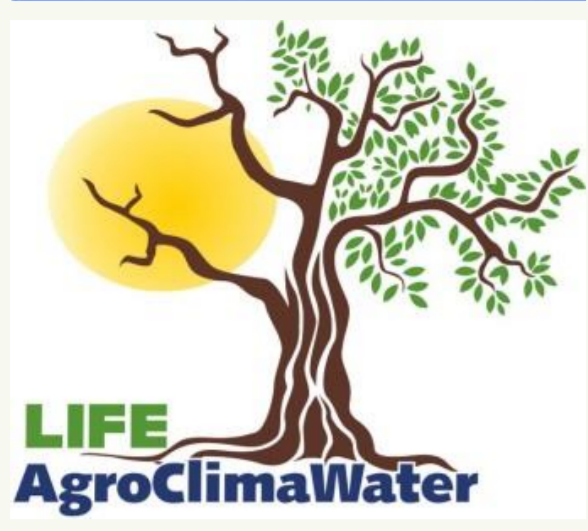




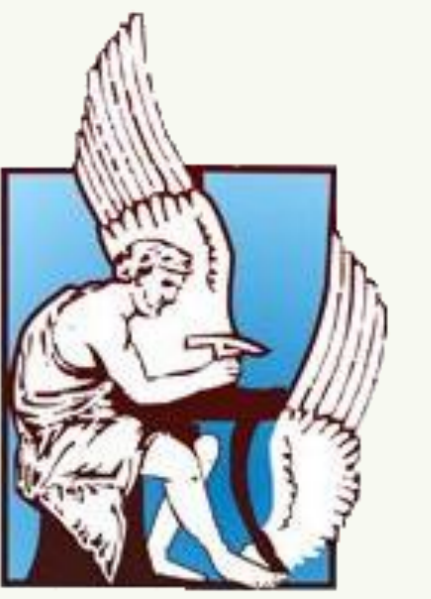
# Assessing environmentally sensitive areas to desertification – An application in two Mediterranean watersheds



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## 1. Introduction

- ✓ **Desertification** is the consequence of a set of important processes which take place in arid and semi-arid environments, where water is the main limiting factor of land use performance in ecosystems.
- ✓ Non-sustainable agricultural practices and water management may significantly affect the potential desertification risk.

## 2. Study Area

- ✓ Two watersheds in the island of Crete (Greece) (Fig.1)
  - Merambelo area (east)
  - Platanias area (west)

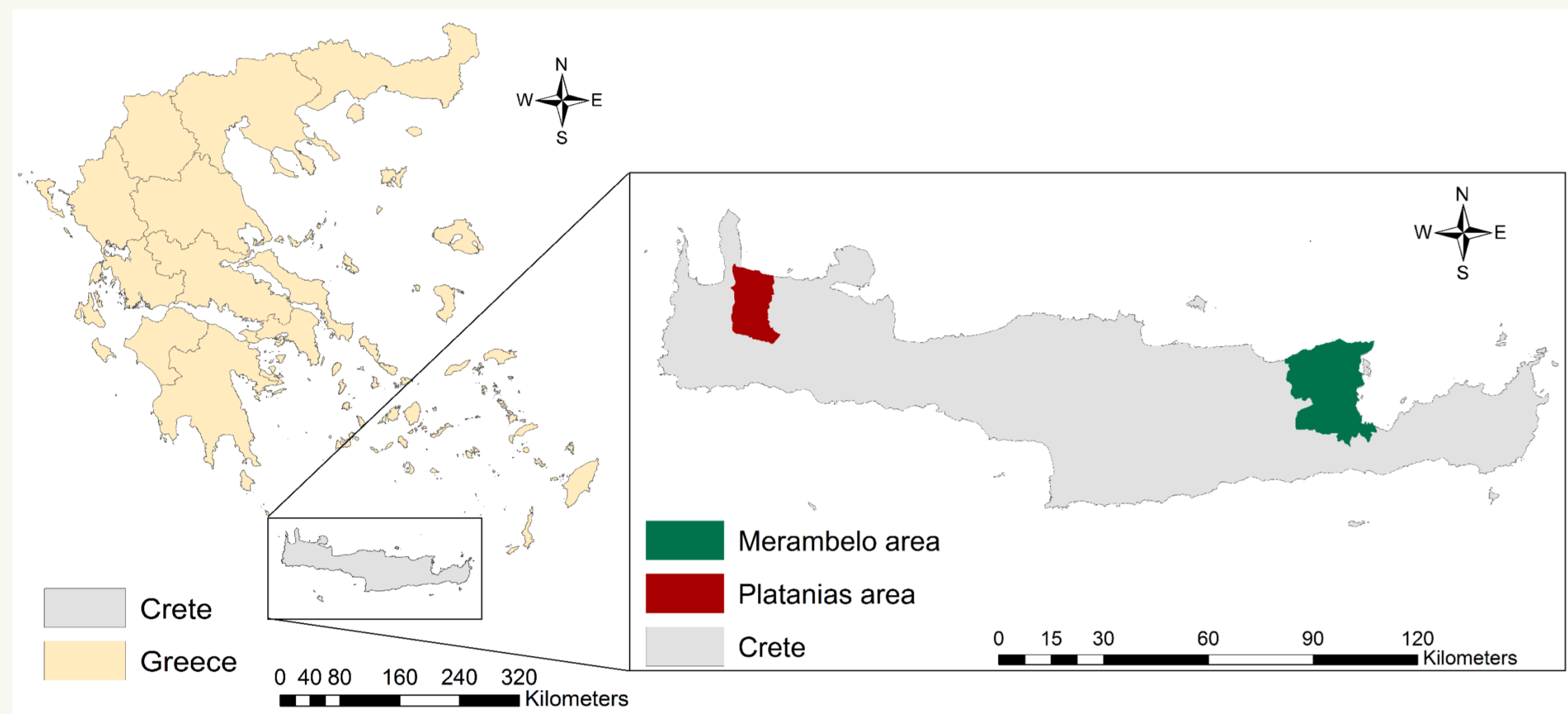


Figure 1. Study areas

## 3. Methodology

The most frequently applied system for assessing desertification is the **Environmentally Sensitive Area Index (ESAI) method** which is developed in a Geographical Information System (GIS) environment.

The method is based on the evaluation of four different categories ESAI that affect desertification, which are related to (a) soil quality, (b) climate quality, (c) vegetation quality, and (d) land management quality.

The four quality indices were estimated according to the ESAI methodology using the following formula (Figure 2):

$$QI_{kij} = (\prod_{layer} n_{ij})^{1/n} \quad (1)$$

where QI k represents each of the quality indices, i and j represent rows and columns of each raster layer and n represents the number of layers used.

In the last ESAI stage, the final sensitivity of an area is evaluated from the five quality indices in a linear way:

$$ESAI = (\prod QI_{kij})^{1/4} \quad (2)$$

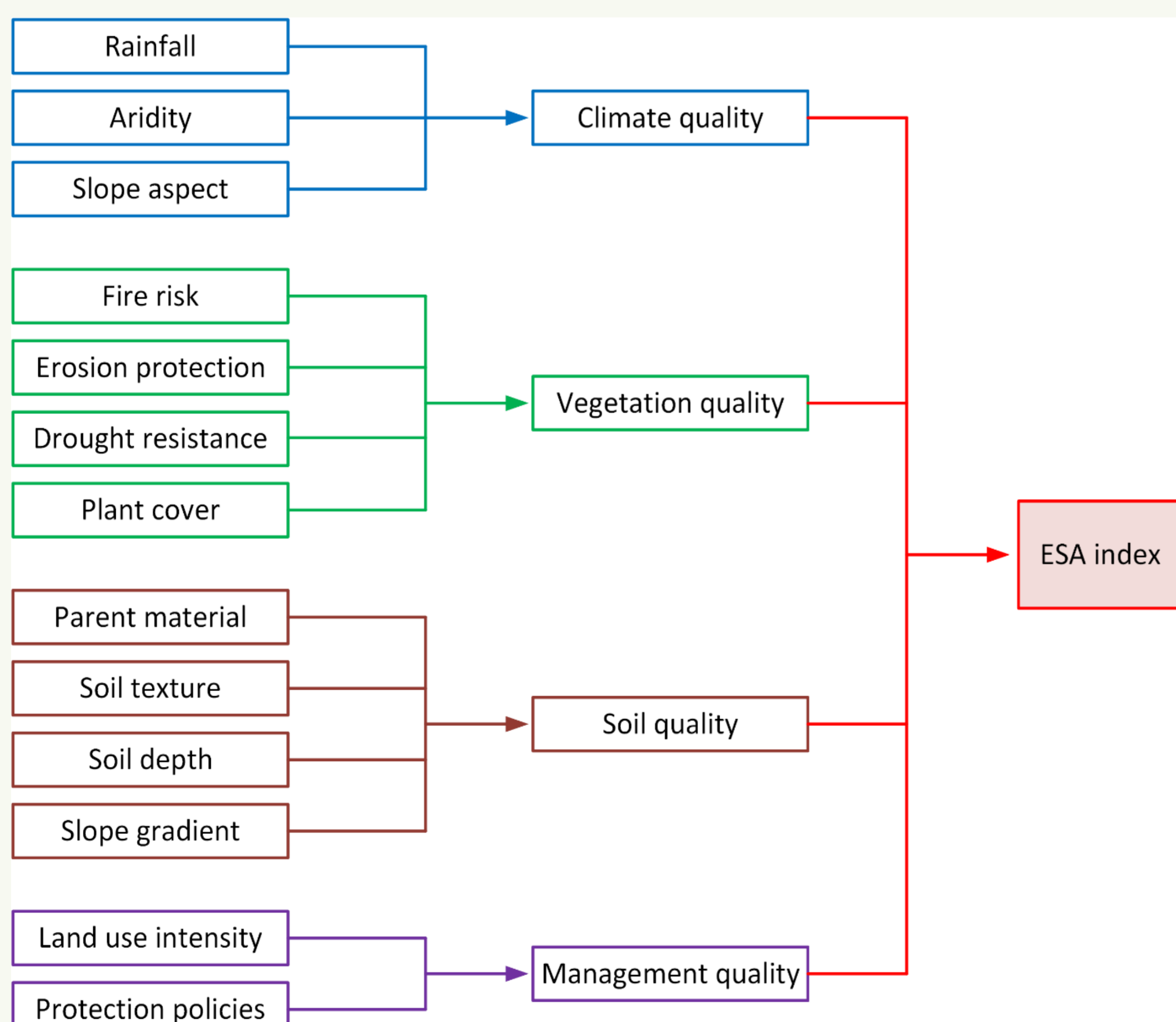


Figure 2. Parameters used for the definition and mapping of the ESAs to desertification

## 4. Results

The results of the four quality indices for the two areas are shown in Figures 3-6 (left: Platanias area and right: Merambelo area).

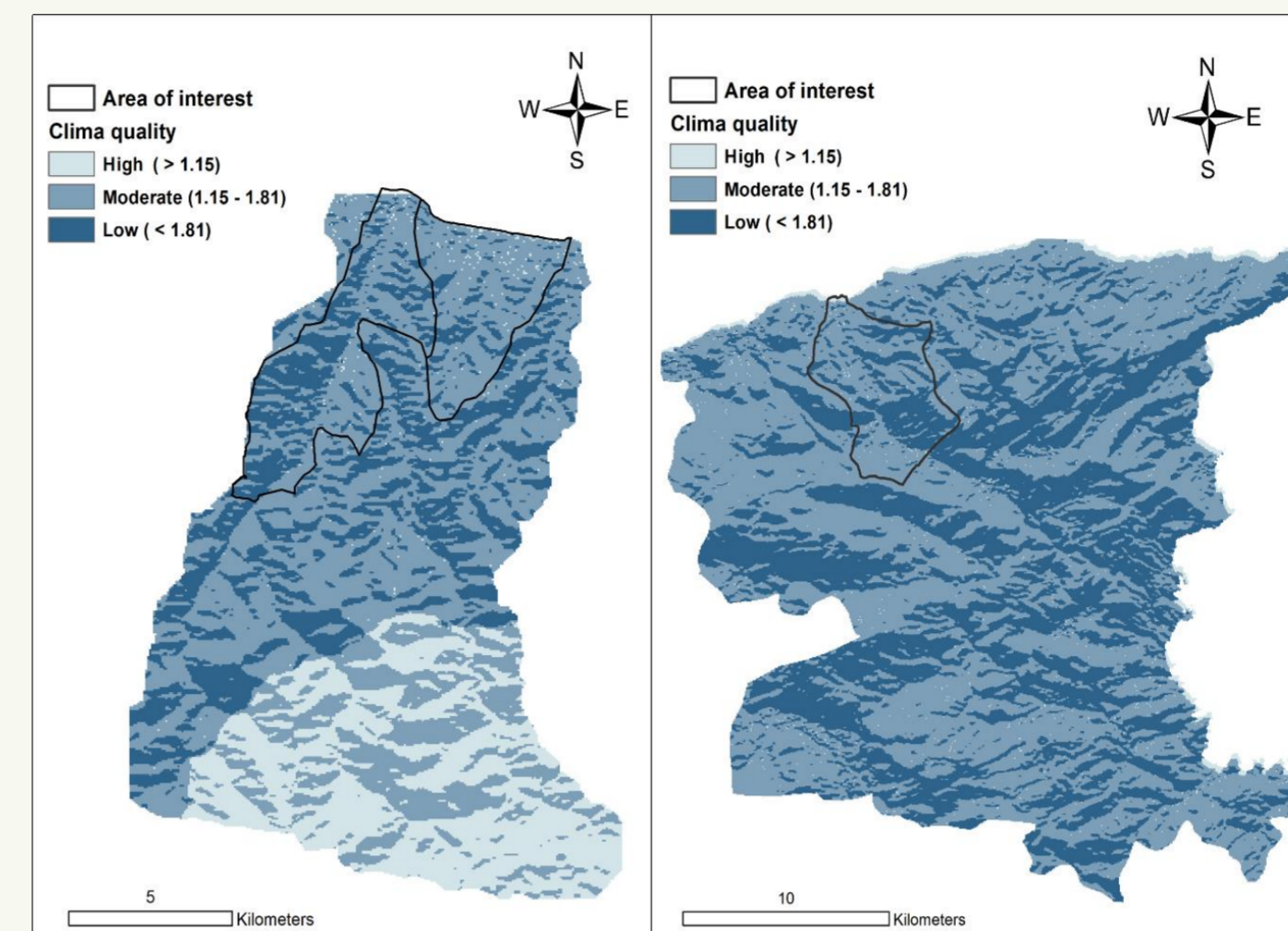


Figure 3. Climate quality maps

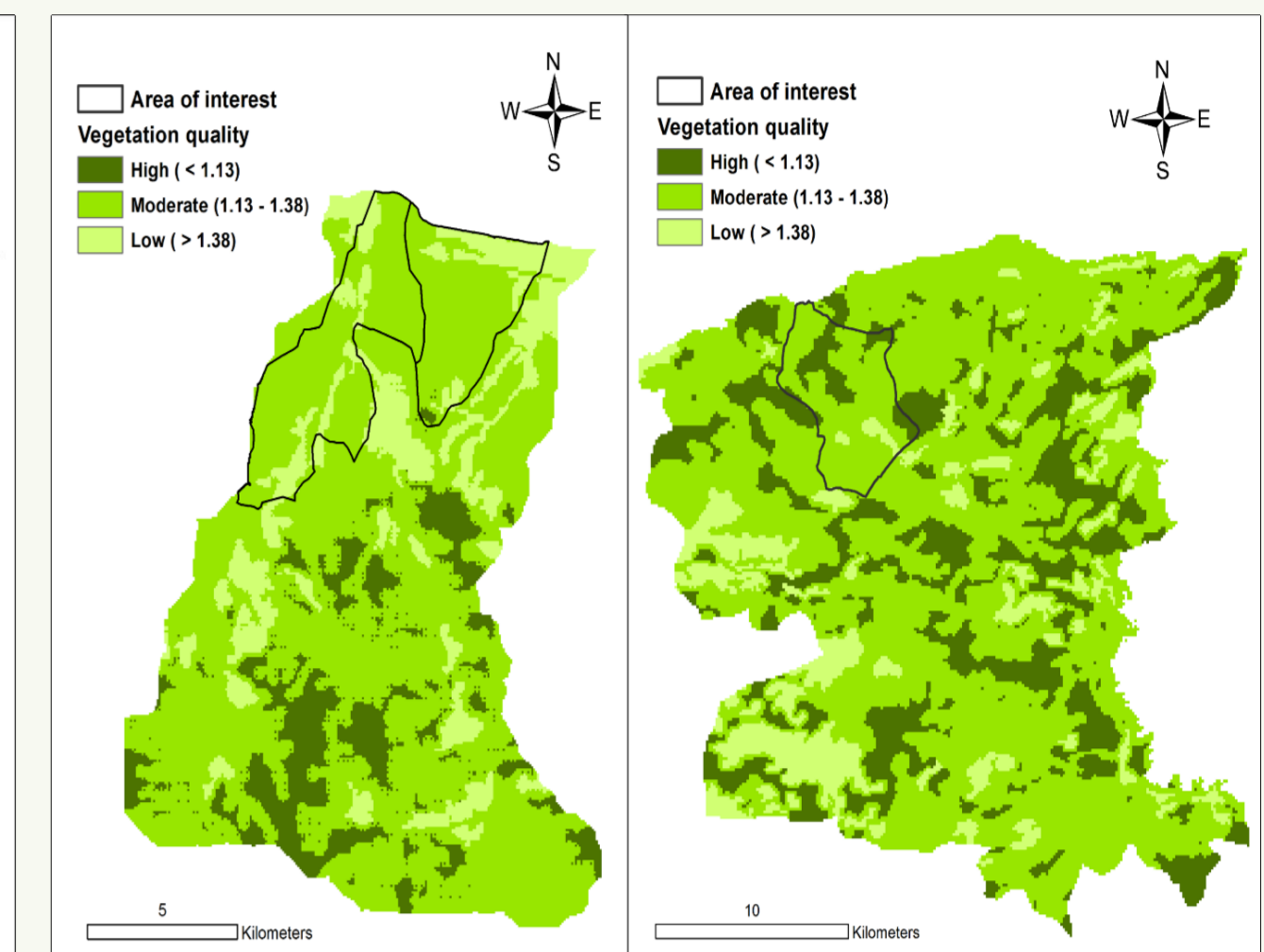


Figure 4. Vegetation quality maps

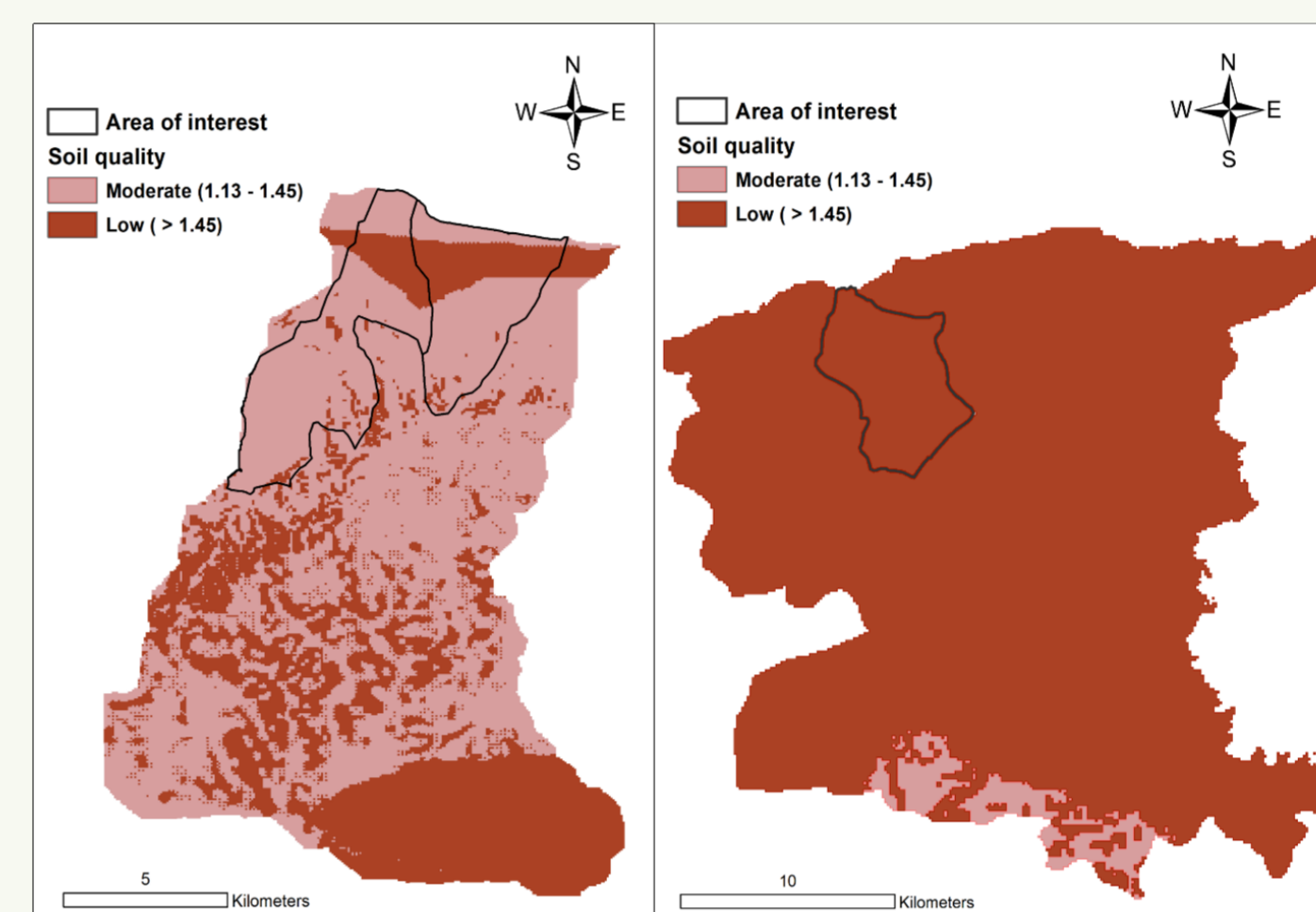


Figure 5. Soil quality maps

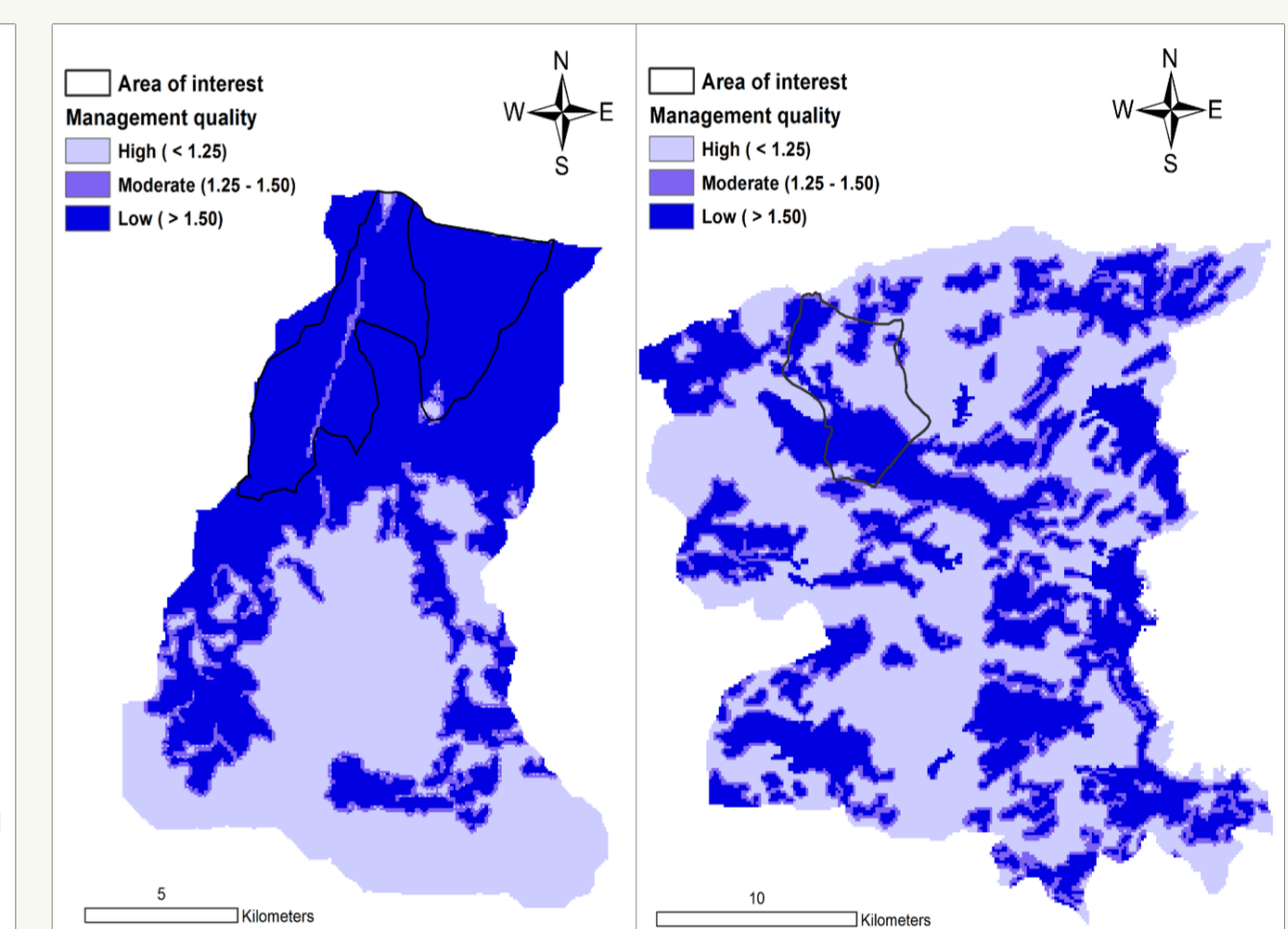


Figure 6. Management quality maps

The four indicators were combined to produce the final ESAI map for desertification. The two study areas were then divided into seven regions characterized by a different degree of desertification risk ranging from **non-affected** to **critical**.

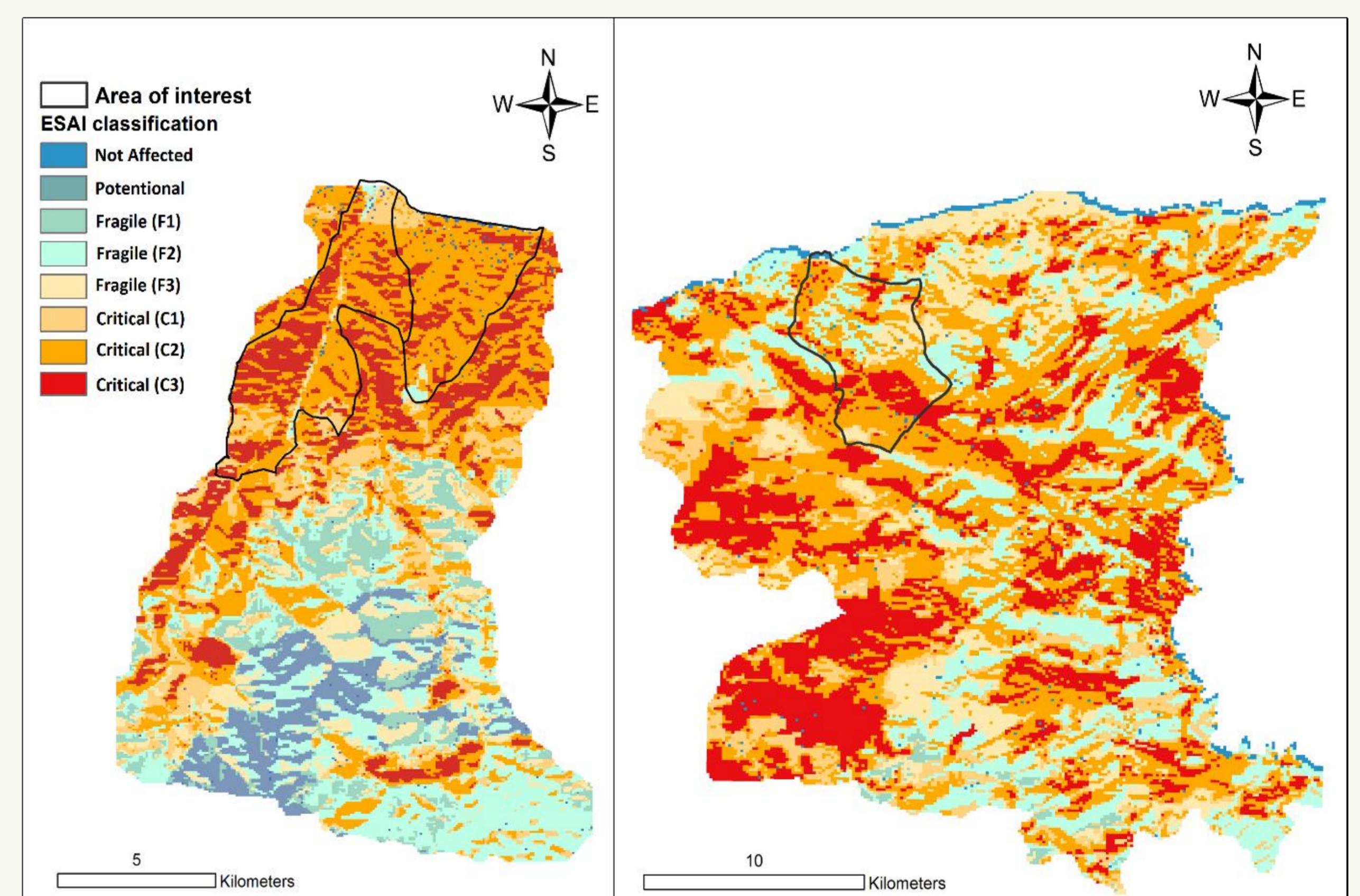


Figure 7. Maps of Environmentally Sensitive Areas to desertification.

## 5. Conclusions

The map of ESAs to desertification indicates that an extended part of the Merambelos area and the northern part of Platanias area can be classified as critical to desertification (Fig. 7). This could be attributed to the lack of water, the soil characteristics and to the non-appropriate agricultural practices.

### ➤ Platanias area

- the northeastern part, receive less precipitation than the southern which is in highest elevation
- the coastal part is characterized by low vegetation quality due to anthropogenic processes
- the southern part has steep slopes and soils with depth less than 30 cm

### ➤ Merambelo area

- receive in general less precipitation compare to Platanias area
- the western part is characterized by low vegetation quality
- the area is characterized by soils with depth less than 30 cm