IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 7.105 ⁜ Vol. 9, Issue 4, April 2022

DOI: 10.17148/IARJSET.2022.9473

Storm Water Management Using Remote Sensing And GIS – A Case Study Of Yewalewadi, Pune

Dakave Omkar U.[1], .Dhole Mangesh [2],Gaikwad Prasad D . [3], Patil Akshay U.[4], Kate Shrikant R.[5]

[1-5]Civil Engineering, Trinity Academy of Engineering, Pune, India

Abstract: Storm water is main source of rainfall and the rainfall flow through the ground surface to generated the rainfall ok and a road, parking area, concrete surfaces and road pavement is do not allow the soak of water in ground surface. This research to focus the storm rainfall runoff. The problem of a due to improper building and drainage line, various solid waste and other domestic waste. In the modern era, to development is inclined towards increase the population of urban area, climate change to storm water management is the main concern to city planner and modelers to storm water check the quantity and quality of storm water. To design and analysis the drainage network system and use of various statistical maps have been generated and collect the rainfall data in GIS suggest modified the present drainage system. Use of rational method to calculate the storm water runoff. To study of storm water modeling with the flooding of urbanized watershed using Epa storm water management model.

Keywards: Runoff, Waterlogging, Geographical Research, digital Database, mapping techniques

INTRODUCTION

Heavy rainfall or snow results for abnormal quantity of surface water storm water originates from rain, including melted ice and snow. Strom water gets saturated into the soil (infiltrate) and can be stored in the ground surfaces like ponds and lakes also it contributes to surface runoff. Most of the time runoff is carried directly nearby rivers, streams and other water bodies without any treatment urban runoff enters in a storm draining like forest natural landscape etc. Plants reduces storm water by interrupting rainfall as it falls, and by taking a water through their roots. In developed cities unmanaged storm water can create measure issues like ne related to timing of overflow (runoff) another one in related to volume of runoff last one is related to pollutants and impurities the water carrying in addition the pollutants carried by runoff, urban runoff is known as a cause of pollution, storm water is important resource for human pollution and demand of water grow, particularly in no rain area or little rain climates. Storm water harvesting could potentially make some self-sustaining terms of water for urban and environment.

Stormwater management –

Stormwater filtration system for urban runoff managing the quality and quantity of stormwater is termed as stormwater management. In urban areas and developing areas impervious surfaces such as pavements and roofs prevent precipitation from naturally soaking instead water run rapidly into sewer system, drainage ditches and storm drains and can cause flooding turbidity (muddiness), erosion of soil sanitary sewer system overflow and infrastructural damage. The term storm water control measure is referred for structural or engineering control devices and systems to store and treat polluted storm water. Management of severe materials to prevent the discharge of impurities into the environment (source control); planning and structure of stormwater systems like retention of on basins, consigned to the grave vaults with various kinds of media filters, and vortex partitions to remove coarse solids before they contaminate surface waters or groundwater reserves; acquisition and safety of natural waterways or rehabilitation; building nature-based solutions such as ponds, swales, created wetlands or green infrastructure solutions to work with occurring or "hard" drainage structures, such as pipes and concrete lanes (constructed wetlands built for stormwater method can also serve as a habitat for plants, amphibians, and fish).

Elaboration of allowance leans to stormwater strategies potentially containing stormwater stoner allowances and the outcome of a stormwater utility; advancement of long-term asset administration strategies to repair and replace aging infrastructure; modification of existing stormwater regulations to address detailed stormwater needs; enhancement and enforcement of prevailing laws to make sure mansion holders consider the effects of stormwater before, during and after the advancement of their land; education of society about how its activities influence water quality, and about what it can do to improve water quality. Remote sensing technology in recent years has demonstrated to be of great importance in

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 7.105 ⁜ Vol. 9, Issue 4, April 2022

DOI: 10.17148/IARJSET.2022.9473

amassing data for effective resources management and hence could even be applied to coastal climate monitoring Remote Sensing and Geographical data system (GIS) and Its Application in Various Fields and management particularly, GIS and remote sensing technologies together offer the skills of instantly collecting data, processing and combining data and information, and presenting governs to geographic referenced maps and reports. Satellite remote sensing may be a detailed specialized improvement insight into the enormous pressures on our biological habitat. it's wont to clarify the images or numerical values attained from a length to collect vital data about special characteristics on earth. For the last couple of decades, the gadget of remote sensing isn't just revolutionized the direction data are accumulated but also considerably enhanced the standard and accessibility of significant spatial knowledge for the preservation and management of natural resources. Similar progress within the trustworthiness of GIS has authorized the understanding of a huge amount of proficiency developed through remote sensing to deal with several environmental crises.

Pune exists a major city found in the state of Maharashtra, India. Pune town hub is the district headquarters of the division. The division population was 10,089,916 in survey 2020. It is the 4th most populous city in India. The Urban population is 58.76% of the whole which almost is 6 lakhs. The population forecast of Pune is 8.59 million within the year 2041. It is one of the vastly industrialized towns in India. In the past we want to study only the stream flood but because the community goes on boosting day by day the paved area boosts runoff and decreases the infiltration ability of the soil. Urbanization establishes lots of pressure on territory use which may result in metropolitan flooding. A metropolitan flood may be a circumstance that occurs when water spills over a sewer and takes the direction to the road and into the tower parking. Due to torrential or immediate rainfalls presently water overflow condition in stormwater drainage network arises entirely repeatedly. It simply shows the need to boost the size and expenditure of not only the given drainage system but also assume a creative way to eliminate the abrupt water. In this article, we shall find out the adequate need for such a technique. The project region is near the Kondhawa side. Its horizons on the eastern side are Pisoli, the Southern side horizon is Undari and Bivari, and the west side horizon is Katraj. The population of Yewalewadi is 24919 out of which 13468 are gentleman men and 11451 are gentlewomen. Stormwater management is the endeavor to scale back runoff of rainwater or dissolved snow into streets, lawns and other sited and the modification of water characteristics, consistent with us Environmental Protection Agency (EPA). When stormwater is consumed into the soil, it's seeped and ultimately recharges aquifers or cycles into streams and rivers. Still less, when enormous rainwater strikes, the ground drenched by water creates additional moisture that runs across the ground and into storm seamstresses and road gutters This water often carries garbage, chemicals, bacteria, destroyed soil, and other contaminants, and transmits them into streams, rivers, lakes, marshlands, etc. Stormwater management is the accomplishment to ameliorate runoff of rainwater or dissolved snow into streets, lawns, and other sites and therefore modification of water quality, according to the United States Environmental Protection Agency.

Surface water in abnormal quantity resulting from heavy falls of rain or snow is called stormwater. Stormwater flows across land and through the elaborate series of pipes, culverts, and catch basins that make up our storm water system, ending up in our streams, lakes, rivers, and usually, the ocean. As the stormwater flows on, it collects and carries many substances that pollute it. These pollutants consist of sediments, pesticides, pet and animal waste, soap and fuels. Urbanization growths stormwater discharges and the capacity to transport contaminants from watershed to the streams it feed. Consequently, stormwater releases need to be managed to meet the regulatory requirements. Expansions of the modern city often results in rise stipulations for water due to population growth, while at the same time changed runoff forecasted by climate changes has the potential to rise the volume of stormwater that can give to drainage and flooding problems, effective stormwater management provides a multitude of possible benefits including protection of wet land and aquatic ecosystem, refined quality of receiving water bodies, conservation of water resources and flood control.

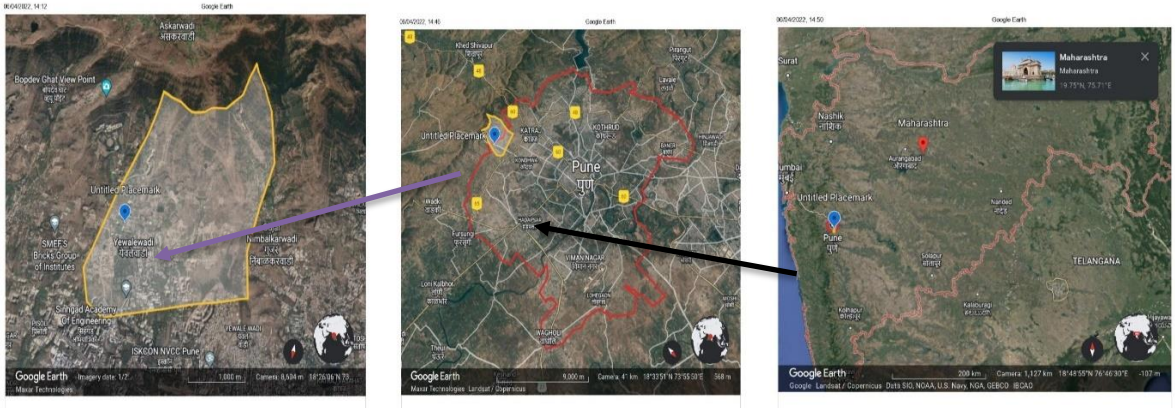


Fig 1: Location Map Study Area

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 7.105 ⁜ Vol. 9, Issue 4, April 2022

DOI: 10.17148/IARJSET.2022.9473

LITERATURE SURVEY:

We realize that the problem can be concluded as we have to prevent the effects of Storm Water on our environment. This can be achieved by adopting Green Infrastructure and utilization of resources properly and sustainably. For most of the paved surface area which is impermeable there, they suggest providing permeable paving which is one of the most important preventions to be done to avoid this major problem of storm waterlogging. They proposed constructing a water tank but it is a little costly but is very practical in storing all the water which can be used for irrigation or reused for supply. These things can be achieved by the proposed solution, like storing water in a water tank. By practicing all these steps we can overcome this problem of Storm Water drainage in our populated urban area.[1]

In this research we get that, innovative method for determining groundwater recharge characteristics using GIS technology has been suggested for the Basaltic terrain of India. In this research, we provided a map of the basaltic terrain's groundwater recharge potential. This research is difficult for the long-term usage of groundwater resources, thus improving groundwater recharge through proper management. The researchers suggest that the use of GIS techniques assists groundwater research by expanding the areas of focus for comprehensive hydrogeological surveys on the site. According to the conclusion, the most efficient groundwater recharge potential region is situated in basaltic terrain. This research explores the complex relationships among groundwater recharge potential variables and groundwater recharge potential scores dependent on India's general hydrology characteristics. The maps generated might be used as a basic guide by government and water policy decision-makers to choose appropriate locations for groundwater management practices. [2]

This paper detailed a study of rainfall and Stormwater has done for Surat city. Due to the increase in population and development activities city is facing a stormwater drainage problem. In the present study, the prevailing layout of the system has been evaluated. Also planning and design of modified drainage system in part of the city area (Variyali Bhagol) has been done. The study area is bounded by natural drainage on the western north site and the western site by main Tapi river land on the southern side and the northern side by roads.[3]

In the design, these futures are considered in conjunction with elevation of the world and existing system for designing the modified stormwater system. IDF is a tool used for planning, design, and operation of water resources projects such as stormwater drainage systems. With the assistance of this tool (IDF) relationship of rainfall has been established at the central zone of Surat city from daily/24-hour rainfall data using the Gumbel distribution method. These relationships are useful in the design of urban drainage works, e.g. storm sewers, culverts, and other hydraulic structures. A rational method has been used for the calculation of stormwater runoff. Section-wise runoff (Lit/Sec.) in the study area is 623.80 (section one), 945.04(section two) 727.53(section four), 415.86 (section five), 415.86(section six), 519.83(section seven). Total runoff of the study area has been calculated supported by the topography and rainfall data. The total length and Diameter of the drain have been proposed using manning's formula. The proposed modified drainage system using GIS technology will help in proper draining out of stormwater from the study area. This study can be used for designing the stormwater system of other cities.[4]

I. METHODOLOGY

Input Data

The maps used are:

Canals, streams and other water bodies' location, contour map, drainage basin map, road network map from survey of India, top sheets and the concerned departments.

Land use map and soil map from higher solution satellite imagery.

Rainfall intensity, past rainfall data and rainfall distribution from Indian Meteorological (IM) stations.

Population distribution—duration frequency curves and other related maps.

Computational Facilities

The work was carried out using ARC/INFO and Earth Resources Data Analysis Systems (ERDAS), Imagine Software running under UNIX Operating System.

Development of GIS Data Base

The following coverages are prepared using ARC/GIS:

- Polygon coverage depicting the boundary of the area selected
- Polygoncoverageshowingthelocationofprobablesitesfordetentionbasins
- Polygon coverage showing the population distribution and population density
- Arc coverage showing the network of the area
- Arc coverage showing the storm sewers designed in the drainage network

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 7.105 ⁜ Vol. 9, Issue 4, April 2022

DOI: 10.17148/IARJSET.2022.9473

Fused data coverage for Land Use (IRS 1D, PAN + LISS III) classification is to be carried out to classify the LISS III image for the Land use/Land cover classification

GIS Data Sources

A heightened awareness of environmental problems developed over the past several decades, which spurred a need for reliable geospatial data to enable better understanding of the environmental processes and their impacts. Environmental models have also undergone changes creating new requirements for geospatial data. In view of the critical role played by the data in any kind of spatial modelling, emphasis is given to new information gathering initiations for remotely sensed data and to advancements in integrating data for different sources with GIS.

A GIS is any system that captures, stores, analyses, manages, and presents data linked to a location. GIS is a system that includes mapping software and its application to RS, land surveying, aerial photography, mathematics, photogrammetry and geography.

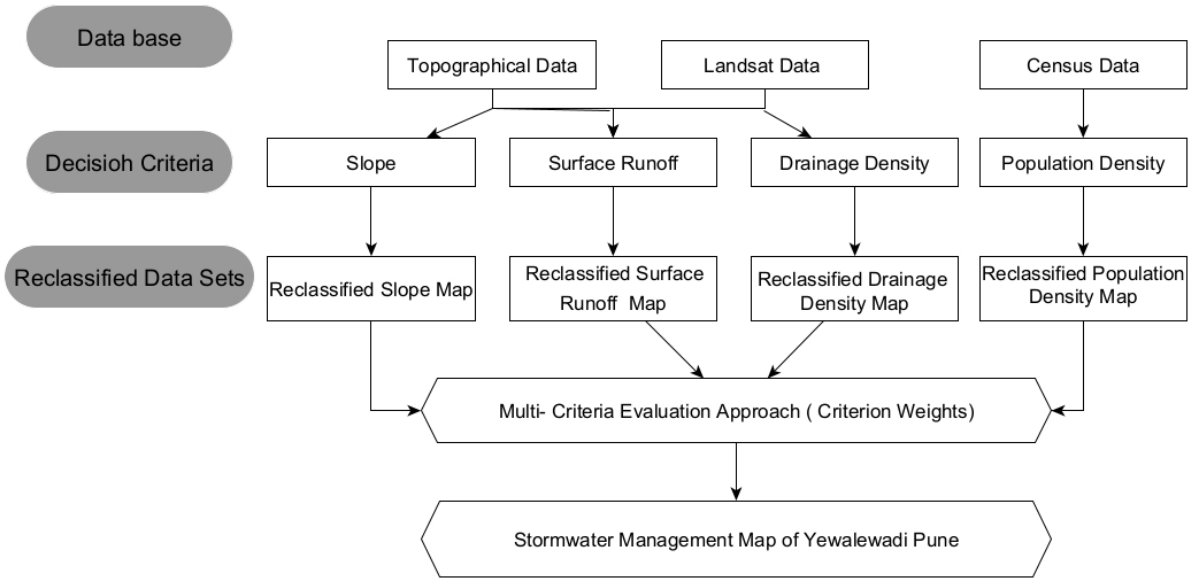
GIS and environmental models function with a broad spectrum of geospatial data used for spatial analysis and modelling of environment related problems at different scales. These data generally come in different formats and from various sources and measurements. The examination and organization of data into a useful form produces information content, which is compatible to GIS, enabling appropriate analysis and modelling of urban environment.

GIS Data Types

Basically, all the GIS data used in this study are classified as

Topographical data;
Thematic data; and
Collateral data.

In stormwater management on urban watersheds many decentralized systems are experimented with around the world along with the best management practices and the methodologies of their planning and design. From the aspect of promoting the decentralized approach to stormwater management on urban watersheds and the integration of this approach in spatial and city panning plans is precise interesting methodology of sensitive design of stormwater system, which is applied on the Molenbek watershed within the Brussels Region in Belgium, with the world of 13.5 km^2 and encompassing the 8% of the Brussels region.



Expected Outcome –

Stormwater runoff management gives conservation of water resources, protection of public health, and flood control. Through GIS studies on a slope and land utilization patterns can be used to predict whether the water in a given area is secure. Due to the ability of GIS to handle a huge amount of data sets operated, stored as well as reports will be generated. Through this project, we will find saturation areas and preventive measures for Storm water.

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 7.105 ⁜ Vol. 9, Issue 4, April 2022

DOI: 10.17148/IARJSET.2022.9473

REFERENCES

[1] A. Patel, "Stormwater Analysis and Solution of Waterlogging in Kothrud Region, Pune," *Int. J. Res. Appl. Sci. Eng. Technol.*, vol. 8, no. 6, pp. 1340–1348, 2020, doi: 10.22214/ijraset.2020.6216.

[2] M. Chakraborty, A. Tejankar, and R. Ayyamperumal, "Site Suitability analysis for artificial groundwater recharge potential zone using a GIS approach in Basaltic terrain, Buldhana District, Maharashtra, India," 2021.

[3] A. Gamit, P. P. Lodha, I. Prakash, and K. Mehmood, "Storm Water Management Using Remote Sensing and Gis-a Case Study of Surat City," vol. 4, no. 05, pp. 167–176, 2017.

[4] N. L. Srinivas, M. A. Reddy, P. S. Rani, and A. Chandrashekhar, "Integration of remote sensing and GIS for urban storm water management," *IUP J. Environ. Sci.*, vol. 4, no. 2, pp. 14–29, 2010.