CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35078

Project Title

Light: A Form of Pollution?

Abstract

Objectives/Goals

The objective of my project was to determine if there is a correlation between light pollution levels and population. I also wanted to compare the different levels of light pollution between areas in Southern California to Mumbai, India. According to the National Library of Medicine, greater amounts of Light At Night(LAN) increases breast cancer rate by 30-50%. It was hypothesized that the light pollution in India will be a minimum of 35% greater than in San Diego. In San Diego, it is hypothesized that the sky brightness will be >36.0 millicandelas per square meter per second. In Mumbai, it is hypothesized that it will be >48.6 millicandelas per square meter per second.

Methods/Materials

1. DSLR Camera; 2. Photometer; 3. MaxIm Pro DL V6; 4. Laptop or Desktop.

I used a Nikon D7000, with a lens that was set at a constant of F3.5. The ISO was also constant at 500. There were many exposures taken, and it took about 25-40 minutes at each location to take the photos.

Results

The results were in three units. They were: relative brightness, millicandelas per square meter per second, and how many times darker than a natural dark sky. The sky at Mumbai was the brightest,and the sky at Palomar Observatory was the darkest. The brightest location in the US was Eastings Park, located in San Diego County. The location at Mumbai was 1172x brighter than a natural dark sky, compared to Palomar Observatory, which was 2.57x brighter than a natural dark sky. The experimenter went to 25 locations total to take photos in RAW mode.

Conclusions/Discussion

These findings show that the light pollution levels are related to population. If all light fixtuers are shielded, 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. These types of lights are already in use in Southern California, specifically for the benefit of the astronomers at Palomar Observatory. Many nocturnal animals would be able to hunt at night, if the sky is not as bright as it is now. Sea turtles would be safer, and birds would be able to migrate at night. It can be concluded that the light pollution levels in an area are directly related to the human population, and that the night sky is getting brighter over time.

Summary Statement

My project is about light pollution, and I wanted to determine whether a correlation between the population of an area's population and its light pollution levels existed.

Help Received

Mr. Dan McKenna helped with determining experimental procedure and loaned a photometer; Ms. Elaine Gillum helped proofread my written work; Mr.Anil Gupta helped drive me around to take photos

Preliminary