

Catchment-scale analysis of Managed Aquifer Recharge to improve groundwater resources management in some Tunisian stressed aquifers

Anis Chekirbane ^{1*}, Catalin Stefan ², Robert Schlick ², Issam Nouri ¹, Dorsaf Aloui ³ & Ammar Mlayah ³

(1) National Institute of Agronomy (INAT), University of Carthage, Tunisia (2) Research Group INOWAS, Technical University of Dresden, Germany (3) Water Research and Technologies Center, Borj Ceria Technopark, Tunisia

*E-mail: anis.chkirbane@inat.u-carthage.tn

Introduction

Groundwater resources in Tunisia:
rare + overexploited

Severe drawdown + quantitative et
qualitative degradation of GW

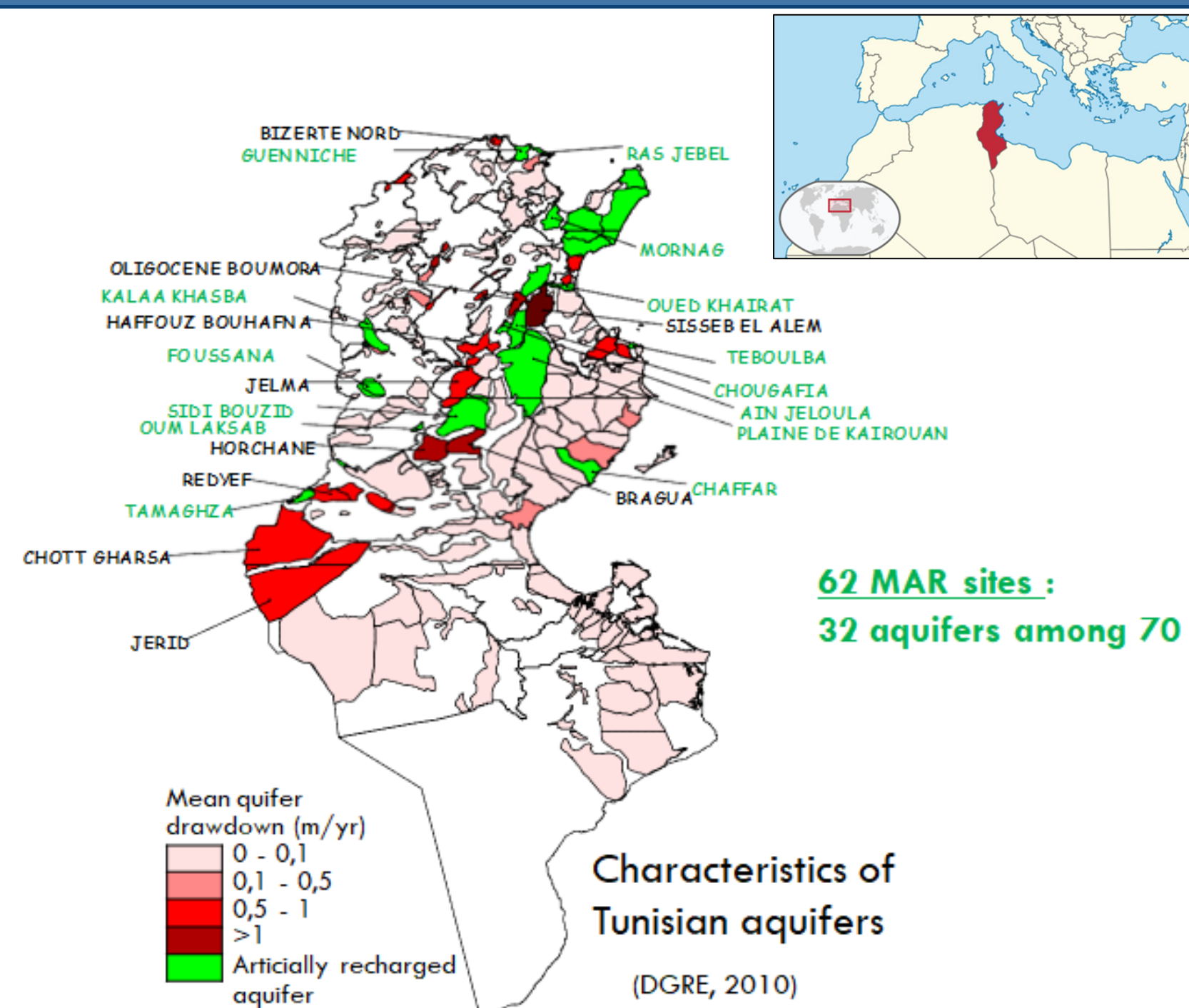
solutions

Managed Aquifer Recharge (MAR)

Poorly
monitored +
Not optimized

Necessity to optimise MAR
technique

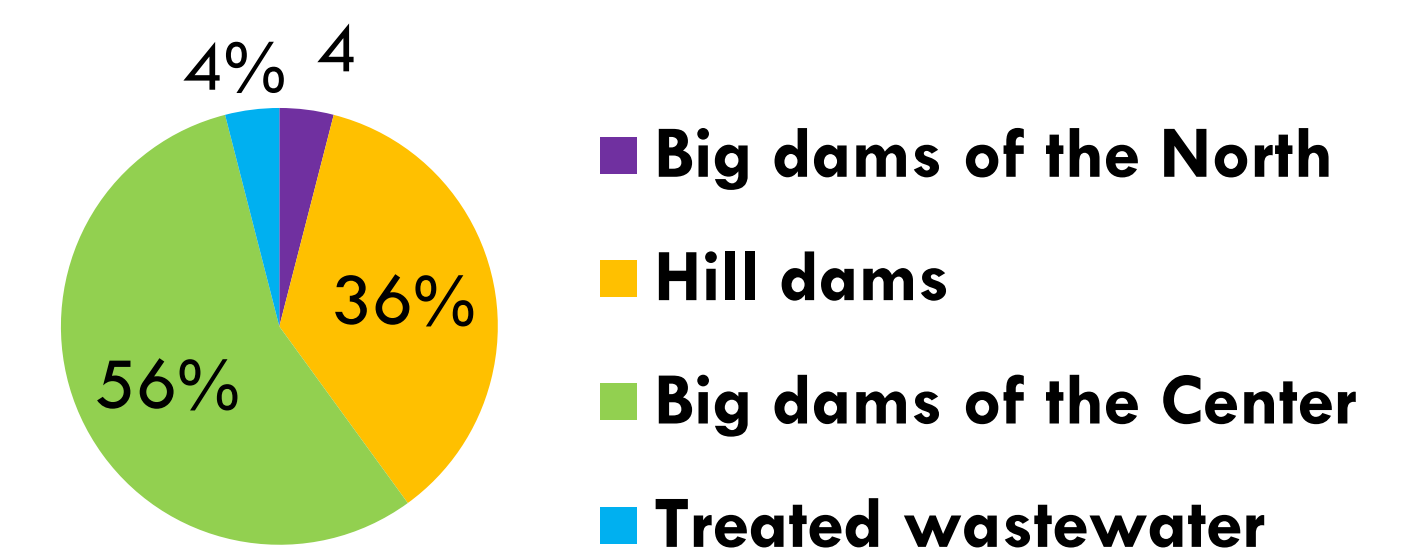
Restore the aquifer
equilibrium:
Sustainability



MAR in Tunisia

MAR constraints:

- Occasional
- Strictly depending from the available resource
- Poorly monitored
- Practiced without scientific and technical optimization
- Experience not shared

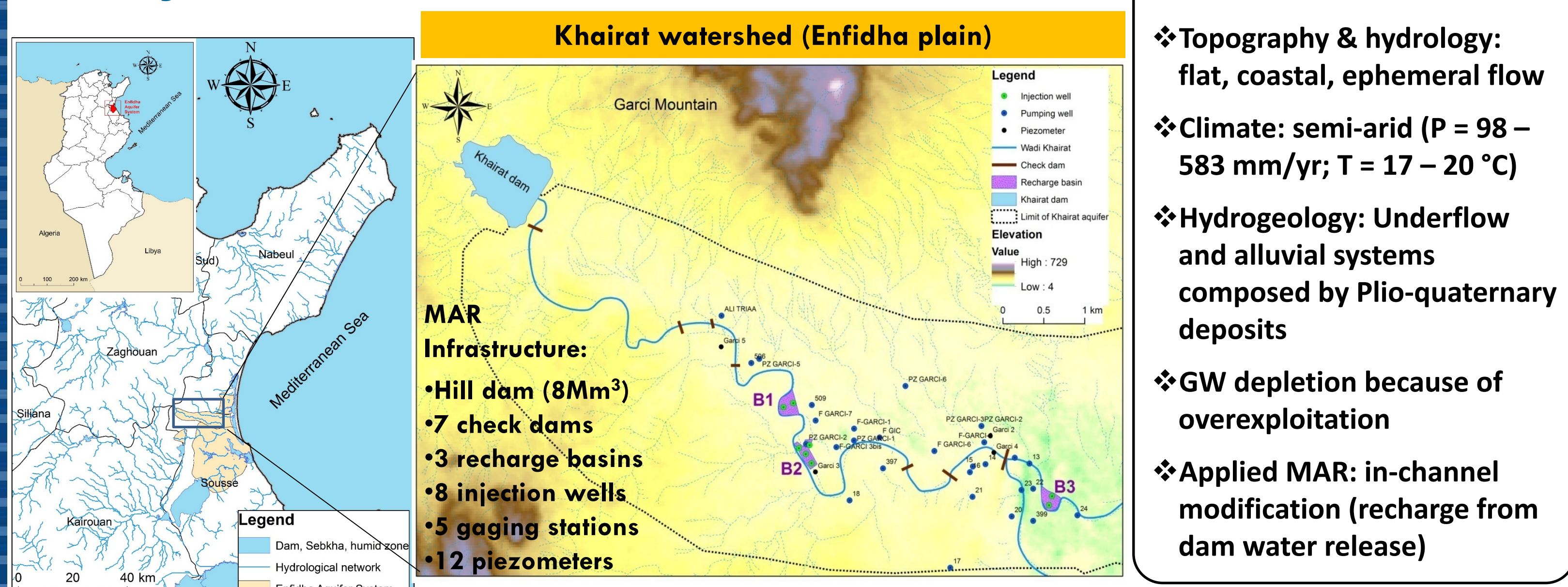


Objectives

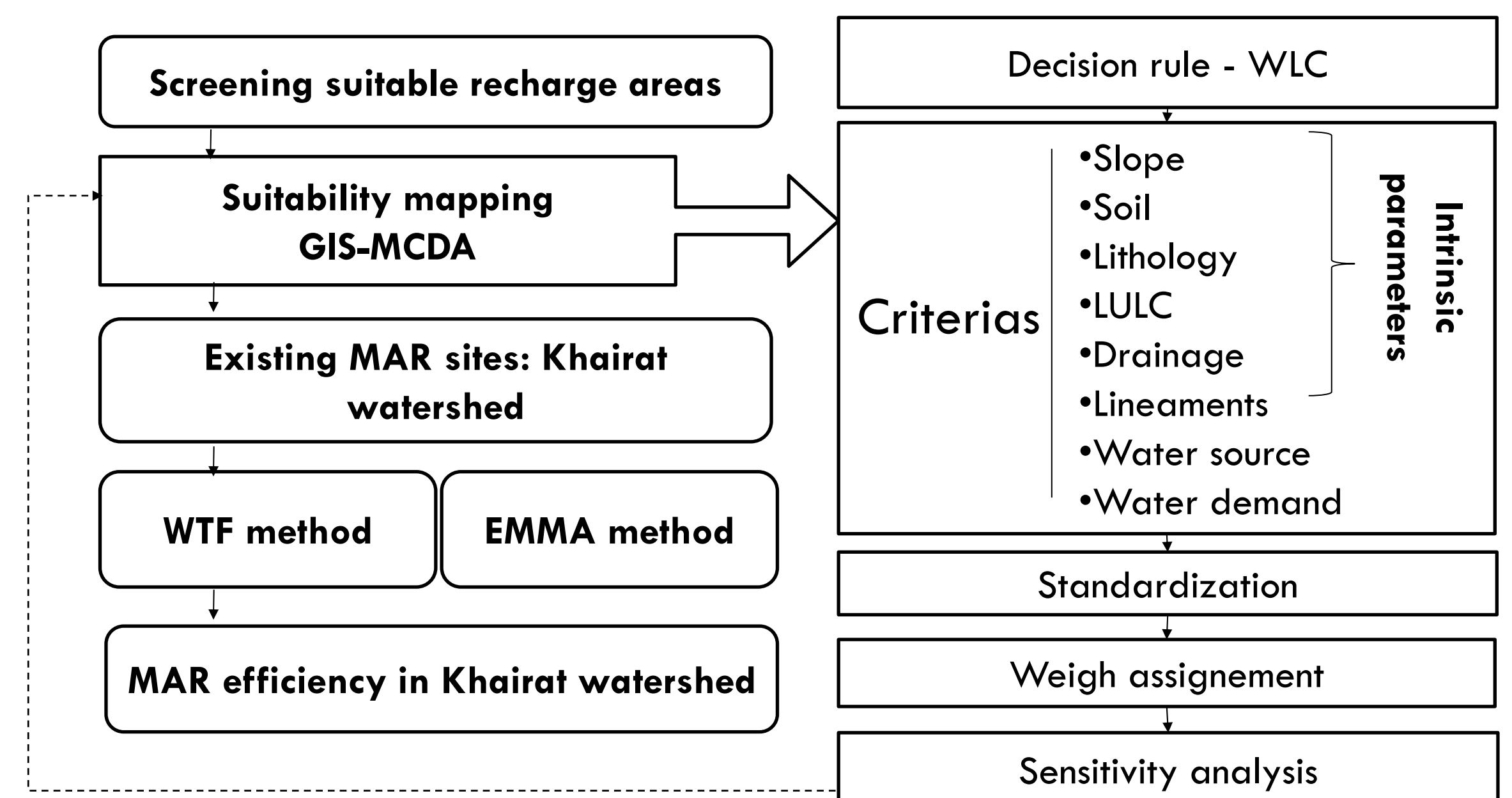
1- Propose an adapted approach to establish MAR suitability and feasibility maps

2- Assess the efficiency of the existing MAR systems and their impact on groundwater resources evolution

Study area



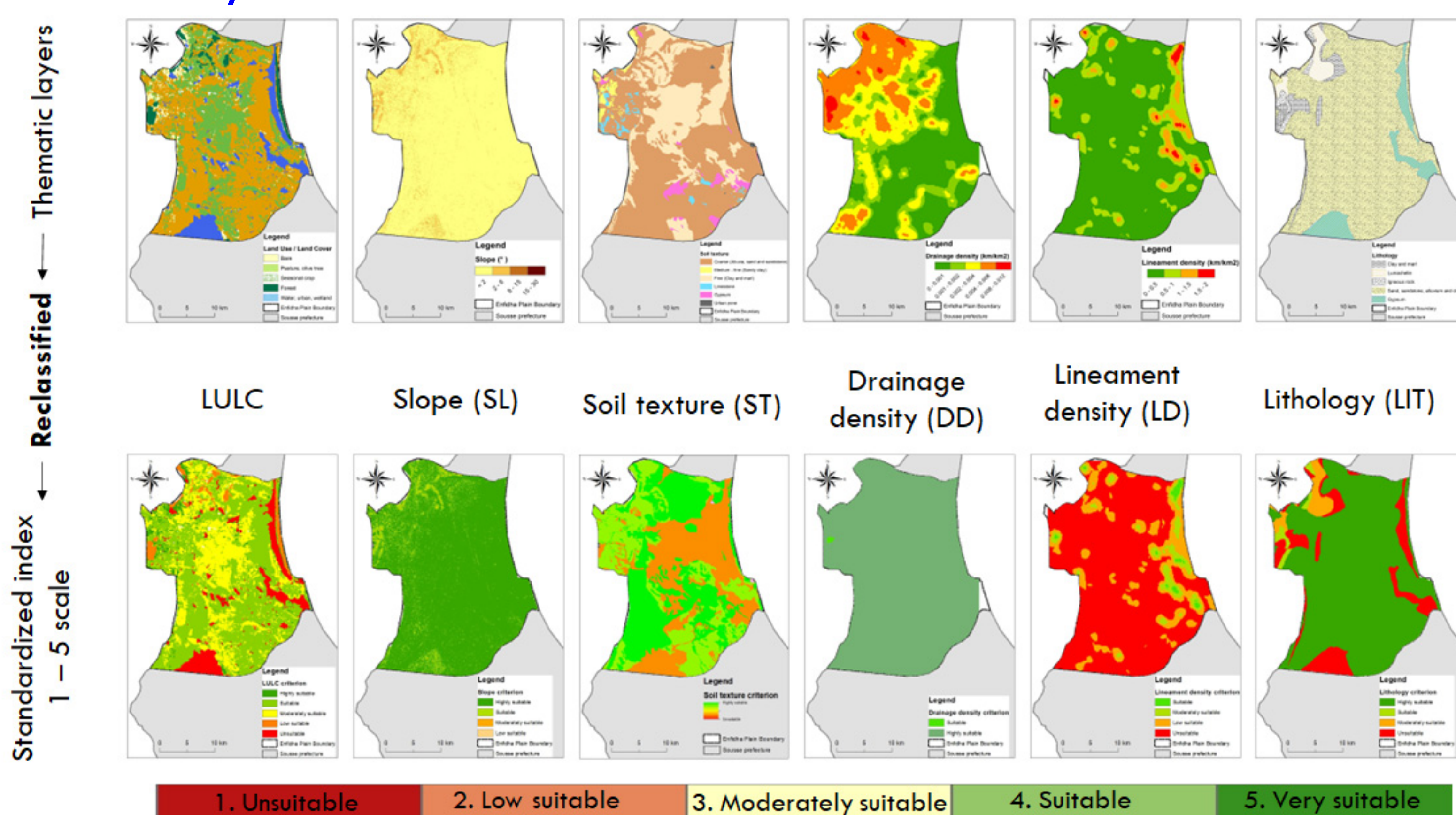
Methodology



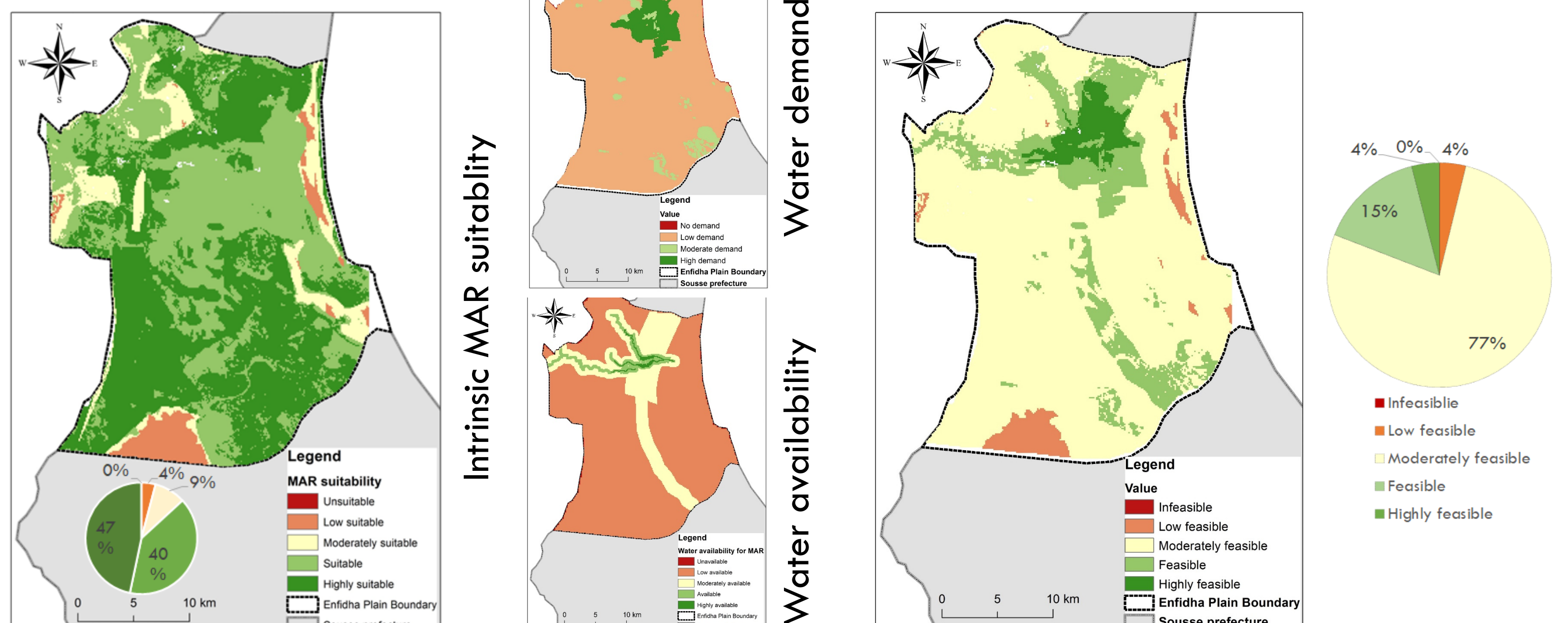
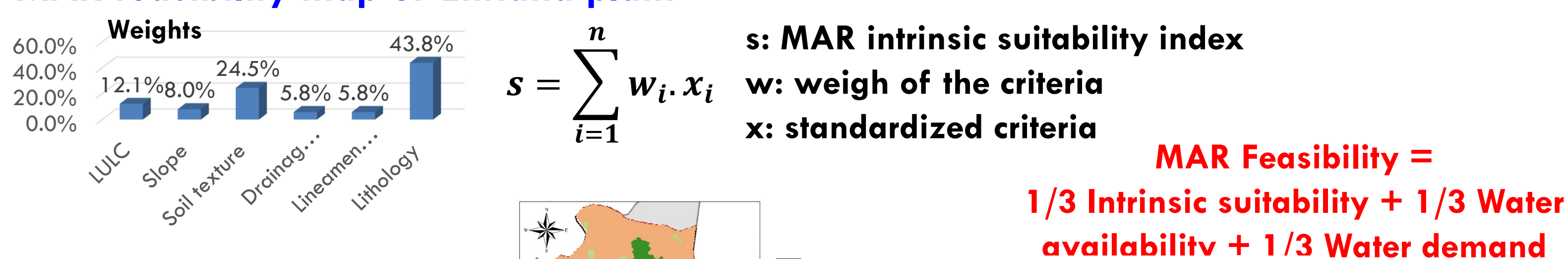
Results and discussion

MAR feasibility mapping using GIS-MCDA approach

Thematic layers and standardized index

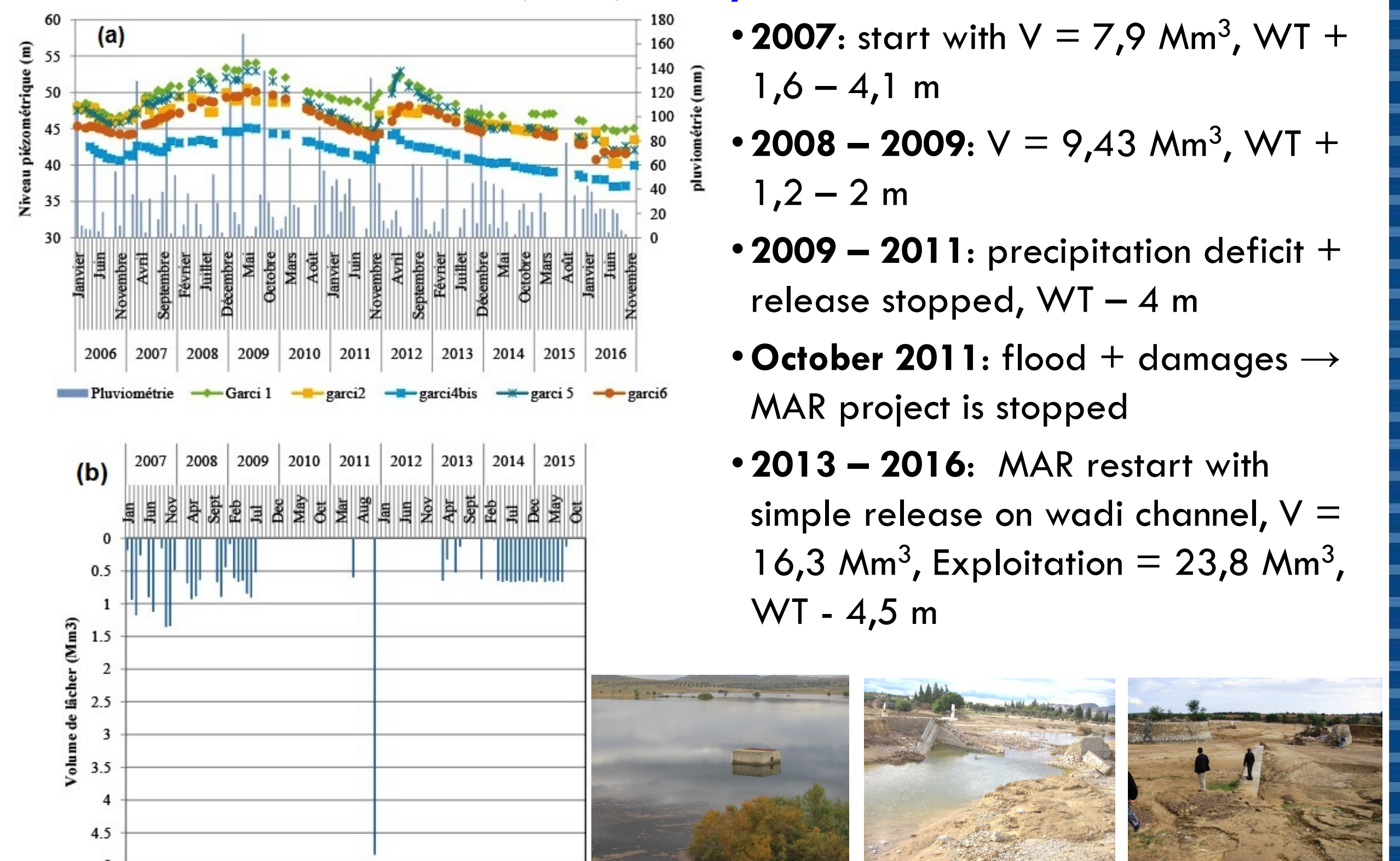


MAR feasibility map of Enfidha plain

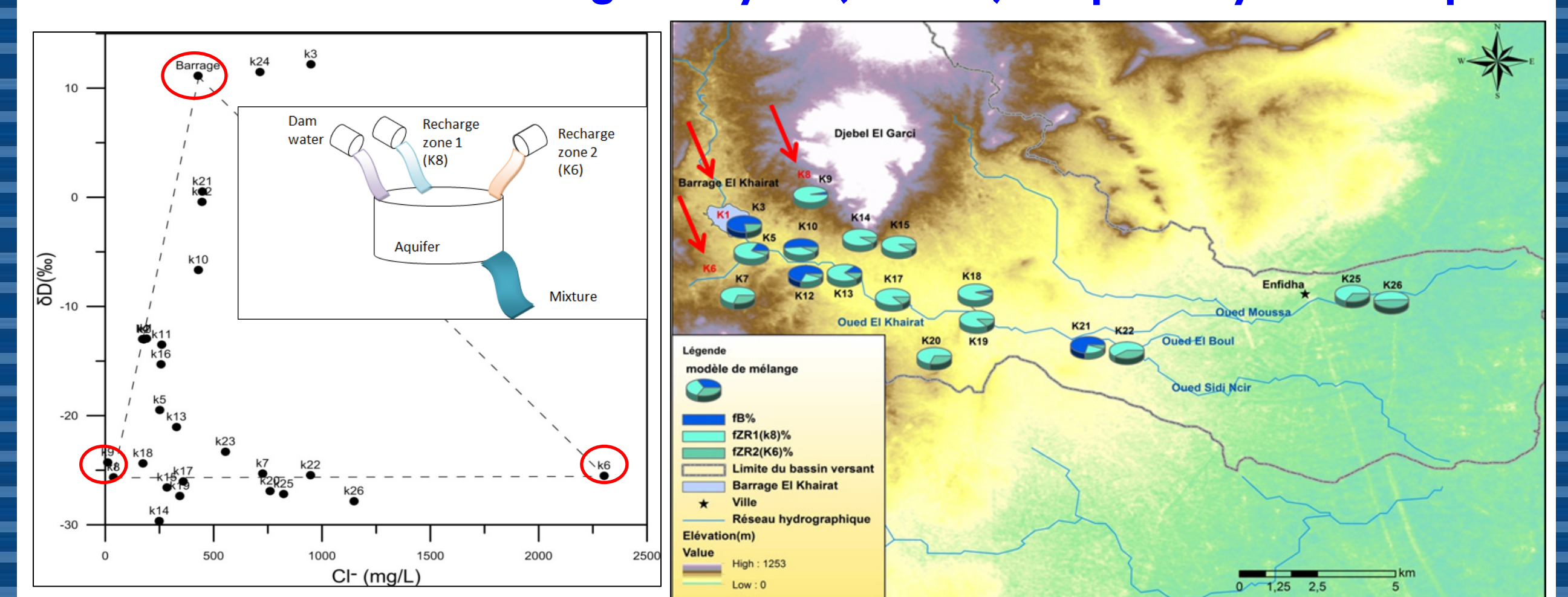


MAR efficiency in Khairat watershed

Water Table Fluctuations (WTF) analysis



Use of End Member Mixing Analysis (EMMA) to quantify MAR impact



Summary and conclusion

- GIS-MCDA approach = useful tool for MAR suitability and feasibility mapping in Enfidha plain as one of the most stressed aquifer systems in Tunisia.
- The obtained MAR feasibility of Enfidha plain shows that only around the fifth of its total area have good to high potential for implementing a MAR system especially near the central part which is dominated by porous formations and spare vegetation.
- Water release from the hill dams is playing an important role in aquifer recharge and the dam water contribution exceeds 70%, especially in zones close to the wadi.
- Integrated approach = effective solution to ameliorate the management of stressed aquifers towards restoring their equilibrium and pledging their sustainability.