

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 6, Issue 11, November 2017

Identification of Greenery Index by Using GIS

Rakhi Shelke¹, Veena Ganvir², Vishal Ghutke³

Assistant Professor, Department of Civil Engineering, PCE, Nagpur, India¹

Assistant Professor, Department of Civil Engineering, PCE, Nagpur, India²

Assistant Professor, Department of Civil Engineering, PCE, Nagpur, India³

ABSTRACT: Green spaces play an important role in deciding the quality of life in urban areas. They decide the local micro climate and the regional climate of the city. Monitoring the evolution of green spaces and comparing urban areas at several levels serves as a tool for urban development and planning. Hence quantifying the urban greenness becomes necessary. The mapping of urban green spaces such as parks/gardens, green spaces near institution, industrial area green spaces, and private green spaces. The whole analysis and final results are generated using Google Earth 2.1 and ARC GIS 9.1. Mapping of urban green spaces and public green spaces been done on satellite imagery. By using GIS we are able to find greenery index of different prabhag and tree canopy spread. By overlay analysis the boundary which consist of major portion of the tree canopy is selected as the boundary for the whole canopy. Different categories of vegetation have varying potential and affects the microclimate, as well as on the individual perception of green spaces. This paper identify the greenery of prabhag, so as to balance greenery of that prabhag or ward. This study also concludes that GIS is a powerful tool to map, assimilate, integrate and multivariate for any analysis.

KEYWORDS: Google Earth 2.1, ARC GIS 9.1, GIS, Greenery Index, Tree canopy

I. INTRODUCTION

Urban greenery has aesthetic, ecological, social & economic benefits. In recent years there is decrease in urban greenery, so it is essential to maintain greenery. Our goal is to make assessment of greenery index in Nagpur city using GIS. GIS (Geographic Information System) is a computer system for capturing data related to positions on earth surface. It is also stores the captured data of various objects on the earth surface. We are analyzing the greenery to maintain and develop greenery index of our city. We have used digitization as a tool to analyze the greenery of the city. Google earth is used so as to give the perfect image of green area covered by the city.

Nagpur is the greenest city of Maharashtra and being a resident of Nagpur city it is convenient to gather all the important information. We are able to cross check the areas covered by trees and vegetation. By Cross checking every prabhag (which are further divided into zones) a very precise study is done.

II. AIM AND OBJECTIVES

To identify the greenery index by using GIS.

The Objectives of the study are:

1. To determine greenery index for different wards or prabhag in Nagpur city.
2. To identify the ward having low green cover area.

To propose tree plantation in areas having low greenery index, so as to balance greenery in different wards of city. The Morphological gradient is an edge-strength extraction operator that gives symmetric edges between foreground and background regions.

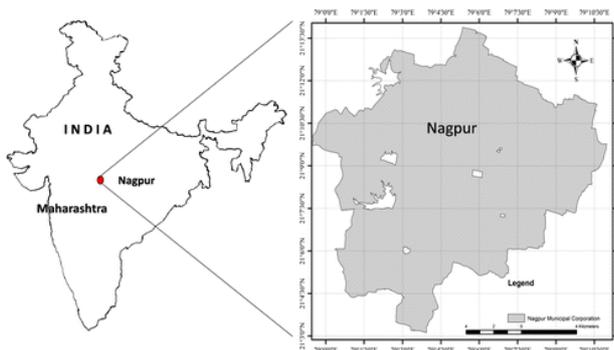
International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 6, Issue 11, November 2017

III. STUDY AREA

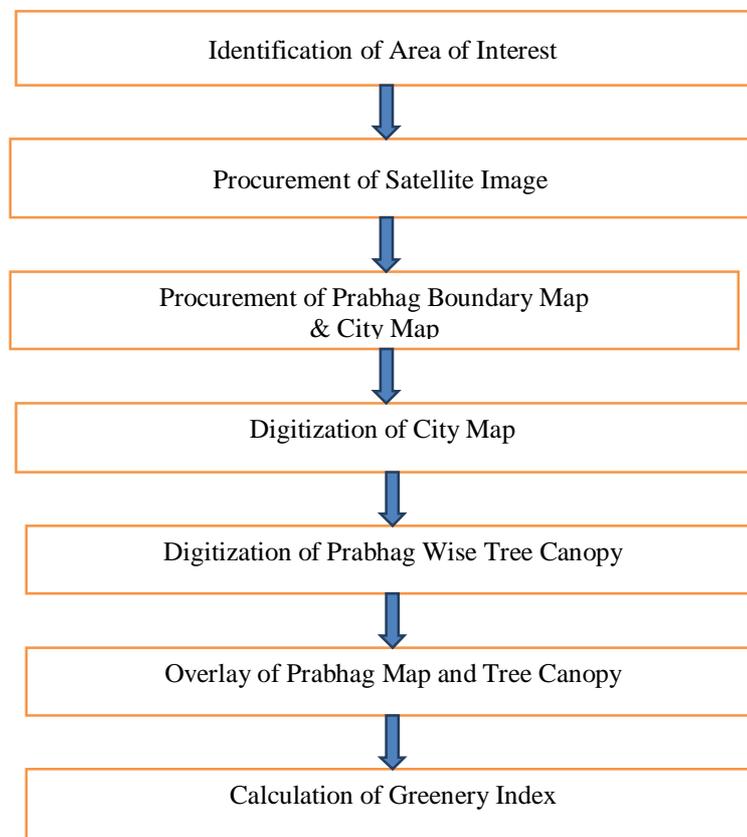


Nagpur is the winter capital and the third largest city of the Indian state of **Maharashtra** and largest city of central India. The city includes 721 villages under 9 Tehsils of the Nagpur District spreading across an area of 3,567 km². The urban area under NMC is 217.36 sq. km. As of the 2011 census, Nagpur municipality has a population of 2,405,665. There are 72 prbhags in Nagpur city and we have studied the core areas which comprise of highly populated area, industrial area, commercial areas, residential areas, institutional areas etc.

Fig.3 Study Area Map

IV. METHODOLOGY

4.1 FLOW CHART



International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 6, Issue 11, November 2017

4.1.1 IDENTIFICATION OF AREA OF INTEREST:

For the analysis of greenery index we have considered the area which accumulates the core of the city. It includes highly populated area, industrial area, commercial areas, residential areas, institutional areas etc. The disparities in area were also taken into account such as the less dense area and more dense areas. The outermost prabhag already consist of more greenery and it does not include crowded area.

4.1.2 PROCUREMENT OF SATELLITE IMAGE:

The satellite image was downloaded from Google Earth and was used for further analysis. The image used for this project work is captured in the month of January 2016.



Fig.4.1.2 Satellite Image of Nagpur City

4.1.3 PROCUREMENT OF PRABHAG BOUNDARY MAP & CITY MAP:

Prabhag boundary and city maps were collected from Nagpur NMC Civil lines, Nagpur.



Fig.4.1.3 Prabhag Boundary”

4.1.4 DIGITIZATION OF CITY MAP AND PRABHAG WISE TREE CANOPY:

The steps involved in the digitization process are as follows:

- First install the Google Earth 2.1 software, then collect the image of particular city (prabhag wise).
- Open prabhag city boundary limit and select the particular prabhag and then add polygon.
- Select colour for the polygon and plot canopies over the trees without plotting the shades of trees. After saving the polygon, it create KMZ file. The process of plotting of canopies is known as ‘Digitization’. This digitization is done by using Google Earth software.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 6, Issue 11, November 2017

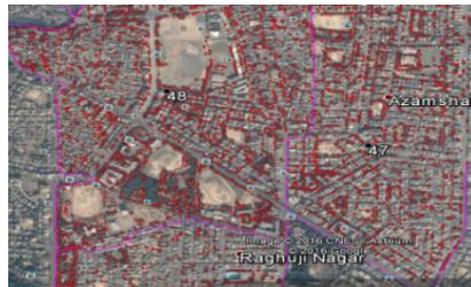


Fig.4.1.3 Digitization

V. RESULTS AND DISCUSSION

5.1 GREENERY INDEX CALCULATION:

Greenery Index: "It is the ratio of area of particular prabhag to the greenery area of same prabhag."

$$\text{Greenery Index (G.I)} = \frac{\text{Greenery Area of Particular Prabhag}}{\text{Area of Same Prabhag}}$$

The following table shows the greenery index of 5 selected prabhag:

Sr.No	Prabhag No.	Prabhag Area	Greenery Area	Greenery Index	% Greenery Index
1	51	3213092.166	914403.2849	0.2845	28.45
2	29	380429.4782	14972.45	0.039	3.93
3	19	445480.0947	39404.2889	0.0884	8.845
4	18	412461.7553	23783.8087	0.0576	5.76
5	21	3882121.87	1348072.552	0.34	34.72

5.2 DISCUSSION

The status of some prabhag are discussed below,

- Prabhagno.21 has maximum greenery index (0.34) within area of interest.
- Prabhag No.29 has minimum greenery index (0.039) within area of interest.
- Average of greenery index: 0.144
- Prabhag No.29 and 18 is in a critical zone with a very less greenery index and thus requires immediate action.

5.3.1 PROPOSAL FOR IMPROVEMENT OF CRITICAL PRABHAG.

1. The most critical Prabhag (no.29) is analysed from Greenery Index perspective. It is found that, this Prabhag has Greenery Index as 0.039. A scheme is generated here, to enhance the Greenery Index of this Prabhag. The following figure shows the present status and the enhanced status of this critical Prabhag. Similarly, other prabhags with lower Greenery Index shall be converted to Higher Greenery level.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 6, Issue 11, November 2017

- The enhanced Greenery Index for the said Prabhag (Prabhag 29) is 5.20

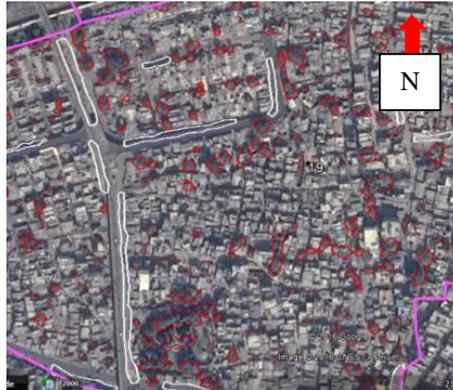


Fig. 5.3.1 Recommendation for Improvement

- The white polygon shows the area to be recommended for tree plantation.

VI. CONCLUSION

The whole analysis and final results are generated by using Google Earth 2.1 and ARC GIS 9.1. Mapping of urban green spaces and public green spaces has been done on satellite imagery. By using GIS we were able to find greenery index of different prabhag and tree canopy spread. The greenery index varies from 0.35 to 0.03. The zones with low greenery area have been analysed and recommendation have been set up for its improvement. The study provides a promising results and can be used for further areas or other zones.

REFERENCES

- [1] Biraj Kanti Mandal, "Destruction Of Urban Greenery Of Indian Cities- A Study Of The Two Wards Of Kolkata Through GIS & Remote Sensing", Netaji Subhash open university, West Bengal, February 2013.
- [2] Jorge Almazan, Darko Radovic, and Tomohiro Suzuki, "Small Urban Greenery: Mapping And Visual Analysis In Kyojima-Sanchome," International Journal Of Architectural Research (Archnet-IJAR), March 2015.
- [3] Xiaojiang Li, Chaunrang Zhang, Robert Richard. "Assessing Street-Level Urban Greenery Using Google Street View, A Modified Green View Index." Institute Of Remote Sensing And Digital Earth, Beijing, China. January 2016.
- [4] Line Straigte & Totas Vaitelys, "Inventory Of Green Space And Woody Plants In The Urban Landscape In Ariogola." Faculty of Forest Science and Ecology, Aleksandra's Stulginskis University, AUG. 2008.
- [5] Ashraf M & Ghase Debjani, "An Assessment Of Declining Urban Greens Patna Municipal Corporation Based On Normalized Difference Vegetation Index." Universal Journal Of Environmental Research And Technology, September 2015.
- [6] D. Venieri, G. Dimos, G. Achilleous, "Spatiotemporal and qualitative analysis and evaluation of urban green using a geographic information system (GIS)" 3rd International Conference on Cartography and GIS, JUNE 2010