METHODFINDER

Practitioner's Guide:

Identification of Desertification Prone Areas

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CoDeL
Combating Desertification in Lebanon

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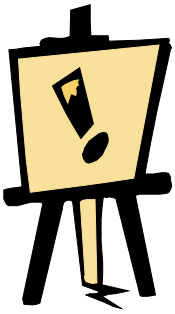
Identification of Desertification Prone Areas

Brief Description



Success in combating desertification will require an improved understanding of its causes and impacts and especially the linkages between desertification and climate, soils, water, land cover and socio-economic factors.

Desertification is a condition of human-induced land degradation that occurs in arid, semi-arid and dry-sub humid regions (precipitation/potential evapotranspiration or P/ETP 0.05 to 0.65) and leads to a persistent decline in economic productivity of useful biota related to a land use or production system. Climatic variations intensify the decline in productivity while restorative management mitigates it. Therefore, the following definition has been adopted by the United Nations Convention to Combat Desertification (UNCCD).:

*"**Desertification**" means land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.*

The following method provides a practical approach for defining desertification prone areas in a region, country or area. The method combines the use of existing data and information which is then presented spatially in form of thematic maps. By overlapping these thematic maps the desertification prone areas can be easily deduced.

Picture 1: Protected Forested area

Picture 2: Forested area with signs of degradation

Picture 3: Degraded areas

Picture 4: Area being rehabilitated

Identification of Desertification Prone Areas

Main Users / Area of Application

Regional and land use planners, technical staff

Purpose of the Method

After the UNCCD (United Nation Convention on Combating Desertification) was approved, the need to assess those areas sensitive to degradation processes and then define priority action areas, were raised as important steps in the study and comprehension of desertification processes. This was seen as being an important step in order to be able to efficiently combat the desertification process.

The following method provides a systematic procedure for the classification of a country, region or territory into levels of sensitivity to desertification. After apply the method, national, regional and local level planners will be able to determine so called "hot-spots" that require high priority as far as remedial action are concerned. The sensitive areas may require specific planning and management activities in order to either slow or better still reverse the degradation process. The complexity of the desertification process invariably requires a multi and intersectoral approach to be undertaken, something that has to be considered during the planning process.

Identification of Desertification Prone Areas

Advantages

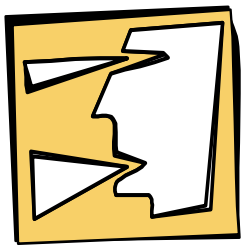
- Method has been tested and validated in the Mediterranean area
- Relatively easy to apply and it is replicable
- Combines subjective and objective criteria
- Can add more indices to the system that are of relevance for a specific country
- Can be easily updated if newer data is provided
- Cost of updating is low
- Provides a good overview of priority areas or "hot-spots"
- Integrates different information layers into a single index
- Type of data needed is usually available at the national level
- Provides insight into mitigations actions required
- Reduces areas where detailed assessments need to be undertaken
- Can use discreet (i.e. land use map, soil map etc.) and continuous data (i.e rainfall map, topography, etc.)

Limitations

- Listing of possible solutions at an early planning stage easily hampers objective and open-minded problem analysis
- Requires consistent spatial data, in other words data has to be on the same level of spatial detail
- Requires know-how in Geographical Information Systems (GIS)
- The individual indices are not weighted to the local problem conditions, the indices have an equal weighting
- The method is a simplification of a complicated process
- Does not include all possible causes of desertification

Identification of Desertification Prone Areas

Principles & General Procedures



Six steps for defining desertification prone areas

Land degradation involves a complex set of processes or factors, which interact in space and time leading to a decrease in land productivity. Thus, it is necessary to identify the various indicators, which will provide the relevant information to define the desertification prone areas.

Many aspects should be considered. However, if every possible variable has to be measured then it is unlikely that the analytical work will be completed. Therefore, as a first step the analytical work should concentrate on examining *major factors* affecting land degradation. Once these have been identified more detailed analysis can be undertaken. The following six procedural steps provides a guidance for using the the major factors causing desertification to define the sensitive or desertification prone areas.

Step 1:

Identification of the indices/factors and the necessary data needed to derive the indices. Four essential considerations have to be taken into account when selecting these factors:

- The correlation to the degradation phenomena or the environmental critical state;
- Availability of data at a suitable and compatible scale ;
- Existence or ease of extrapolation from existing data sources;
- Ease and affordability to update the information, especially if it is to be used for monitor desertification process.

Step 2:

Elaborate a model where all the indicators are listed, including the relevant data needed to calculate them. Define the relationships that connect all the data and indicators.

Step 3:

Map all the initial data into data layers, which could be overlaid in a GIS (Geographical Information System).

Step 4:

Apply a re-classification scheme with values ranging from 1-2 to each component of the initial data layers. The value "1" is assigned to components which contribute *least* to desertification while "2" is assigned to components which contribute *most*. The range between 1 and 2 reflects relative role.

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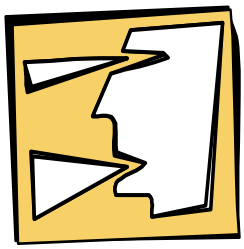


Step 5:

Calculate each index based on the pertinent data layers. Each index-layer is the result of the overlay process in the GIS of the different relevant data layers and it is estimated as the geometric mean of its own sub-layers, according to the following formula:

$$Index\_x = (layer\_1_x * layer\_2_x * layer\_3_x * ..... * layer\_n_x)^{(1/n)}$$

Where x is the index in consideration and n is the number of layers used for a specific index.

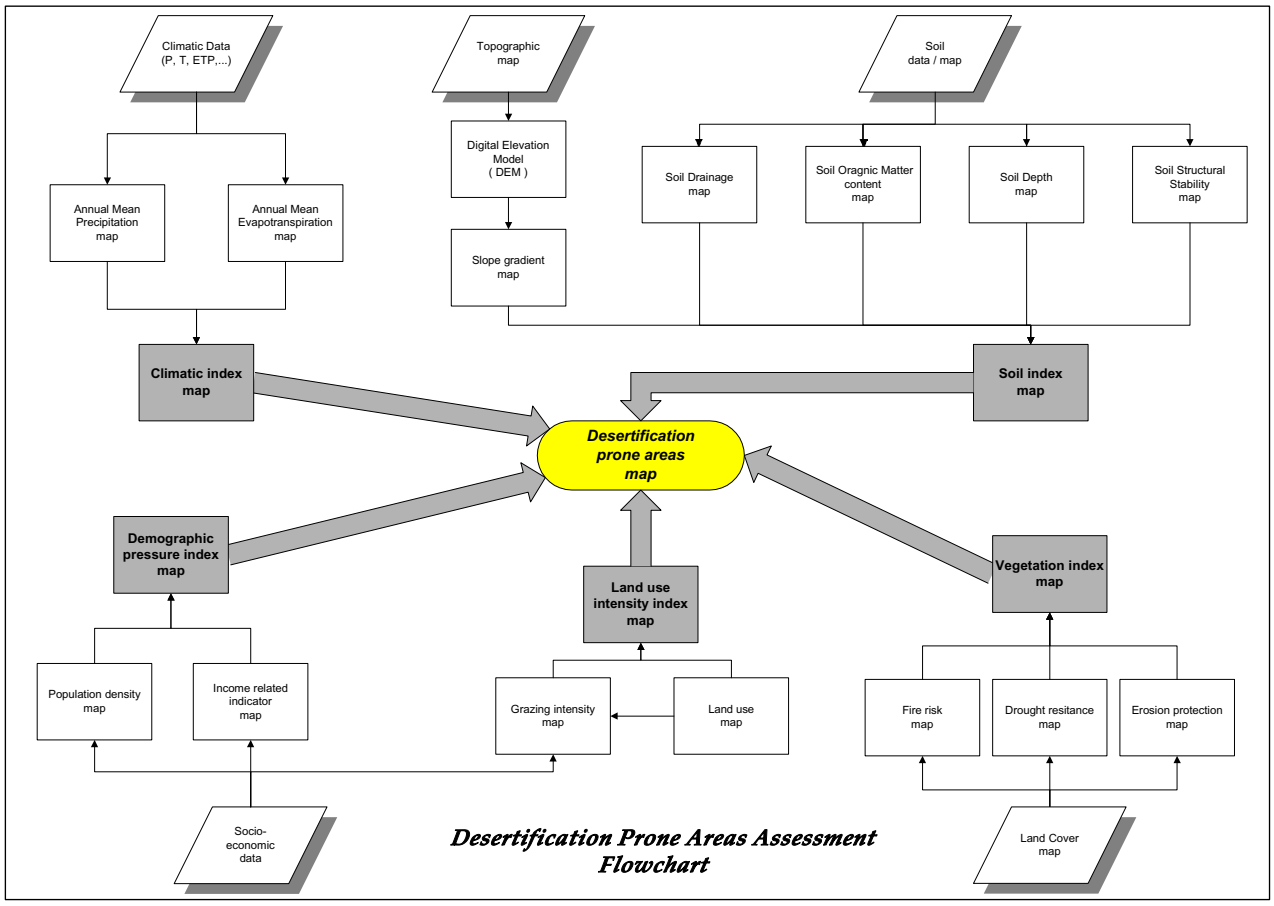
Step 6:

Calculate the DPA (Desertification Prone Areas). The DPA is the result of the overlay process in GIS of the different indices and is estimated by the geometric mean of the individual indices:

$$DPA = (index\_1 * index\_2 * index\_3 * ..... * index\_n)^{(1/n)}$$

Where n is the number of indices used for calculation of DPA.

Figure 1: The DPA model approach



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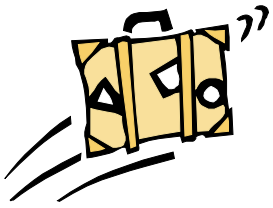

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