Initial canal alignment studies by Using Remote sensing techniques

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Abstract

GIS assist in specific planning and decision-making processes in irrigation through the input, spatial analysis & output of relevant information. The real strength of GIS is its ability to integrate information. This integration power makes the scope of GIS almost infinite. The unique integration capability of GIS allows disparate data sets to be brought together to create a complete picture of a situation. GIS technology illustrates relationships, patterns & connections that are not necessarily obvious in any one data set but are amazingly apparent once the data set are integrated. The GIS based systems helps in selection & fixing of the various canal alignments in a command area. The main aim of this study is to present the application of the GIS techniques for canal alignment.

Keywords:
Geographic Information Systems (GIS); contour map; TIN model; slope map; narayanapura dam; remote sensing

Introduction:

- Selection of alignment for a canal is critical in terms of cost and execution time. Several alignments may be possible between the source and destination of a canal, but command area and cost of work is more important. Canal works costs include the cost of earthwork both for embankment and cuttings
- Application of Remote Sensing and GIS is highly useful in study and planning of alignment of canals network system.
- GIS is able to integrate spatial and non-spatial geographical data for the management and planning of land and water resources. These recent developments provide new ways to collect, store and retrieve, evaluate and analyse a broad variety of data for a wide range of irrigation management aspects.
- They also may assist in specific planning and decision-making processes in irrigation through the input, spatial analysis and output of relevant information.

I. FIELD STUDIES

Narayanapur Right Bank Canal up to 95 Kms is located across bijapura district which extends till yadgir. The area which is chosen is kodekal, bardevanhal, yarkihal, yadgir district which comprises of upto 40 sqkm, located at 16°19'N 76°19'E to 16°21'N 76°24'E these places are experiencing draught so the suitable canal is designed.

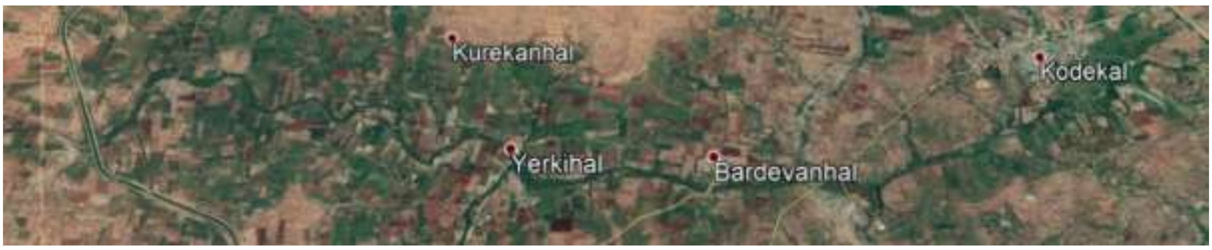

Fig-1 Google Earth image of study area

II. LABORATORY WORK/ ANALYSIS

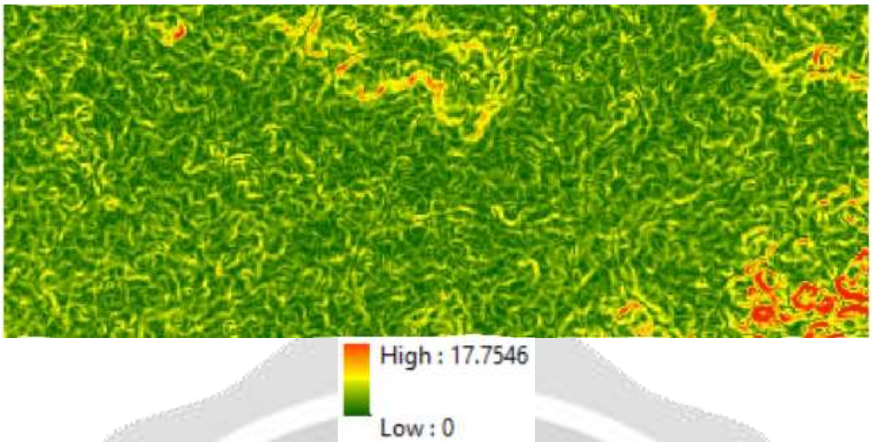

Fig-2 Image indicating Slope map

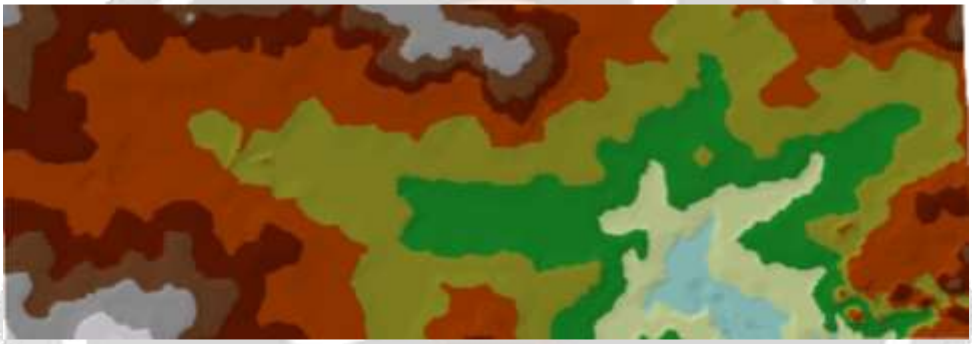

Fig-3 TIN model

Fig-4 Contour map

- The DEM data was extracted from LISS-III satellite and the maps were created from ArcGIS desktop 10.8.

III.DISCUSSION

- Triangular irregular networks (**TIN**) have been used by the **GIS** community for many years and are a digital means to represent surface morphology. TINs are a form of vector-based digital geographic data and are constructed by triangulating a set of vertices (points). ... **ArcGIS** supports the Delaunay triangulation method. The vertices of these triangles are created from field recorded spot elevations through a variety of means including surveying through conventional, Global Positioning System Real-Time Kinematic (GPS RTK), photogrammetry, or some other means. Associated with three-dimensional data (*x*, *y*, and *z*) and topography, TINs are useful for the description and analysis of general horizontal (*x* and *y*) distributions and relationships.

- Digital TIN data structures are used in a variety of applications, including geographic information systems (GIS), and computer aided drafting (CAD) for the visual representation of a topographical surface. A TIN is a vector-based representation of the physical land surface or sea bottom, made up of irregularly distributed nodes and lines with three-dimensional coordinates (*x*, *y*, and *z*) that are arranged in a network of non-overlapping triangles.
- A TIN comprises a triangular network of vertices, known as mass points, with associated coordinates in three dimensions connected by edges to form a triangular tessellation. Three-dimensional visualizations are readily created by rendering of the triangular facets. In regions where there is little variation in surface height, the points may be widely spaced whereas in areas of more intense variation in height the point density is increased.
- The **slope** of a line is defined as the rise over the run, m = $\Delta y/\Delta x$. In mathematics, the **slope** or gradient of a line describes its steepness, incline, or grade. A higher **slope** value indicates a steeper incline. Through differential calculus, one can calculate the **slope** of the line to a
- curve at a point. The **Slope** tool identifies the steepness at each cell of a raster surface. The lower the **slope** value, the flatter the terrain; the higher the **slope** value, the steeper the terrain. The output **slope** raster can be calculated in two types of units, degrees or percent (percent rise).
- The **slope** value is **calculated** by measuring the angle between topographic surface and the referenced datum. Both planar and geodesic computations are performed using a 3 by 3 cell neighbourhood (moving window). For each neighbourhood, if the processing (centre) cell is No Data, the output is No Data.
- **Contours** are lines that connect locations of equal value in a raster dataset that represents continuous phenomena such as elevation, temperature, precipitation, pollution, or atmospheric pressure.
- The distribution of the **contour** lines shows how values change across a surface: an outline especially of a curving or irregular figure: shape the sleek **contours** of the car The map shows the **contour** of the coastline. also: the line representing this outline. 2: the general form or structure of something: characteristic —often used in plural the **contours** of a melody…
- The **contour tools** produce engineering-quality **contours**, representing an exact interpretation of the raster surface. Branching **contours can** occur in cases of intersecting ridges that fall exactly on a **contour** interval.
- **For 3D Analyst, navigate to System Toolboxes > 3D Analyst Tools > Raster Surface > Contours.**

1. Select the output from Step 1 as the input raster.
2. Specify the name and location of the output polyline features.
3. Set the **contour** interval value.
4. Click OK.

IV.CONCLUSION

With the use of Arc GIS software, it was possible to select canal alignment, fix the canal L-section & cross-section more favourably and economically. Remaining maps such as DEM, aspect, watershed area, land use and land cover maps are done in the next volume, even the canal is designed suitably with the minimum amount of cut and fill.

V.REFERENCES

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