Data Article

Data on identification of desertified regions in Anantapur district, Southern India by NDVI approach using remote sensing and GIS

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\section*{Abstract}
Present dataset aims at the inventory data on preparation of Desertification Status Maps (DSM) for the first time in semi-arid region of Anantapur district in the state of Andhra Pradesh, South India by applying Normalized Difference Vegetation Index (NDVI) with acquired Remote Sensing (RS) satellite imageries and processed in ERDAS Imagine and ArcGIS software's. The NDVI has been classified into five such as water body, vegetation, fallow land, degradation land, and desertified land. Further, degradation land has been decreased to 4.87\% which lead to desertification in the study region. The current research data will be resourceful to the environmental scientists and planning agencies who can utilize optimum for sustainable development and good governance in land degradation, desertification, and conserve land resources.

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Specifications Table

| Subject                  | Environmental Geology |
|--------------------------|-----------------------|
| Specific subject area    | Remote Sensing and GIS|
| Type of data             | Tables and Figures    |
| How data were acquired   | Topographical sheets from SOI, ASTER DEM, Land sat 4–7 and Land sat 8 data from USGS website, Soil data from Irrigation department, Anantapur and GPS (Germinetrix 10) field surveys processed and analyzed |
| Data format              | Raw and analyzed      |
| Parameters for data collection | SOI maps are georeferenced, Geometric corrections were made in ArcGIS. NDVI and SAVI were carried out in ERDAS Imagine software and Geometric data procured by using ArcGIS 10.4 software |
| Description of data collection | DSM have been prepared for knowing the rate of migration of desertification for the past 29 years |
| Data source location     | Bommanahal Mandal, Anantapur district, Southern India (Fig. 1) |
| Data accessibility       | Data is available in the article |

Value of the data

- Data showed the first catalog on the DSM (Desertification Status Mapping) occurrences in the semi-arid region of Anantapur District, Southern India, during 1990, 2000, 2010, and 2019.
- The analyzed data is useful to the stakeholders and decision makers for governance to implement the sustainable development for eco-friendly ecosystem in the desertified regions.
- Can be utilized for future research in monitoring various studies and preparations of natural hazard zone maps to assess the desertification in future.
- Taking the data into account, it can be realized that the majority of land degradation and desertification is happening on the eastern side of the Hagari/Vedavathi River.

1. Data

1.1. Study area

The study area, Bommanahal, is the southern-most point of Anantapur District in the Rayalaseema region of Southern India and lies in the SOI topographical maps 57A/16, 57B/13, 57 E/4, and 57 F/1 between 13° 40’ and 15° 15’ Northern latitude and 76° 50’ and 78° 30’ Eastern longitude (Fig. 1). It is geologically formed by older groups of metamorphic rocks that belong to the Archean and younger groups of Sedimentary rocks of Proterozoic age (Fig. 2) [7,8,11]. Geo-

Table 1
Lithology, geomorphology, and soils data.

| Thematic layers | Parameters                                    | Area (km²) | Area (%) |
|-----------------|-----------------------------------------------|------------|----------|
| Geology         | Gray granite/pink granite                     | 6.72       | 2.19     |
|                 | Hornblende - biotite gneiss, Biotite gneiss, Migmatites | 279.96     | 90.23    |
|                 | Quartzite; BIF/BMQ/Ferruginous Quartzite      | 3.57       | 1.16     |
|                 | River/Water body                              | 19.61      | 6.42     |
| Geomorphology   | Denudational Origin-Pediment-Pedi Plain Complex | 268.71     | 87.85    |
|                 | Structural Origin-Moderately Dissected Hills and Valleys | 5.47       | 1.78     |
|                 | River/Water body                              | 20.41      | 6.67     |
|                 | Aeolian Origin/Sand/Sand dunes                | 11.28      | 3.68     |
| Soils           | Gravelly clayey moderately deep desert soils  | 239.88     | 78.42    |
|                 | Loamy to clayey skeletal deep reddish brown soils | 18.4       | 6.01     |
|                 | Gravelly clayey moderately deep red soils     | 23.39      | 7.58     |
|                 | Fine loamy gravelly clayey shallow reddish brown soils | 11.82      | 3.86     |
|                 | Water bodies                                  | 12.57      | 4.11     |
morphologically, the study area has geomorphic changes due to wing action where alluvium is seen along the course of the Hagari/Vedavathi River [8,10]. A pattern of sand dunes sand sheets are also spread over the course of the Hagari River that are migrated by the action of wind in the study area (Fig. 3).

A range of soils present in the study area are shown in Fig. 4. At the same time, Lithology, Geomorphology, and soil data has shown in Table 1. On the other hand, NDVI of the study area of four different years has been provided respectively in Fig. 5(A) (year 1990), (B) (year 2000), (C) (year 2010), and (D) (year 2019), that are the primary Desertification Status Maps (DSM) of the study region [1,2,4]. Statistical data of NDVI for the past 29 years i.e., from 1990 to 2019 has been given in the Table 2.

2. Experimental design, materials, and methods

As a part of the dataset design, four different Landsat data for the past 29 years i.e., 1990, 2000, 2010, and 2018 has been collected from USGS earth explorer (Landsat 4–5(1990), Landsat 7(2000 and 2010) with 30 m’ resolution, and Landsat 8 (2019) with 30 m’ resolution). SOI toposheets have been collected and georeferenced by using ArcGIS and extracted the bound-
Fig. 2. Geology.

Fig. 3. Geomorphology.
ary of the study area [3]. Further, attribute tables are prepared for geology, geomorphology, soil maps, and geometric calculations procured for these base maps in ArcGIS software.

Simultaneously, normalized Differential Vegetation Index (NDVI) enumerates vegetation by quantifying the variance between near-infrared (vegetation strongly reflects) and red light

Table 2
NDVI for past 29 years.

| Year | Features       | Area (Km²) | Area (%) |
|------|----------------|------------|----------|
| 1990 | Water body     | 19.37      | 6.33     |
|      | Vegetation     | 81.96      | 26.79    |
|      | Fallow land    | 59.78      | 19.54    |
|      | Degraded land  | 97.86      | 31.99    |
|      | Desertified land | 46.89 | 15.33    |
| 2000 | Water body     | 16.65      | 5.44     |
|      | Vegetation     | 75.09      | 24.55    |
|      | Fallow land    | 50.04      | 16.36    |
|      | Degraded land  | 92.96      | 30.39    |
|      | Desertified land | 71.12 | 23.25    |
| 2010 | Water body     | 12.96      | 4.23     |
|      | Vegetation     | 60.26      | 19.7     |
|      | Fallow land    | 35.72      | 11.67    |
|      | Degraded land  | 96.47      | 31.54    |
|      | Desertified land | 100.45 | 32.84    |
| 2019 | Water body     | 6.83       | 2.23     |
|      | Vegetation     | 53.49      | 17.48    |
|      | Fallow land    | 27.04      | 8.84     |
|      | Degraded land  | 82.94      | 27.11    |
|      | Desertified land | 135.56 | 44.32    |
NDVI = \frac{(NIR - Red)}{(NIR + Red)}

For the Landsat 4 – 7 the bands combination is, NDVI = \frac{(\text{Band4} - \text{Band3})}{(\text{Band4} + \text{Band3})}.

For the Landsat 8 the bands combination is, NDVI = \frac{(\text{Band5} - \text{Band4})}{(\text{Band5} + \text{Band4})}.

NDVI always ranges from \(-1\) to \(+1\). But there isn’t distinct boundary for each type of land cover. Negative NDVI values are likely water, the NDVI value is close to \(+1\), it will be green leaves or vegetation, and the value is close to zero will have degraded land or desertified land \([5,6,9]\). It is carried out for the study area through ArcGIS software where four signatures are collected such as water body, Vegetation land, degraded land (severely affected) and desertified land (very severely affected) (Fig. 6).
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Conflict of Interest

All authors have participated in conception and design, or analysis and interpretation of the data. This manuscript has not been submitted to, nor is under review at, another journal or other publishing venue. The authors have no affiliation with any organization with a direct or indirect financial interest in the subject matter discussed in the manuscript. The following authors have affiliations with organizations with direct or indirect financial interest in the subject matter discussed in the manuscript.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi: 10.1016/j.dib.2020.105560.
References

[1] A.S. Arya, P.S. Dhinwa, S.K. Pathan, K.G. Raj, Desertification/land degradation status mapping of India, Curr. Sci. (2009) 1478–1483.
[2] K. Amal, Desertification, in: R.S. Dwivedi, P.S. Roy (Eds.), Central Arid Zone Research Institute (CAZRI), Yes Dee Publishing, Chennai, 2016, pp. 295–320.
[3] Anonymous, Desertification Status Mapping – Technical Guidelines, Forest, Land use and Photogrammetry group, RESIPA, Space Application Venter, Ahmadabad, 2003, p. 34. and.
[4] Anonymous, Bellary district at a glance: 2003–2004, Directorate of Economics and STATISTICS, Govt. of Karnataka, Bangalore, 2005.
[5] V.S. Arya, H. Singh, R.S. Hooda, A.S. Arya, Desertification change analysis in Siwalik Hills of Haryana using geo-informatics, International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, 2014, p. 8.
[6] L. Hau, S. Yaping, Towards quantitative prediction of dust storms: an integrated wind erosion modeling system and its applications, Environ. Model. Softw. 16 (2001) 233–244.
[7] B. Pradeep Kumar, K. Raghu Babu, M. Rajasekhar, M. Ramachandra, Assessment of land degradation and desertification due to migration of sand and sand dunes in Belugappa Mandal of Anantapur district (AP, India), using remote sensing and GIS techniques, J. Indian Geophys. Union 23 (2) (2019) 173–180.
[8] B. Pradeep kumar, K. Raghu Babu, M. Rajasekhar, M. Ramachandra, Siva Kumar Reddy, Assessment of land degradation and desertification due to migration of sand dunes- a case study in Bommanahal Mandal, Anantapur district, Andhra Pradesh, India using remote sensing and GIS techniques, IJRAT 6 (6) (2018) E-ISSN-2321-9637.
[9] P.S. Dhinwa, A. Dasgupta, Ajai: monitoring and assessment of desertification using satellite remote sensing, J. Geom. 10 (2) (2016).
[10] M. Rajasekhar, R.G. Sudarsana, R. Siddi Raju, M. Ramachandra, B. Pradeep Kumar, Data in brief data on comparative studies of lineaments extraction from aster DEM, SRTM, and cartosat for Jilledubanderu river basin, Anantapur district, AP, India by using remote sensing and GIS, Data Brief 20 (2018) (2018) 1676–1682.
[11] M. Rajasekhar, G.S. Raju, R.S. Raju, U.I. Basha, Data on artificial recharge sites identified by geospatial tools in semi-arid region of Anantapur district, Andhra Pradesh, India, Data Brief 19 (2018) 462–474.