Using Of Mediterranean Desertification And Land Use Model In Subtropics: A Review

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Abstract- After twenty years from its launch, the Mediterranean desertification and land use model (MEDALUS) is intensively used in both practical applications and fundamental studies. It is applied operationally in the field of climate change in general and desertification sensitivity checking in specific and it is considered a universal environmental sensitivity index. This overview is to cover the interval 1999-2018, it focuses on the main publications in international journals and reports. The project MEDALUS is a unique model that can hold the ability to be very modifiable according to the deferent environment conditions that can be used in and it contain every affected element in the desertification process starting with the climate, soil and vegetation ending with the mankind pressure. This review concluded that this model was widely used across the globe and the deferent environment being the target. On the other hand, we observed that the modification that the authors make to change the MEDALUS to become more suitable for their environmental circumstances. Eventually, this model proves its important role all over the world and we hope in the coming days the authors start to use it in the deferent fields such as determining the transitional zone (the ecotone) which is depending on the same element that MEDALUS have.

Key word: MEDALUS, ESAs, DSI, SQI, CQI, VQI, MQI.

I. INTRODUCTION

Desertification is a type of land degradation in drylands involving loss of biological productivity caused by natural processes or induced by human activities (1). The desertification is one of our biggest problem of our present time because it mean the consequence of a set of important degradation processes in the environments, especially in semi-arid and arid regions, where water is the main limiting factor of land use performance on ecosystems and by it rapid expanding there was a necessary need for a model to detect it before becoming irreversible and this is where medalus model was created by C. Kosmas Laboratory of Soils Chemistry, Agricultural University of Athens, Greece, M. Kirkby School of Geography, University of Leeds, United Kingdom and N. Geeson Medalus Project Office, Thatcham, Berkshire, United Kingdom Project) (2) The Project created by European environment and climate research program To detect and product the environment sensitivity to. Scientists use many ways but one of the most useful tools is the MEDALUS model and of course, there is ether but because of its wide use for mapping the environmental sensitivity to desertification and for the modifiable ability, addition and removed according to the targeting area.

II. The methodology

The threat of desertification and soil erosion in Europe in 1999 made the (2) work focuses on the choice of appropriate indicators at the European/National (RDI) and Regional (ESAs) scales; and illustrates their application to identifying ESAs for three target areas defining during the execution of MEDALUS Project and located in Greece (the island of Lesvos), Italy (the Agri basin in Basilicata), and Portugal (Alentejo region) they realize that is essential to adopt a nested approach so that limited resources are applied cost-effectively it is impossible to identify single fields or communities precisely, but only to identify the regions for which more detailed work is required. These Regional Indicators should be based on available international source materials, including remotely sensed images, topographic data (maps or DEM's) climate, soils, and geological data, at scales of 1:250 000 to 1 000 000). At these scales, the impact of socio-economic drivers is expressed mainly through patterns of land use Regional Indicators may be used as a base-line for allocation of funds and expertise between countries and between regions within a country Each Regional Indicator or group of associated indicators should be focused on a single process The proposed methodology at this scale is through the identification of Environmentally Sensitive Areas (ESA's) through a multi-factor approach based on both a general and a local knowledge of the environmental processes acting first they focus primarily on European Mediterranean environments where physical loss of soil by water erosion, and the associated loss of soil nutrient status is identified as the dominant problem .with wind erosion and salinization problems. they start with determining the various types of ESAs to desertification that can be distinguished and mapped by using certain key indicators for assessing the land capability to withstand further degradation or the land suitability for supporting specific types of land use. The key indicators for defining ESAs to desertification, which can be used at the regional or national level, can be divided into four broad categories defining the qualities of soil, climate, vegetation, and management (stressor indicators). Map of the vulnerability to the desertification Depending on their values, each of the four quality index is classified as high, average or low. Finally, all four are combined to calculate of desertification sensitivity index (DSI) by using the equation(2):

ESAI (DSI) = (SQI * CQI * VQI * MQI)1/4
Which is come from gathering the following equations:
SQI = (texture * parent material * rock fragment * depth * slope * drainage)1/6
CQI = (rainfall * aridity * aspect)1/3
VQI = (fire risk * erosion protection * drought resistance * vegetation cover)1/4
MQI = (land use intensity * policy enforcement)1/2
All of the previous parameters can be taken from the remote sensing data (satellite image) after processing it in the Arc map or any other special software, and many of it can be assembled from the field work and lab analysis.
In present study, thirty-two researches was reviewed and IBM-SPSS statistics 24 was used to test the statistically differences.

IV. Results and discussion:

Thirty-two article researches were reviewed in this study from different subtropics regions to investigated the role of MEDALUS in desertification sensitivity. According to the MEDALUS, the results showed that the subtropics' land is more sensitivity with years (Fig. 1). That may be because of climate change, increasing temperature, and drought (3). As shown in Fig. 2, Brazilian lands were more sensitivity to desertification compared with another region (4, 5). While Italian lands were less exposure to desertification, but there is still losing the green lands (6). Fig.3 showed that the desertification sensitivity percentage of subtropical countries in Africa >Southern America> Asia > Europe is because of a decrease in rainfall and mismanagement of these lands and climate change (7).
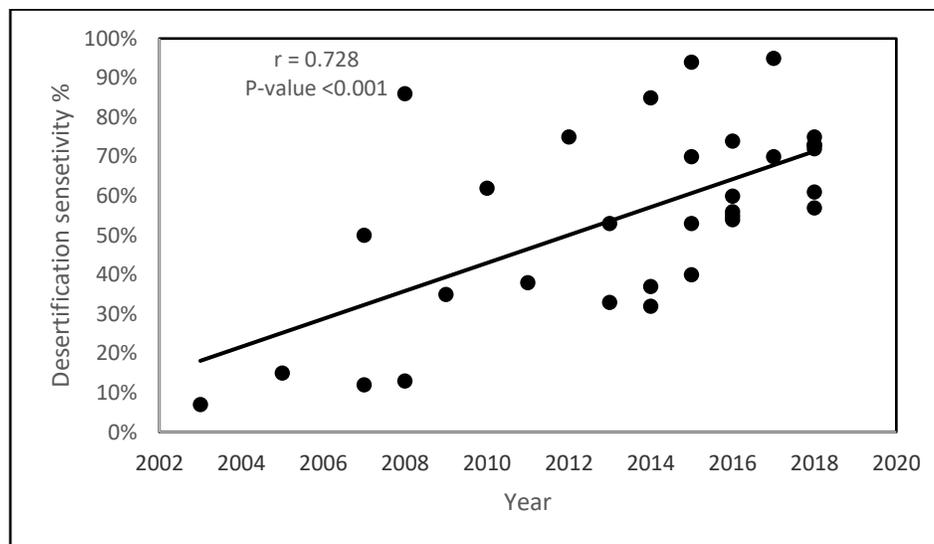

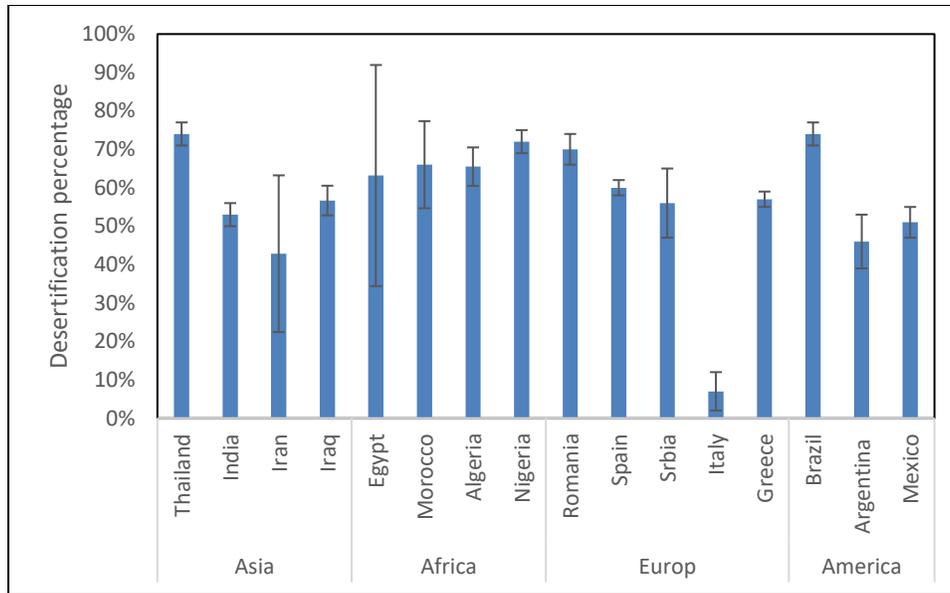Fig.ure 1. The percentage of desertification sensitivity of some lands during sixteen years.

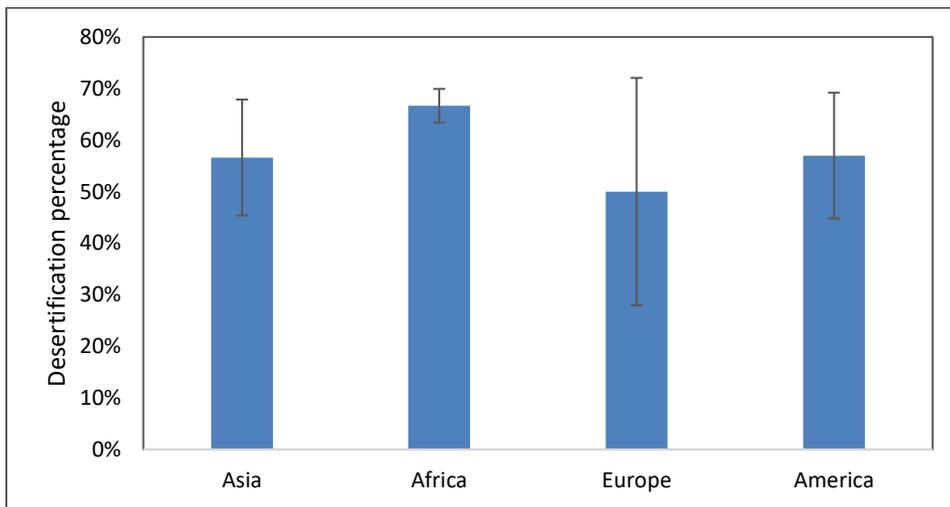Figure 2. The mean of percentage (±SD) percentage of desertification sensitivity in different lands.

Figure 3. The mean of percentage (±SD) of desertification sensitivity in different Continents.

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