Finding the Darkest Sky in an Urban Environment – Integrating the Novel Variable of Vegetation Cover To Improve the Star-Gazing Experience

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Light pollution is a growing societal issue with at least 80% of the world's population encountering reduced night sky visibility due to urban skyglow. As well as scattered light emanating from incandescent lamps and more recently gas-discharge and LED lamps, topographical and climatic factors such as elevation, humidity and aerosol concentration can affect the observations of stars. However, one topographical factor that doesn't feature in light pollution reports or research studies is vegetation coverage - a factor the author hypothesised to be a significant factor for finding the darkest sky in an urban environment. This investigation involved a sampling regime of multiple transects with incremental measurements (5-10 km apart) of apparent magnitude and SQM readings. Climatic data for 31 locations were recorded, and a regression analysis was performed against SQM readings with weak correlations. A strong correlation (R 2 = 0.86) was obtained when light proximity to urban locations, using ImageJ software and satellite imagery, was plotted against SQM readings. A novel vegetation index, combining ground coverage density and vertical stratification for each location was integrated with light proximity, yielding a stronger correlation (R 2 = 0.91), demonstrating that thick vegetation in an urban environment can contribute to a measurably darker night sky by reducing the albedo in the ground layer. This finding of vegetation's combative effect to light pollution has global significance for improving the experience of star gazing in urban environments.

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