Data Article

Data of remote sensing and GIS - to demarcate the potential sector of groundwater in Debre Berhan, Amhara region, Ethiopia

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Article history:
Received 13 April 2019
Received in revised form 23 August 2019
Accepted 12 September 2019
Available online 19 September 2019

Keywords:
Remote sensing
GIS
Groundwater potential
Debre Berhan
Ethiopia

Abstract
The present research datasets provide a different potential sector of groundwater accessibility in Debre Berhan, Amhara region represented by GIS and remote sensing techniques. Groundwater potential factors such as geology, slope, geomorphology, landuse/landcover, drainage density, and lineament density thematic layers were prepared from the SRTM 30m and LANDSAT multispectral satellite data. Weightage and scores were assigned to all thematic layers based on their groundwater holding capacity. The Inverse Distance Weighted (IDW) method was applied to integrate all the thematic layers to appraise the groundwater potential sector. From this method, the total data site is classified as very good - 6.5%; good - 22.1%; moderate - 51.2%; low - 18.4%; and very low - 1.8% of the groundwater potential sector. This analysis of data demonstrates the fact that the implication of GIS and remote sensing techniques in groundwater potential sector mapping at the...
regional scale and suggests that similar techniques could be applied to other regions of this country.

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1. Data

The data contain different thematic layers such as geology, slope, geomorphology, land-use/landcover, drainage density, and lineament density. Fig. 1 shows the geology map of the Debre Berhan, it consists of eluvial, sandstone, gorgo ignimbrite, kesern basalt, and Tarmabre-Megezeze basalt. Geomorphic features are dissected plateau, pediment, plateaus of piedmont, structural hill, structural valley, and valley filling as shown in Fig. 2. Fig. 3 denotes the slope of the Debre Berhan categorized into four types viz., gentle, moderate, steep, and very steep slope. Figs. 4 and 5 illustrate the different lineament density (low, moderate, high, and very high) and drainage density (low, moderate, high, and very high) classes. Fig. 6 represents the land use/land cover map of the data site and are classified as farm lands, drylands, forests, hills, and wetlands. The weights and ranks were determined based on their hydrological property as shown in Table 1. Fig. 7 represents the different potential sector (varies from poor to very high) classes in the Debre Berhan.

2. Experimental design, materials, and methods

Debre Berhan is a town in Amhara region, Ethiopia, and is located between latitude 9°41’ N and longitude 39°32’ E with a total of 2330.86km². The average annual precipitation level in Debre Berhan is 964mm and the average temperature is 14.4°C. The data site is mainly covered by hills, with a small part of the plain surface. The hilly area is in the form of undulating terrain. The maximum elevation in the south-western portion is 3,700m. Hydrogeological factors, viz., geology, slope, geomorphology, land-use/landcover, drainage density, and lineament density have been considered to delineate the
groundwater potential sector in the Debre Berhan. Thematic layers for these factors were georeferenced, digitized, and converted into raster format from the existing maps, and remote sensing images using the Arc GIS and ERDAS softwares. The geological data obtained from the geological survey of Ethiopia, were georeferenced and digitized using the ARC map software to generate geology map. The geomorphological features were extracted and interpreted from the LANDSAT image and the major features were dissected plateau, pediment, followed by plateaus of piedmont, structural hill, structural valley, and valley filling. The slope is an important thematic layer for the occurrence and recharge of groundwater. Digital elevation model (DEM) data were used to estimate the slope in degrees, using the contour information [1–4], and the slope is found varying from gentle to very steep slope. The landuse/landcover classification map of the Debre Berhan was generated from high resolution remotely sensed satellite data. The major classes are farmlands, drylands, forests, hills and wetlands. The drainage pattern reflected both the subsurface and surface formation characteristics. The drainage density (km/km²) indicates the proximity of the channel spacing and the nature of the surface material [5,6]. The data drainage density was calculated as the length of the flows per unit and it was found varying between very high and very low drainage density. The lineament data was generated from Landsat satellite image. The lineament density was found varying from low to very high density. The very high lineament density was obtained in the central and north western part. Different methodologies were used for the purpose of mapping and locating the groundwater potential sectors [7,8]. With these data, the weights of the individual thematic layer and ranking were fixed and added to the layers depending on their groundwater holding capacity using the IDW techniques. The proposed weighting and rankings of these layers were found as 0 to 3 and 5 to 35 respectively. Then, all above mentioned thematic layers overlayed and demarcated the groundwater potential sector. From the collected data,
Fig. 2. Geomorphology map of the Debre Berhan.
Fig. 3. Slope map of the Debre Berhan.
Fig. 4. Lineament density map of the Debre Berhan.
Fig. 5. Drainage density map of the Debre Berhan.
Fig. 6. Land use/land cover Map of the Debre Berhan.
Table 1  
Different parameters considered in the groundwater prospect evaluation and their class, rank and weightages.

| Parameters                  | Classes                     | Rank | Weightages |
|-----------------------------|-----------------------------|------|------------|
| Geology                     | Eluvial                     | 10   | 3          |
|                             | Sandstone                   | 3    |            |
|                             | Gorgo ignimbrite            | 3    |            |
|                             | Kesem basalt                | 0    |            |
|                             | Tarmabre-Megezeze Basalt    | 2    |            |
| Geomorphology units         | Dissected plateau           | 20   | 1          |
|                             | Pediment                    | 3    |            |
|                             | Piedmont plateaus           | 3    |            |
|                             | Structural hill             | 0    |            |
|                             | Structural valley           | 2    |            |
|                             | Valley fill                 | 3    |            |
| Slope                       | Gentle slope                | 35   | 3          |
|                             | Moderate slope              | 3    |            |
|                             | Steep slope                 | 1    |            |
|                             | Very steep slope            | 0    |            |
| Lineament density           | Low                         | 30   | 0          |
|                             | Moderate                    | 1    |            |
|                             | High                        | 2    |            |
|                             | Very High                   | 3    |            |
| Drainage density            | Low                         | 5    | 3          |
|                             | Moderate                    | 2    |            |
|                             | High                        | 1    |            |
|                             | Very High                   | 0    |            |
| Land use/land cover         | Agricultural lands          | 25   | 3          |
|                             | Dry lands                   | 3    |            |
|                             | Forest lands                | 2    |            |
|                             | Hill shade                  | 0    |            |
|                             | Wetland                     | 3    |            |
the groundwater potential sector can be classified into five classes namely, very good (6.5%), good (22.1%), moderate (51.2%), low (18.4%) and very low (1.8%) potential sector.

Acknowledgments

This work was supported by a grant (NNNU – KLOP - K1909) from the opening foundation of Key Laboratory of Environment Change and Resources Use in Beibu Gulf Ministry of Education (Nanning Normal University) and Guangxi Key Laboratory of Earth Surface Processes and Intelligent Simulation (Nanning Normal University). Our hearty thanks to the Editor-in-Chief and an anonymous reviewer for his valuable suggestions to improve the present form.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.104542.

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