

Analyzing decline of Green Cover due to Eastern Peripheral Expressway

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Abstract:

The increasing level of economic development of our country has a positive influence on our government's effort to improve the public infrastructure; one such advancement can clearly be seen with the improving road networks of our country. According to the World Health Organization (WHO), 80 people die each day owing to air pollution, it is also the fifth leading cause of premature deaths in India. The main reason assigned to it is deforestation. The tree cover is dropping at a rapid pace. Hence, for the betterment of the society and the environment it is necessary to maintain a balance. The Road and Transport Ministry of India has publicized results based on a recent survey, indicating that it is the need of the hour to have a better road network connecting the metropolitan cities with its urban suburbs of the Delhi-NCR Region having heavy traffic congestion problem. Thus, to improve road communication and to look out for the environment in and around the NCR region two big projects namely, The Eastern peripheral expressway and the Delhi Meerut Expressway were proposed. The current study has been conducted with the help of GIS and Remote Sensing techniques, which have turned out to be of immense help as they provide a holistic view to the subject matter. This work identifies the major green cover areas around the Eastern peripheral expressway corridor, which have significantly decreased. A change detection has also been done for evaluating the temporal changes in the green cover for the areas around the expressway apart from this the Indices (NDVI) have also been prepared for the specified study area. The journal has been wound up by proposing certain measures which could help the environment by improving the green cover.

Keywords: *Corridors, Expressway, Green Cover, Buffering, Change detection.*

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Introduction

All over India, the road construction/widening invariably involves chopping off trees. Thousands of trees are being chopped off every year in the name of 'development'. Development surely is positive but never at the cost of our natural environment. Development at the expense of nature can easily disrupt the ecological balance. However, we must agree to the fact that roads are a crucial part of the economic development of a region and with the enormous increase in the vehicular traffic it has become the need of the hour for any country to have an effective and well developed road network system. The road network in India is huge, Indian government have taken different initiatives in order to meet the growing demand of rising number of vehicles on the road. Many of these initiatives were taken through the development of Highways throughout the country. However, over the years there have been a number of serious problems encountered by these highways for instance, uncontrolled traffic movements, illegal habitation of people on the footpaths, few lanes etc. Consequently, to resolve such problems the government started to focus on the development of expressways. The expressways provides an unobstructed and secure movement of people and it also helps in easy traffic flow.

One such 'development' of expressway corridor was recently done in the region between Palwal and Kundli. It is a known fact that Delhi is facing some serious air pollution. Its pollution level is getting worse year on year. Going by a study it was found that by creating an expressway between Kundli and Palwal Delhi's pollution could be controlled by at least 27% by diverting the commercial traffic, additionally it would also help to curb the vehicular traffic between Ghaziabad and Faridabad. Thus, the project of Eastern Peripheral Expressway (EPE) was approved in 2015 and was recently inaugurated by PM Narendra Modi on 27th May 2018.

The National expressway II has some of the features which have been included for the first time ever in an expressway these features include rain water harvesting along its route which will be in every 500m, facility of drip irrigation for the plants along the expressway etc. But despite all these features, this expressway has had a huge impact on the natural habitat of the region. According to the data published by the 'Department of Forest' (INDIA), government had given permission to cut about 657 trees for clearing the path for constructing of EPE. Not just this, but even more trees were chopped off for a 137 km stretch of National Expressway II (NE II). Talking in terms of land, then in order to build this expressway, officials stated that about 1,700 hectares of land was acquired and cleared out. Hence, it is evident that the construction of the Eastern Peripheral Expressway had a massive influence on the environment and it is the need of the hour to study the subject matter. Thus, this paper intends to clear out the amount and kind of changes that have taken place due to the construction of eastern peripheral expressway. The current work was carried out to achieve the following objectives:

1. To identify the prominent green cover areas/patches
2. To estimate the amount of greenness along the corridor.
3. To quantify the decline in green cover due to expressway.
4. To suggest the measures for improving Green Cover

Study Area

The study area i.e. the Eastern Peripheral Expressway (or National Expressway [NE II]) is an expressway connecting Kundli and Palwal Districts of Haryana via Ghaziabad. It passes through 5 districts of Haryana and U.P - Baghpat, Ghaziabad, and Gautam-Buddha Nagar districts of Uttar Pradesh & Palwal and Kundli districts of Haryana.

NH II has a span of about 135kms. The significance of this expressway could be judged from the fact that because of this expressway the air pollution in Delhi is expected to reduce by 27% due to the main diverging traffic of trucks. Apart from this it includes several salient features for an expressway which have been introduced for the

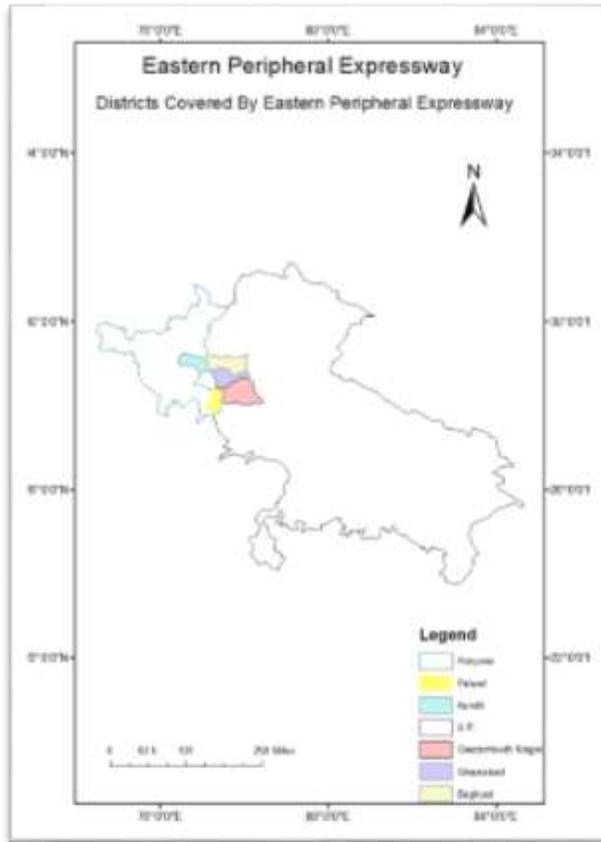


Figure 1

States covered by Eastern Peripheral Expressway

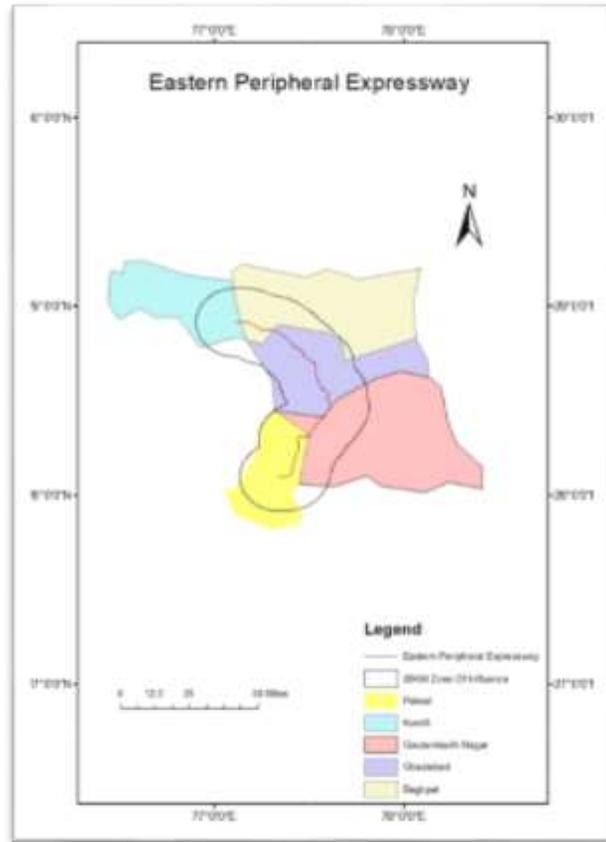


Figure 2

Eastern Peripheral Expressway- Study Area

very first time in India, for instance the weigh in motion sensors have been installed to prevent the over loading vehicles thereby limiting air pollution, the facility of electronic toll collection have also been facilitated among several others (location of study area shown in figure 1 & 2) .

Methodology

To examine the influence of Eastern Peripheral Expressway on the declining vegetation cover along its corridor. For conducting the study, geo-informatics approach was used, which included the remote sensing data and geo spatial techniques to interpret the satellite imageries of different years.

Data source

Data	Source links	Resolution	Date
Sentinel 2B	https://earthexplorer.usgs.gov/(ESA)	10m	2018.06.19
Sentinel 2A	https://earthexplorer.usgs.gov/(ESA)	10m	2016.06.04

Fig: 1 Data sources

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Software Used

For band stacking and mosaicking, various software including ArcGIS Desktop software was used and along with it Google Earth Pro was used for digitizing the expressway corridor. Arc GIS was also used for creating subset, buffer, and LULC maps.

Data Processing

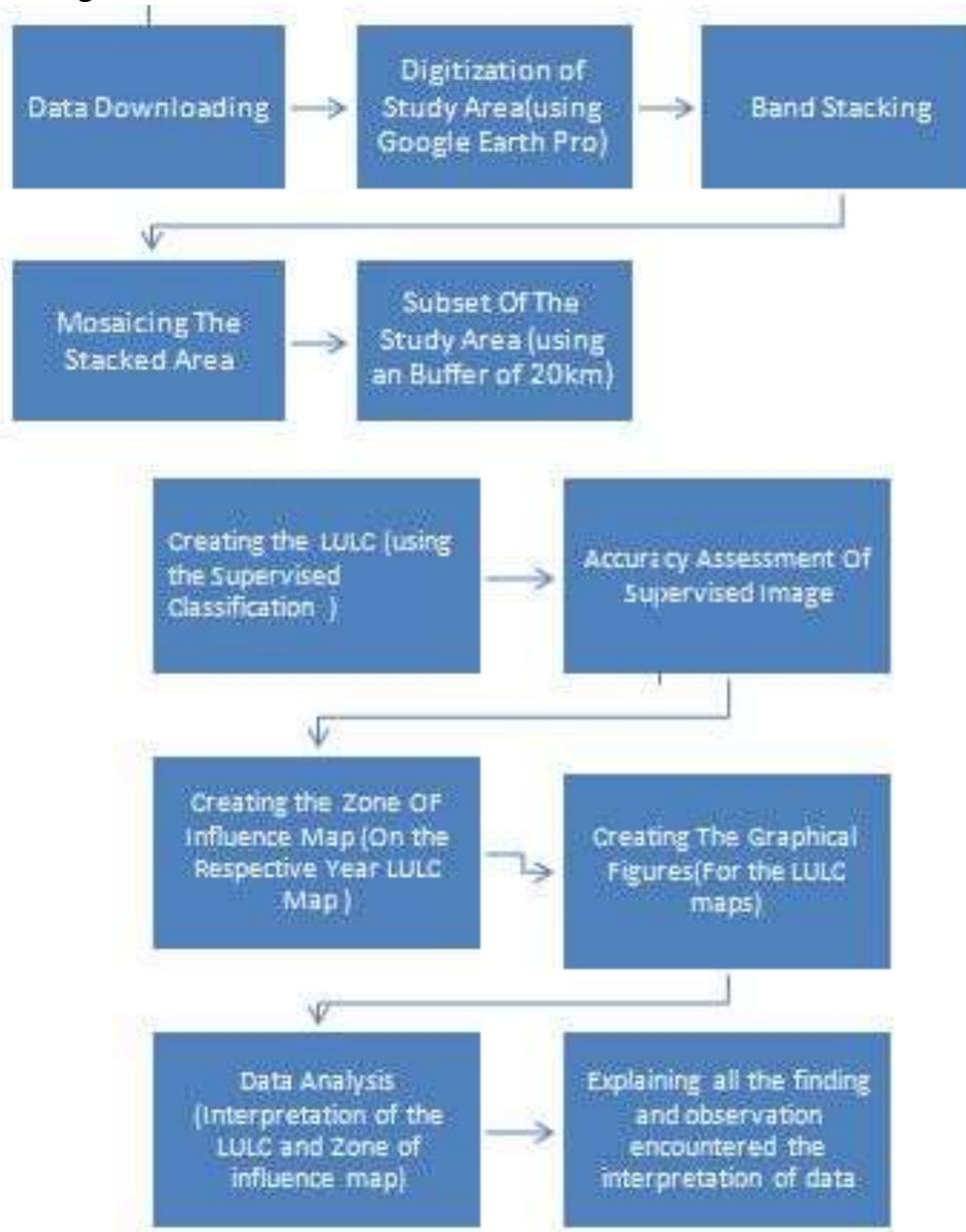


Figure 3– Flowchart for Methodology

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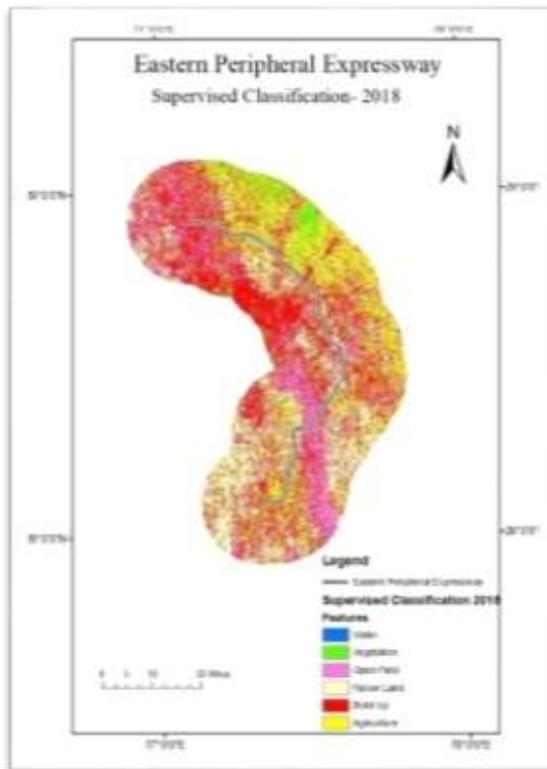
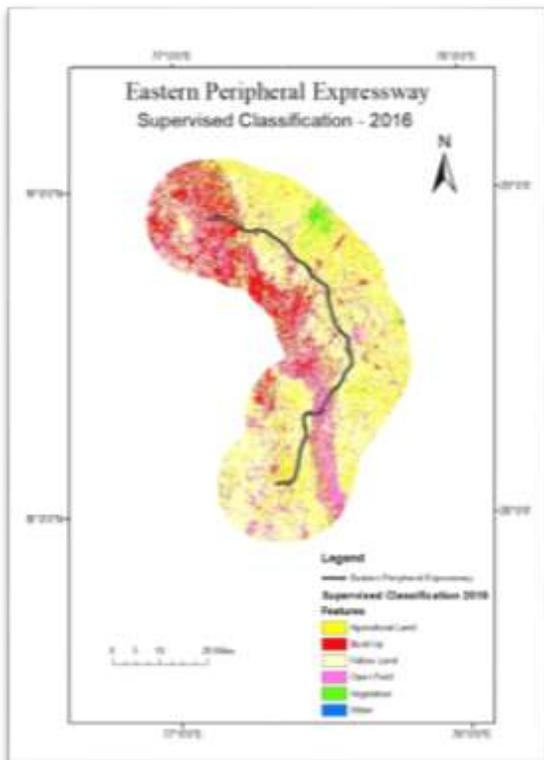
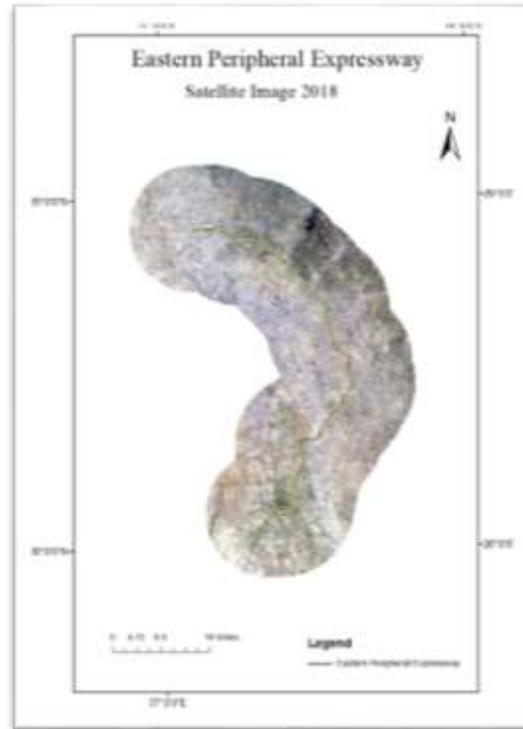


Figure 4
Satellite Imagery 2016

Figure 5
Satellite Imagery 2018

Data Analysis

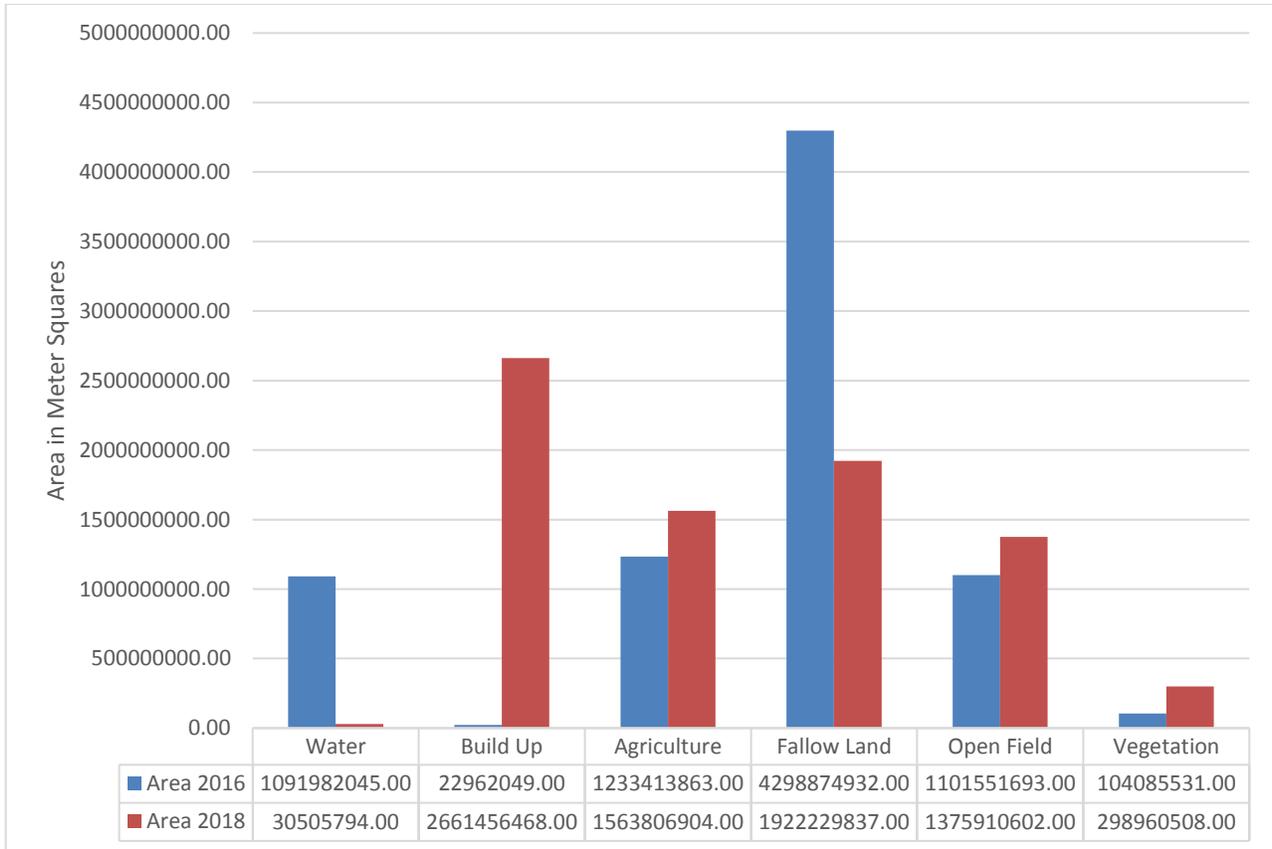


Fig 2: Graphical representation of LULC- year 2016 and 2018

After the comparison done between the 2016 and 2018 satellite imagery of the area along the expressway we can see that the build-up was very less in the year 2016 compared to the year 2018 whereas fallow land was very high in 2016 and compared 2018 which was clearly seen on the figures of agricultural land which shows a increase in 2018 compared to 2016. The overall Vegetation was showing an increase in 2018 than 2016 but the vegetation cover is less within the 1.5 km range of expressway in the year 2018.

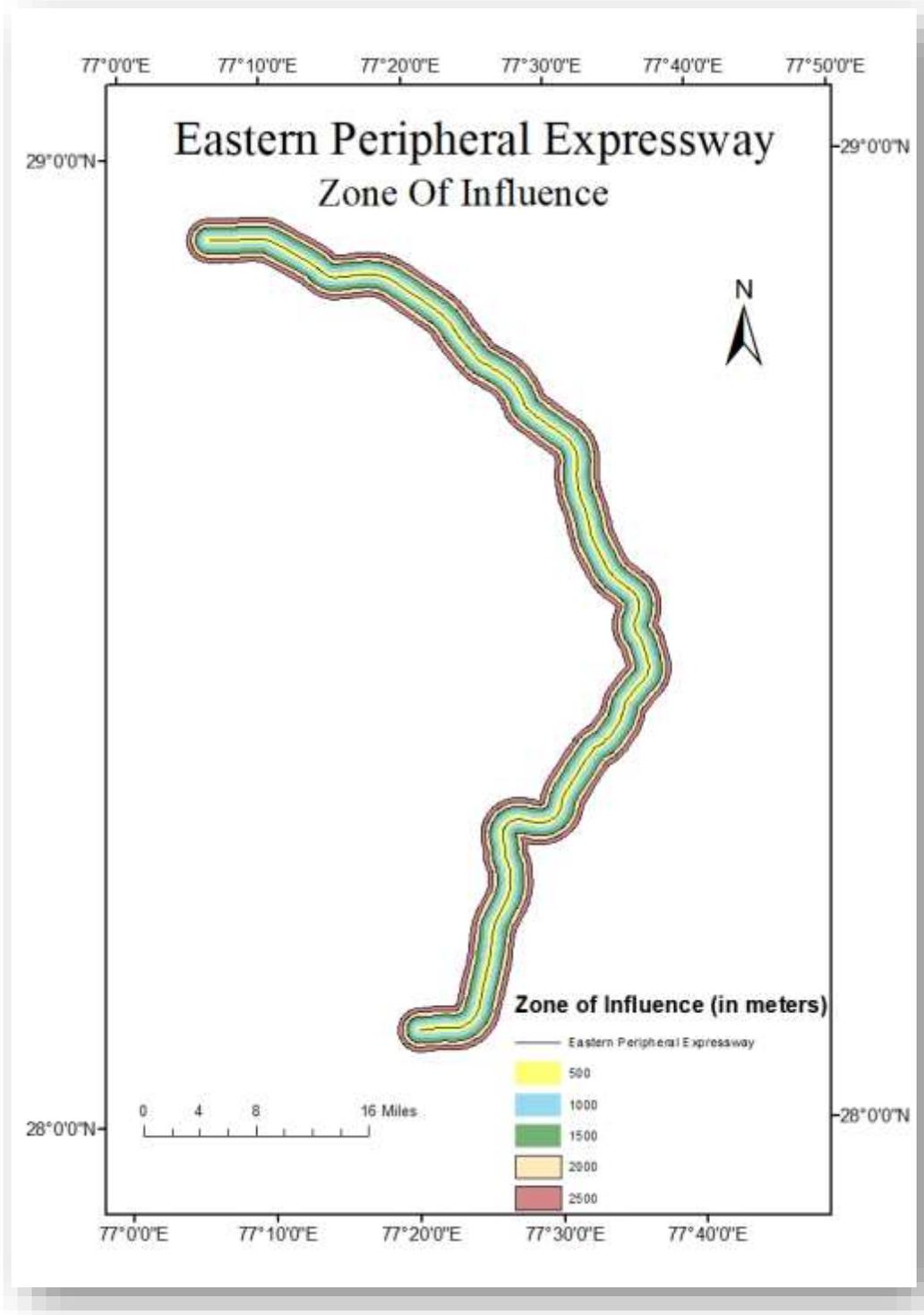


Figure 8
Zone of Influence Of Eastern Peripheral Expressway (in meters)

Conclusion

Using the satellite images of the study area captured during two different years we were able to easily identify the areas which have lost their vegetation cover over the past few years primarily due the development process of the Expressway. The decline in tree cover indicates the negative influences such projects can bear on the environment. Hence, to see the actual change in the vegetation cover of an area affected by the Expressway project we have used the satellite imageries of the study area and with the help of GIS software(s) and different interpretation techniques we classified the loss of vegetation. But just the interpretation will not do justice to the loss of green cover. It is evident from the study that the green cover is declining at a huge pace mainly due to the large-scale structural development activities, which are on their boom stage. Additionally, such kind of structural development activities are encouraged by the immigratory activities of people. The NE II initially build for diverting the vehicular traffic, mainly for trucks which used to pass through Delhi. Researchers believe that, this expressway is going to reduce about 27% of Delhi's pollution but in longer run the air pollution of the areas from which this expressway is passing is expected to increase. Presently, the vegetation cover is declining at a huge speed with a boost in the build-up areas, if the scenario continues, then we could conclude that these newly emerging build up areas will be facing similar environmental issues like in Delhi, soon. So, the questing which now emerges is that, Is our govt. going to make another such expressway at the sake of our environment.

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