

Determination of Greenery Index of GCOE campus using GIS

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Abstract:

Urban greenery has aesthetic, ecological, social and economic benefits. To ensure sustainability of those benefits, urban greenery needs appropriate maintenance and management. Knowing the importance of pressure of greenery, this study aims to bring attention to the potential role of environmental and social sustainability played by vegetation cover. Government College of Engineering campus situated in Jalgaon is selected as study area. In the present study, a spatial technique of tree canopy mapping is used to generate the precise green cover and final results are generated using Google Earth and GIS. Mapping of green spaces in college campus has been done on satellite images. By using GIS we were able to find greenery index of Government college of Engineering campus and tree canopy spread. The Greenery Index of the college campus is 38.3% which is more than enough. So, there is no need of plantation in the college campus.

Keywords: GPS, GIS, Greenery Idex. QGIS, Green Campus

INTRODUCTION

Greenery is beautiful; it serves us by providing many other services at no charge. Greenery produces oxygen for all air breathing life. Greenery also provides the ground with a natural erosion protection by the strong roots penetrating deep into soil and helping to hold it in place in the event of floods or other natural disasters. Greenery in the landscape provides homeowners with a beauty that is not found by building structures of any type. "GREEN is a color of life cycle; green is clean and is always in".

The local authorities, has many constraints and are very much reluctant in shaping the greenery for the city or any institute this situation leads to the disparity in development of green canopy. More ever, the average citizen is often removed from understanding the individual features of their unique environmental habitats.

Government College of Engineering campus situated in Jalgaon is selected as study area. In the present study, a spatial technique of tree canopy mapping is used to generate the precise green cover and final results are generated using Google Earth and GIS. Mapping of green spaces in college campus has been done on satellite images. The main aim of study is to assess of greenery of Government College of Engineering Jalgaon using GIS. The study intended to achieve the following specific objectives.

- To determine greenery index for Government college of Engineering campus.
- To propose tree plantation in campus if it having low greenery index, so as to balance greenery.
- Compare the parameters of the study area with optimal values
- Suggest remedies of the vegetation areas and management the greenery care.

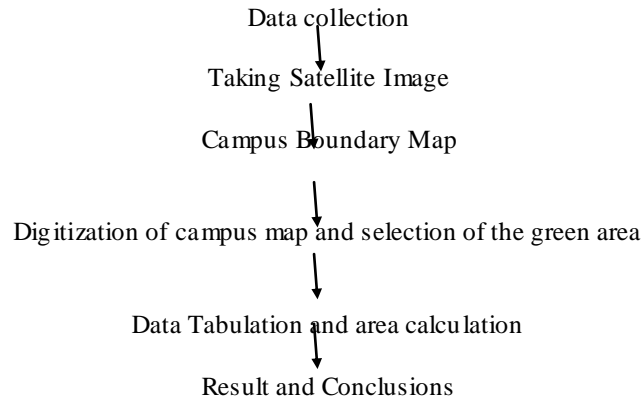
1.1 GIS AND GPS:

A GIS is an information system designed to work with data referenced by spatial / geographical coordinates. In other words, GIS is both a database system with specific capabilities for spatially referenced data as well as a set of operations for working with the data.

Google Earth is a computer program that renders a 3D representation of Earth based on satellite imagery. The program maps the Earth by the superimposition of images obtained from satellite imagery, aerial photography and GIS data onto a 3D globe, allowing users to see objects at various angles..

METHODOLOGY

The following project methodology was adopted for systematic and scientific analysis of the Greenery Index for college campus.



2.1 Data Collection

The boundary of Government college of Engineering Jalgaon is collected from Google map in the form of map. The map was scanned and converted into jpg format. Autodesk Map5 was used to view the jpg file and create layer of college boundary.

2.2 Satellite Image

Satellite Image of college campus was collected from Google Earth software. From that satellite image, layer of college campus was created and that image had been used for digitization.

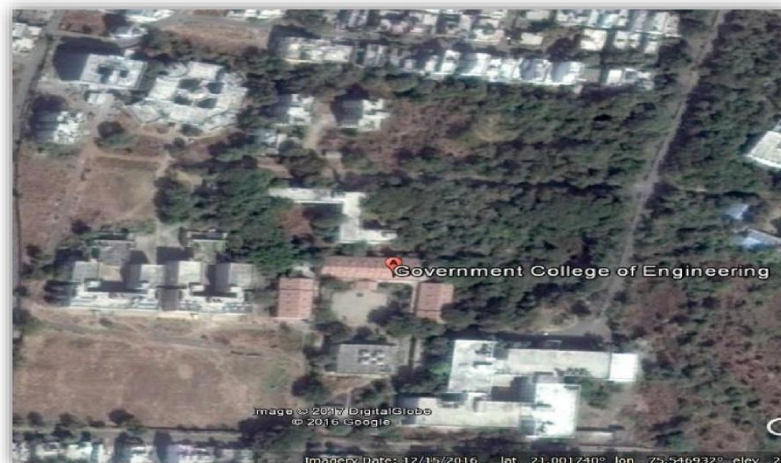


Fig 2.1 Satellite image

2.3 Selection College Boundary

The image from the Google earth is then used to set boundary for area calculation of college campus



Fig 2.2 Satellite image with college boundary

2.4 Digitization Of Campus Map And Selection Of The Green Area

Once the boundary is selected then the greenery area in the campus is selected so as to find the total greenery area of the campus. While calculating the greenery area care should be taken that the shadow of tree shall not included in the area.



Fig 3.3 Satellite image with greenery area

2.5 Data Tabulation And Greenery Index Calculation

The greenery area of college campus is calculated and tabulated for further processing. It is observed that the greenery area of the college campus is **3.08 Sqkm** and the total area acquired by the college campus is **8.042 Sq km**. The Greenery Index calculated from the total area and greenery area.

Greenery Index: It is the ratio of area of particular institute or place to the greenery area of same institute or place.

$$\text{Greenery Index (G.I)} = \frac{\text{Greenery Area of college campus}}{\text{Area of college campus}}$$

RESULTS AND DISCUSSIONS

Once all the procedure is done we moved on to the results or the readings we get from the GIS. The total green area includes the area of each and every small tree in the college campus, we add them and we get the gross or total green area, from which we calculate the greenery index of the college campus which is represented in tabular form as follows.

Table No.4.1 Total area calculation

Sr. No	Campus Area (in sq.km)	Greenery Area (in sq.km)	Greenery Index (in %)
1	8.042	3.08	38.3

QUALITATIVE ANALYSIS OF GREENERY INDEX

The Greenery Index was analyzed and a qualitative model was generated in GIS platform to understand the green area spread within the college campus. The following parameters were used for the qualitative analysis:

Table No. 4.2 Logically range of greenery index which shows greenery categories

Sr.No.	Range of Greenery Index	Greenery Category
1	0.2 & above	Very high
2	0.15 & 0.2	High
3	0.1 & 0.15	Moderate
4	0.07 & 0.1	Low
5	Below 0.07	Very Low

CONCLUSION

The whole analysis and final results are generated using Google Earth and GIS. Mapping of green spaces in college campus has been done on satellite images. By using GIS we were able to find greenery index of Government college of Engineering campus and tree canopy spread. The greenery index of the college campus was analyzed and set up for its improvement in need. The study provides promising results.

The Greenery Index of the college campus is **38.3%** which is more than enough. So there is no need of plantation in the college campus.

REFERENCES

- [1] Ashraf M & Ghose Debjani, "An Assessment of Declining Urban Green Patna Municipal Corporation Based On Normalized Difference Vegetation Index", *Universal Journal of Environmental Research and Technology*, (2015). Vol.5 (5), 220-232.
- [2] Xiaojiang Li, Chaunrang Zhang, Robert Richard, (2016). "Assessing Street-Level Urban Greenery Using Google Street View, A Modified GreenView Index." *Institute Of Remote Sensing and Digital Earth, Beijing, China, Vol.14*, 675-685.
- [3] Jorge Almazan, Darko Radovic, and Tomohiro Suzuki, (2015) "Small Urban Greenery: Mapping and Visual Analysis in Kyojima-Sanchome", *International Journal of Architectural Research (Archnet-IJAR)*, Vol.6 (1), 57-76.
- [4] Maija Jankevica, Daiga Zigmunde, (2011) "Researching the Current Situation of Street Greenery in Latvia Large Cities", *Latvia University of Agriculture in Mg. Arch, Vol.3 (3)*, 33-41.
- [5] Nnam Godwin Uchechukwu, Ndukwu Raphael and Nnam Victor "Comparison of Pixel Based and Objects Oriented Image Classification for Mapping Urban Greenery in Uwani Enugu."
- [6] Line Straigyte and Totas Vaitelys, (2008) "Inventory of Green Space and Woody Plants in the Urban Landscape in Ariogala." Faculty of Forest Science and Ecology, Aleksandra's Stulginskis University, ISSN 1847-8481, 116-121.
- [7] Anna Butt, Rabia Shabbir, Sheikh Ahmad and Neelam Aziz, (2015). "Land Use Change Mapping and Analysis Using Remote Sensing, GIS." *Egyptian Journal of Remote Sensing, Vol.14*, 251-259.
- [8] Pradeep Chaudhary, Ranjan Bagra, Bilab Singh. "Urban Greenery Status of Some Indian Cities: A Short Communication." 2011. Vol.2 (2), 98-101.
- [9] Biraj Kanti Mandal, (2013) "Destruction Of Urban Greenery Of Indian Cities- A Study of The Two Wards of Kolkata Through GIS and Remote Sensing", Netaji Shubhash Open University, West Bengal, Vol.6(4), 93-110.
- [10] D. Venieri, G. Dimos, G. Achilleous, (2010) "Spatiotemporal and Qualitative Analysis and Evaluation of Urban Green Using A Geographic Information system (GIS)" 3rd International Conference on Cartography and GIS.
- [11] Saied Pinastch, Syed Ahmad Ali and Heshmi Tamil Hussain. (2008), "Greenery Percentage Estimation Using Band Ratio, NDVI from Landsat Enhanced Thematic Mapper (ETM) 2002. An Application of GIS Techniques, Derful- Andime-Shikhuzeest on South-West Iran."
- [12] Kamila Klemešová, Miroslav Kolář, Ivan Andráško (2014), "Using GIS in the flood management, flood maps." *Geographia Technica, Masaryk University, Czech Republic, Vol.9, Issue 2*, 44-53.
- [13] N. H. Wong, S. K. Jusuf. (2007), "GIS Based Urban Heat Island Study in University Campus." Second PALENC Conference And 28th AIVC Conference On Building of Low Energy Cooling And Advance Ventilation Technology, Vol.2, 1121-1126.
- [14] K. Narmada and G. Bhaskaran, (2014), "Urban Green Space Mapping of Chennai" Department of Geography, University of Madras, Chennai, Vol. XXXIV, 102-107.