

Monitoring of land degradation from space: a focus on soil erosion and salinity in arid/semi-arid regions

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Abstract

Arid and semi-arid Regions are largely affected by salinity. Irrigation regions and oases in Southern Tunisia are as such Typical areas, where the excessive content of salt in the soil is a challenging phenomenon. Salinity engenders several environmental problems such as limiting plant growth and reducing crop productivity. This work benefits from the combination of remote sensing and ground-based geochemical measurements. We use remote sensing to diagnose and monitor arid land degradation and environmental change caused by salinity in Southern Tunisia. Soil samples from the upper 10 cm top-soils were collected in southern Tunisia and analyzed to provide on the ground data. We then classify degraded soils using supervised and unsupervised classifications. A database was built under the shape of WebGIS. It gathers all the information, data, inputs and outputs of this research project. Furthermore, we placed the causal factors underlying dry land degradation into a Geographic information (GIS) database. This permits a rapid diagnosis of the causes of land degradation for the purpose of designing intervention strategies. The present study highlights also that classes of extreme and high saline soils are predominantly represented by gypsum rich soils.

Introduction

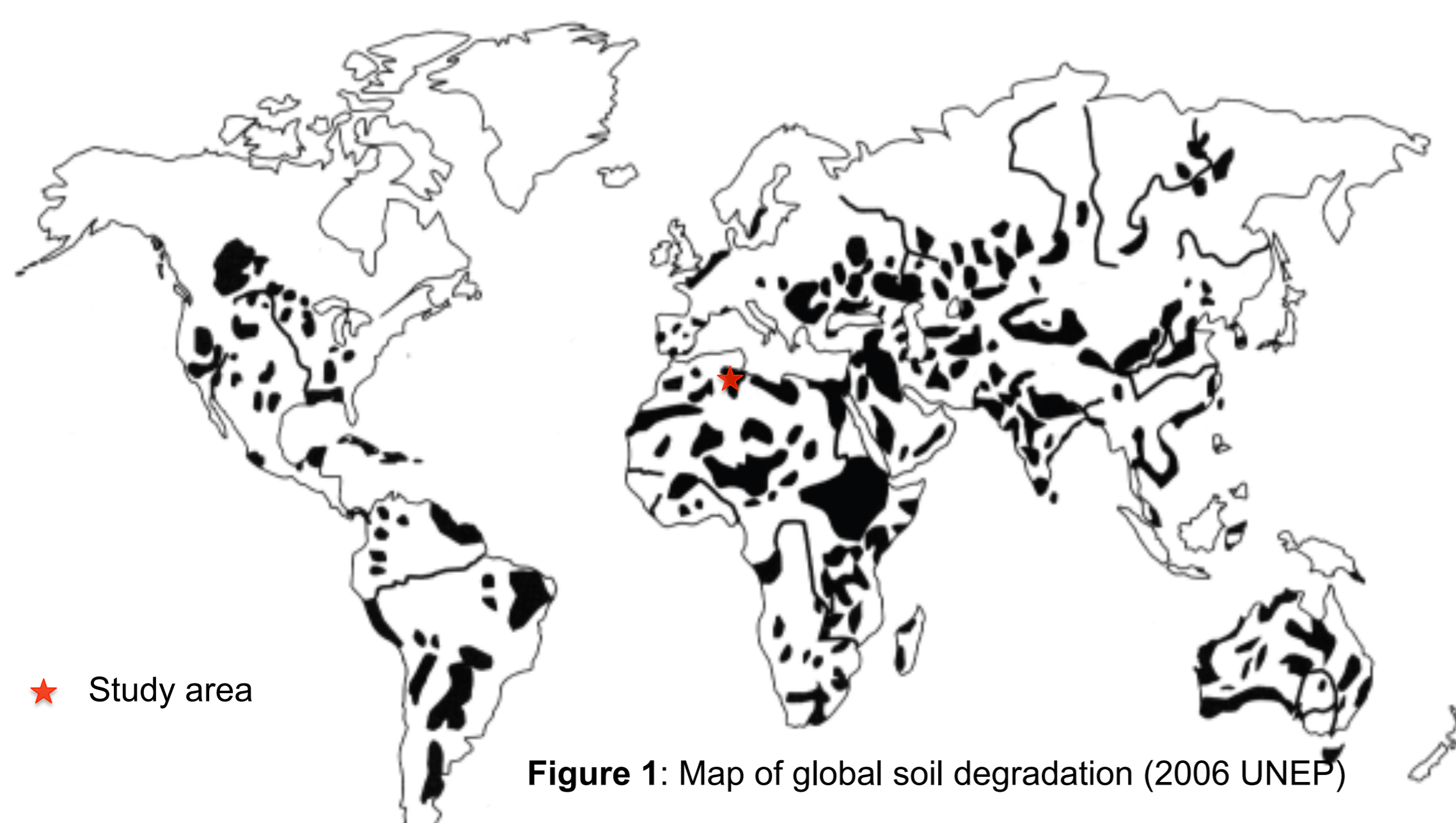
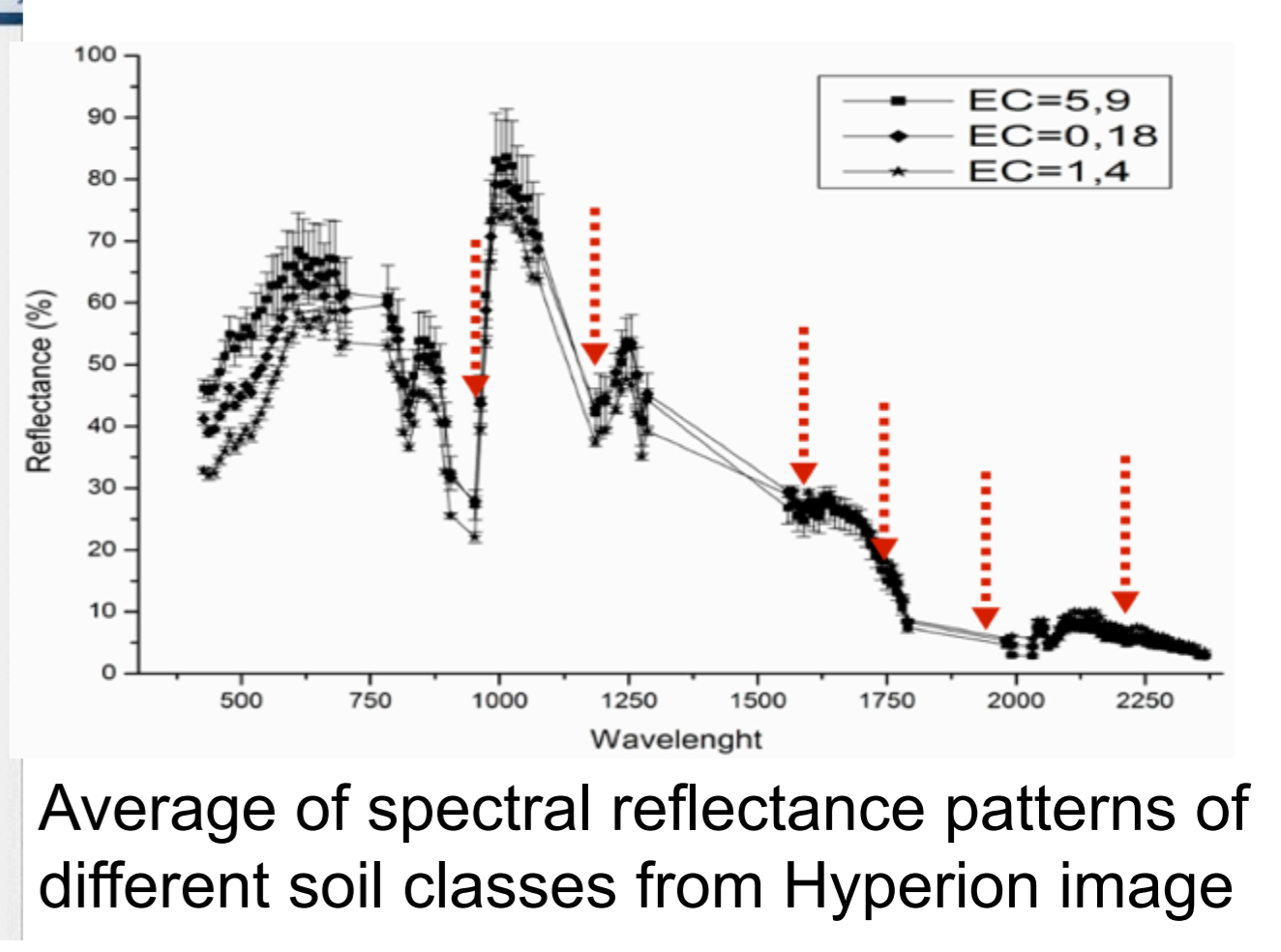
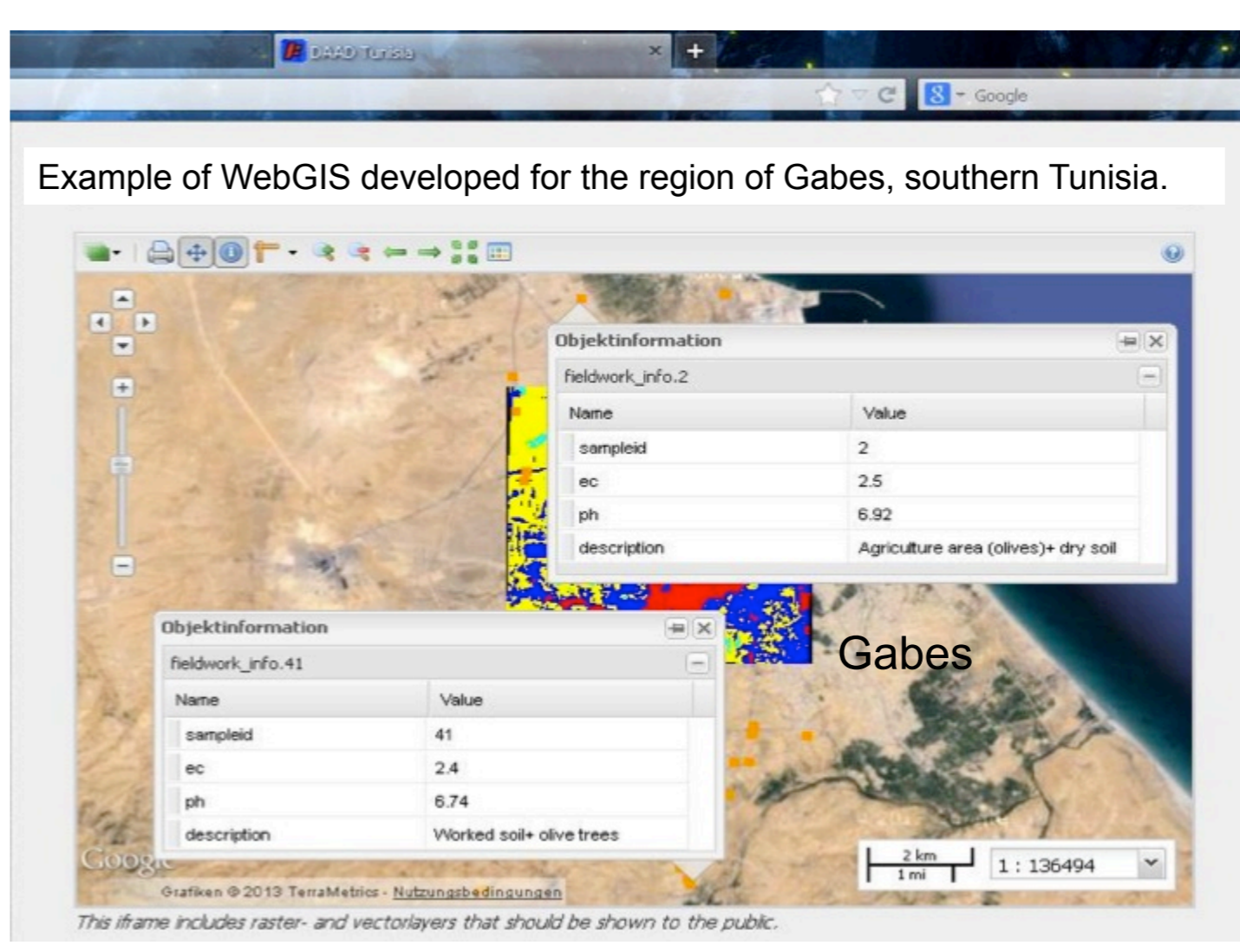
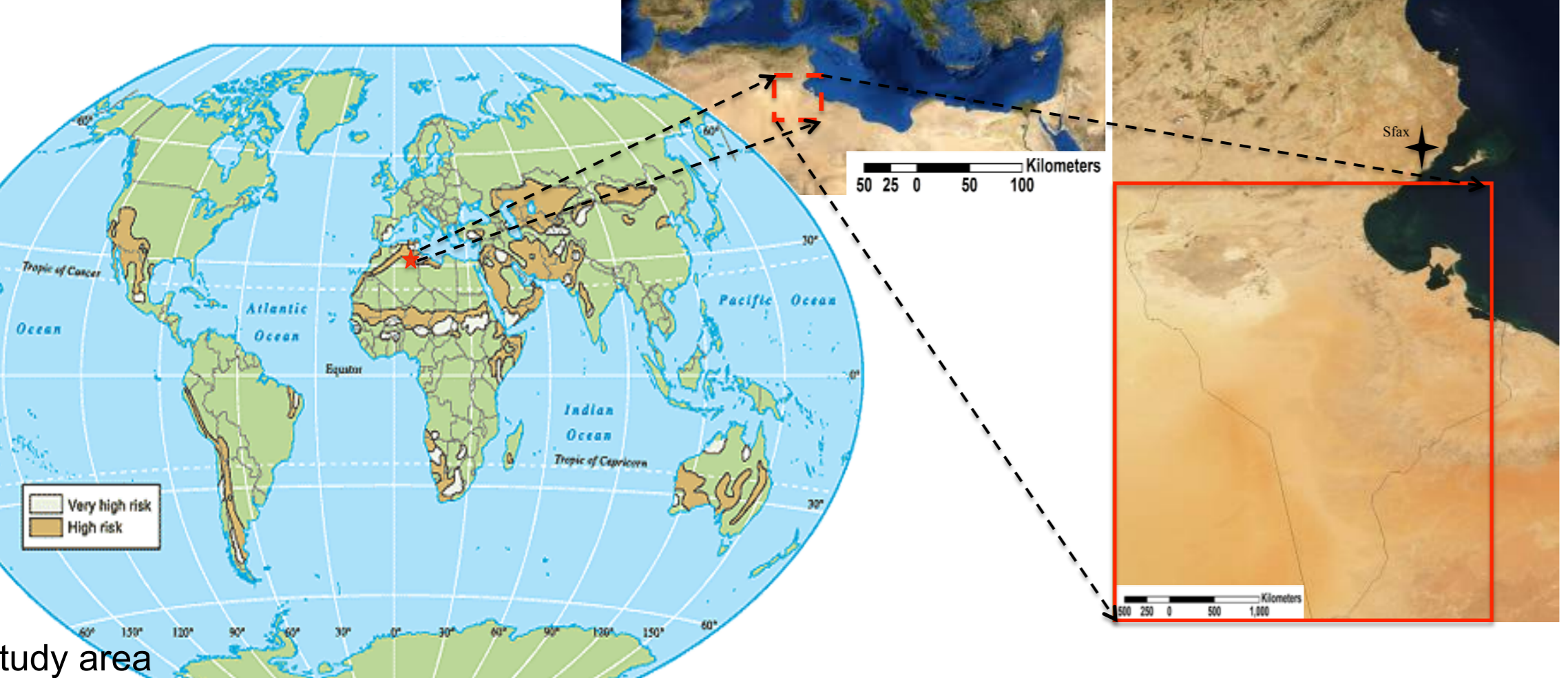
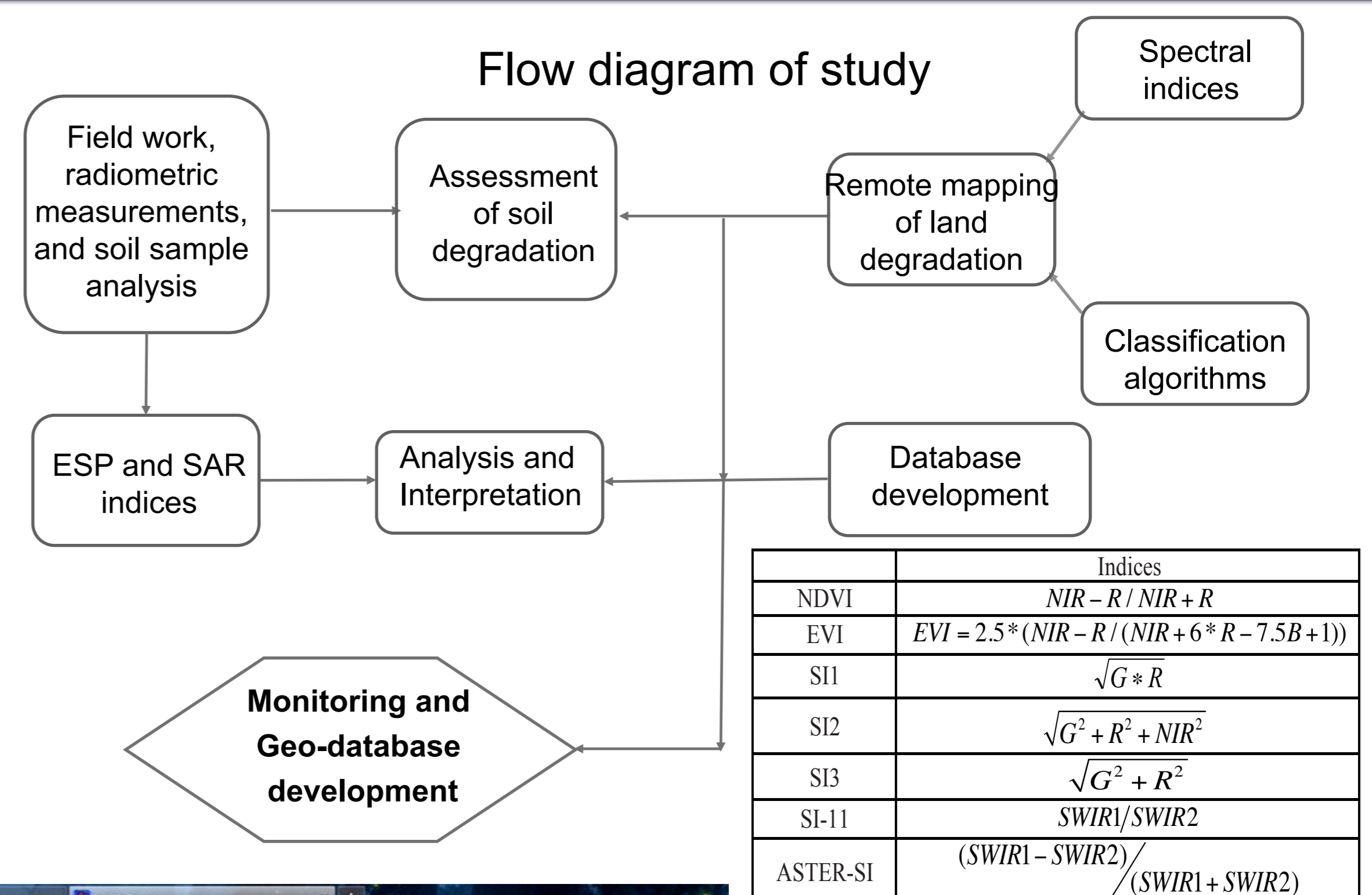


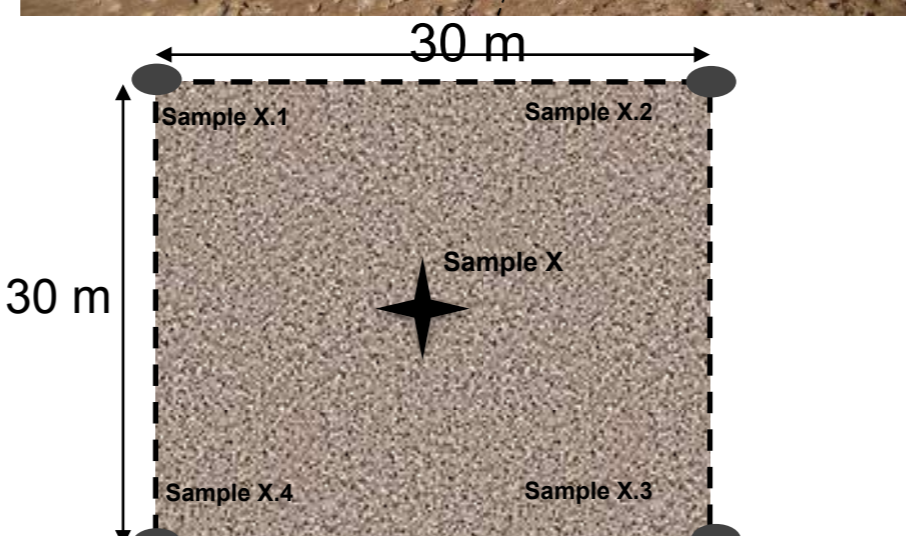
Figure 1: Map of global soil degradation (2006 UNEP)

Methods & materials

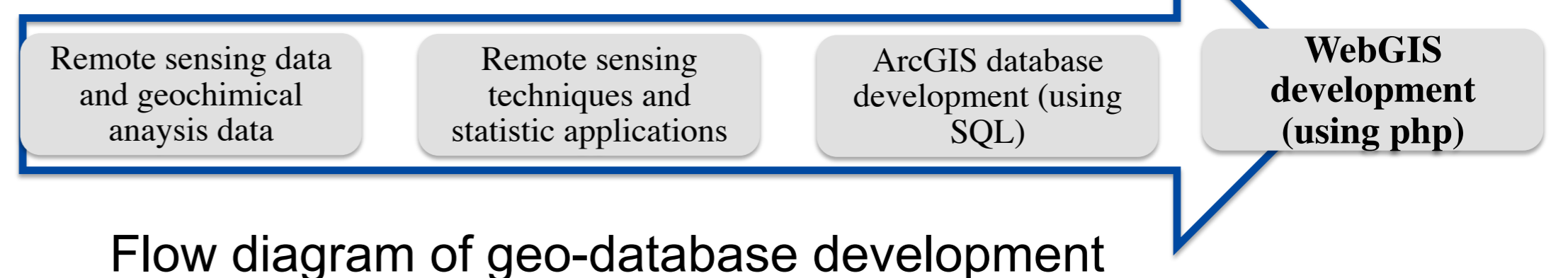


Soil sampling method

Mixing of the samples from the 4 corners to represent one soil sample



Geo-data base development



Flow diagram of geo-database development

Potential contributions of the proposed research

- This research work develops a conceptual model for the quantification and qualification of land degradation (erosion, salinization, and desertification) based on multi-source remote sensing data
- Our approach provides a WebGIS data base and reliable method for monitoring of land degradation. It enable us to adequately predict, diagnose the roots of land degradation, and mitigate the problems related to land degradation in arid environments.

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