The Bright Side of the Night: Unveiling Perceptions of Light Pollution in Madeira's Archipelago

COSTA, TÂNIA [1]; A. CRUZ[2], Y. REDOLOSIS[2] & C. GOUVEIA[1]

[1] Sociedade Portuguesa para o Estudo das Aves (SPEA Madeira), Rua da Mouraria nº9, 4ºB, 9000-047 Funchal, Portugal, www.spea.pt
[2] Sociedade Portuguesa para o Estudo das Aves (SPEA Açores), Rua António Alves de Oliveira nº1 R/C, 9630-147 Nordeste, S. Miguel, Açores, Portugal, www.spea.pt

Introduction

In recent decades, the world has witnessed an unprecedented surge in urbanization, alongside a corresponding increase in artificial light at night (ALAN), leading to the widespread issue of light pollution. This pervasive threat impacts ecosystems, human well-being, and astronomical observations. Island environments and their unique species are particularly vulnerable to the disruptive effects of light pollution.

Addressing light pollution demands a collaborative and interdisciplinary effort involving a range of stakeholders, including researchers, policymakers, NGOs, and local communities. Recognizing the crucial role of public sentiment, it is imperative to engage communities in decision-making processes, ensuring that policies strike a balance between the necessity for illumination and environmental preservation.

Surveys emerge as important tools to understand the local population's perceptions of light pollution and its consequences, and to grasp their support for mitigation measures, which can expedite the adoption of comprehensive policies and proactive measures to reduce light pollution and to protect natural darkness.

Goals

1. Assess perceptions of light pollution and its consequences
2. Evaluate preferences regarding public lighting
3. Measure support for changes to less polluting forms of lighting and mitigation measures

Methods

A survey by questionnaires of close-ended questions was conducted through online and in person approaches, using a combination of convenience, random and stratified sampling. The online questionnaire was available to be answered by any person over 18 years old and from the Madeira archipelago.

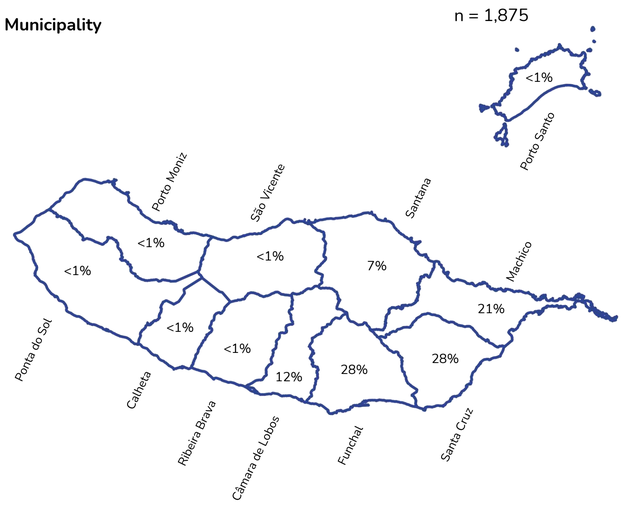
The survey was carried out in person in the five target municipalities of project LIFE Natura@night in Madeira Island: Câmara de Lobos, Funchal, Machico, Santa Cruz and Santana. Answers were gathered from October 2022 until May 2023. Data was analyzed through descriptive analysis.

Participants

Survey was completed by 1,875 Madeira archipelago residents. Completion rate was 72% and the average response time was 17 minutes.

Demographics	
Age (mean)	43.8 (SD = 15.6), n = 1,875
Gender	n = 1,875
Male	36%
Female	64%
Education level	n = 1,875
Basic school	20%
High school	34%
Bachelor's degree	32%
Master's degree	10%
PhD	1%
Other	3%
Environment	n = 1,864
Rural	18%
Small parish	21%
Village	12%
City	48%

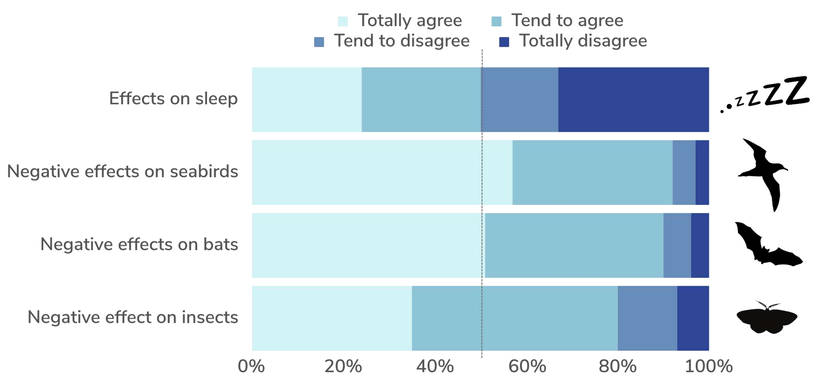
Municipality n = 1,875



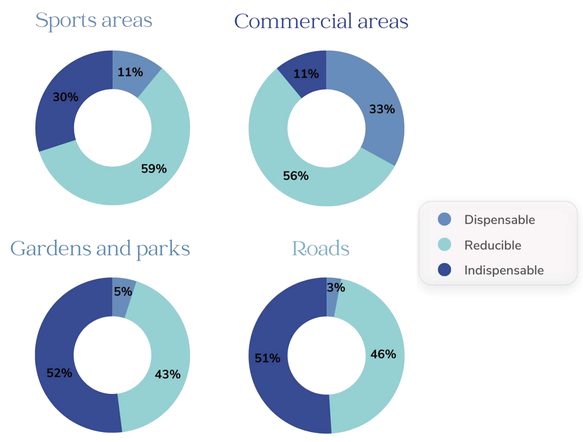
Results

1. Most respondents recognize negative effects of ALAN on nocturnal biodiversity, but less so on human sleep.
2. Over 70% of respondents consider lights from sports and commercial areas as reducible or dispensable, while regarding public gardens, parks and road lighting as indispensable.
3. Most respondents support the reduction or changes in ALAN to protect wildlife, in and outside natural areas.
4. 95% of the people surveyed are ready to help reduce light pollution impacts.

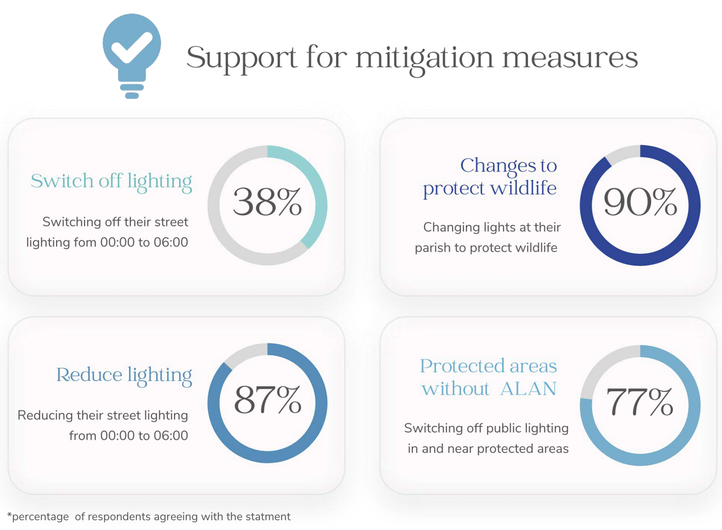
Perceptions of ALAN



Preferences of ALAN

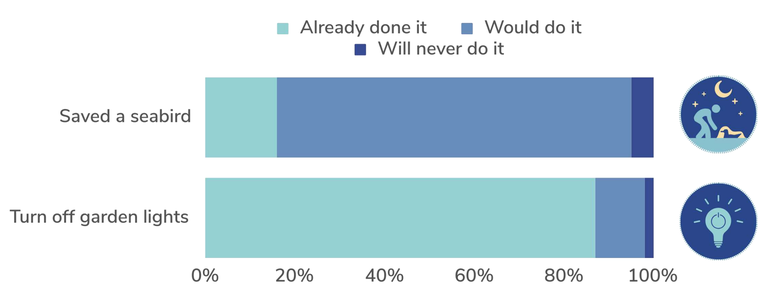


Support for mitigation measures



*percentage of respondents agreeing with the statment

Attitudes



Discussion

- Overall, there is an apparent **high level of awareness of ALAN as an environmental threat to nocturnal biodiversity** and collected answers mainly support its reduction in and outside of protected areas. Higher awareness of negative effects for seabirds, followed by bats and insects, may be related to the knowledge and likeability attributed to each group, and may also be a reflex of the work in environmental education developed in the last two decades by organizations like SPEA, focusing on seabirds.
- These findings highlight the growing concern for wildlife conservation regarding urbanization and rising light pollution. They also express **strong support for light pollution reduction measures** and a **willingness to participate in actions that protect nocturnal biodiversity**. Additionally, they shed light on the critical role that biodiversity, particularly seabirds, can play in gathering support and acceptance for ambitious mitigation measures. This emphasizes the importance of effective communication and outreach efforts in this realm.
- This research not only deepens the understanding of public perceptions towards ALAN from Madeira's archipelago population but also **provides crucial support for changes in policy and proactive measures to protect natural darkness, biodiversity, and human welfare**.

Acknowledgements

This study was conducted within the scope of the LIFE Natura@night project and was replicated in target municipalities of the archipelagos of Azores and Canary Islands. Data collection was possible through the willingness of the population to participate in the survey, as well as the efforts of volunteers and entities helping in gathering responses and disseminating the survey. We are thankful to the Municipalities of Câmara de Lobos, Funchal, Machico, Santa Cruz and Santana, Simão Vieira and Vítor Camacho.

References

1. Burstein, P. (2003). The impact of public opinion on public policy: A review and an agenda. In Political Research Quarterly (Vol. 56, Issue 1, pp. 29–40). SAGE Publications Ltd. https://doi.org/10.1177/106591290305600103
2. Coogan, A. N., Cleary-Gaffney, M., Finnegan, M., McMillan, G., González, A., & Espey, B. (2020). Perceptions of light pollution and its impacts: Results of an Irish citizen science survey. International Journal of Environmental Research and Public Health, 17, 1–7. https://doi.org/10.3390/IJERPH17155628
3. Lyytimäki, J., & Rinne, J. (2013). Voices for the darkness: Online survey on public perceptions on light pollution as an environmental problem. Journal of Integrative Environmental Sciences, 10(2), 127–139. https://doi.org/10.1080/1943815X.2013.824487
4. Navara, K. J., & Nelson, R. J. (2007). The dark side of light at night: Physiological, epidemiological, and ecological consequences. In Journal of Pineal Research (Vol. 43, Issue 3, pp. 215–224). https://doi.org/10.1111/j.1600-079X.2007.00473.x

This study was conducted within the scope of the LIFE Natura@night project (LIFE20 NAT/PT/001098), with financial contribution from the European Union's LIFE programme.
For more information, visit https://naturaatnight.spea.pt/.