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Calculation and Variation of Light Pollution in Indian State-UP

Sanjana Bhatia, Kanishk
Department of Physics, Panjab University, www.kanishq14@gmail.com

Abstract
Light pollution in India is one of the greatest concerns. It went unchecked and unnoticed for a large amount of time, and slowly and steadily it has crept into the most uninhabited of the places. Now the night skies are full of the artificial light and devoid of the natural starlight. The growing light pollution heavily affects the observational aspects of astronomy, the growth pattern of flora and fauna, and perceivably the health issues in humans. This study highlights some of the perceived causes of LP in India and describes a method of calculating Light Pollution Index (LPI), a quantitative parameter to measure the light pollution of a city or town. As an instance LPI for ten major cities of Uttar Pradesh has been documented, and analysis can be carried in a similar way for all the cities/towns. The light pollution maps have been taken from Google.

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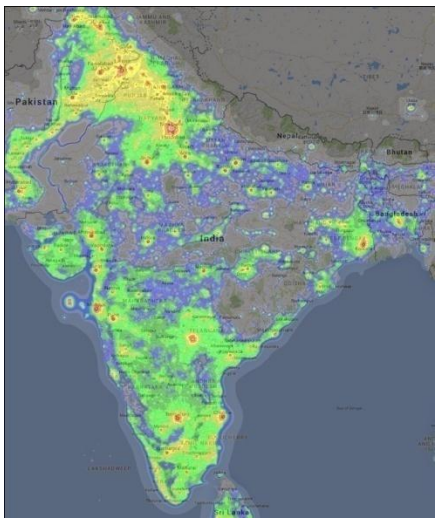
1. Introduction

Light Pollution refers to the unwanted, misplaced, unshielded and excessive artificial light which floods the night skies of the places that they were not intended to. Earlier it was not taken into consideration as human beings tend to take natural things for granted but the unchecked rates of LP has grown over the decades and now the result is that they have started to affect human life directly and indirectly. Studies illustrate that LP leads to sleeping disorders, behavioral changes and hormonal imbalances in humans. Not only humans, but the flora and fauna are also paying adversely for the human neglect, especially the nocturnal species.

Broadly, there are three major types of light pollution- glare, light trespass and sky glow, in addition to over illumination. Although this issue is gaining much attention in the overseas countries, still there is not much awareness over this issue in India, and a large scale quantitative assessment is required for a full damage analysis and to develop methods to prevent and cure it. This paper illustrates a small step in this journey by illustrating a method to calculate LPI for ten major cities in Uttar Pradesh – Lucknow, Kanpur, Gorakhpur, Varanasi, Jhansi, Meerut, Agra, Allahabad, Bareilly and Aligarh.



2. Methodology

The Google map overlaid on the light pollution map of India that was used to calibrate the different LP levels the color coding in the map that refers to different levels of light pollution as shown:

On the map from http://djlorenz.github.io/astronomy/lp2006/overlay/dark.html [1] keeping a uniform zoom level, uniform segments around the cities and towns of Uttar Pradesh, India were taken out as screen shots