



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 Issue: IX Month of publication: September 2020

DOI: <https://doi.org/10.22214/ijraset.2020.31317>

www.ijraset.com

Call:  08813907089

E-mail ID: ijraset@gmail.com

Effects of Unregulated Development on Indian Cities: A Case Study of Noida and Nainital

Rahul Dabra

Deputy Manager, Rudrabhishek Enterprises Ltd. Delhi

Abstract: Ever increasing populations have led to increased demand for urban land and thus high rate of urbanization is observed in the last decade. This comes at the cost of environmental degradation in terms of reducing green cover in Indian cities. The paper deals with spatial land cover analysis of Nainital and Noida, growing regions in close proximity to the capital of India, Delhi, through the technique of Normalized Difference Vegetative Index (NDVI), comparing the data for 2000 and 2016. The factors accounting for land cover change in these two metropolitan cities, in the past few years, are also discussed in the paper.

I. INTRODUCTION

Land cover refers to variations in the state or type of physical materials on the Earth's surface, such as forests, grass, water, etc., which can be directly observed using remote-sensing techniques (Fisher P., 2005). Land cover information has been identified as one of the crucial data components for many aspects of global change studies and environmental applications. (Sellers P. J., 1995) India, being a developing country, has majority of its population involved in primary sector majorly agriculture. Almost two-thirds of total workers in India earn their livelihood through agriculture and other allied sectors like forestry, animal husbandry and fishing. The primary sector of economy makes direct use of natural resources and includes sectors like agriculture, fisheries, horticulture, mining etc. (Sethi, 2017) With the advent of urbanization, a new trend can be seen coming up. More stress is now being laid on developing secondary and tertiary sector. With the concept of satellite town and counter magnets, a huge stress is being given on developing smaller towns laced with all the relevant facilities.

It becomes imperative to regulate population spurt so as it doesn't affect the environment negatively. However, rarely it is seen that development efforts are put in to provide a sustainable environment for the people without deteriorating the environment. Land cover change and degeneration is what follows post establishment of settlements. This needs to be kept in check. (Kaustav Ritwik, 2016) This paper outlines the challenges in planning to ensure better delivery of basic services across the city.

II. STUDY AREA

A. NOIDA

NOIDA (New Okhla Industrial Development Authority) was formed under the U.P. Industrial Area Development Act, 1976, NOIDA has now established itself as one of the few planned, integrated, modern Industrial Cities in India. Well connect to Delhi through a well laid network of roads, this city is spread over an area of 20,316 hectares. NOIDA offers a pollution free high standard of living and highly supportive industrial environment with its unique infrastructure providing numerous, matchless facilities. As per provisional reports of Census India, the population of Noida in 2011 is 642,381; of which male and female are 352,577 and 289,804 respectively. In 2015, Noida was ranked the Best City in Housing sector in India as per a leaning news channel. Noida dethroned Mumbai as the second-best realty destination. Noida has emerged as a hot spot for IT and IT-enabled services industry with many large companies setting up their businesses here. Moreover, as per Noida authority CEO, Noida is considered to be India's greenest city with about 50% green cover, the highest of any city in India.

Even after all these incessant "Green Noida, Clean Noida" drives, the land cover has immensely changed over the last decade due to the proliferation of the city because of urbanisation.

B. Nainital District

Nainital is one of 13 districts of the state of Uttarakhand. The *hill town* is known for its scenic beauty and acts as a major tourism hotspot in North India. The city is set around Naini lake, named for its shape like 'eye', and is dependent on the lake for variety of purposes. With a population of 954,605, as per Census 2011, Nainital district is known as a part of Terai region. Terai means areas lying close to wetlands and which have good potential of groundwater availability. The district comprises of three broad physiographic divisions: The Lesser Himalayan Zone, the Himalayan Foot Hill Zone and the Piedmont Alluvial Tract, as shown in the map below. (Sethi, 2017)

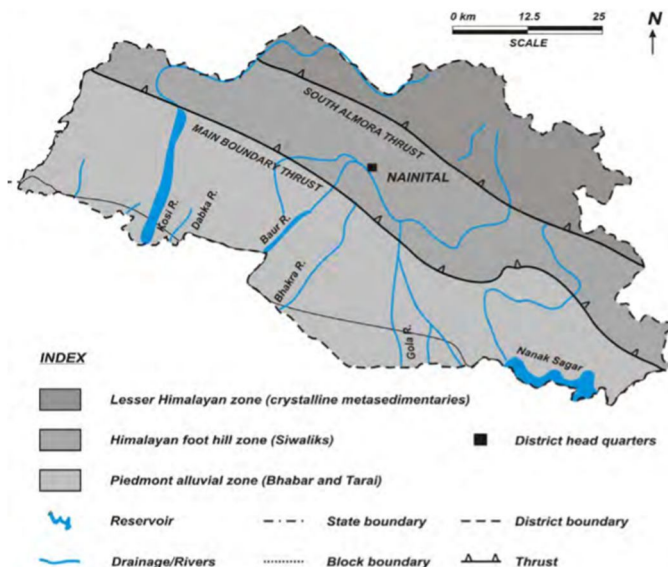


Figure 1. Physiographic divisions of Nainital District, CGWB 2010

More than 55% of the geographical area of the district lies in the first two zones, primarily comprising of sand stone, mudstone, slates, clay lenses and phyllites. These rock formations have poor porosity and yield adequate water only when secondary porosity develops due to weathering and disintegration along weak planes. Due to such conditions, certain measures need to be lake to ensure aquifer recharge in the region and maintain water sustainability.

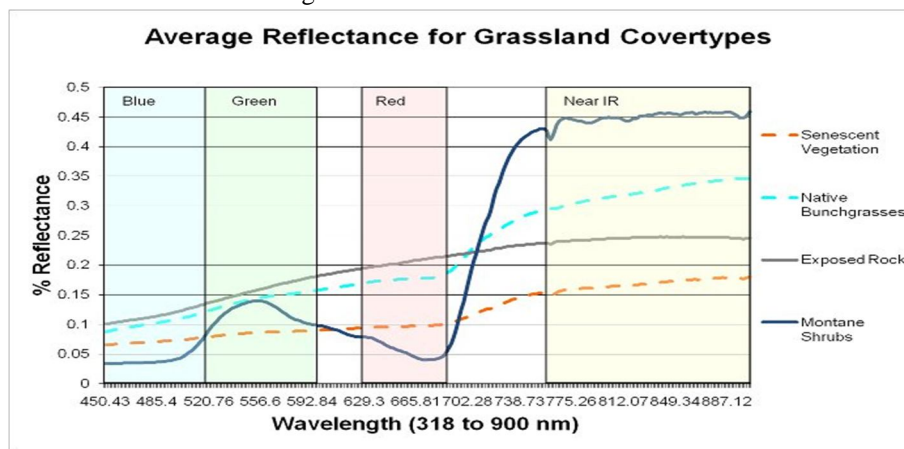
III. LITERATURE STUDY

A. Normalized Difference Vegetation Index

The NDVI, in the range of -1 to 1, is derived from red and near-infrared bands of images:

1) $(NIR-Red) / (NIR+Red)$: The concept behind NDVI is that plants' chlorophyll absorbs sunlight, which is captured by the red band of the electromagnetic spectrum, whereas a plants spongy mesophyll leaf structure has a reflectance in the near-infrared band of the spectrum. (Lv, 2013). The NDVI is the quantification of the energy received and energy emitted by plant communities. This index gives a value of how green a particular region is, i.e., the quantity of vegetation present in that area and its state of health of the growth. (C.L Meneses-Tovar)

Figure 2: Reflectance of Grassland



2) Courtesy:

(http://wiki.landscapetoolbox.org/doku.php/remote_sensing_methods:normalized_difference_vegetation_index)

B. Urbanization

Urbanization is an index of transformation from traditional rural economies to modern industrial one. It is progressive concentration of population in urban unit (Kingsley Davis, 1965). Urbanisation is an increase in population and economic activities in the urban areas which leads to further development of towns and agglomerates to contain this rising population. It is a cause and effect of heightened economic progress in a region (Census of India, 2011). Population of India is expected to increase from in 1.2 billion (2011) to 1.3 billion (2021), increasing the degree of urbanization from 31% (2011) to 42% (2021). Since 1981 population of the country has increased 1.7 times while urban population has increased 2.4 times. This shows that urban populations will be increasing tremendously in the coming decades. (India, 2011)

Determinants of urbanization can be social, economic or demographic. Public policies and governance, stage of technological advancement, degree of socio-economic awakening; all these factors are social determinants of degree of urbanization. The economic determinants are; the type of economy, degree of development, degree of commercialization and extent of diversification of economy. And rate of population growth, magnitude of migration and population density are the demographic determinants of urbanization. Migration plays a key role in urbanization. Migration as defined as movement of people from one place to another. (Geographic, 2005) According to United Nations, migration is the crossing of the boundary of a political or administrative unit for a certain period of time. Migration can be temporary as well as permanent. (Castle, 2000) Migration to urban areas from rural areas depends on many factors like lack of basic facilities and amenities in rural areas, high employment opportunities in urban areas, low and uncertain wages in rural areas and better living conditions in urban areas. (J. Corbett, 1885)

To provide the basis needs of the people such as housing and infrastructure, land is cleared off. This not only changes the land cover but has severe repercussion in the longer run. To provide a sustainable living, prudent planning is imperative. (Ritwik et al, 2016)

C. Methodology

Land use is the function of land, i.e., what a particular parcel of land is used for. Land varies in utility from area to area. In rural area, land use majorly includes forestry and agricultural land while, in urban areas land use could be housing or industry. Humans take the natural environment and change it for their own purposes. This paper will be highlighting how the land use and land cover of Noida and Bengaluru has been changed in the course of 8 years. Two imageries which have been used are that of April 2008 and April 2016. Two separate images have been used to find the overall change in land cover. These includes multispectral satellite imageries from Landsat-4 and Landsat-8 OLI/TIRS satellites respectively. Land cover has been shown using both the techniques of supervised as well as unsupervised thematic classification. Classification of the Built up, Grassland and Dense Forest, has been carried out by using ERDAS imagine (v 15).

IV. CASE STUDY

A. Noida

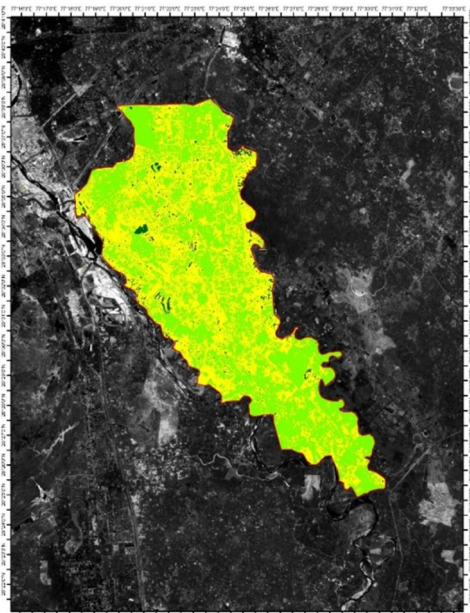


Figure 3: NDVI (Supervised classification), 2008

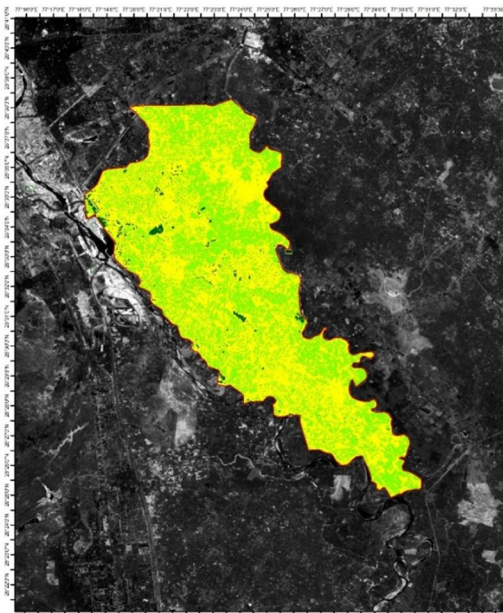


Figure 4: NDVI (Supervised Classification), 2016

According to the results achieved through this exercise, it can be seen that overall vegetation of Noida has reduced distinctively. (See fig 18 and 19)

Land Type	2008	2016
Forest	430.53	337.41
Grassland	10211.8	8377.56
No Vegetation	8532.9	10542.24

Table i: Area under different land cover

Table (i), gives an exact detail of how much the change is in terms of area under vegetation. From 430.53 Ha in 2008, forest reduced to 337.41 Ha. In 2016. While, grassland reduced from 10211.8 Ha. to 8377.56 Ha.

B. Major Changes

From the above images, it can be seen that the city doesn't have a definite pattern of growth overall but have spread across in every direction. In the recent years, due to intense land acquisition from the farmers at cheap rate and selling it to the builders for constructing huge projects, large amount of agriculture land has been converted in non-vegetation land. Major changes have happened around the expressway area where land was acquired from the farmers at very cheap rate and was sold to builders for high cost and with high FSI. This region has the highest number of high rise structures in NOIDA.

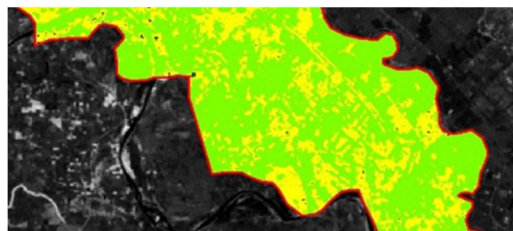


Figure 5: (a) 2000, Towards Greater Noida

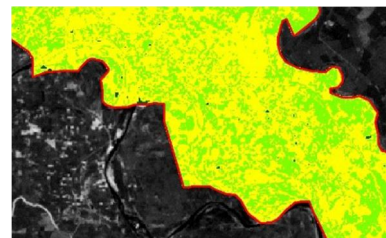


Figure 6: (b) 2016, Towards Greater Noida

It can be seen that though change in forest remains negligible in terms percentage (though, a reduction of 430.53 Ha. to 337.4 Ha), the grassland has reduced by dramatically by 10%. In 2008, area which came under grassland was 10211.8 Ha and in 2016, it reduced to 8377.56 Ha.

Reason to this is the development taking place throughout the city. It is one of the most promising real estate market and have a latent potential to become an IT hub. Hence, large scale residential townships are spawning throughout the city.

C. Nainital

Being a tourism hotspot, the district has seen high increase in construction activities since the last decade. Using remote sensing techniques, changing land use patterns of the district were analyzed and compared. The Land Use/Land Cover analysis of Nainital District for 2008 and 2016 shows that the percentage of built-up areas has increased in these 8 years with acute decrease in green areas. Deforestation, as discussed above, has major impacts on water availability and this is another reason for reducing water availability in the district. The forest area has decreased by more than 20% in just 8 years. While the built-up area has increased in these 8 years. These maps depict the rate of deforestation in the district and present a disturbing situation.

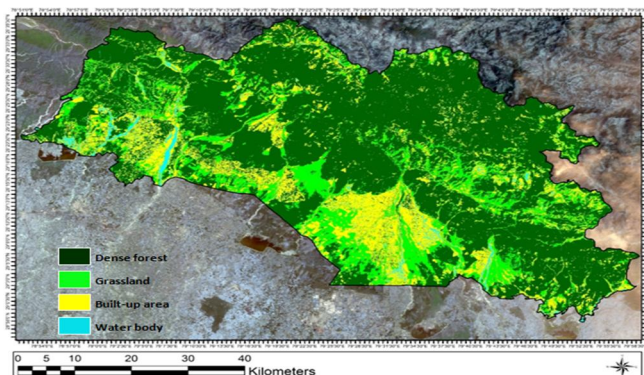


Figure 6. LULC of Nainital District in 2008

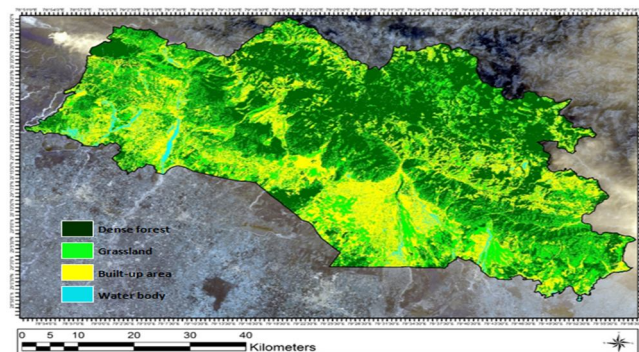


Figure 7. LULC of Nainital District in 2016

V. CONCLUSION

The approach adopted in this study clearly demonstrated the potential of GIS and remote sensing techniques in measuring change pattern of land use/cover in town area. The study conducted advocates that multi-temporal satellite data are very useful to detect the changes in land use quickly and accurately.

NOIDA has been ranked as the second best city for real estate development and has undergone a drastic urbanization in the past 7-8 years. Not only the real estate, even other infrastructure facilities are getting an upgrade from time to time and this is beneficial for the city itself. Several other projects such as IT parks, International cricket stadium and even the country's first Formula 1 race track have graced the city in the last 5 years which has completely changed the face of the city. However, several steps have also been taken to preserve the green cover and the environment as a whole such as "preservation of Okhla bird sanctuary", "Night safari", Golf courses, Gardens and even terrace garden are being promoted to secure a sustainable development for the future.

REFERENCES

- [1] Fisher P., C. A. (2005). Land use and land cover: contradiction or complement. Wiley & Sons, Inc.
- [2] Kaustav Ritwik, A. S. (2016). Land Cover Change of Indian Cities:. International Research Journal of Engineering and Technology (IRJET), 1613-1617.
- [3] Sellers P. J., M. B. (1995). Remote sensing of the land surface for studies of global change: models-algorithms-experiments. 3-26.
- [4] Sethi, A. (2017). WATER SUSTAINABILITY: ASSESSMENT OF WATER RESOURCES. INTERNATIONAL JOURNAL .
- [5] XIJIE LV, "Remote Sensing, Normalized Difference Vegetation Index and Crop Yielding Forecasting," Science, Thesis, 2013,
- [6] Z. Gong, K Kawamura, M. Goto, T. Wulan, D. Alateng, T. Yin and Y. Ito, "MODIS normalised Difference Vegetation Index and Vegetation phenology dynamics in the inner Mongolia Grassland", Solid earth, 6, 1185-1194, 2015. doi:10.5194/se-6-1185-2015
- [7] I. Esau, V. Miles, R. Davy, M Miles and A Kurchatova, "Trends In Normalized Difference Vegetation Index Associated With Urban Development In Northern West Siberia," Atomic Chemistry and Physics, 16, 9563-9577, 2016, doi:10.5194/acp-16-9563-2016
- [8] Master Plan of Noida and Bangaluru (2021 and 2015 respectively), Development Authority, State Government
- [9] Castle, S. (2000). International Social Science Journal, vol 52, 269-270.
- [10] Geographic, N. (2005). Human Migration Guide. Retrieved from National Geographic Web site: www.nationalgeographic.com/xpeditions/lessons/09/g68/migrationguidestudent.pdf
- [11] J. Corbett, E. G. (1885). The law of migration. CSISS Classics.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)