

Identification of Desertification Status Using Gis Modelling, A Case Study of Pavagada Taluk in Karnataka



Geography

KEYWORDS : Desertification, GIS Model, Climatic factors, Vegetation, Anthropogenic activity

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ABSTRACT

The present study has framed to assess the process of desertification in Pavagada taluk in Karnataka state. The assessment of total four major parameters was considered such as, climate, soil, vegetation and anthropogenic activities. The selected factors were used as input data in the created GIS based model. The result obtained from the model has been classified into three categorize as Low, Moderate and High desertification area. The result of study shows the spatial vulnerability of desertification in study area.

Introduction

Karnataka is one of the states in India which affected severely by drought followed by desertification. The term desertification refers the degradation of land in arid, semi-arid and dry sub-humid areas that initiated by natural as well as anthropogenic activity. Around the world every year total twelve (12) million hectares of land has converted to desert (Ministry of Environment, Forest and Climate Change New Delhi, 2015). As large area of Karnataka has covered by semi-arid and sub-humid. The state has countersigned desertification in recent decades. The growing human and livestock population, mining activities, improper management of land use and land cover, vegetation degradation and encroachment of forest also destroyed the area vastly. It is necessary to analyze the natural and anthropogenic influence on land to understand the process of desertification completely. Therefore, the present study has conducted to assess the influence of natural and anthropogenic activities for the desertification in Pavagada taluk.

The Pavagada is one of the most backward taluk in the state, that has been witnessing severe drought very often, resulting of water scarcity, loss of vegetation and fodder. Hence the proper study of desertification process in the taluk would useful for the management purpose. The development of spatial technologies in recent decades made spatial analysis easier with several comfortable models. The currently available GIS software allows the user to build a model using predefined coding, these models are very useful to perform the analysis for different places by different users. The present study has built a model for the assessment of desertification using ArcPy script in ArcGIS environment, which can be used for desertification assessment for any region that similar to present study area.

Methodology

Total four main factors have been used in the present study to build a model and for the assessment of desertification, such as soil, climate, vegetation and anthropogenic factors. The selected each factor consists of few parameters that influence the desertification. The soil factor consists of four parameters such as, slope, soil texture, soil drainage and soil depth. The climatic factor consists of four parameters such as, standard precipitation index, aridity and average rainfall. The anthropogenic factor also consists of four parameters such as, population pressure, land use and land cover, cattle pressure and grazing level. The vegetation factor consists of only normalized difference vegetation index (NDVI) parameter (fig:1).

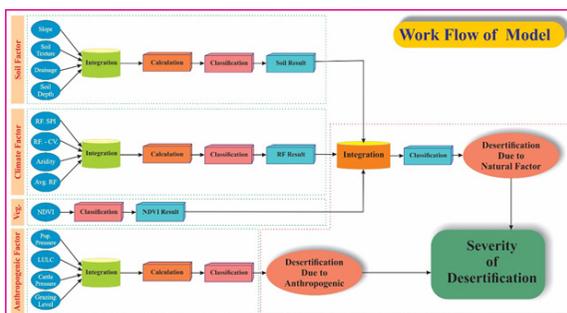


Fig:1 Workflow of Prepared Model

The parameters in the selected factors have been mapped using GIS, and it has been classified into separate classes. The classified classes have been assigned by suitable weightages based on the influence of desertification, that shown in fig 2. For example, in the case of slope, the higher the weightage has given to steep slope while plain area has assigned with least, and in the case of soil depth, higher weightage has assigned to shallow depth while least value has assigned to deep depth.

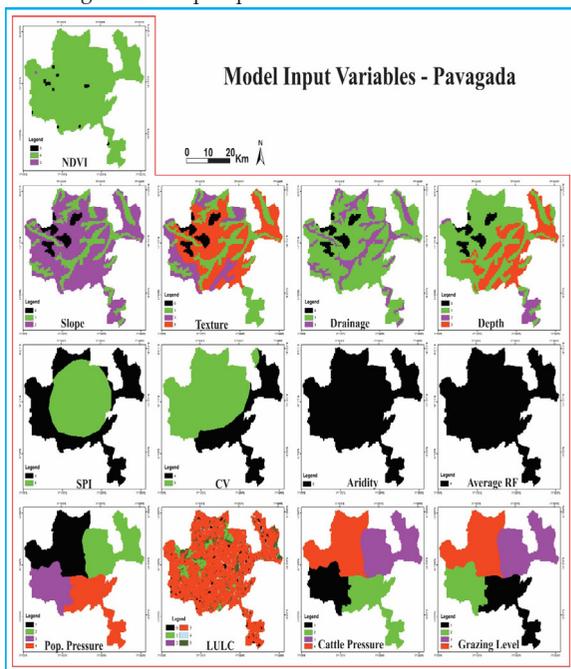


Fig:2 Parameters used in Model

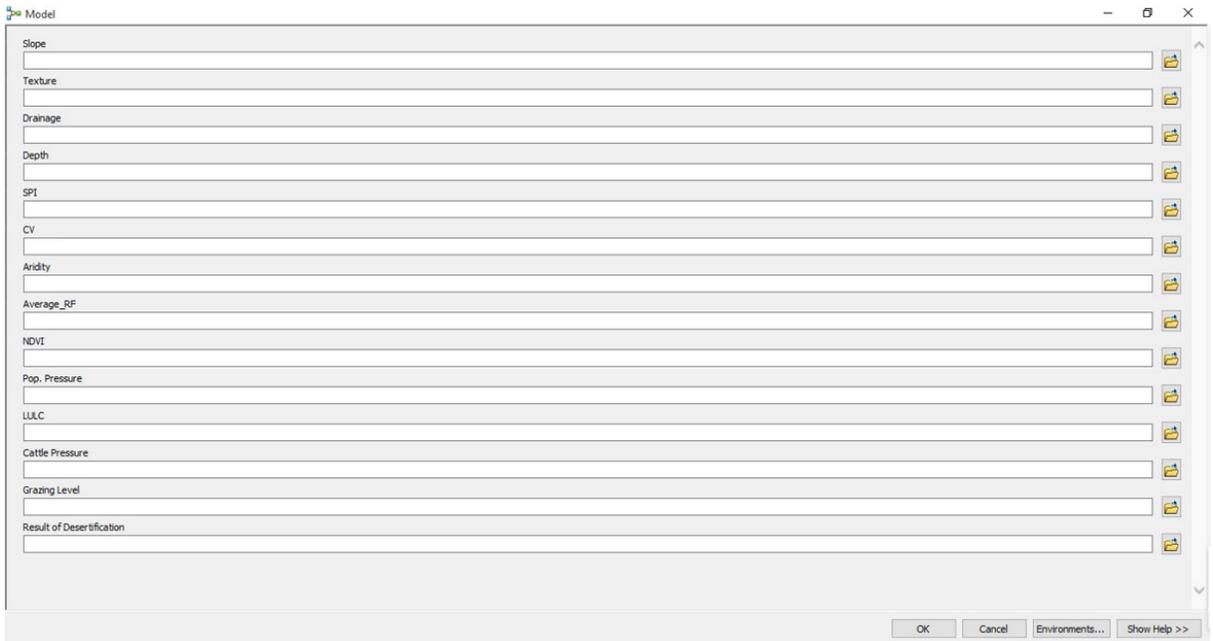


Fig: 3 Graphical User interface of Model

Once the assigning of weightage for each parameter was over, the parameter has put into the model using created Graphical User Interface as shown in fig.3. The model integrates the parameters through multiplication of each other and produces the influence of desertification by natural and anthropogenic activities separately, further these two factors result integrated together to produce the result of overall desertification process in the area.

Result and Discussion

The model produces the result as integer values in numerical by integrating the natural and anthropogenic factors, these values have been classified into three classes to represent the vulnerability of desertification. The classified area has been mapped and characterized as Low, Moderate and High susceptible areas in the taluk (Fig:4). The calculation each class areal extension shows that, 612.64 Km² area comes under low desertification class, 348.88 Km² area comes under moderate desertification class and 325.2 Km² area comes under high desertification class.

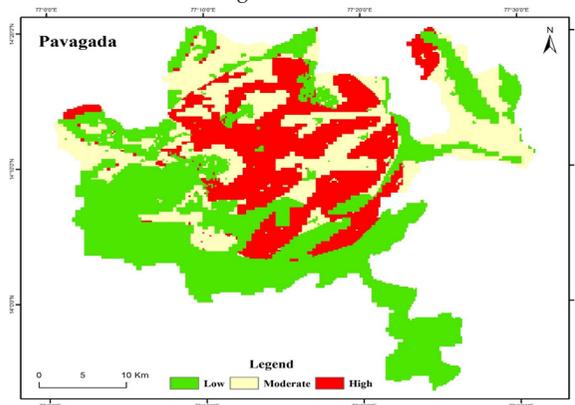


Fig:4 Susceptibility of Desertification

Conclusion

The study shows the necessary factors and its parameters for the analysis of desertification. This also explains the use of GIS based model for the assessment of desertification using different parameters. From the result it is clear that,

vast area is covered by low, reasonable area is covered by moderate and low area is covered by high susceptibility of desertification. The study can be extended with more parameters with the modification model that would increase the accuracy of result.

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