IOSR Journal of Computer Engineering (IOSR-JCE)
e-ISSN: 2278-0661,p-ISSN: 2278-8727,
PP 56-59
www.iosrjournals.org

"Morphometric Analysis of Godavari River-Sub-Drainage in Marathwada Region by Using Srtm Data Set"

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Abstract: *Urbanization and heavy industrial growth has made its impact on the ecosystem and also potentially affected on environment balance. Therefore, its need to increase the watersheds conservation area as the water drought affected area has being in existence so it's a primary goal of government to reduce the water stressed area for sustainable development. The natural resources management in a country where 70-75 % population is based on agriculture related Practices has an immense important role to play not only in providing the economic goods but also maintaining and improving productivity of agricultural fields. So it's a necessary to better plan the natural resources such as watersheds. Ultimately it help full to plan land use, land cover and agricultural practices. To accomplish this it is essential to understand the use of the integrated techniques that is Remote Sensing and GIS.*

This research work is focused on to note the softness of algorithms the minute to describe the sub-watersheds, drainage topography over drainage shape, shape area, shape perimeter, drainage streams, stream length, and Stream hierarchy-network etc. In excess of these morphometric analysis or quantitative analysis also plays a major role. The results were obtained with a DEM90m resolution dataset reveals out that the watershed area was 204 sq.km. There were total 51 number of streams with cumulative stream length has 99.84 km of the characteristics of given sub-watershed topography.

Keywords: *SRTM, RS, GIS, Morphometric Parameters.*

I. Introduction

There are two potential techniques used to design procedures, approaches that are primarily based on remote sensing integrated with GIS. These methods have tremendous potential in sorting voluminous spatial and non-spatial data. GIS provides technological capability to develop and analyse natural resources information system for the vast agriculture countries like India. It can help in changing the concept of natural resources management, which can be based on more on current information and location oriented .Remote Sensing integrated with GIS has been efficiently used for generating integrated watershed modeling. This modern technology gives the holistic way of perception related to morphometric analysis of watersheds. The characterization of a watershed for drainage development, storage-location assessment and water harvesting so it is essential to understand the watershed characteristics like shape, stream pattern, and terrain features, etc. related parameters helps in binding whole measurement (morphometric analysis) of the shape of the proposed watershed topography.

Information in this research work for experimental purpose here collected from the Consortium for Spatial Information (CGIAR- CSI) that is the Shuttle Radar Topographic Mission's (SRTM) data. This raw data retrieved from the link here i.e. http://www.cgiar-csi.org/data/srtm-90m-digital-elevation-database-v4-1#download of NASA, SRTM DEM of Tagged Image file format as a Raster Dataset. The purpose of this research work is to extract the Drainage characteristics in integrated environment with the use of appropriate algorithms and to observe the functionality and smoothness of algorithms. The point to find out given Drainage characteristics here need to primarily describe the drainage topography as over drainage shape, shape area, shape perimeter, drainage streams, stream length, and Stream hierarchy-network etc. are the characteristics of drainage watershed. That being investigated characteristics are analysed by the use of morphometric analysis or quantitative analysis methods. It is used for the descriptions of the watershed topography and to minimize the watershed related issues (drought, flood). So ultimately it helps out to better plan of drainage development, storage-location assessment and water harvesting related aspects, lately for land use, land cover and agricultural related practices. This landform profile investigations is suitable for sustainable developments and significant resources plans mostly concern land cover, land use practices for water security and for food security.

II. Location of Study area

The study area for this research work is a part of the Godavari river's sub-drainage watershed. It is localized at GahininathNagar, is a small Village of Ambad Tahasilit's part of Jalna District of Maharashtra State (India). It is located 32 KM towards the south from Jalna district headquarters and 369 KM from state capital Mumbai. The watershed area geographically located between 19° 21′ - 19° 34′ North Latitude and 75° 35′ - 75° 47′ East Longitude, Figure 1 shows the location of the study area on district map.

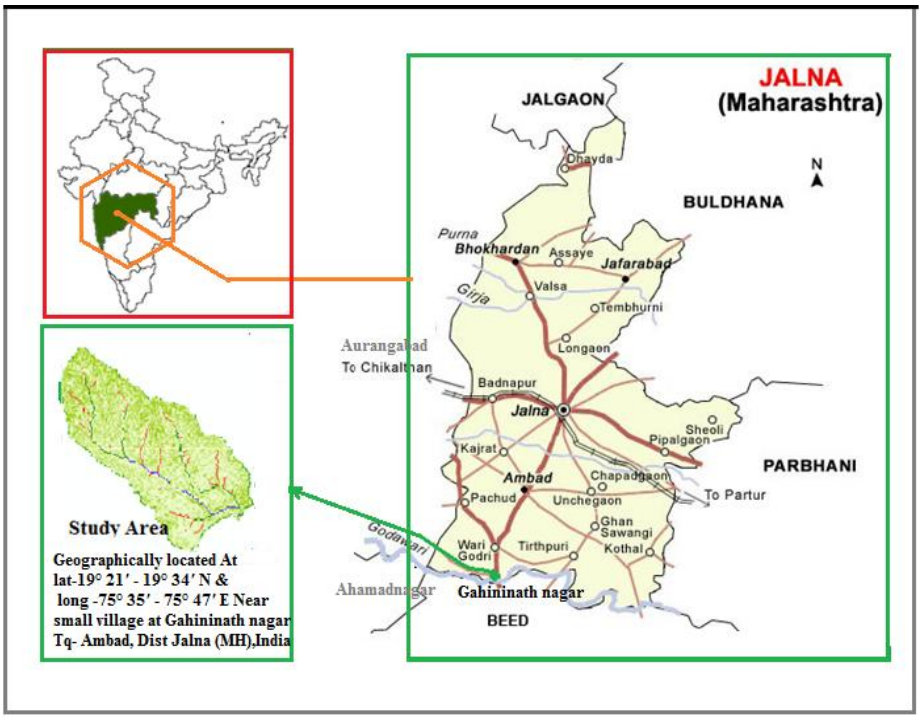


Figure 1: Proposed Location of Study area

III. Methodology

The In this watershed analysis, research work the ArcGIS 9.3 software tools with extensions ArcHydro was utilized, because it is fully functional geographic data processing supportive environment, software tool. It handles Remote Sensing raster data as well as secondary sources data like toposheets, maps, etc.

In this work the SRTM DEM data has been used as raw input to extract the terrain features of the given topography generally it include Area, shape, Shape perimeter, Drainage streams, Stream network, Stream hierarchy, Stream length, and watershed boundary etc. lastly applied here morphometric analysis to get the better quantitatively detail measurement of given drainage topography configurations.

IV. Overview of Process Flow

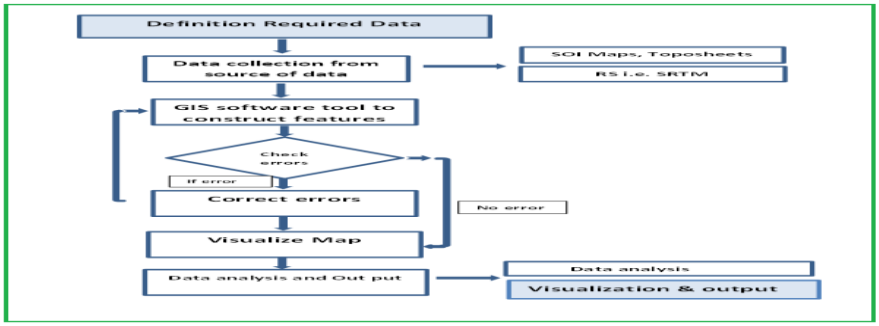


Figure 2: Indicating overall Process flow

The data processing aspect were obtained by use of the auto-algorithms those has been resides in Arc Hydro tool where following steps applied to investigate topography. The delineation of watershed in software environment requires using a sequence of hydrologic tools that create new output raster at each step. Generally the series of tools builds on itself by using the output raster from previous tool in the series. The process is relatively user friendly, as the tool dialog boxes prompt you to use specific raster features for the input raster

features [2]. The steps of terrain processing treatments those are processed through sequential manner that being converges the way of continues surface (DEM) is processed for watershed related issues. The sequential steps were used; those are actually the hydrologic tools in the Arc Hydro environment for delineations watershed. The uses of ArcHydro tools auto-algorithms are promoted to the feature are constructed scientifically. The algorithms used for the extraction of the watershed morphometric analysis are benefitted by the speed, accuracy and standardization and got some idea that the automatic algorithm works as transpire.

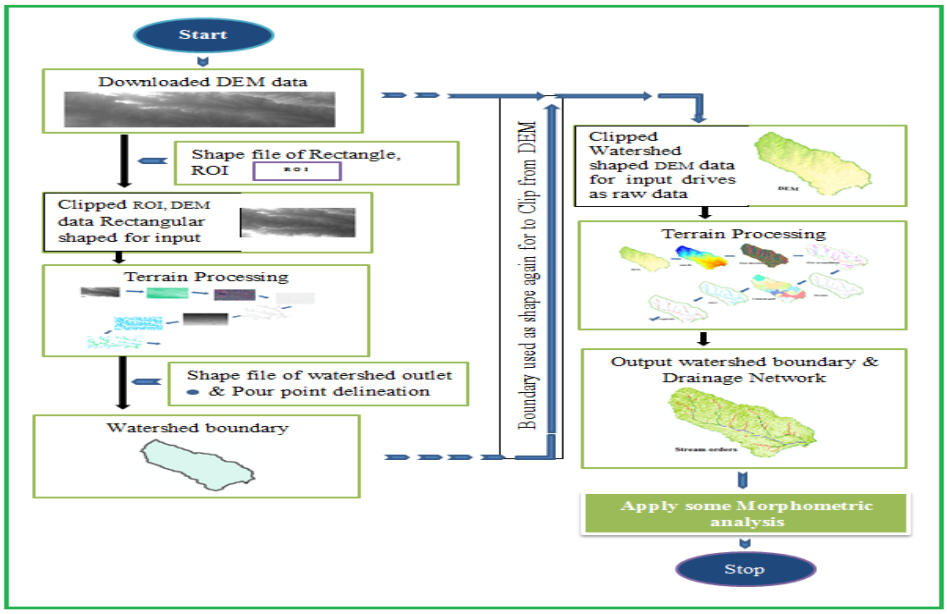


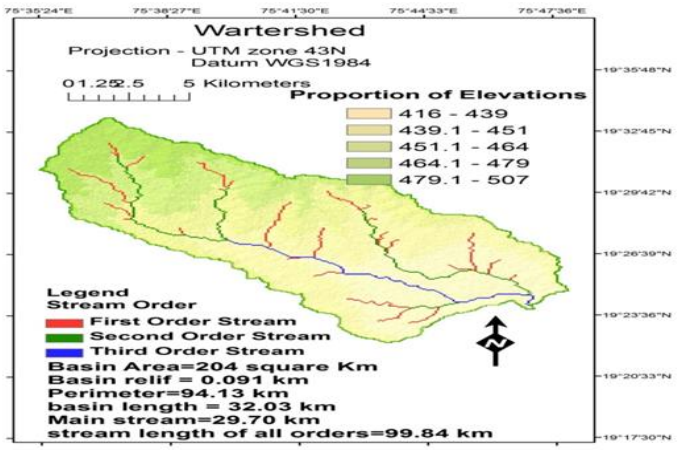
Figure 3: shows the systematic way of data processing steps:

V. Experimental Results

This modern technology gives the holistic way of perception related to morphometric analysis of watersheds. The morphometric parameters firstly extracted from a layered of spatial feature properties that are as of attribute tables are actually generated while developing step by step feature of treatments. Once the calculations of morphometric parameters [15,16] finishes the following results were observed. See table1. The final output is capable to fit the purposes that are quantitative measurement of configuration of given topography then these results are expressed in pictorial and tubular form.

Figure 4: Godavari River-Sub-Drainage Watershed Map

Variable	Watershed
Area (km²)	204
Relief (m)	0.091
Perimeter Length (km)	94.1375



Gradient (longest path)	32.03154
Relief Ratio	0.00284095
Drainage Pattern (name)	Dendritic
Number of 1st Order Streams	26
Number of 2nd Order Streams	18
Number of 3rd Order Streams	7

Table 1: Drainage Basin Morphometry Worksheet

VI. Conclusion

In Integrated environment the drainage morphometric study is helpful in identification and characterization of given sub-watersheds. To extract the catchment characteristics in integrated environment the certain algorithms are applied. These are D8 algorithm and flow vector algorithm etc. The algorithms used for the extraction of the watershed morphometric analysis are benefitted by the speed, accuracy and standardization and got some idea that the automatic algorithm works as transpire. Through this work the natural made topography measured in quantitative approach. Catchment shape characterization three parameters were evaluated namely elongation ratio (0.05),circulatory ratio (0.2) and form factor (0.19).All these parameters values indicate that the shape is in elongation nature. The bifurcation ratio observed 1.33 and it indicate that the basin area is in flat nature. Likewise analysed the morphometric parameters such as area, length, streampattern, flow direction, perimeters, elongation ratio, circulatory ratio and form factor, by use of integrated environment to quantify the configuration of the given topography and noticed the functionality of algorithm of integrated environment.

Acknowledgements

I am sincerely thanks to Vision and Intelligent System Lab, Department of CSIT, Dr. Babasaheb Ambedkar Marathwada University, India for providing me necessary research laboratory / facility for completion of this research work.

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