e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:01/January-2023 Impact Factor- 6.752 www.irjmets.com

A REVIEW ON RUNOFF ESTIMATION OF VRISHABHAVATHI WATERSHED USING GIS

Md Ismail[*1], Sai Vinay G[*2], Owais Ahmed Malik[*3], Nishanth S[*4], Spoorthy S S[*5]

[*1,2,3,4]UG Students BE, Department Of Civil Engineering DSCE, Bengaluru, Karnataka, India.

[*5]Professor, Department Of Civil Engineering, DSCE, Bengaluru, Karnataka, India.

ABSTRACT

In this project we came to know about various aspects of GIS (Geographical Information Systems). Geographic Co-ordinate system- Latitude and Longitude which is measured in degrees, minutes and seconds or decimal degrees. Different types of maps such as Digital Elevation model, contour, layout, continental network, soil and slope map. Topo sheets- Coordinates, water bodies, streams, drainage network, road and railway network, settlement or habitation, contours, relative heights of bunds or river banks, legends, administrative boundary, topo index. Scale is the ratio of maps units to ground units. Watershed analysis includes division of water bodies such as region, basin, catchment, sub catchment, watershed, sub watershed, mini watershed, and micro watershed.

Geo referencing of topo sheets is the process of assigning real-world coordinates to each pixel of the raster. Morphometric analysis of the watershed includes quantitative analysis of size and shape. For example drainage networks, stream ordering, stream numbering, etc.

Keywords: Controlled Low Strength Material (CLSM), Concrete, Compressive Strength, Flowability, Plastic Aggregate.

I. INTRODUCTION

A geographic information system (GIS) is a system that creates, manages, analyzes, and maps all types of data. GIS connects data to a map, integrating location data with all types of descriptive information. This provides a foundation for mapping and analysis that is used in science and almost every industry. GIS helps users understand patterns, relationships, and geographic context. The benefits include improved communication and efficiency as well as better management and decision making.

Every body of water (e.g., rivers, lakes, ponds, streams, and estuaries) has a watershed. The watershed is the area of land that drains or sheds water into a specific receiving waterbody, such as a lake or a river. As rainwater or melted snow runs downhill in the watershed, it collects and transports sediment and other materials and deposits them into the receiving waterbody.

Watershed management is a term used to describe the process of implementing land use practices and water management practices to protect and improve the quality of the water and other natural resources within a watershed by managing the use of those land and water resources in a comprehensive manner.

Need of Watershed

Biological, physical, and chemical processes occurring within watersheds provide critical ecosystem functions and services that support plants and animals, including humans. Nutrient cycling, carbon storage, erosion control, soil formation, increased biodiversity, wildlife corridors, water storage, water filtration, flood controls, timber, and recreation are just a portion of the services provided by ecosystems within watersheds. For instance, riparian forests (forest habitat adjacent to streams) act as buffers to non point source pollution and as corridors for animal foraging (Clip & Anderson, 2014). The role of watersheds in nutrient cycling is important for stabilizing the environment at local and global scales (Allan & Castillo, 2007). Forested head water streams function to filter sediment and pollutants, which directly benefit humans and other animals in the form of clean water. At a larger scale, naturally vegetated floodplains provide storage and slow release of water. This benefit reduces the risk of flooding for anyone who lives near a river. Stable soils, an absence of pollutants, and a rich biological community are all characteristics of a healthy watershed (USEPA, 2017). When watersheds are degraded and pollution ensues, ecological benefits and services can be reduced or completely lost.

Within watersheds, much of the water transported from high to low elevations is carried through streams and rivers. Because this water carries sediments and pollutants from the land area it drains, impairments in rivers

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:01/January-2023 Impact Factor- 6.752 www.irjmets.com

and streams are indicators of unhealthy watersheds caused by upstream land use. The U.S. Environmental Protection Agency reported that 44 percent of the nation's rivers and streams and 64 percent of lakes, ponds, and reservoirs were impaired or not clean enough to support their designated uses (2009). The National Water Quality Inventory: Report to Congress documented that the leading causes of impairment to rivers, streams, lakes, ponds, and reservoirs are pathogens, habitat alterations, and toxins and pollutants in the water. The main causes for these pollutants include agricultural activities, hydro-logic modifications, atmospheric deposition, and other unknown or unspecified sources (USEPA, 2009). If water bodies can no longer support their designated or natural uses, the environment and/or humans will be negatively impacted.

II. LITERATURE REVIEW

Generation of contour and drainage map using GIS has been found effective in determining the various morphological parameters quickly and accurately. Morphologic parameters coupled with land use, soil, slope and drainage can be helpful in decision-making process for watershed development and management. Among the identified sub-watersheds in the Ret, Six sub-watersheds covering an area of 66.5 km2 falls under very high category. The count of sub-watersheds which fall under high, medium, low and very low priority class are five each and covering areas of 61.7, 58.27, 39.62 and 31.84 km2 respectively. The suitable site for the check dam has been identified and its was reveals that sub watershed numbers 1, 4, 5, 6, 7, 8, 9, 10, 12, 22 and 24 need construction of check dams for soil and water conservation. The remote sensing and GIS based approach for planning of soil and water conservation structures in watersheds can be extended to other parts of the India.

This project has analyzed the applications of GIS and remote sensing tools in watershed management with emphasis on the need to provide a baseline data about change in the ecology and forest cover that forms the basis of future management of the Niger Delta watershed of Southern Nigeria. The paper presented a concise overview of the attributes and benefits of watershed approach in general, issues in the literature, review of the major environmental effects and factors associated with the problem, and a series of suggestions to mitigate the problems.

It is evident that watershed management has transitioned to a more holistic resource management approach, employing integrated and adaptive management strategies to account for biological, physical, and social elements within the landscape. Technological advancements have significantly contributed to this well-rounded approach. Information is now more easily shared within and across disciplines, there is improved accuracy in data collection techniques and model development, and it has become possible to develop integrated, multi-level analysis that generates more complete information about the watershed system both socially and ecologically. These improvements in watershed management and technology provide more comprehensive and multi-dimensional information for decision makers to assess the status of a watershed and implement necessary regulations. As evident in the case studies, social, economic, and environmental issues of concern are unique to each watershed.

III. CONCLUSION

GIS automated watershed tool are used in the delineation of watershed . The technological advances provided by GIS and the increasing availability and quality of DEM have greatly expanded the application potential of DEM to many hydrologic, hydraulic, water resources. GIS ArcHydro provides increased efficiency, a typical hydrographical analysis was performed using GIS and using traditional methods. In a hydrographical analysis, efficiency means primarily minimizing the expense in acquiring data and time required for completing the analysis. These results can be effectively used in hydrological modeling, land use planning and watershed studies, reservoir operation and planning.

This study demonstrates the capability of GIS-based spatial interpolation technique for developing sustainable land-use system on watershed basis. There are enough opportunities for diversification of the rainfed upland area with short duration field crops and vegetables for higher land and water productivity.

IV. REFERENCES

[1] PandeyA, Behra RP. Pandey and Singh RP(2011), Application of GIS for Watershed Prioritization and Management A Case Study, journal springe.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:01/January-2023 Impact Factor- 6.752 www.irjmets.com

[2] Setyawan C, Susanto S and Lee SS (2019) Spatial modelling of watershed health assessment by using GIS, juornel springer

[3] Kar G, Patra PK, Raychaudhuri M, Anand PS, Alam NM, Panigrahi S, Sahoo H and Chaudhari SK (2021) Land resources evaluation and drainage network analysis of watershed for site specific crop planning using GIS, Current Science Vol 121

[4] Gos K, Rao S(2004) GIS-based technologies for watershed management, juornel springer(current science volume 87)

[5] Suthar VK, Bhoite RR, Mane AB, Mandhare AJ, Salvi SS (2022) Watershed Management of Purandar Taluka by Remote Sensing and GIS.

[6] S. Kale(2020) watershed management for loni mavala watershed using GIS and remote sensing techniques, volume 5

[7] N VI. Mangrule and J Um. Kahalekar (2013)Watershed Planning and Development Plan by Using Rs and GIS of Khultabad Taluka of Aurangabad District, volume 3.

[8] G Wn, S MN, H Ch, S Li, Z Zh, L Wn, L John.(2016)Integrated watershed management evolution, development and emerging trends, journal springer. journal vol 10.