

# Assessing the Impact of LED Lighting Transition on the Night Sky and Biodiversity in Montevideo: A Collaborative Study Between Academia and Policy Makers.

Theme: Biology & Biology and Ecology  
Governance & Regulation

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## Introduction

The continuous urban expansion inevitably leads to the advancement of artificial light in areas that were previously under a natural lighting cycle. Light pollution has become an increasingly pressing issue in urban areas, not only affecting the visibility of the night sky, but also having an impact on biodiversity. The increasing use of LED technology globally has opened the doors to debate about the possible environmental impacts of using this light source, its contribution to light pollution, and its ecological effects.

This proposed study aims to delve deeper into the study of the environmental impact of artificial light at night in public spaces, strengthening the link between the academic community with an interest in the topic and the Municipality of Montevideo through the Technical Unit of Public Lighting, dependent on the Department of Urban Development. The study will focus on two main axes: astronomical and biological. This project represents a contribution to the environmental considerations in the elaboration of the Lighting Master Plan of the City of Montevideo. In this occasion, we will present preliminary results of the experimental phase that will begin in February 2023.

## Methods

The study will be conducted using an experimental design, comparing the effects of LED lighting on the night sky and biodiversity of birds and insects to the effects of traditional sodium lighting. Specific methodologies will be employed for each axis.

Astronomical axis: Measurements will be taken at different points in the city of Montevideo (urban

and rural areas) and will also be recorded at the sampling sites of the biological axis. The intensity of the light source will be recorded at different angles (vertical towards the pavement, horizontal, etc.) following international recommendations. Each location will be visited once a month and a sequence of measurements of the night sky background will be taken using a sky photometer, starting at the end of astronomical twilight. Weather conditions, particularly the presence of clouds that can affect measurements, as well as other relevant atmospheric factors, will be recorded.

Biological axis: Birds: Diversity and abundance sampling will be carried out in 4 urban areas, within each area 5 control sites (sodium light) and 5 treatment sites (LED) will be sampled. A total of 20 control sites and 20 treatment sites will be sampled. Nest sampling and sound recordings will also be carried out in spring. Insects: Sampling will be carried out in common with birds at 5 points per zone, for both nocturnal and diurnal insects.

In order to ensure the validity and reliability of the results, a control group will be maintained with traditional sodium lighting for the first 12 months of the study, after which the lighting will be changed to LED. Standardized measurement protocols will be used, and data will be analyzed using statistical methods to identify any significant differences between the control and treatment groups.

## **Conclusions**

The results of this study will provide valuable information on the impact of transitioning to LED lighting on the night sky and on the biodiversity of birds and insects in the city of Montevideo. This project represents two innovative approaches: a) a collaborative interaction between academic researchers and decision-makers; b) evaluating the environmental impact of LED lighting by considering the interactions between different components of the urban ecosystem, such as the night sky, birds, and insects.

The use of specific methodologies for each axis, and collaboration with academic researchers and the Technical Unit of Public Lighting will allow for accurate results to be obtained and contribute to decision-making in public policies related to lighting in the city.