

Interactive comment on “Use of remote sensing and GIS in mapping the environmental sensitivity areas for desertification of Egyptian territory” by A. Gad and I. Lotfy

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Gad and Lotfy present an evaluation of areas sensitive to desertification in Egypt based on RS data, existing cartography and the use of MEDALUS model. This study could be of great interest for researchers and managers in Egypt and elsewhere, but to my advice the manuscript needs thorough reworking to improve its scientific value and capture the interest of a broader audience. Authors should be more convincing in showing that their study represents a useful step to combat desertification. Some ways to achieve this may be: (1) to validate the outputs of the model with results from other models or independent measures of desertification and (2) to discuss in further

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detail the outputs of the model, including the identification of the main drivers of desertification in the different areas of Egypt, quantification of the impacts of current and future management practices and climatic conditions, the identification of priority areas for protection and restoration, and recommendations on feasible land use practices to reduce the risk of desertification.

The format could be easily improved by reducing the number of Tables and Figures, and particularly, by improving the way the manuscript is written. I have outlined a few unclear sentences and errors, but I d strongly recommend careful editing of the whole text.

-Abstract

The first part of the abstract should emphasize the relevance of identifying desertification-sensitive areas rather than describing the main features of desertification indicators. Provide some figures. Rewrite according to my previous suggestions.

-Introduction

Authors conclude that implementing the maps of desertification sensitive areas is *rather useful*. This practice can be useful or not, but avoid using *rather* here. No validation of the method or comparison with alternative approaches has been done; so stating that ESAI is a useful method may be correct, but is unsupported by this study.

There is no need to explain USLE and RUSLE here. The importance of the interaction between climatic, geological and human factors can be highlighted by providing a short reference. On the other hand, this interaction is weakly integrated in ESAI, and thus including this topic in the Introduction deserves further explanation.

The introduction discuss some aspects of desertification, its drivers, their interaction, and indicators of desertification, but it does not set the context to present the main objectives of the study. The study focuses on the application of ESAI method to identify sensitive areas in Egypt. It is a descriptive study, with no scientific hypotheses to be

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tested. There is no validation of this method or comparison between the outcomes of this and similar methods to quantify sensitivity to desertification. But still, descriptive studies have some value, especially for researchers and managers willing to apply the same or alternative methodologies, and use meta-analysis and synthesis to obtain new perspectives on this topic. The Introduction should thus focus on similar cases, identify limitations for the application of EISA methodology (see below), discuss the advantages of this methodology as compared to alternatives, discuss the improvement over existing studies such as OSS (2003), and present some type of performance evaluation (in terms of time invested, information needs, usability, etc.).

-Materials and methods

Reference to the software and methods used should be provided.

Tables 1-4 could be merged into one single table or added as an Appendix. Other tables can be also condensed to avoid an excessive number (18).

Table 2 . The class *very thin* is for soils <0.25 cm depth, or else there is no class for soils 0.15-0.25 cm depth.

Table 5. The first class should be for $SQI < 1.13$ and not > 1.13 .

Explain the difference between ESA for desertification and DSI in the text.

Provide further details on the mapping protocol: scale, resolution for each input variable, interpolation methods, accuracy.

Contents of Figure 1 should either be described in the text or presented as a Figure (with a succinct description in the text), but avoid a detailed description on how the indices were calculated, as Figure 1 becomes redundant.

-Results and discussion

There is no such discussion. Results are described, but not situated in a scientific context, compared with similar studies, integrated, etc.

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Recommendations should be based on data. Avoid using general statements and use your own data to elaborate sound and specific recommendations. Some desertification drivers such as those related to vegetation can be altered by human action, whereas others can not or at a very high cost. Identify priority areas for actions to combat desertification, evaluate the effects of changes in land use in different areas; Critically evaluate the outputs of the exercise with independent measures of desertification sensitivity.

I d suggest the authors consider that ESAI is a simplified protocol, focused on soil protection, paying no attention to the quality of the vegetation cover or other aspects of ecosystem function and composition (e.g., water use, nutrient cycling, fauna abundance and activity, etc.).

Conclusions should not be a mere condensed repetition of the previous section.

I d recommend condensing all thematic figures (i.e. soil, climate, vegetation) in a single figure.

Figure 2 can be removed or moved to an Appendix if space is limiting. Alternatively it should be discussed somewhere in the manuscript.

-Technical corrections (not a complete list)

42/1. First *part* instead of *art*. 42/20. The sentence *Arc-GIS 9 software was used for the computation and sensitivity maps production* is a bit awkward; suggested rephrasing: *Calculations, including the production of sensitivity maps, were performed using Arc-GIS 9 software (reference)*. 42/22. *soils* instead of *soil*. 42/22. *The results show that the soil of the Nile Valley are characterized by a moderate SQI, however the those in the interference zone are low soil quality indexed*. This sentence is unclear and needs rewriting. *Interference zone* has not been described before. When stating that SQI and other are high/low authors should mention the other term of the comparison. They were high/low as compared to what? 42/23. *The dense vegetation

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of the valley has raised its VQI to be good, however coastal areas are average and interference zones are low.* Unclear, please rewrite. 42/25. ESA not defined (better use ESAI or ESA throughout). 42/26. Use no decimals. 43/2. The sentence *as they give more likely quantitative trend for frequency of sensitive areas* is unclear. Are authors referring to temporal trends? Time has not been previously presented in the text. 43/4. *remote sense* instead of *space data* 43/13. *MEDALUS* instead of *MEDLUS*. 43/24. This is obvious if UNCCD definition of desertification (which involves human intervention) is considered. 49/3. *CONOCO* instead of *CONCO*. 53/32. World Meteorological Organization (WMO)? Figure 2 heading: define *TM*. etc.

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