

Interactive comment on “Identifying areas susceptible to desertification in the Brazilian Northeast” by R. M. da Silva Pinto Vieira et al.

Anonymous Referee #1

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GENERAL COMMENTS:

The work of da Silva Pinto Vieira et al. shows relevant information about susceptibility to desertification in NE Brazil using an interesting methodology such as ESA Index. This research is valuable mainly by two reasons. On one hand, this methodology is very useful to identify areas with potential problems of desertification, particularly in NW Brazil where millions of hectares are in risk. And, on the other hand, this work has involved a great effort of data and cartography collection dealing important factors such as climate, geology, soils or land management.

This article is potentially interesting for SOLID EARTH readers, because it is the first time that this kind of methodology is used in NE Brazil, where desertification processes induced by land management, among other causes, have not been enough

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studied so far. Furthermore, the proposed research objective is achieved. However, this work must be improved considerably in terms of presentation quality, particularly in the methods and results sections, previous to be accepted for publication in this journal. Therefore, I suggest a “Major Revision”.

The manuscript is not easy to read because, in my opinion, it is not well structured. Indicators and indexes (methods and results) are not shown in a logical sequence throughout the text. Some parts of the text should be rewritten and/or restructured and some indexes or indicators should be rethought or justified. Some linguistic mistakes have also been detected (particularly some literal translations from Brazilian Portuguese to English) but I am not the proper person to suggest corrections in this sense because English is not my mother tongue.

The sequence shown in this article is the following:

- Work presentation: [1] Introduction and [2] Study area (Well done!).
- Relevant information (mixed in 12 Methods and 5 Results sections): [3] Indicators, [4] Indexes and [5] ESA Index (It look atomized and confused!).

Well, if you read Lavado Contador et al. (2009), the most-cited article dealing ESA Index, you can see that they present the methods chapter in only 3 sections (after Study area): [1] Environmentally Sensitive Areas, [2] Map validation and [3] Statistical methods. In the first section, they perfectly explain, only using 2 tables and some paragraphs, how ESA Index and their indexes were obtained and what indicators provide (please read pages 132-135). Please, consider a similar structure for your article.

Related to graphs and tables as well as bibliography section, some formal changes are still needed. Furthermore, some indexes or indicators are called with different names. Even, map validation is commented at the end of the text but it is not referred in the methods section. These kinds of corrections and/or suggestions are better explained below in the specific comments.

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SPECIFIC AND TECHNICAL COMMENTS:

Abstract

Line 6: "driving factors". I suggest using "influencing factors".

Line 8: "HDI". I suggest not using acronyms in the abstract.

Line 14: "83.35 km²". I suggest that it is rounded to one decimal place.

Introduction

Page 3228, lines 23-25: Overgrazing is one of the main causes of the increasing of bare soil surfaces (e.g. Pulido-Fernández et al., 2013: page 22, figure 6)

Page 3228, lines 25-26: References in the text should be sorted in a logical order: alphabetical or chronological.

Page 3229, lines 1-6: The Introduction chapter is divided in 13 paragraphs. The first one addresses the global situation of drylands and it goes on in the 4th paragraph. Therefore, paragraphs 2 and 3 should be deleted.

Page 3229, line 7: "Forty four percent". I think it is much better to use always number in spite of words.

Page 3229, line 21: "relief". It is much logical to use "landscape"

Page 3230, line 20: "Lavado Contador et al., 2009a". Is not necessary to add a letter when is the first and only time that you cite works by this author.

Material and methods

Study area

Page 3231, line 21: The coordinates do not match with those displayed on the corners of the Figure 1.

Page 3231, line 10: "flash". I think that you would to write "floods"

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Selection of the susceptibility indicators

As above mentioned, after study area the methods must be re-structured and integrated in less sections (not a section for each indicator). Table 1 is very interesting and appropriated for this section

Page 3233, line 3: "They were grouped in three sets: physical, biological and socioeconomic quality indicators". I completely disagree with this paragraph. I think you have to state what indexes you use and what indicators are used in each index. It is not logical to separate indicators in 3 groups and after to use 4 indexes. It makes confusion in the reader.

Topography data, geology, geomorphology and pedology maps

Page 3233, line 8: "altimetry". I think is much better to use "elevation"

Page 3233, line 9: Why do you use surface break-lines? Please explain it better.

Page 3233, line 14: "reinterpreted". Probably the most correct is to write "rescaled".

Page 3233, lines 15-16: "Valeriano (2008) and Valeriano and Rosetti (2008)". Please explain briefly in which consists this procedure because these works are written in Portuguese.

Land use and land cover maps

Page 3233, line 21: "Ninety". It is better using numbers.

Human development index (HDI)

What happens with these areas that their HDI has a value between 0.60 and 0.69? Please modify properly the intervals.

Method

Why Environmental Quality Index does not include climate or vegetation data? Please renamed to Soil Quality Index or Topographical Quality Index or something similar or

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to modify properly. Environmental is better using only to ESA index.

Why Climate Quality Index is only composed by Aridity Index? You could add some variables such as aspect.

For example, Lavado Contador et al. (2009) use 4 indexes: Soil, Vegetation, Climate and Management. Regarding to Climate they use much many variables.

Determination of the Environmentally Sensitive Area Index (ESAI)

Page 3237, lines 11-13: Please be consistent in the proposal of intervals. What happens from 1.50 to 1.75?

Results and discussion

Page 3238, line 18: "Table 7". It is in the Table 8.

Page 3239, lines 8-9: This sentence is bad expressed. Please rewrite it.

Section 3.3 "Climate Quality Index". That is the aridity index. Please add more indicators to this index.

Pages 3239, lines 14-24: These lines do not match with Climate Quality Index. They should be written in other part of the text such as that related do Management Quality Index.

Page 3240, line 4: "lower". I think that it should be written "lowest".

Pages 3240 and 3241, lines 26-27 and 1-3: Map validation should be explained in the methods section. Map validation is a key issue to make reliable the information provided in the maps.

Conclusions

Page 3241, lines 15-18: This sentence looks contradictory. Please rewrite it. References

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I think that to add the doi of each article is not necessary.

Page 3242, line 9: "and Sala, O.A.". That is "Sala, O.E."

Table 1

"Declividade" must be translated into English by "slope" and not by "declivity".

Table 3

This table does not provide relevant information. Please remove it.

Tables 4, 5, 6 and 7 are not properly referred in the text.

Table 8

The differences between 2 periods are relatively low. Why 2000 and 2010 are compared? That is not stated in any part of the text. Are there any new political rule or law?

Figure 1

What does it mean these capital letters? Are they acronyms of the name of federal states? Brazil and Equator are shown in Portuguese. Please correct it.

Suggested references:

Lavado Contador, J. F., Schnabel, S., Gómez Gutiérrez, Á., Pulido Fernández, M., 2009. Mapping sensitivity to land degradation in Extremadura. SW Spain. *Land Degradation and Development* 20, 129-144.

Pulido-Fernández, M., Schnabel, S., Lavado-Contador, J. F., Miralles Mellado, I., Ortega Pérez, R., 2013. Soil organic matter of Iberian open woodland rangelands as influenced by vegetation cover and land management. *Catena* 109, 13-24.

Interactive comment on *Solid Earth Discuss.*, 6, 3227, 2014.

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