

**Greater San Diego Science and Engineering Fair
2015 PROJECT SUMMARY**

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Project Title: Light: A Form of Pollution?

Abstract

Objectives/Goals

The goal of this project is to compare the light pollution levels between two areas, and to see whether there is a correlation between the population of an area and its sky brightness.

Hypothesis

Light pollution levels in San Diego will be a minimum of 36.0 millicandelas per square meter per second, and light pollution levels in Mumbai will be a minimum of 35% greater, at 48.6 millicandelas per square meter per second.

Methods/Materials

A DSLR camera; MaxIm DL Pro V6 photometry software; remote for the camera
A laptop or desktop running Windows XP or higher; Microsoft Excel

Results

The light pollution levels in Mumbai were approximately 4x brighter than the light pollution levels in San Diego County, and there is a correlation between the populations of both areas. As Mumbai has approximately 4x the population of San Diego County, it is plausible that the population has an effect on the sky brightness of an area.

Conclusions/Discussion

The images for each location were taken with the exact same settings. The DSLR camera used was a Nikon D7000 with a Nikon 18-200mm f/3.5-5.6G AF-S ED VR II Nikkor Telephoto Zoom Lens. The aperture was set at F3.5, and the ISO was 500. The exposures taken varied slightly in some of the locations, but the exposures of 1", 5", 10", 20", and 30" were taken at every location. The same program was used to analyze the data, to obtain the relative brightness value. Since the lowest correlation factor was 97.788%, and since the majority of the correlation factors were greater than 99%, the data shows a strong linear correlation, so the data is deemed reliable.

These findings show that the light pollution levels are related to population. If the government in either of San Diego or Mumbai decides to decrease light pollution levels, they can simply shield all lights. By shielding the lights, the light will not travel upward and pollute the sky. This is a cost effective solution to the problem, and it may decrease cancer rates in those areas. Another way to minimize the effect of light pollution is to use low-pressure sodium lights, which impact light pollution levels the least.

Summary Statement

If the leaders of the world take charge, and help eliminate light pollution, there are many benefits. In the long run, money will be saved, because it costs less to illuminate less area. Cancer rates in heavily light polluted areas would decline, as it has been shown that sky brightness has an effect on cancer rates. Melatonin levels would rise, leading to a more alert and rested population. Wildlife would also be affected positively.

Help Received Dan McKenna, mentor, Anil Gupta helped with taking pictures