what actually accumulates in the important water reservoir
- 3. Chemical characterization of the sources**  
=> To connect lake sediments to the sediment sources and estimate their contribution

In several field campaigns **4 main sediment sources** were identified on the basis of:

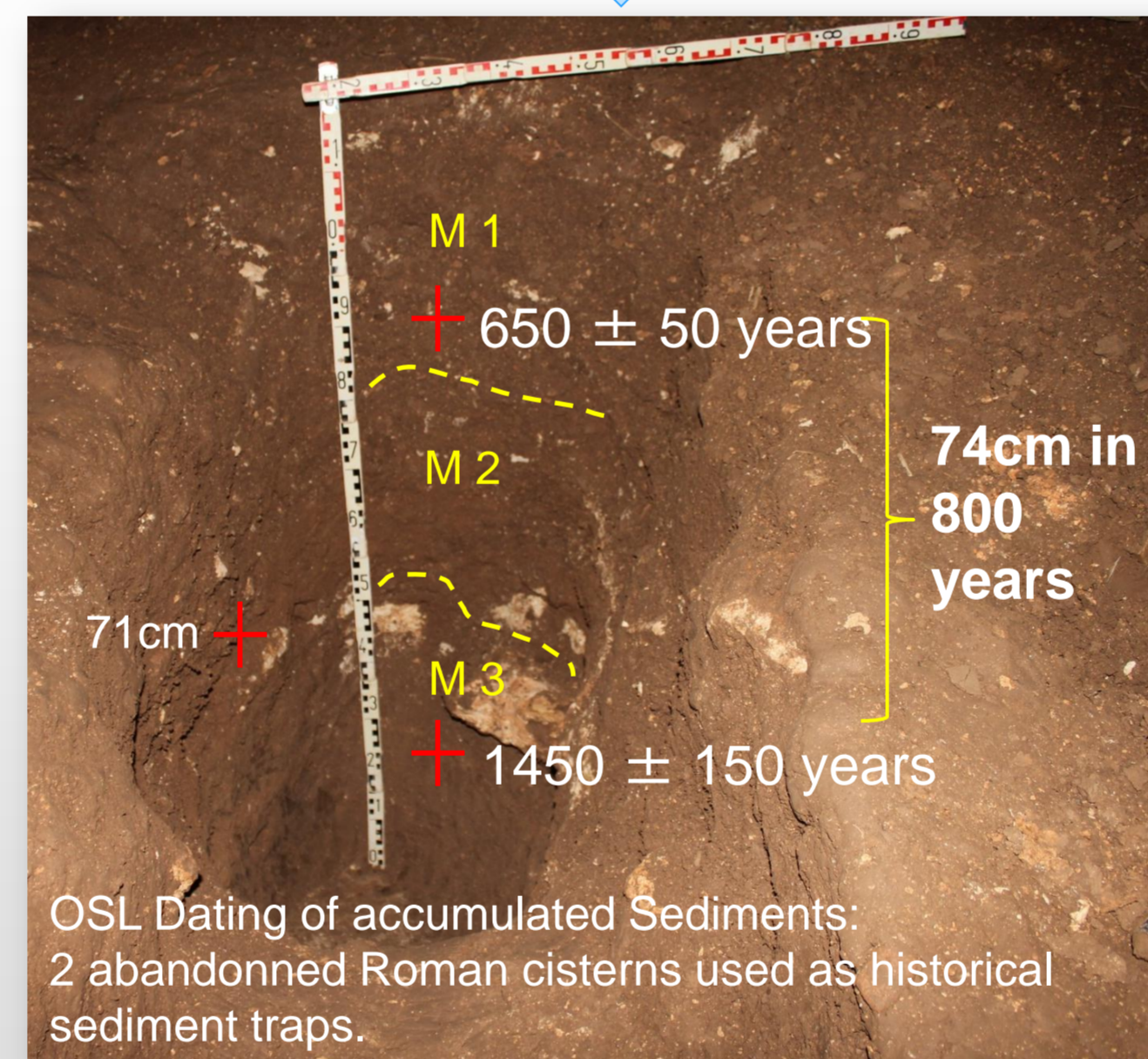
- visible erosion features, like olive mounds, rills, gullies, and siltation
- predominant landscape units



## 1) Field measurements



Eroded volume averaged = **88,00 t/ha/year**



= **0,22 t/ha/year**

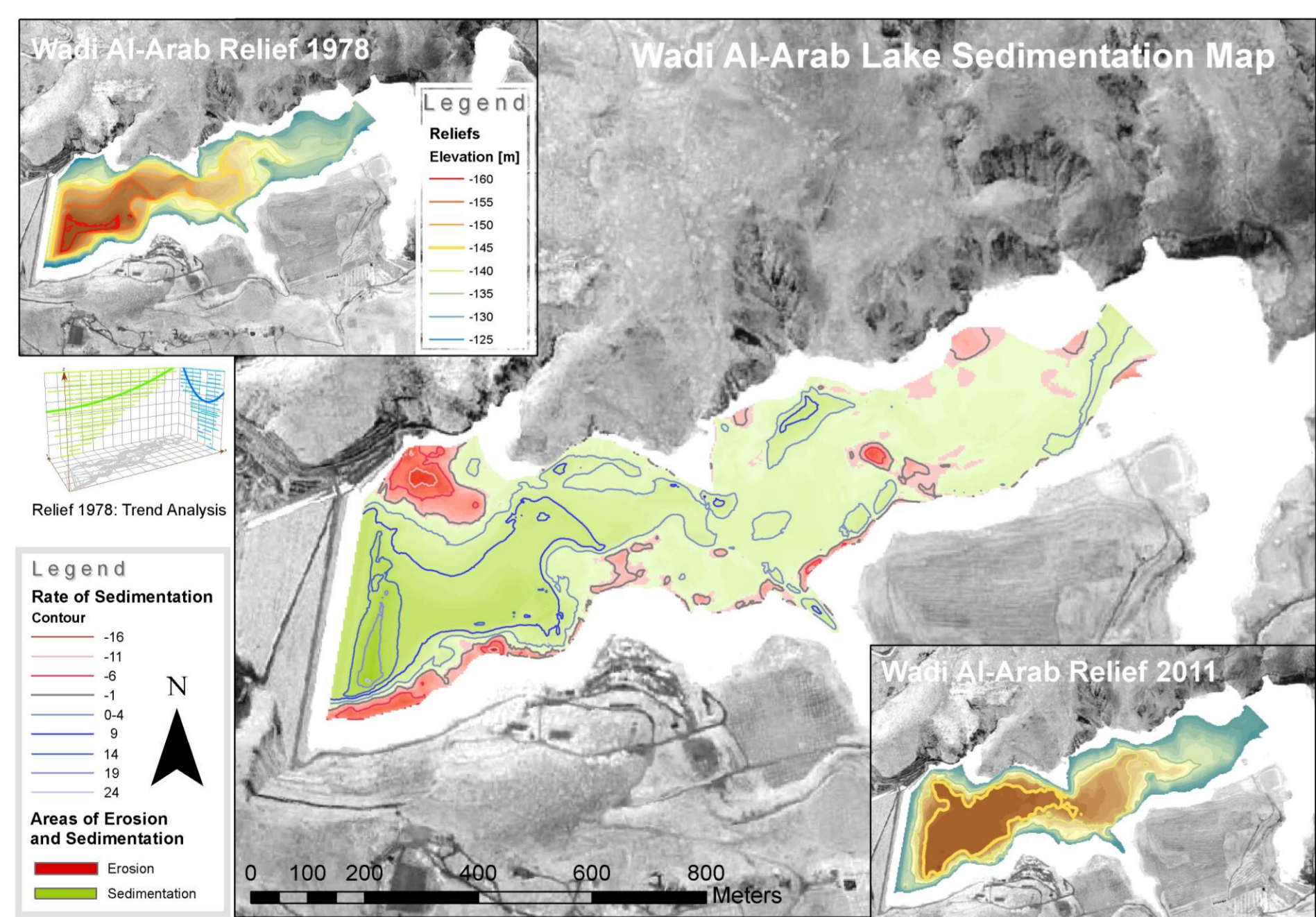


= **43,33 t/ha/year**



= **1,79 t/ha/year**

## 2) Analysis of the sink - Wadi Al-Arab Lake

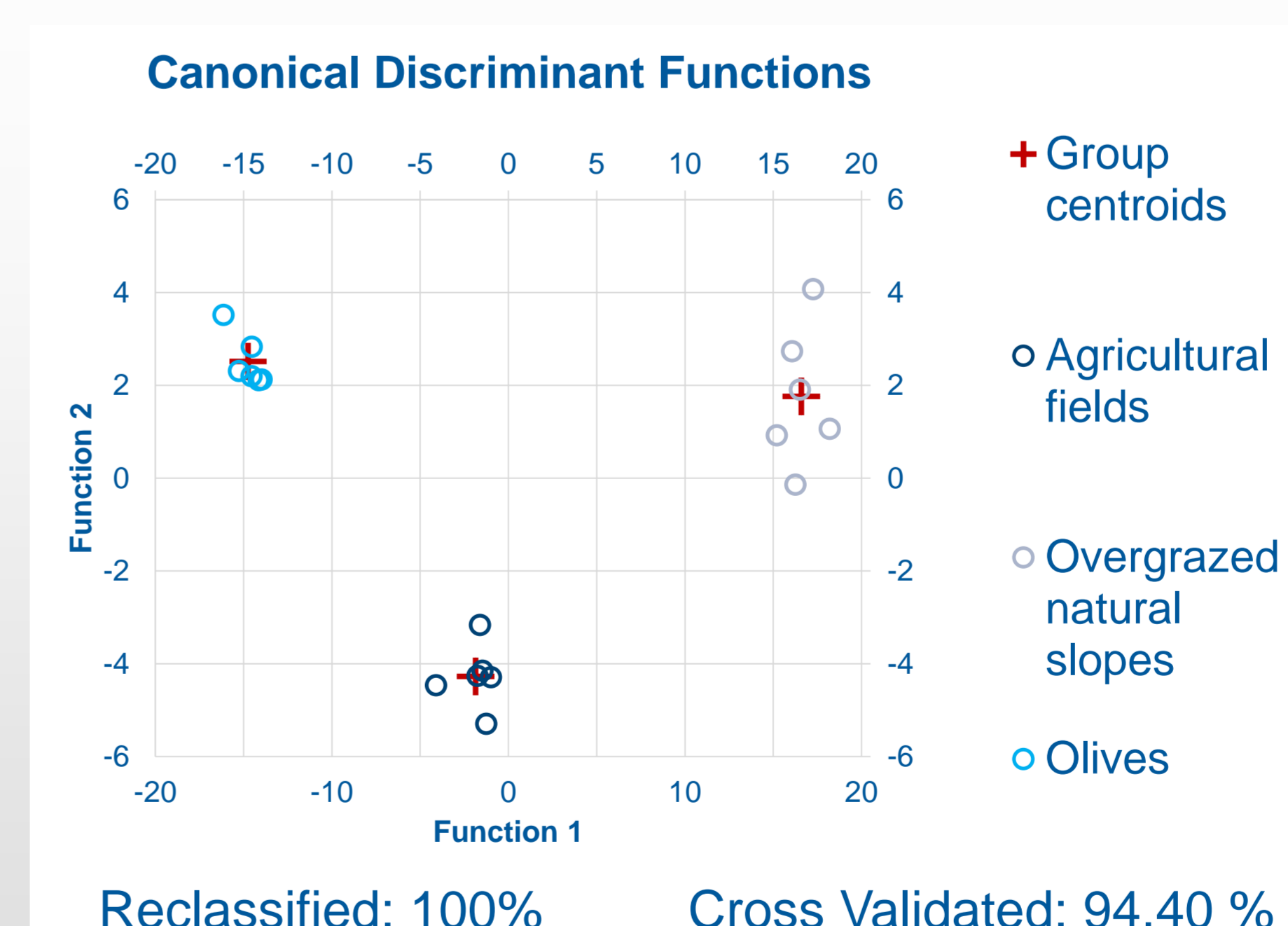


➤ The Wadi Al-Arab Dam Lake has a **sedimentation rate of 67160m<sup>3</sup>**.

➤ The spatial concentrated sedimentation is 3 times higher close to the dam wall and the outlet than expected.

➤ This **presumably constitutes a threat to the life span of the reservoir!**

## 3) Chemical characterization of the sources



The sediment sources are chemically discriminable by following elements:

- Pb TOC
- Ti Cu
- Rb U
- <sup>40</sup>K <sup>137</sup>Cs
- <sup>234</sup>Th <sup>226</sup>Ra
- <sup>214</sup>Pb

In the final step a mixing model algorithm will be used to estimate the relative contributions of the individual sediment source to the lake



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