

The Gaia4Sustainability project

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Gaia4Sustainability is a Proof-of-Concept project granted by the Ministerio de Ciencia e Innovación in the 2021 call. The project aims to develop a robust, reliable, and straightforward framework for estimating the natural brightness of the sky. High quality photometry provided by the ESA Gaia satellite allows the computation of the contribution of the integrated star light to the sky brightness. The project consists of a set of implementations (web service, stand-alone program and open-source measurement device) devised for any interested stakeholder to accurately evaluate the impact of light pollution on, for example, environmental activities.

The presence of excessive artificial lighting at night and the consequent disruption of the natural day-night cycle has a pernicious effect on many species. To obtain reliable measurements of the light pollution levels, it is mandatory to know the natural night sky brightness including the integrated star light, zodiacal light, the galactic and extragalactic background light, and the airglow. This together with a model of the terrestrial atmosphere extinction and scattering provides a realistic image of the night sky for a given place and time. The resulting model can, then, be used as a reference value of the natural sky brightness (in cloudless nights), or to know the expected natural levels of sky brightness at pristine areas.

The project also includes the design and construction of a cheap and easy-to-build photometer, named FreeDSm, based on open software and low-cost hardware. It will include several connectivity options and the ability to collect positioning information and measure light pollution, with the capacity to share data on the platform, if desired.

This twofold methodology (modelling and low-cost measuring) proposed by Gaia4Sustainability, intends contributing 1) to widely spread the acquisition of measurements; 2) achieve a greater engagement of social agents; and 3) raise generalised awareness on the light pollution problem.

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