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LIFE Natura@night

Report on local perceptions about Public Lighting in Macaronesia

Funchal, 2023

COFINANCIAMENTO

PARCEIROS

COORDENAÇÃO

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Funchal, 2023

Tânia Costa

In the **LIFE Natura@night** project, we intend to the reduction and mitigation of the impact of light pollution in the areas of the Natura 2000 network from Macaronesia.

COFINANCIAMENTO

PARCEIROS

COORDENAÇÃO

SPEA

Mission

Work for the study and conservation of birds and their habitats, promoting a development that guarantees the viability of the natural heritage for the enjoyment of future generations.

SPEA – Portuguese Society for the Study of Birds is an Environmental Non-Governmental Organization that works for the conservation of birds and their habitats in Portugal. As a non-profit association, it depends on the support of its members and various entities to carry out its actions. It is part of a worldwide network of environmental organizations, BirdLife International, which operates in 120 countries and aims to preserve biological diversity through the conservation of birds, their habitats and the promotion of the sustainable use of natural resources.

SPEA was recognized as an entity of public utility in 2012.
www.spea.pt

Report on local perceptions about Public Lighting in Macaronesia

Sociedade Portuguesa para o Estudo das Aves, 2023

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SUMMARY

Light pollution is a pervasive environmental issue that demands a collaborative, interdisciplinary approach for resolution, with active involvement and input from the public. As part of the LIFE Natura@night project, a survey was conducted to gain deeper insights into people's perceptions of light pollution and its associated consequences, their preferences regarding Artificial Light at Night (ALAN), and their support for mitigation measures. In total, 2,207 respondents from the archipelagos of Madeira, Canary Islands, and Azores participated in the survey, most of them from the target municipalities of the project. The results, at both archipelago and municipal levels, reveal a notable awareness of light pollution, particularly in its impact on nocturnal biodiversity and strong support for the adoption of less polluting forms of lighting. These findings have the potential to inspire local and regional governments, along with other stakeholders, to intensify their efforts in combating light pollution, that are inclusive and that garner support from the public.

RESUMO

A poluição luminosa é um problema ambiental transversal que exige uma abordagem colaborativa e interdisciplinar para sua resolução, com a contribuição e participação ativa da população. No âmbito do projeto LIFE Natura@night, foi realizado um inquérito para conhecer melhor as perceções da população sobre poluição luminosa e consequências associadas, as suas preferências em relação à luz artificial e o seu apoio a mudanças e medidas de mitigação. No total, 2207 pessoas dos arquipélagos da Madeira, Canárias e Açores foram inquiridas, sendo a maioria residente dos municípios abrangidos pelo projeto. Os resultados, tanto a nível de arquipélago quanto municipal, revelam uma notável consciencialização sobre a poluição luminosa e o seu impacte na biodiversidade noturna e um elevado nível de apoio à adoção de formas de iluminação menos poluentes. Estes resultados poderão inspirar governos locais e regionais, juntamente com outros *stakeholders*, a intensificar seus esforços no combate à poluição luminosa, desenvolvendo estratégias abrangentes que contam com o apoio da população.

1. INTRODUCTION

In recent decades, the world has witnessed an unprecedented surge in urbanization, with more people moving to cities seeking better opportunities and improved living standards (United Nations, 2019). This global urban transformation and development of human communities has led to a remarkable increase in the use of Artificial Light at Night (ALAN), with light progressively intruding dark spaces, disrupting natural cycles of light and darkness (Gaston et al., 2013), and expanding into rural and offshore areas (Hölker et al., 2010).

ALAN derived from public lighting (PL) systems has become synonymous with modern urban lifestyles, illuminating the night, and extending human activities into the dark hours (Falchi et al., 2011). And although artificial light can be associated with an improvement of human quality of life and economic growth (Doll et al., 2006), this widespread reliance on ALAN has inadvertently given rise to an alarming consequence: light pollution.

Light pollution, characterized by the introduction of artificial light that alters natural light levels in the night environment, is considered one of the most rapidly increasing alterations to natural environments (Cinzano et al., 2001; Falchi et al., 2011), with 80% of the world living under light-polluted skies (Falchi et al., 2016). It has emerged as a pervasive environmental issue affecting ecosystems, human health, and astronomical observation (e.g.: Fontana et al., 2021; Longcore & Rich, 2004; Navara & Nelson, 2007).

The over-illumination caused by ALAN disturbs the natural behaviours of wildlife and ecosystems, affecting species that rely on darkness for foraging, reproduction, and navigation (Gaston et al., 2013), as well as diurnal species (Jägerbrand & Spoelstra, 2023). Moreover, light pollution has implications for human health, including disrupting circadian rhythms and sleep patterns, which in turn can lead to a range of health issues (Chepesiuk, 2009; Falchi et al., 2011). Consequences on astronomical observations show a worldwide rapid decrease in the ability to stargaze (Kyba et al., 2014). Additionally, increase in outdoor and street lighting, even using more energy efficient lights, can lead to higher energy consumption and higher greenhouse emissions, further exacerbating the challenges of climate change and sustainability (Azman et al., 2019; Kyba et al., 2014). Light pollution in urban areas can be caused by a wide range of sources, such as streetlights, illuminated buildings, roads, bridges, commercial buildings and advertising, parking places, airports, illuminated sports areas and lights from traffic (Falchi et al., 2011; Hölker et al., 2010; Longcore & Rich, 2004), many of which can be reduced.

In the scope of years of research and literature on light pollution and its consequential effects, it is imperative to implement transformative changes and measures. Such changes imply a collaborative interdisciplinary approach, involving researchers, policymakers, non-governmental organizations (NGOs), and a diverse array of stakeholders. Technological innovations, policy interventions and public engagement efforts can be the pillars that drive mitigation and reduction of light pollution.

Public opinion and citizen participation play a vital role in decision-making and policy formulation processes (Burstein, 2003; Michels & de Graaf, 2010). And, as the primary beneficiaries and stakeholders of urban lighting, we consider public engagement and

awareness to be essential in driving change and demanding responsible lighting solutions. Understanding public attitudes, preferences, and concerns is crucial in creating effective and well-accepted policies that balance the need for illumination with environmental considerations, and that also consider possible public concerns on safety and cultural significance associated to light (Hölker et al., 2010; Peña-García et al., 2015).

Sample surveys are the most common method used to gain knowledge on public opinion on a given issue (Berinsky, 2017), and can provide insights into the public's awareness of light pollution, their understanding of its implications, and their support for less polluting form of lighting (e.g.: Coogan et al., 2020; Lyytimäki & Rinne, 2013). These can then be used to support decision making processes next to local government and other decision makers, guiding them towards inclusive, informed, and evidence-based policies that resonate with the public's expectations.

The LIFE Natura@night project is a great example of a multidisciplinary approach to reduce light pollution and mitigate its effects. It involves environmental NGOs, governmental organizations, local municipalities and technological centres and companies related to lighting solutions and light pollution. In the scope of this project, a survey was conducted on perception of light pollution, targeting the population of beneficiary municipalities of the project in Madeira, Canary Islands and Azores archipelagos.

This report is part of Action A10 of project LIFE Natura@night, named "Survey of the population of the municipalities covered by the project on public lighting and light pollution". The project is mainly developed in eight municipalities of the three abovementioned archipelagos. Specifically, five of these municipalities are on Madeira Island (Câmara de Lobos, Funchal, Machico, Santa Cruz and Santana), two in the Canary Islands (Mogán and Buenavista del Norte), and one in Graciosa Island, in the Azores (Santa Cruz da Graciosa).

These municipalities differ in their social-economic contexts. While some, like Funchal, are highly urbanized with populations exceeding one hundred thousand inhabitants, others, such as Santa Cruz da Graciosa and Buenavista del Norte, are distinctly rural, with fewer than five thousand residents. Nevertheless, all archipelagos and municipalities face a shared environmental challenge in the form of light pollution, which is particularly concerning due to the unique ecosystems they harbour, which can be particularly sensitive to this threat.

Therefore, this survey aims to gather information from diverse social-economic contexts, attempting to understand people's perspectives on public lighting and light pollution, and on possible solutions for its reduction and mitigation.

This study has three primary objectives:

i) Assess the population's perceptions of light pollution and its consequences;
ii) Understand their preferences regarding artificial and public lighting;
iii) Measure their support for changes to less polluting forms of lighting and mitigation measures.

2. METHODS

2.1 Survey design

A survey by questionnaire was developed and conducted in the archipelagos of Azores, Madeira and Canary Islands. This was an online-based survey and questions selected and produced to accomplish the set goals were based on the studies of Coogan et al., 2020, Lyytimäki & Rinne, 2013 and Peña-García et al., 2015.

The questionnaire was extensive, with a wide range of questions to provide insight of people's perceptions on the topics evaluated by the survey. In total, 29 questions were developed, that can be divided into six sections:

1. Sample characterization;
2. Lighting characterization at the respondent's residence;
3. Perceptions on light pollution and ALAN;
4. Preferences regarding ALAN;
5. Support for changes in public lighting;
6. Attitudes and individual action.

An informative section on light pollution was included between sections three and four, to provide people context on the topic before they would state their level of support for changes in public lighting, that can be found in Annex A and B, in the original questionnaire.

The questionnaire was tested by 20 people, who provided feedback on content of the questions, clarity, length, and duration. Inputs provided were integrated into the final version of the survey, that was uploaded to an online platform (https://www.questionpro.com/). The survey was available in Portuguese and Spanish and could be responded by people with or over 18 years old and living or visiting the archipelagos of Madeira, Canary Islands and Azores. Non-residents could respond to a simpler set of questions.

Final questions used in the survey, as well as their attributes, such as type and scale of answer are described in Table 1. Additionally, the original questionnaire, in Portuguese and Spanish is presented in Annex A and B, respectively.

Table 1 | Survey questions, type and scale of answer, reclassification, and type of question. Mandatory questions are represented by "*" next to the question number.

Question number	Question	Type of answer	Scale	Reclassification	Type of question
Q.1*	Do you live in archipelagos of Azores, Madeira, or Canary Islands?	Multiple choice	1 – Yes 2 – No, just visiting	–	Sample characterization
Q.2*	In which archipelago do you live in?	Multiple choice	1 – Azores 2 – Madeira 3 – Canary Islands	–	Sample characterization
Q.3	On which island?	Multiple choice	Multiple options	–	Sample characterization
Q.4*	What is your municipality of residence?	Multiple choice	Multiple options	–	Sample characterization

Q.5*	How old are you?	Numerical	≥ 18	Yes (see Table 3)	Sample characterization
Q.6*	Gender	Multiple choice	1 – Male 2 – Female 3 – Non-binary	–	Sample characterization
Q.7*	Education level	Multiple choice	1 – Basic education 2 – High school 3 – Bachelor's degree 4 – Master's degree 5 – PhD 6 – Other	–	Sample characterization
Q.8*	Does your work schedule include night work?	Multiple choice	1 – Yes 2 – No 3 – NR	–	Sample characterization
Q.9*	Do you belong to any environmental association?	Multiple choice	1 – Yes 2 – No 3 – NR	–	Sample characterization
Q.10*	Do you usually observe the stars or participate in astronomical observations?	Multiple choice	1 – Yes, I'm astronomer 2 – I like to observe the stars regularly 3 – I like to watch the stars occasionally 4 – No, never 5 – NR	–	Sample characterization
Q.11*	Do you do any of these other nocturnal activities in nature?	Multiple choice	1 – Nocturnal trails 2 – Observation of nocturnal fauna 3 – No, none 4 – Other (open ended)	If "4 – Other", reclassified manually (see Table 3)	Sample characterization
Q.12*	How would you characterize your place of residence?	Multiple choice	1 – Rural 2 – Small parish 3 – Village 4 – City 5 – NR	–	Sample characterization
Q.13*	Which of these images best approximates the night sky you can see from your home	Multiple choice	Bortle scale in images: 1 – Excellent dark sky 2 – Dark sky 3 – Rural sky 4 – Suburban/Rural transition 5 – Suburban sky 6 – Bright suburban sky 7 – City/Suburbia transition 8/9 – City sky/Inner city	–	Lighting characterization
Q.14*	What is the strongest light source in your neighbourhood at night?	Multiple choice	1 – Lights from my house 2 – Lights from the neighbours 3 – Lights from local businesses 4 – Public lighting 5 – Traffic lights 6 – Other (open ended)	If "6 – Other", reclassified manually (see Table 3)	Lighting characterization
Q.15*	Is it a permanent light source throughout the night?	Multiple choice	1 – Yes 2 – No 3 – Intermittent 4 – NR	–	Lighting characterization

Q.16*	You think the level of lighting where you live is…	Multiple choice	1 – Insufficient 2 – Good 3 – Excessive 4 – Other (open ended)	If "4 – Other", reclassified manually (see Table 3)	Lighting characterization
Q.17*	In your daily life, if you carry out nocturnal activities, at what time do you use public lighting? Considering the season with less natural light.	Multiple choice	Hourly scale, from 18:00 to 08:00, and NR option	–	Lighting characterization
Q.18*	Have you ever heard of Light Pollution?	Multiple choice	1 – Yes 2 – No 3 – NR	–	Perception
Q.19	How would you define Light Pollution?	Open-ended	–	Manual reclassification (see Table 3)	Perception
Q.20*	In your opinion, what is the importance of light pollution for biodiversity, people, and the economy?	Multiple choice	1 – Not important 2 – Little importance 3 – Quite important 4 – Very important	Yes (see Table 3)	Perception
Q.21*	Do you know of any project/initiative that works on this issue?	Multiple choice	1 – Yes 2 – No 3 – NR	–	Perception
Q.22	Can you give an example of a project/initiative working on this issue?	Open-ended	–	Manual reclassification (see Table 3)	Perception
Q.23	Provide your opinion on the following questions: **Q.23.1** –The intensity of night lighting near my home has increased over the past three years. **Q.23.2** –Artificial lighting affects my sleep. **Q.23.3** – Artificial lighting negatively affects seabirds, for example Cory's Shearwaters. **Q.23.4** –Diurnal birds (blackbird, sparrow, robin) sing at night where I live. **Q.23.5** –Artificial lighting negatively affects insects. **Q.23.6** –Artificial lighting negatively affects bats. **Q.23.7** –Authorities are little concerned about the issue of light pollution. **Q.23.8** –Everyone should be able to observe the stars and the Milky Way from their home. **Q.23.9** –The possibility of observing the night sky is important to me. **Q.23.10** – I prefer white night lighting to yellow light.	Multiple choice	Agreement scale 1 – Totally agree 2 – Tend to agree 3 – Tend to disagree 4 –Totally disagree 5 – NR	–	Perception
Q.24	Of the following types of lighting, which do you find bothersome? **Q.24.1** – Road lighting **Q.24.2** – Light signs **Q.24.3** –Ornamental lighting for buildings and monuments **Q.24.4** – Commercial areas lighting **Q.24.5** – Festive and Christmas lighting **Q.24.6** – Lighting in sports areas **Q.24.7** –Lighting in parks and public gardens **Q.24.8** – Lighting in residential areas	Multiple choice*	1 – Doesn't bother 2 – Bothers slightly 3 – Bothers a lot *Options represented by images	–	Preference

Q.25	Of the following types of lighting, which do you consider to be dispensable? **Q.25.1** – Road lighting **Q.25.2** – Light signs **Q.25.3** –Ornamental lighting for buildings and monuments **Q.25.4** – Commercial areas lighting **Q.25.5** – Festive and Christmas lighting **Q.25.6** – Lighting in sports areas **Q.25.7** –Lighting in parks and public gardens **Q.25.8** – Lighting in residential areas	Multiple choice*	1 – Indispensable 2 – Reducible 3 – Dispensable *Options represented by images	–	Preference
Q.26	Have you seen any of these changes in public lighting? If yes, please tell us your preference. **Q.26.1** –Change from traditional light bulbs to white LED **Q.26.2** – Change from traditional light bulbs to yellow LED **Q.26.3** – Reduction in the number of light fixtures **Q.26.4** – Occasional blackouts for environmental reasons **Q.26.5** – Installation of timers **Q.26.6** – Installation of motion sensors in lights		1 – Didn't see 2 – Disagree 3 – Agree 4 – NR	–	Support
Q.27	In order to reduce Light Pollution, which of these measures do you consider appropriate: **Q.27.1** – Switching off light in your street between 00h00 and 6h00 **Q.27.2** – Reduce the lights in your street between 00h00 and 6h00 **Q.27.3** – Switching off public lighting in and near protected areas **Q.27.4** – Using light bulbs with yellow/warm colours **Q.27.5** – Changing the lights in my parish to protect wildlife **Q.27.6** – Installing motion sensors in parks and public gardens **Q.27.7** – Reduce festive lighting	Multiple choice	1 – In favour 2 – Against 3 – NR	–	Support
Q.28	But there are also actions we can take to reduce Light Pollution and promote energy efficiency. Which of the following have you done or are you considering doing? **Q.28.1** – When I leave a room in the house, I turn off the light **Q.28.2**– I already saved a grounded seabird by light pollution **Q.28.3** – I have a timer on the exterior lights of my house **Q.28.4** – All the light bulbs in my house are LED **Q.28.5** – I turn off the lights in my garden when I'm not there	Multiple choice	1 –I have done or usually do 2 – I have never done it, but would consider doing 3 – I haven't, nor will I. 4 – NR	–	Attitudes
Q.29*	In your opinion, what is the importance of light pollution for biodiversity, people, and the economy?	Multiple choice	1 – Not important 2 – Little importance 3 – Quite important 4 – Very important	Yes (see Table 3)	Perception

2.2 The universe and sample

The universe of the survey consisted of the population aged 18 years and above, residing in the eight municipalities targeted by the project. These municipalities are situated in the Macaronesia region, spanning the archipelagos of Madeira, Canary Islands and Azores.

In the Madeira archipelago this encompassed five municipalities situated on the eastern part of Madeira Island: Câmara de Lobos, Funchal, Santa Cruz, Machico and Santana (Fig. 1). In the Canary Islands, the project covered the municipalities of Buenavista del Norte, on Tenerife Island, and Mogán, on Gran Canaria Island (Fig. 2). In the Azores archipelago, the survey was directed towards residents from Santa Cruz da Graciosa, on Graciosa Island (Fig. 3).

This represented a global universe of 179,585 people in Madeira, 3,499 in the Azores and 21,436 in the Canary Islands, creating a total of 204,520 people. Detailed information regarding the universe considered for each municipality (considering the most recent population census data), sample size obtained, and corresponding percentage of universe considered, can be found in Table 2.

Table 2 | Universe of the survey by target municipality with or over 15 years old (Azores and Madeira) and with or over 18 years old (Canary Islands), number of people sampled, and corresponding percentage related to the universe considered. Source: Census 2021, INE, 2022 (Portugal) and INE, 2023 (Spain).

Archipelago	Municipality	Population (2021)	Sample (No. people)	Sample (%)	Total by archipelago
Madeira	Câmara de Lobos	27,318*	217	0,8%	1,817
	Funchal	93,135*	529	0,6%	
	Machico	17,377*	401	2,3%	
	Santa Cruz	35,854*	530	1,5%	
	Santana	5,901*	140	2,4%	
Azores	Santa Cruz da Graciosa	3,499*	64	1,8%	64
Canary Islands	Buenavista del Norte	4,192**	42	1,0%	92
	Mogán	17,244**	50	0,3%	
Total		204,520	1,973	1,0%	

* Considering people with or over 15 years old, due to the data format available at the source.
** Considering people with or over 18 years old.

2.3 Target municipalities

Madeira archipelago

This Portuguese archipelago, consisting of the islands of Madeira, Porto Santo, and Desertas, is situated in the Atlantic Ocean about 600 kilometres from the coast of Africa and 900 kilometres from the Portuguese mainland. There are roughly 250,000 residents, most of them in Madeira Island (742 km^2). The five target municipalities are in the east part of Madeira Island (Fig. 1), which has increasing pressure from tourism and urbanization.

Figure 1 | Map of Madeira archipelago, and partner municipalities of Câmara de Lobos, Funchal, Machico, Santa Cruz and Santana. Map credit: Fernando Chacon (SPEA).

- **Câmara de Lobos**

Câmara de Lobos is the most western located out of the five partner municipalities in Madeira (Fig. 1). Surrounded by steep cliffs facing the Atlantic Ocean, the town of Câmara de Lobos itself is a lively urban centre, while its outskirts extend into more rural settings. About 32,000 inhabitants (2021 census) are scattered in this a mix of urban and rural areas, offering a diverse social and economic backdrop. This municipality has worked in the past with SPEA, towards the reduction of light pollution in its front sea areas and is part of the partnership alliance of project LIFE Natura@night.

- **Funchal**

Funchal is the largest urban centre of the archipelago, and with ca. 105,000 residents, is home to over 40% of the archipelago population. This municipality is also a centre of economic activity, with a range of industries including tourism, commerce, and services. In opposition to its urban nature, Funchal also holds several Natura 2000 sites, and the municipality is responsible for the management of "Parque Ecológico do Funchal", an important natural area, holding a diverse range of species that can benefit from light pollution

mitigation measures and this project. This dynamic and densely populated environment can provide valuable insights into how urban communities perceive and are affected by light pollution.

- **Machico**

Machico, home to nearly 20,000 people, is situated in the most eastern part of Madeira Island. It has a diverse landscape that ranges from lush valleys to dramatic cliffs and is characterized by a mix of urban and rural settings. Economically, Machico is diverse, with activities ranging from tourism to agriculture and commerce. This municipality has developed notable efforts regarding environmental education and valorisation of natural heritage, that include several Natura 2000 sites. Its valleys and cliffs are home to diverse species of nocturnal lepidoptera and bats, and to possible nesting sites of Cory's shearwater, which can be negatively impacted by light pollution. This municipality is one of the pioneers in the country and the region when it comes to tackling light pollution and have already their own Municipal Public Lighting Plan.

- **Santa Cruz**

This municipality is home to ca. 42,000 residents, exhibits a blend of urban and rural landscapes, where residential areas coexist with agricultural lands. This municipality is committed to implementing effective management of public lighting, combined with energy efficiency and reduction of light pollution. For many years, Santa Cruz has celebrated the "Planet Hour" initiative, involving the community and bringing attention to the need to reduce energy consumption and light pollution. Similarly to Machico, Santa Cruz has its own Municipal Public Lighting Plan since 2019. This municipality has important breeding sites of seabirds, as it includes Desertas Islands, where a large colony of Cory's shearwater breeds.

- **Santana**

Santana municipality is situated on the northern coast of Madeira Island and is characterized by its natural landscapes, that include more untouched cliffs by the sea, and lush green landscapes of Laurissilva forest. With a population of around 6,500 people, it predominantly comprises rural areas characterized by low population density. The local economy is influenced by agriculture and tourism, with focus on eco-tourism. Santana is a UNESCO Biosphere Reserve, due to its rich cultural and natural heritage, and the sustainable relation between them. The community places a strong emphasis on environmental conservation and sustainable practices, reflecting a commitment to preserving its natural resources for future generations. As part of this project, Santana municipality increases its efforts to ensure less polluting and more efficient forms of lighting, protecting people and the unique biodiversity it holds.

Canary Islands archipelago

The Canary Islands archipelago, located in the Atlantic Ocean, is a Spanish territory comprising seven main islands. Situated about 100 kilometres west of the coast of Morocco,

these islands are characterized by a diverse range of landscapes, from volcanic terrain to lush forests. With a total population of approximately 2.2 million people, Tenerife is the most populous island, followed by Gran Canaria. The two municipalities involved in this project, Buenavista del Norte and Mogán, are located on Tenerife and Gran Canaria islands, respectively (Fig. 2). These areas face increasing pressure from tourism and urban development, emphasizing the importance of sustainable practices and responsible lighting solutions.

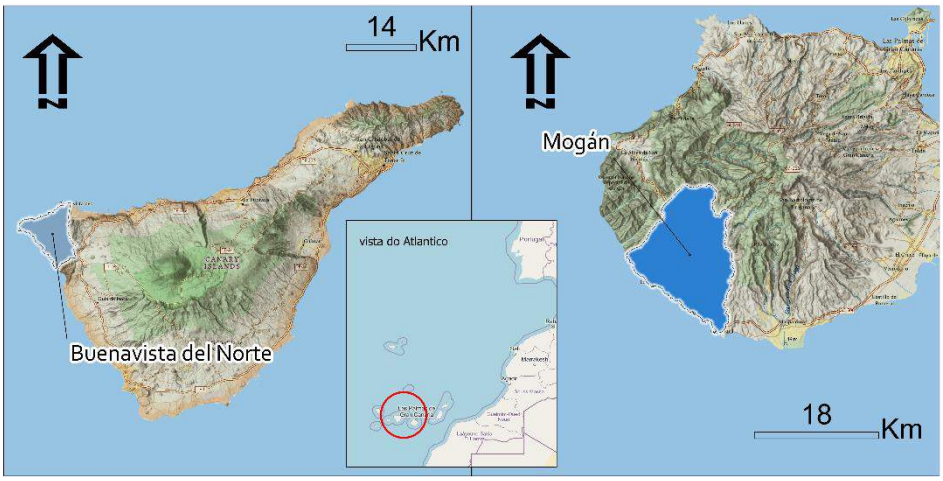

Figure 2 | Map of Canary Islands archipelago, and partner municipalities of Buenavista del Norte and Mogán. Map credit: Fernando Chacon (SPEA).

- **Buenavista del Norte**

Buenavista del Norte, located on the northwest coast of Tenerife in the Canary Islands, is home to close to 5,000 people. This municipality, surrounded by nature, includes rugged coastlines and verdant landscapes facing the Atlantic Ocean and the Teno Massif. It has an important cultural heritage and was declared "Bien de Interés Cultural". Even though Buenavista del Norte is not a partner of the project, it is one of its beneficiaries, as pilot actions to reduce light pollution will take place in this municipality.

- **Mogán**

Mogán, nestled in the southwest of Gran Canaria, in Canary Islands, is renowned for its diverse landscapes, ranging from arid coastal areas to lush mountainous terrain. It is home to approximately 20,000 people, and has higher tourism pressure, when compared to Buenavista del Norte. This municipality, the biodiversity it holds and its citizens, will benefit from the actions implemented throughout LIFE Natura@night projects, despite not being part of the partnership alliance.

Azores archipelago

The Azores archipelago, an autonomous region of Portugal, is situated in the middle of the Atlantic Ocean, approximately 1,400 kilometres from mainland Portugal. Comprising nine

islands, the Azores islands are known for their natural beauty, including volcanic landscapes, and Laurissilva forest. The archipelago has a population of around 235,000 inhabitants, with São Miguel being the most populated island. Santa Cruz da Graciosa, the municipality included in this project, is located on Graciosa Island, which constitutes one of the smaller islands in the Azores (Fig. 3). This archipelago is home for most of Cory's shearwater population, and its citizens are highly engaged in their rescue, when they are grounded light pollution.

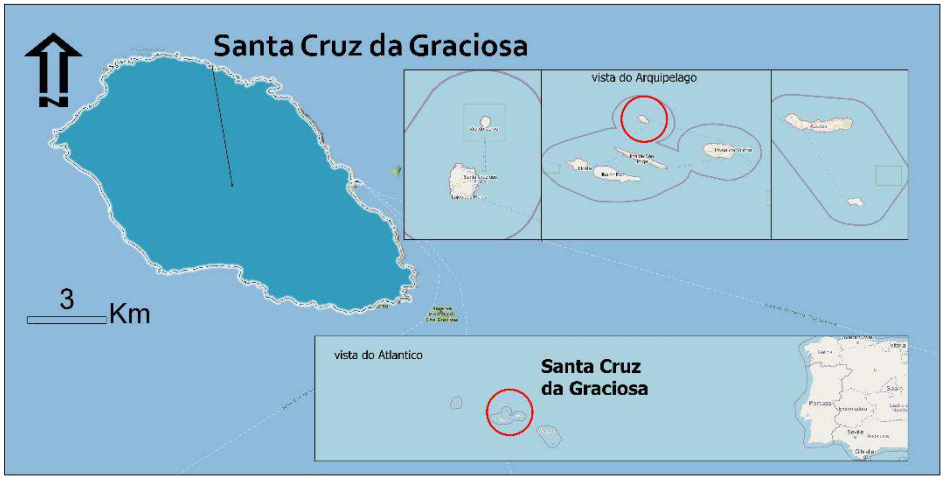

Figure 3 | Map of Azores archipelago, and partner municipality of Santa Cruz da Graciosa. Map credit: Fernando Chacon (SPEA).

- **Santa Cruz da Graciosa**

Graciosa island is a small island with 60.65 km², located in the Central Group of the Azores archipelago (Fig.3). It encompasses the entirety of Graciosa Island, providing a tranquil and close-knit community for its approximately 4,000 residents (2021 census). A significant portion of its territory included in Natura 2000 network with a unique species, the Monteiro's storm-petrel nesting mostly in its two islets (Praia and Baixo islets). This municipality is distinguished by its emphasis on preserving its natural heritage and is interested in promoting more sustainable actions, such as a public lighting system that benefits people and biodiversity. As Santa Cruz da Graciosa is the only municipality on the island, all the territory and unique habitats will benefit from measures and actions implemented in the scope of the LIFE Natura@night project.

As partners of project LIFE Natura@night, these municipalities alongside with all other partners, are engaged in improving quality of life for its citizens, taking steps towards more efficient and less polluting lighting systems, that can benefit people, biodiversity, and economy.

2.4 Data collection

The questionnaire was widely disseminated in social media and news outlets, through press releases, for autonomous online answering. This resulted in multiple news and radio interviews being published in local, regional and national press (examples provided in Annex C). Additionally, as an effort to engage local communities, institutions and organizations within the target municipalities were contacted to share and answer the survey. These included schools, social institutions, local parishes, nature related groups, university classrooms, museums, firefighter and police departments, and the municipalities themselves.

The questionnaire was available for online response from October 17, 2022, to May 31, 2023, to any internet user aged 18 or above residing or visiting the archipelagos of Azores, Madeira, and Canary Islands.

Additionally, in person administration of the questionnaire was used in the target municipalities of the project, during the same period. Pedestrians and people present or working in local commerce/stores and services (e.g.: firefighter departments, police stations, social and recreation centres) were randomly approached to participate in the survey. Older people staying in nursing homes and adult daycare centres were also visited and administered the questionnaire. Some, in the case of Graciosa island, through the nurses in charge who had a short training to undertake the survey to collect the opinion of the residents of nursing homes. When approached, people could autonomously fill the questionnaire in a provided device (smartphone or tablet) or would answer the questions made by the interviewer, which was properly identified.

By approaching people in person, it was possible to reach people with lower digital literacy levels or that would be less inclined to participate in the survey autonomously. Therefore, answers were obtained from a multitude of methods, including random, convenience and stratified sampling, and attempted to reach a representative sample of the universe considered.

Upon in person approach and on online autonomous response, people were informed of the subject of the survey, that the participation was entirely voluntary and that participants were not obliged to complete the survey and could stop at any moment. Additionally, guarantee of confidentiality and the explanation that data would be analysed in an aggregated manner was provided. By the end of the questionnaire, participants could provide their name and email to receive further information on the project. Completion of the questionnaires was only possible upon agreement with the Privacy Policy of SPEA (https://spea.pt/en/privacy-policy-2/), the coordinator of the project and action.

2.5 Data analysis

The data collected for this study underwent a descriptive analysis. Descriptive statistics were used to summarize and present the key findings. These included measures such as frequencies, percentages, means, and standard deviations, according to the type of answer allowed (e.g.: categorical, numeric). The descriptive analysis aimed to provide a comprehensive overview of the survey results without applying inferential statistical techniques.

Prior to the data analysis, the collected data underwent a curation process. This involved reviewing incompatibility of responses in certain questions (e.g.: when respondents chose option "none" and another listed option) and consistency. Such inculpabilities resulted in the removal of that specific question, maintaining all other answers given in that entry. Only completed entries (i.e.: that accepted the Privacy Policy and clicked on "Finish") were considered for data analysis.

Furthermore, data reclassification was employed to ensure consistency in responses. This process included manual reclassification of answers from open-ended questions. For those, a set of categories and criteria was created, that were attributed to each applicable answer. These were reviewed by colleagues, to ensure unbiasedness. This was also done for closed-ended questions that were initially categorized ambiguously. Reclassified questions, as well as categories and criteria used are presented on Table 3.

Table 3 | Questions subjected to reclassification process. Type of answer and reclassification are presented, as well as categories and criteria used to reclassify.

Question	Type of answer	Type of reclassification	Categories and criteria
Q5 – How old are you?	Numeric Only accepted introduction values ≥ 18	Automatic	Classes: • 18 to 24 years old • 25 to 34 years old • 35 to 44 years old • 45 to 54 years old • 55 to 64 years old • ≥ 65 years old
Q11 – Do you do any of these other nocturnal activities in nature?	Multiple choice: 1 – Nocturnal trails 2 – Observation of nocturnal fauna 3 – No, none 4 – **Other (open-ended)**	Manual for option 4 ("other")	**If "4 – Other", respondents were asked to specify**. Classes: • Camping • Physical activity • Photography • Educational or research activities • Other recreational activities • Stargazing – reclassified to "No, none", as was already asked on question Q10
Q14 – What is the strongest light source in your neighbourhood at night	Multiple choice: 1 – Lights from my house 2 – Lights from the neighbours 3 – Lights from local businesses 4 – Public lighting 5 – Traffic lights	Manual for option 6 ("other")	**If "6 – Other", respondents were asked to specify**. Classes: • Airport • Sports areas • Gardens • Sky glow • Other buildings • Without light/natural light

	6 – **Other (open-ended)**		
Q16 – You think the level of lighting where you live is…	Multiple choice: 1 – Insufficient 2 – Good 3 – Excessive 4 – **Other (open-ended)**	Manual for option 4 ("other")	**If "4 – Other", respondents were asked to specify**. Classes: • Non-existent • Insufficient/inadequate
Q19 – How would you define Light Pollution?	Open-ended	Manual	Assessment of knowledge on light pollution Classes and criteria: • **Yes** –Answer refers to excess of light, relation with artificial light, any concrete consequence caused by light pollution, any specific origin/source of light pollution. • **Partially** – Answer shows understanding of negative effects in a generic way, but do not define the term correctly (unnecessary, uncomfortable, affects nature, etc.) • **No** – If an incorrect definition is provided, or answer does not mention sufficient elements to be consider correct of partially correct.
Q20 and Q29	Multiple choice: 1 – Not important 2 – Little importance 3 – Quite important 4 – Very important	Automatic	Reclassified into two categories: • **Little or not important** – If 1 or 2 is the response • **Quite or very important** – If 3 o4 2 is the response
Q22 – Can you give an example of a project/initiative working on this issue	Open-ended	Manual	Classes and criteria: • **Governmental** – refers to any work project, or governmental organization • **Academia/Research** – refers to any research project or group on the topic • **SPEA/ SEO** – If it refers to SPEA/SEO or any of its works and projects • **NGO** – if it refers to another project of activity related to light pollution, other than SEO and SPEA • **Astronomy** – if it refers o a project or initiative related to astronomy • **Environmental Education** – if it refers to activities or initiatives related to environmental education • **More than one** – if refers to more than one type of initiative or project • **Unspecified** – does not provide any specific example that can be attributed to one of the categories

Data was analysed per archipelago, and per target municipality. As the survey was available to answer by any resident of the three archipelagos considered, answers from municipalities other than the ones targeted by the project were also included in the analysis done by archipelago. As such, a total of 114 responses were considered for Azores' archipelago, 1,875 answers from Madeira's archipelago and 218 for Canary Islands' archipelago. In total, the survey was answered by 2,207 residents of these archipelagos. Number of answers considered in the analysis at municipal level are provided in Table 2, where sample size is presented. Responses from visitors were not considered for this report.

3. RESULTS

3.1 Results by archipelago

3.1.1 Madeira archipelago

Sample characterization

In the archipelago of Madeira, the survey was completed by 1,875 individuals, with 97% of respondents residing in the municipalities targeted by the project (Table 4).

Table 4 | Distribution of survey respondents by municipality of Madeira archipelago.

Island	Municipality	Number of respondents
Madeira	Calheta	12
	Câmara de Lobos	217
	Funchal	529
	Machico	401
	Ponta do Sol	4
	Porto Moniz	3
	Ribeira Brava	11
	Santa Cruz	530
	Santana	140
	São Vicente	11
Porto Santo	Porto Santo	16
Total		**1,875**

The mean age of respondents was 43.8 years (SD=15.6), with respondents ranging from 18 to 92 years old. In terms of gender, 64% identified as female, 36% as male, and less than 1% (0.2%) as non-binary (n=1,875). Regarding education, 20% had attained a basic education level, 34% had completed high school or equivalent, 32% held a bachelor's degree, 10% had a master's degree, 1% possessed a PhD, and 2% held other unspecified levels of education. Approximately 22% of respondents (n=1,834) reported their work schedule included working at night. Additionally, 6% of the sample (n=1,862) were affiliated with an environmental association. Average time of response was 18 minutes and completion rate was 72%.

More than a third of respondents (36%) admit to never watching the stars, while 46% enjoy stargazing occasionally, 17% regularly, and less than 1% identify as astronomers, either professionally or as amateurs (n=1,854). Regarding other nighttime activities in nature, 86% of the sample do not participate in any, 7% partake in nocturnal trails, and 5% engage in fauna observations. About 2% of respondents named other activities, namely physical activity, camping, education or academic activities, photography, and other recreational activities (n=1,875).

Lighting characterization at the respondents' residence

According to the respondents' type of residence, the sample was predominantly urban, with nearly half of respondents reporting to live in a city (48%), followed by 12% in a village, 21% in a small parish, and 18% in a rural area (n=1,864). When evaluating night sky brightness at their place of residence using Bortle scale, the majority (81%) indicated living under a "Suburban sky" (Bortle scale 5) or in even more light-polluted areas (Fig. 4). The scale used during the survey can be found in Annex D.

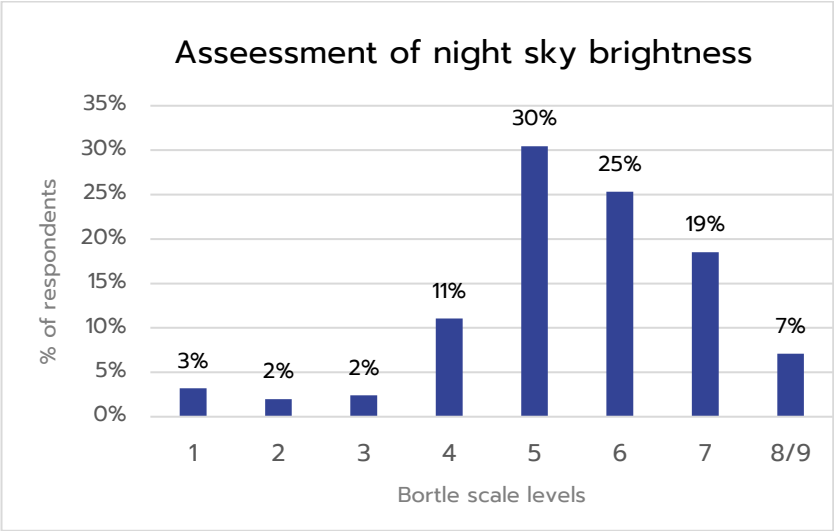

Figure 4 | Level of night sky brightness indicated by respondents of Madeira archipelago, using Bortle scale (n=1,875). 1 – "Excellent dark sky", 2 – "Dark sky", 3 – "Rural sky", 4 – "Suburban/Rural transition", 5 – "Suburban sky", 6 – "Bright suburban sky", 7 – "City/Suburban transition" and 8/9 – "City/Inner city sky". Original Bortle scale presented in the questionnaire can be found in Annex D.

Of the participants, 79% identified public lighting as the primary source of light at their neighbourhood, followed by their own household lights (10%), neighbours' lights (4%), traffic (2%), local businesses (2%), and 2% mentioned other unlisted sources (n=1,689). Among these, sports areas, the airport, and other buildings were the most frequently cited.

When indicating if that source of light was permanent during the night, 79% answered yes, 18% said no and the resulting 3% mentioned it was intermittent (n=1,664). In terms of their satisfaction, 79% assessed the level of light from where they live as "Good", 12% as "Excessive", and 9% as "Insufficient". Additionally, 1% specified other level, considering them either inefficient, inadequate, or inexistent.

Generally, public lighting was most used between 18:00 and 00:00, and from 06:00 to 08:00 (n= 1,565). From 01:00 to 05:00, only 7% or less respondents reported using public lighting (Fig. 5).

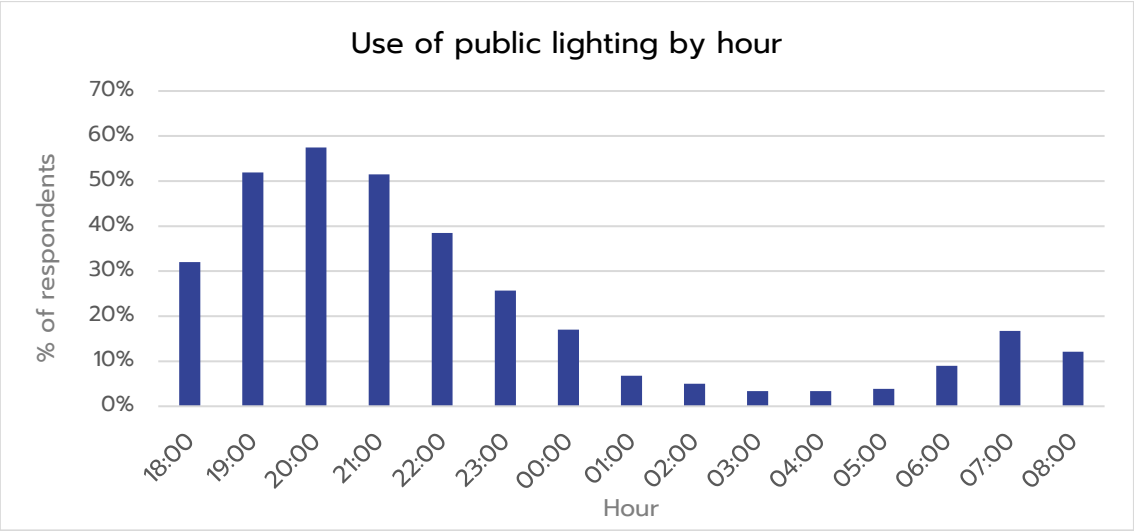

Figure 5 | Use of public lighting by hour, reported by Madeira archipelago respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=1,565).

Perceptions on light pollution and ALAN

A total of 69% respondents reported having prior knowledge of light pollution, while 31% stated to have never heard of it before (n=1,864). Of those who answered yes and answered the next question (Q19, n=1,131), 80% knew how to define it, 16% had partial understanding of the concept and 4% could not define it correctly.

Considering only respondents that had already heard of light pollution (n=1,281), 91% considered it to be a "quite or very important" issue regarding people, biodiversity, and the economy, and 9% considered it to be "little or not important".

Out of 1,835 respondents, only 20% demonstrated awareness of projects, organizations, or initiatives dedicated to addressing light pollution. Among the 337 respondents who provided examples, 64% of them cited SPEA or projects associated with SPEA, while 8% mentioned government-led efforts. Other types of initiatives, such as astronomy, academia/research, environmental education, and other non-governmental organizations, received less frequent mentions (each accounting for 1%). Additionally, 20% of responses did not specify a particular project, initiative, or organization, and 5% identified multiple initiatives in their answers. Notably, the project LIFE Natura@night was specifically mentioned by 86 respondents (25%).

The respondents exhibit a high level of awareness regarding the detrimental impact of ALAN on nocturnal biodiversity. Specifically, 92% acknowledged, to varying degrees, that seabirds are negatively affected by artificial light, followed by 90% for bats and 80% for insects (Fig. 6). In relation to the effects of artificial light on their sleep (Q23.2), opinions are divided. While 24% "totally agree" with the statement, 33% "totally disagree".

Findings show a pronounced emphasis placed on the right to observe the stars and the Milky Way from their homes, and on the personal importance attributed to observing the night sky (Q23.8 and Q23.9, respectively). However, 48% of respondents, who either partially or entirely agreed with the statement in question Q23.10, expressed a preference for white light over

yellow. A significant 83% of respondents, either partially or entirely, believe that authorities show little concern regarding light pollution (Fig. 6).

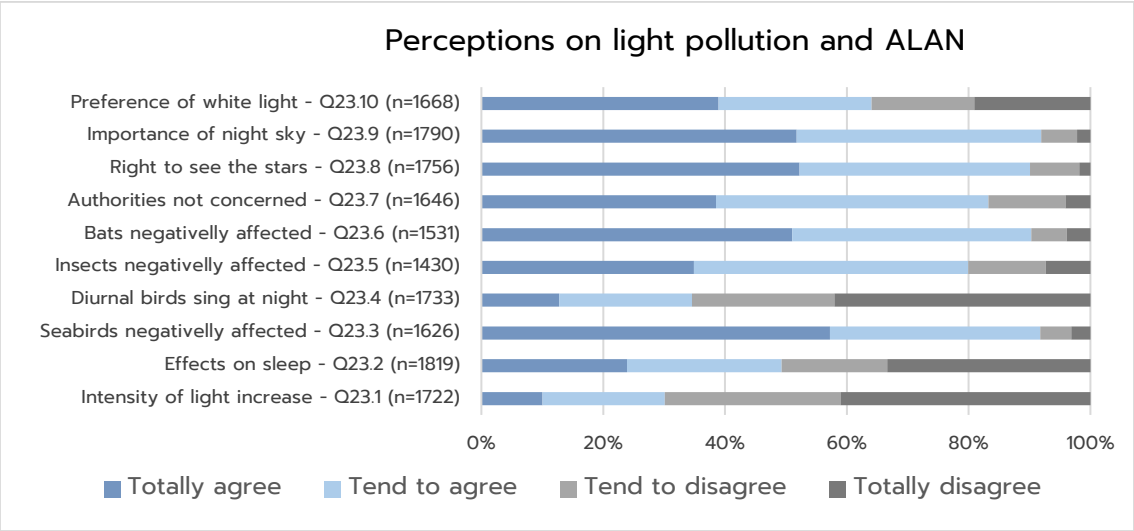

Figure 6 | Perceptions on light pollution and ALAN among respondents from Madeira archipelago. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

When asked about level of bothersome caused by different types of lighting (Q24), lights from commercial areas, followed by light signs and sports areas were considered the most bothersome. On the other hand, lights in residential areas, public gardens and parks, roads, ornamental lights, and Christmas and festive lights raised lower levels of inconvenience (56% or more considered not to be bothered by them) (Fig. 7).

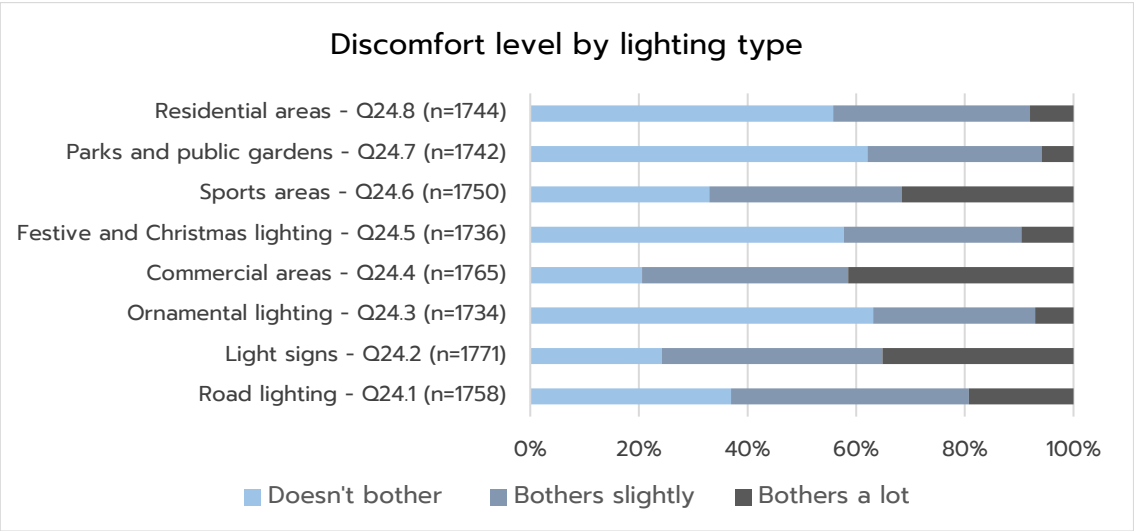

Figure 7 | Discomfort level reported by the Madeira archipelago respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents of each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

Some of the lights considered less inconvenient where also the types of lights considered most indispensable, namely lights in roads, residential areas and on public gardens and parks (for over 50% of respondents in all cases). Alternatively, lights from commercial areas, light signs and ornamental lights were considered the most dispensable (over 70% of respondents considered them to be either dispensable or reducible). All lights presented were considered reducible or dispensable by a large part of the respondents (at least 47% respondents for all types of lighting) (Fig. 8).

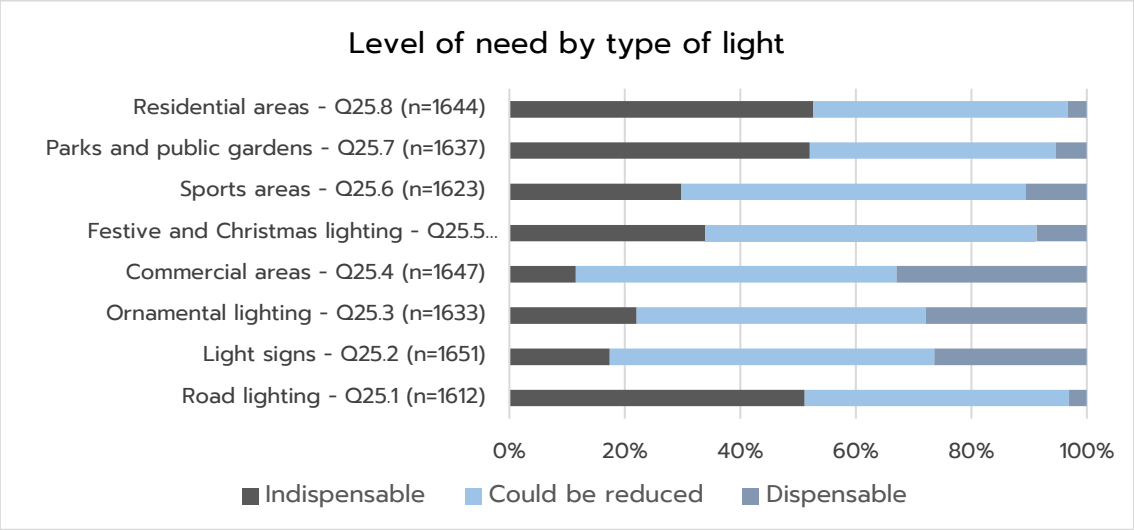

Figure 8 | Perceived necessity of different types of lighting by respondents in the Madeira archipelago. The horizontal bars represent percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

In response to inquiries about changes in public lighting detailed in question Q26, a significant majority of respondents reported having witnessed these modifications. Specifically, 63% affirmed observing a shift from traditional lights to white LEDs (n=1,714), while 51% noted changes to yellow LEDs (n=1,676). Of those who observed these changes, 81% expressed support for the transition to white LED bulbs (n=1,073), and 73% for the adoption of yellow LEDs (n=856). It is noteworthy that all listed alterations (question Q26 – Table 1) were observed by over half of the respondents and garnered substantial support, with approval rates exceeding 80% in all cases. However, these results should be considered with caution. Most respondents reported witnessing changes, such as motion sensors in lights, that, to our knowledge, did not occur in public lighting. This discrepancy may be attributed to the phrasing of the question, which might have inadvertently led respondents to provide inaccurate information.

Respondents displayed high levels of support for most light pollution mitigation measures proposed in question Q27 (Fig. 9). While a majority, at 62%, opposed the idea of switching off streetlights from 00:00 to 06:00 (Q27.1), most of respondents agreed with its reduction (87%) (Q27.2). The measure outlined in Q27.5 (Table 1), which suggests making changes in lighting within respondents' parishes to protect wildlife was the most supported, with 90%

of respondents in favour. Additionally, the implementation of motion sensors in public parks and gardens, along with the reduction of festive lighting, received widespread support, with 73% or more expressing approval. Except for question Q27.1, all proposed measures received the backing of at least 60% of respondents (Fig. 9).

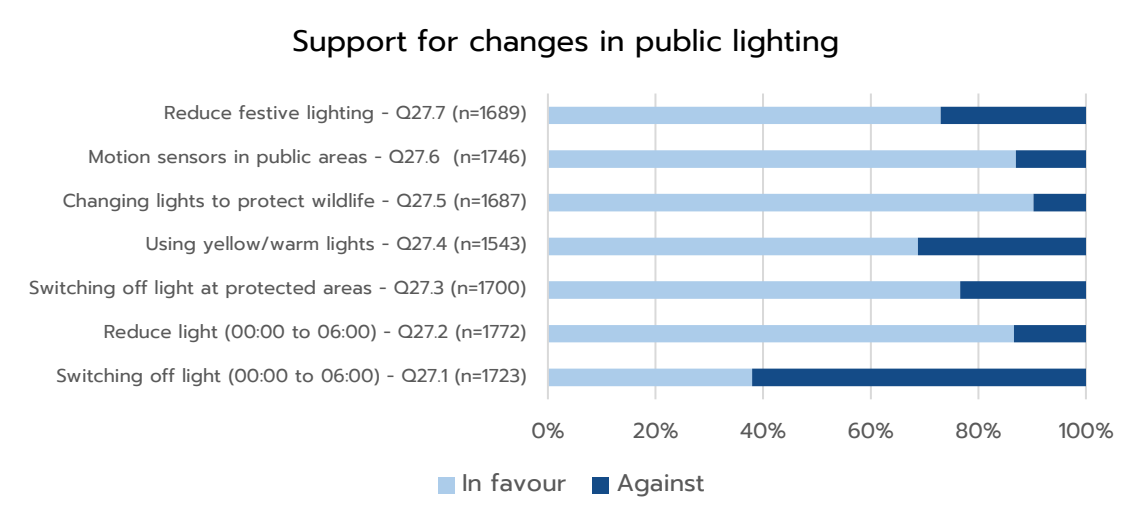

Figure 9 | Support for light pollution mitigation measures in public lighting reported by the Madeira archipelago respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

When evaluating individual attitudes and actions, most of respondents indicated to already adopt actions such as turning off the lights inside the house when not using them and doing the same for exterior lights (98% and 87%, respectively). Few of the respondents mentioned having already rescued a grounded seabird by light pollution (17%), but most would consider it if it was the case (79%). For all the actions listed, most respondents (83% or more) indicated they had either already participated in them or were willing to do so (Fig. 10).

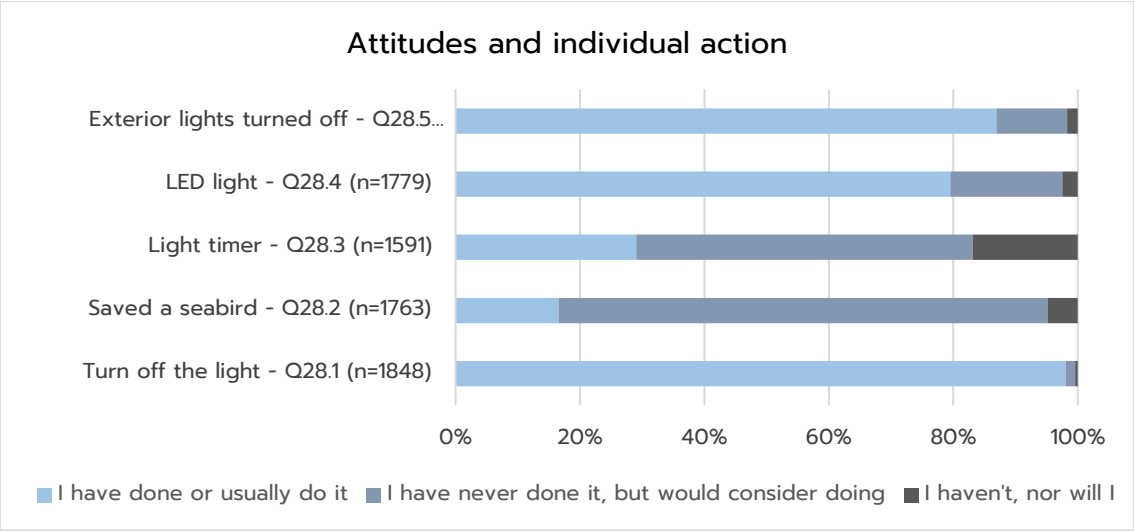

Figure 10 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents of Madeira archipelago. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.

By the end of the survey, 92% of respondents considered light pollution to be a "quite or very important" issue regarding people, biodiversity, and the economy (n=1,875).

3.1.2 Canary Islands archipelago

Sample characterization

The questionnaire obtained 218 responses from 46 municipalities, from five islands (El Hierro, Fuerteventura, Gran Canaria, Lanzarote, and Tenerife). Of these, 52% identified as female and 48% as male. Concerning education level, 3% had basic education level, 33% high school or equivalent, 35% a bachelor's degree, 15% a master's degree, 6% a PhD and 7% had other unlisted level of education (n=218). Mean age of respondents was 40.8 years old (SD=13.9), ranging from 18 to 92 years old. Average time of response was 18 minutes and completion rate was 64%.

Regarding education level, 20% had basic education level, 34% high school or equivalent, 32% a bachelor's degree, 10% a masters' degree, 1% a PhD and 2% had other unspecified level of education. Work schedule included working at night for 21% of the respondents (n=214), and 29% of the sample belonged to an environmental association (n=215).

While assessing stargazing habits, 16% of respondents (n=218) said to never watch the stars, 59% enjoyed watching them occasionally, 23% regularly and 2% were astronomers (either amateur of professional). As in for other nocturnal activities done in nature, night trails were pointed out by 24% of all respondents and observation of fauna by 17% (n=218). Most respondents (61%) said to never engage in activities in nature at night, and about 2% said to do other unlisted activities, such as physical activity, educational or academic activities or other recreational activities.

Lighting characterization at the respondents' residence

The sample was quite evenly distributed regarding place of residence. Out of 215 respondents, 25% lived in a city, 30% in a small parish, 32 % in a small village and 13% in a rural area. Most (82%, n=218) considered to live under "Suburban sky" (Bortle 5) or more polluted night skies, and only 6% believed the sky at their place of residence to be equivalent to a rural or less polluted sky (Bortle 3 or under) (Fig. 11).

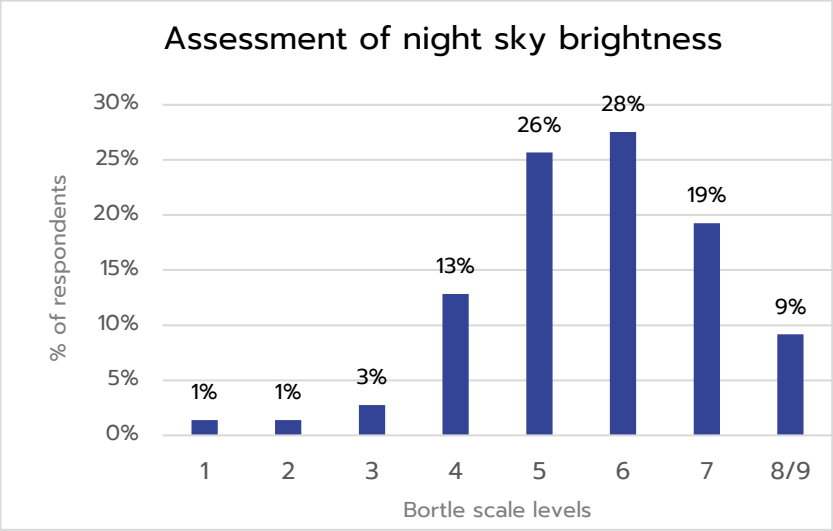

Figure 11 | Level of night sky brightness indicated by respondents of Canary Islands archipelago, using Bortle scale (n=218). 1 – "Excellent dark sky", 2 – "Dark sky", 3 – "Rural sky", 4 – "Suburban/Rural transition", 5 – "Suburban sky", 6 – "Bright suburban sky", 7 – "City/Suburban transition" and 8/9 – "City/Inner city sky". Original Bortle scale presented in the questionnaire can be found in Annex D.

Public lighting was considered the strongest source of light at their neighbourhood by 84% of respondents, followed by neighbours' lights (5%) and light from commercial areas (3%) (n=174). Additionally, 6% of respondents pointed out other sources of light, such as sports areas and other buildings. For 87% of respondents, the light indicated as the strongest was permanent throughout the night (n=173). Out of the 218 respondents, 52% assessed the level of lighting at their residence as "Good", 42% as "Excessive" and 6% as "Insufficient".

Use of public lighting was predominantly reported from 18:00 to 01:00, and then again from 06:00 to 08:00 (n=211). From 02:00 to 05:00, less than 7% reported using public lighting (Fig. 12).

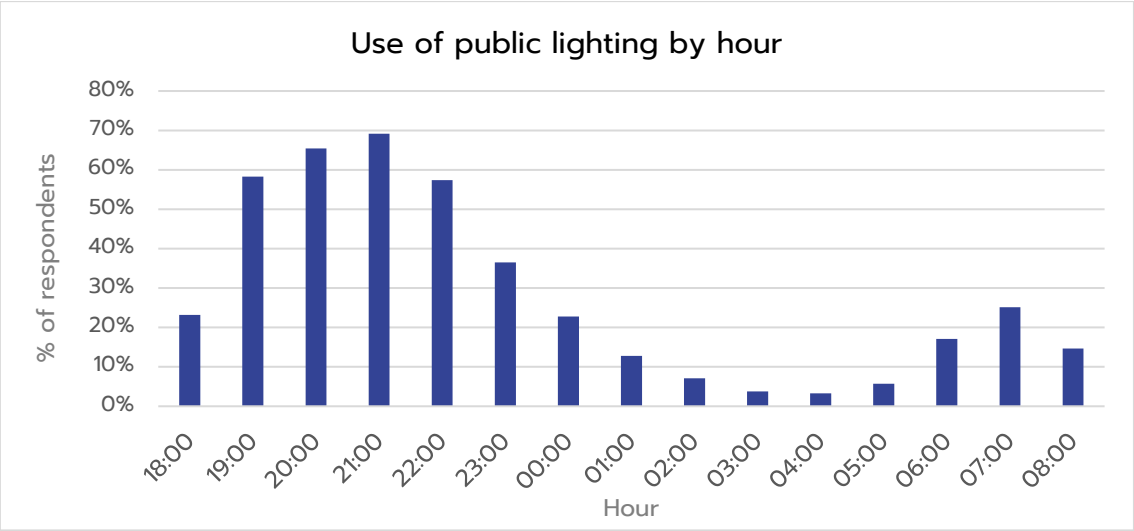

Figure 12 | Use of public lighting by hour, reported by Canary Islands archipelago respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=211).

Perceptions on light pollution and ALAN

A high level of awareness regarding light pollution was observed among respondents from Canary Islands. Most said to be familiar with the concept of light pollution (93%, n=217). Of those, 98% considered it to be a "quite or very important" issue concerning people, biodiversity, and economy. When asked to define light pollution, 86% knew provided accurate definitions, 12% had a partial understanding of the concept and 2% provided responses that were considered incorrect (n=187). Additionally, half of respondents knew about a project or initiative working against light pollution (50%, n=210), and when asked to specify, 95 people responded. In 45% of the times, SEO or one of its associated projects were mentioned and 15% of responses were related to astronomy initiatives. Moreover, 9% mentioned NGOs other than SEO, 3% governmental initiatives and 7% specified more than one project or organization. Of these, 15 responses (16%) mentioned LIFE Natura@night project.

Respondents were highly aware of the existence of negative impacts of ALAN. In fact, 99% of respondents either totally agreed or tended to agree that artificial light negatively affects seabirds, followed by insects (96%) and bats (95%). Furthermore, respondents were also aware that artificial light affected their sleep, considered that intensity of light has increased over the last three years and did not prefer white light over yellow light. A great level of importance was given to watching the night sky and to the right to see the stars and Milky Way from their homes, with 65% and 64% totally agreeing with statements from questions Q23.9 and Q23.8, respectively (Fig. 13).

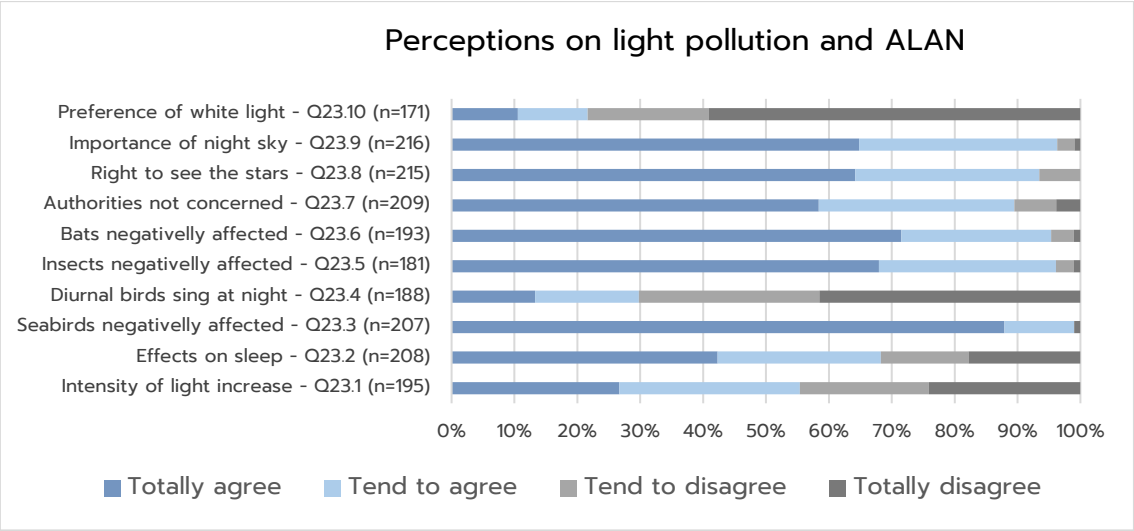

Figure 13 | Perceptions on light pollution and ALAN among respondents from the Canary Islands archipelago. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

When presented images of different types of lighting, respondents stated to be most bothered by lights in commercial areas, light signs, and sports areas. Conversely, lights in residential areas, public parks and gardens, and ornamental lights of buildings and monuments were considered less bothersome. However, 67% of respondents were bothered to some degree ("slightly" or "a lot") by all types of light presented (Fig. 14).

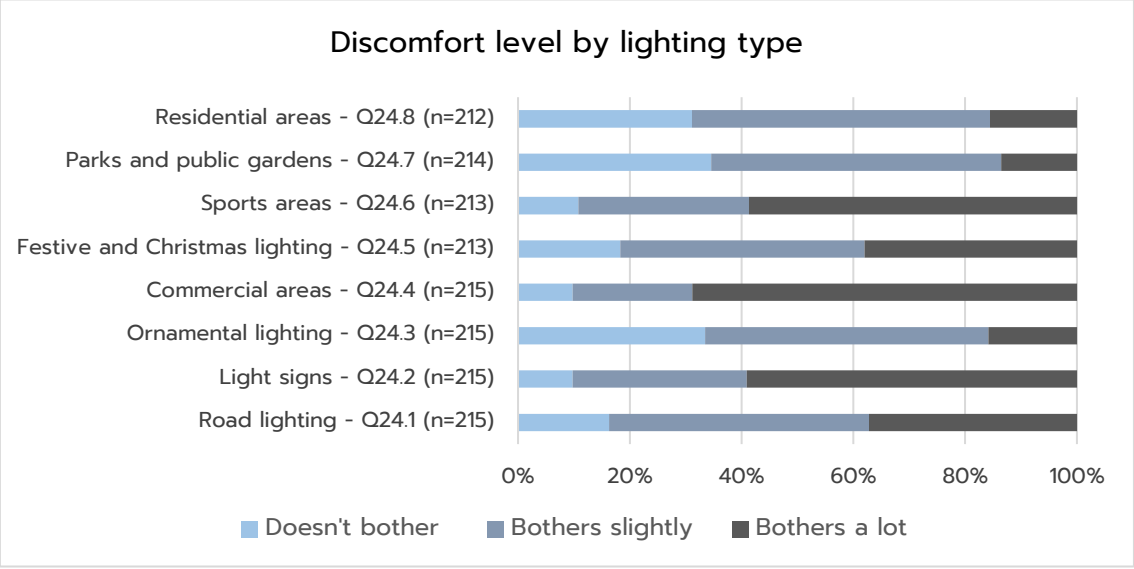

Figure 14 | Discomfort level reported by the Canary Islands archipelago respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents of each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

Of these types of lighting, lights in commercial areas, light signs, ornamental lights, and festive and Christmas lights were considered the most dispensable. These, alongside lights in sports areas, were considered either dispensable or reducible by over 88% of the respondents. Even lights considered most indispensables (as residential lights, lights in public gardens and parks, and roads), were said to be reducible by at least 59% of respondents (Fig. 15).

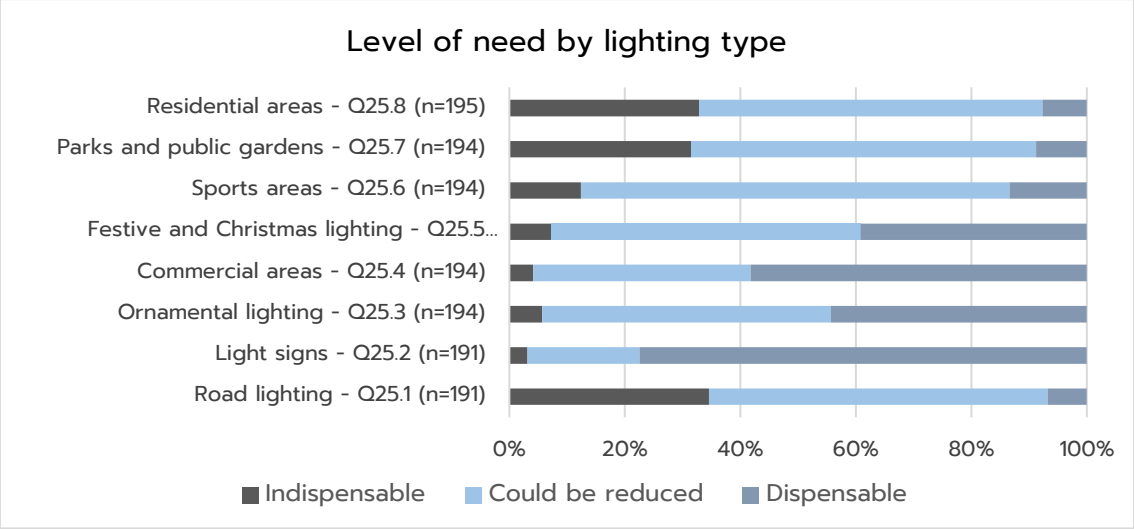

Figure 15 | Perceived necessity of different types of lighting by respondents in the Canary Islands archipelago. The horizontal bars represent percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

When respondents were queried on having witnessed the listed changes in public lighting detailed in question Q26, and their level of approval, a 47% reported witnessing a transition from traditional light bulbs to white LEDs (n=189), while 48% noted the shift to yellow LEDs (n=187). Among those who had observed these changes, 66% expressed approval for the switch to white LEDs, and a substantial 91% endorsed the transition to yellow LEDs. All other changes in lighting listed in question Q26 (Table 1), were supported by 84% or more of the respondents that witnessed them.

As for the proposed measures to reduce light pollution in question Q27 (Table 1), most respondents were against switching off public lights in their street from 00:00 to 06:00 (55%), although 92% favoured its reduction in the same period. The latter and all other measures presented were highly supported, with over an 88% support in all cases (Fig. 16). This included support for changes in benefit of wildlife (Q27.5) and for switching off public lighting in protected areas and near them (Q27.3).

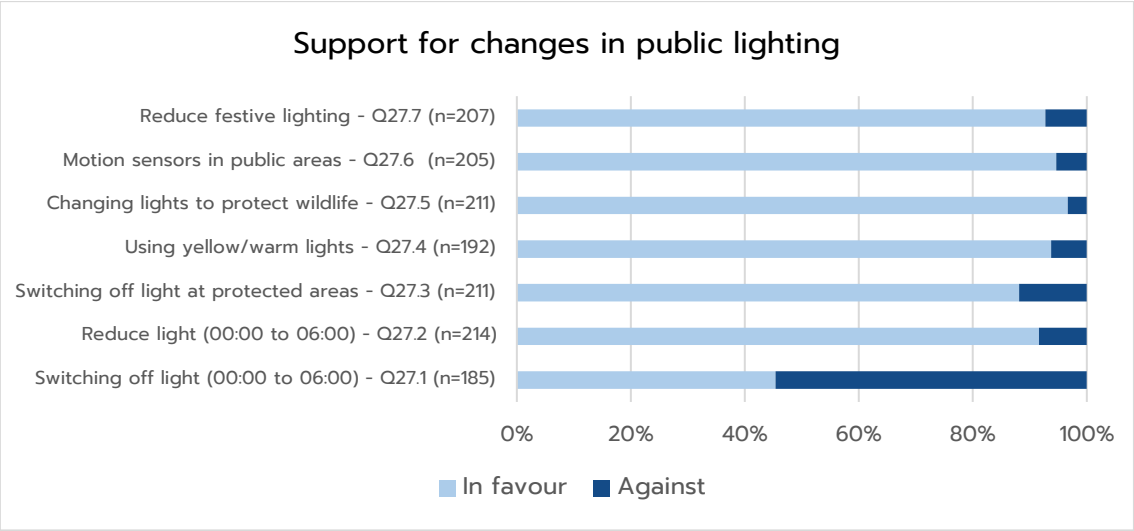

Figure 16 | Support for light pollution mitigation measures in public lighting reported by the Canary Islands archipelago respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

Respondents stated to already adopt simple behaviours such as a turning off interior lights when not using them (99%, Q28.1), as well as exterior lights (75%, Q28.5) and using LED lights (84%, Q28.4). Out of 211 respondents, 36% said to have saved a grounded seabird by light pollution and 57% expressed willingness to do so. For all listed behaviours, most respondents either had already engaged in them or was open to do so (87% or more) (Fig. 17).

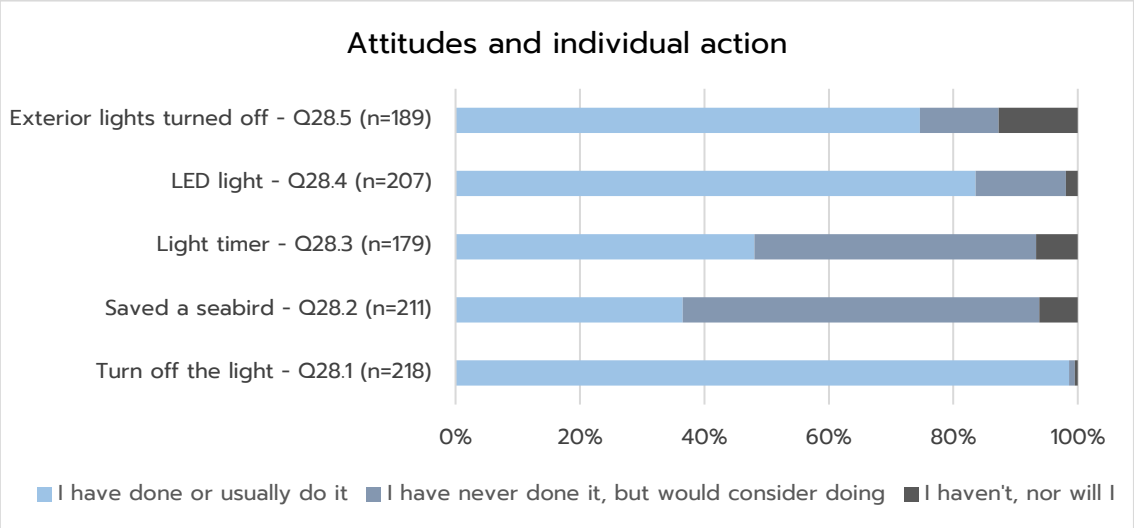

Figure 17 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents of Canary Islands archipelago. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.

By the end of the survey, 95% of respondents (n=212) regarded light pollution as a "quite or very important" issue regarding people, biodiversity, and the economy.

3.1.3 Azores archipelago

Sample characterization

The survey was completed by 114 respondents in the archipelago of Azores, distributed by seven out of the nine islands (Table 5). The sample consisted of individuals aged between 18 and 80 years old, where the average age of respondents was 40.9 years (SD=11.9). Regarding education, participants were distributed as follows: 6% had basic education level, 36% completed high school or equivalent, 39% held a bachelor's degree, 13% possessed a master's degree, 3% a PhD and 3% had other unspecified level of education. The gender breakdown showed that 58% of the respondents identified as female, while 42% identified as male. In general, the average time of response for Azores' respondents was 18 minutes and completion rate was 69%.

Table 5 | Distribution of respondents by island of the Azores archipelago.

Island	Number of respondents
São Jorge	1
Pico	3
Faial	5
Corvo	7
Terceira	9
São Miguel	24
Graciosa	65
Total	**114**

Regarding work schedule, the great majority of respondents did not work at night, representing a 84% (n=114), and 16% of respondents stated it did. When asked if they belonged to an environmental association, most said no (73%), and 27% said yes (n=110).

As for their stargazing habits (Q10), most respondents said to enjoy watching the stars to some degree (75%), while 25% assume never watching the stars or participating in astronomical observations (n=113). When assessing the sample's engagement in other activities carried out during the night in nature, 80% of the sample (n=113) said to never do it and nocturnal trails were pointed as the main activity (13%), followed by observation of nocturnal fauna (9%). Additionally, 4% engaged in non-listed activities, namely physical activity, or seabird rescue campaigns.

Lighting characterization at the respondents' residence

Living context of participants was mainly rural, with 64% of respondents living in rural areas or small parishes (32% and 36%, respectively) and 24% in a village (n=114). Only 9% of respondents lived in a city.

Yet, when assessing sky brightness in their area of residence using Bortle scale, 63% considered to live under "Suburban sky" (Bortle 5) or more polluted night skies (n=114) (Fig. 18). The scale used during the survey can be found in Annex D.

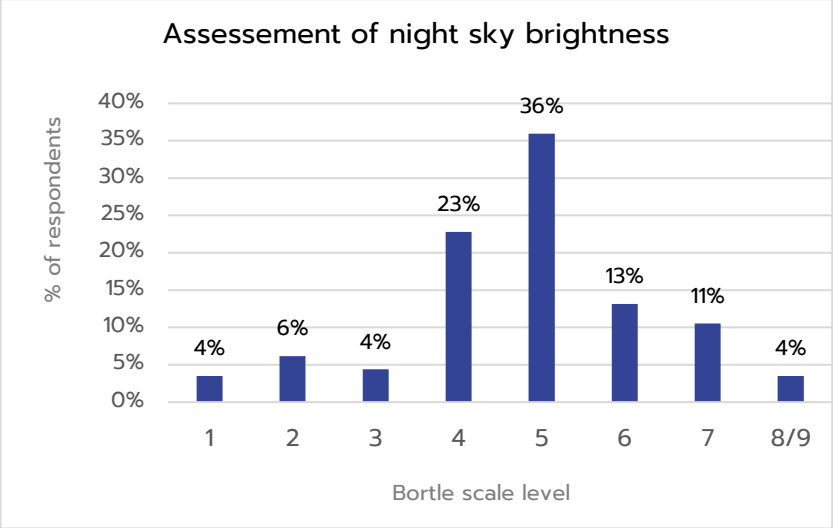

Figure 18 | Level of night sky brightness indicated by respondents of the archipelago of Azores, using Bortle scale (n=114). 1 – "Excellent dark sky", 2 – "Dark sky", 3 – "Rural sky", 4 – "Suburban/Rural transition", 5 – "Suburban sky", 6 – "Bright suburban sky", 7 – "City/Suburban transition" and 8/9 – "City/Inner city sky". Original Bortle scale presented in the questionnaire can be found in Annex D.

When asked about the strongest light source in their neighbourhood (question Q14), public lighting was pointed out in 96% of the answers (n=105), and for 95% of the respondents, the strongest light indicated by them was a permanent source of light throughout the night (n=102).

Public lighting was mostly used from the continuous period of 18:00 to 0:00, and additionally at 07:00. During the remaining period only 8% (or less) reported using it (n=102) (Fig. 19).

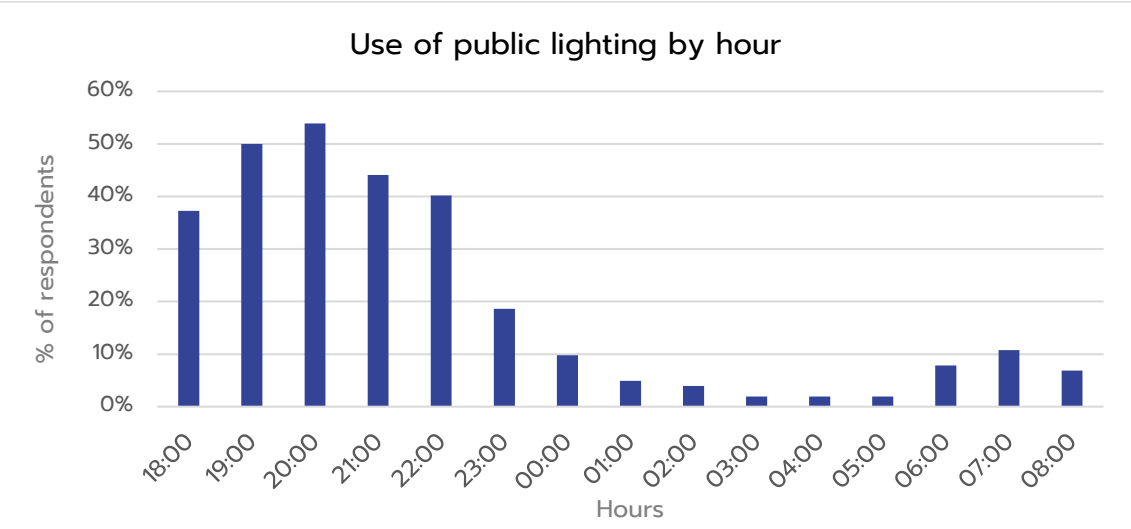

Figure 19 | Use of public lighting by hour, reported by Azores archipelago respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=102).

Regarding the sample satisfaction with lighting levels at their residence area, 25% of respondents considered it excessive, 74% of respondents considered it acceptable and 2% insufficient (n=114).

Perceptions on light pollution and ALAN

A large proportion of respondents (81%) had already heard about light pollution (n=113). Of those (n=81), 86% knew how to define light pollution, and 93% considered it to be a "quite or very important" issue concerning people, biodiversity, and economy (n=92).

Over half of 112 respondents did not know about any project tackling light pollution (54%), and 46% said to know about some project or initiative. When specifying an example, SPEA was named in 38% of the answers, governmental initiatives were named in 17%, research or academia initiatives and environmental education actions in 2% each (n=48). Additionally, 21% of respondents identified more than one initiative and 21% of the responses were unspecified. Project LIFE Natura@night was mentioned by 10 of the respondents (21%).

Regarding their perceptions on light pollution and ALAN, respondents showed to be highly aware of negative effects of artificial light on nocturnal biodiversity. Almost all respondents either tend to agree or totally agree that artificial light has negative effects on seabirds (98%), bats (90%) and insects (80%). Opinions on the effects of artificial light on sleep were divided, as 52% agree, at least to some degree, with statement Q23.2, and 48% disagree. Altogether, 82% of respondents consider that authorities display little concern about light pollution, and attribute high value to observing the night sky (95%), and to the right to observe the stars and Milky Way from their homes (88%) (Fig. 20).

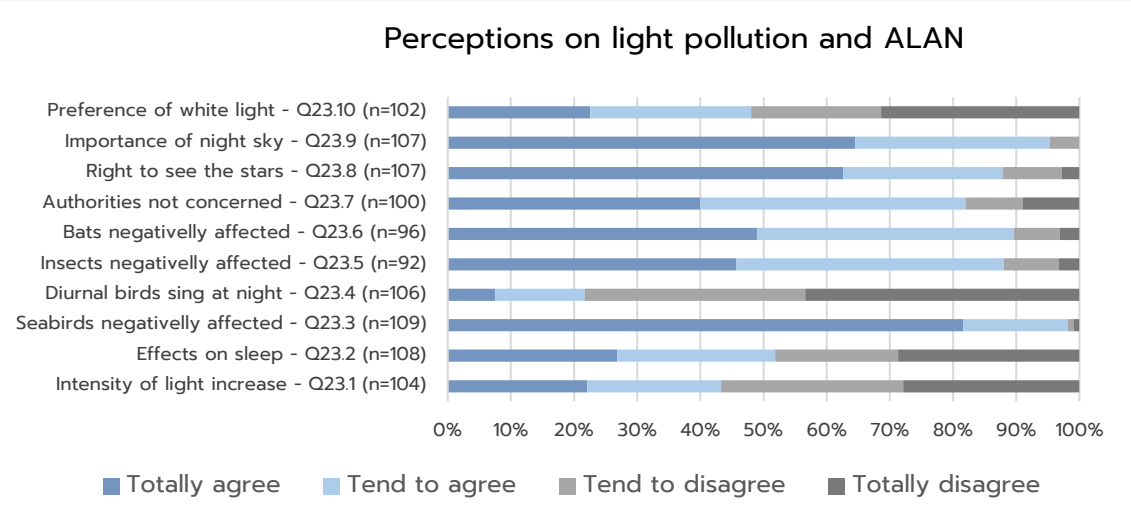

Figure 20 | Perceptions on light pollution and ALAN among respondents from the Azores archipelago. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

When asked about different types of lighting in terms of discomfort and necessity (Fig. 21 and Fig. 22), lights from commercial areas emerged as the most bothersome (95% found them to be slightly or very bothersome) and were also considered the least necessary, with 97% of respondents considering them dispensable or reducible. A similar scenario was also found for light signs. Lights associated with sports areas were also among the most uncomfortable for respondents, with 81% stating they were very or slightly bothered by them.

Road lights stood up for being considered one of the most uncomfortable types of light, but also for being the type of light considered most indispensable (40%) (Fig. 21 and Fig. 22). Similarly, the lights associated to public areas, such as residential areas and parks and public areas, were considered indispensable by 38% and 33% of the respondents, respectively (Fig. 22).

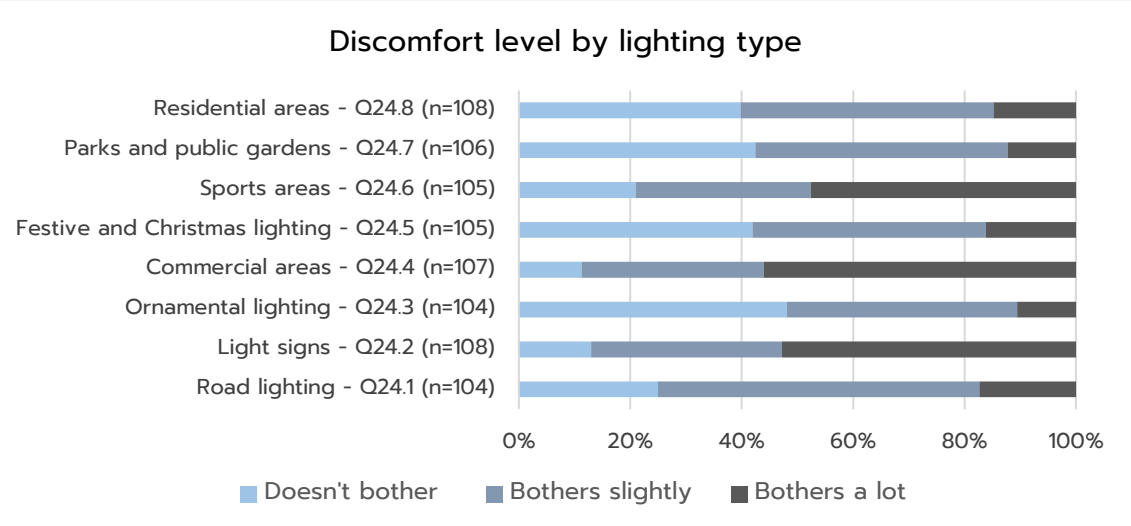

Figure 21 | Discomfort level reported by the Azores archipelago respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

Regardless of the level of discomfort caused, all types of lighting presented were considered reducible by most respondents (>50%). This was found even for cases not associated with lower levels of bothersome, such as ornamental lights of buildings and monuments and as festive and Christmas lights (Fig. 22).

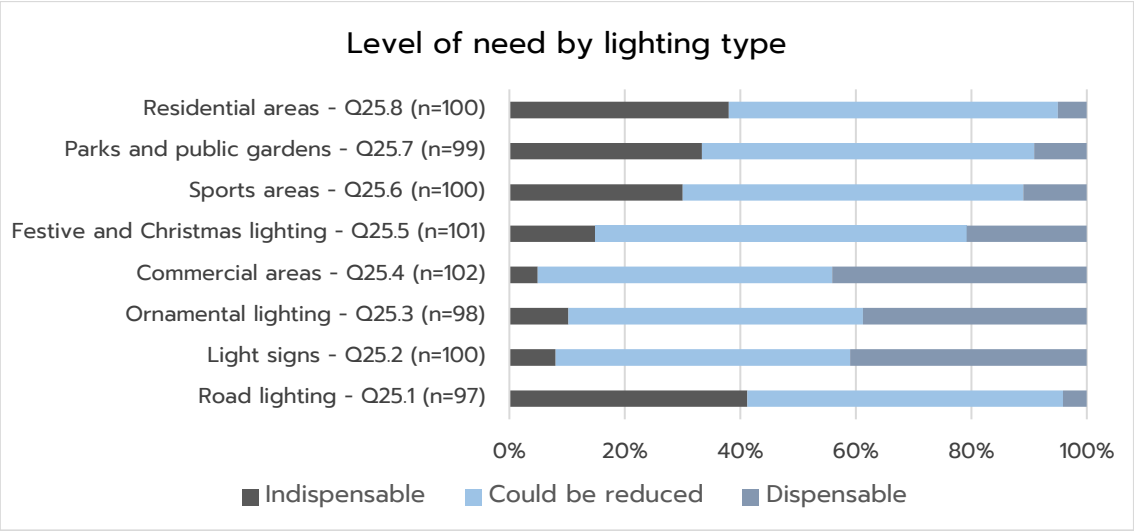

Figure 22 | Perceived necessity of different lighting types by respondents in the Azores archipelago. The horizontal bars represent the percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

In response to whether the surveyed residents had observed any of the listed changes in public lighting and, if so, their level of support (question Q26), participants exhibited stronger support for transitioning from traditional light bulbs to yellow LEDs (92%, n=62) compared to white LEDs (72%, n=92). More respondents reported observing changes to white LEDs than to yellow LEDs. Apart from changes to white LEDs, all other measures presented in question Q26 received support from 90% or more of the respondents. Nevertheless, it is crucial to interpret these findings with caution, as they can be biased. Instances where changes, to the best of our knowledge, have not been implemented in public lighting (e.g., motion sensors in lights) were reported as if they had been observed. This discrepancy may be attributed to the phrasing of the question, which might have misled respondents.

As for future changes in public lighting, respondents display high levels of support. Results show that 85% or more of respondents agree with six out of the seven measures outlined in question Q27. While support for switching off public street lighting from 00:00 to 06:00 was lower, with 52% of respondents against it, a total of 94% supported its reduction during the same period (Fig. 23).

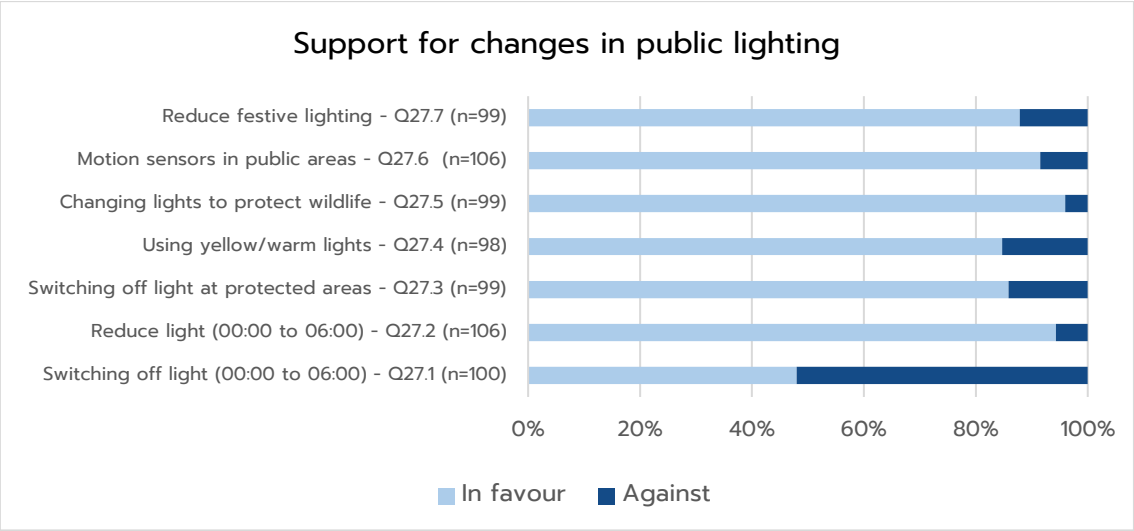

Figure 23 | Support for light pollution mitigation measures in public lighting reported by the Azores archipelago respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

Results show that respondents already adopt simple individual actions, such as switching off lights when leaving a room or turning off exterior lights when not using them (Fig. 24). However, it remains unclear if the motivation behind these actions is purely related to energy saving or if it considers the reduction of light pollution. Notably, 82% of the sample reported having rescued a grounded seabird affected by light pollution.

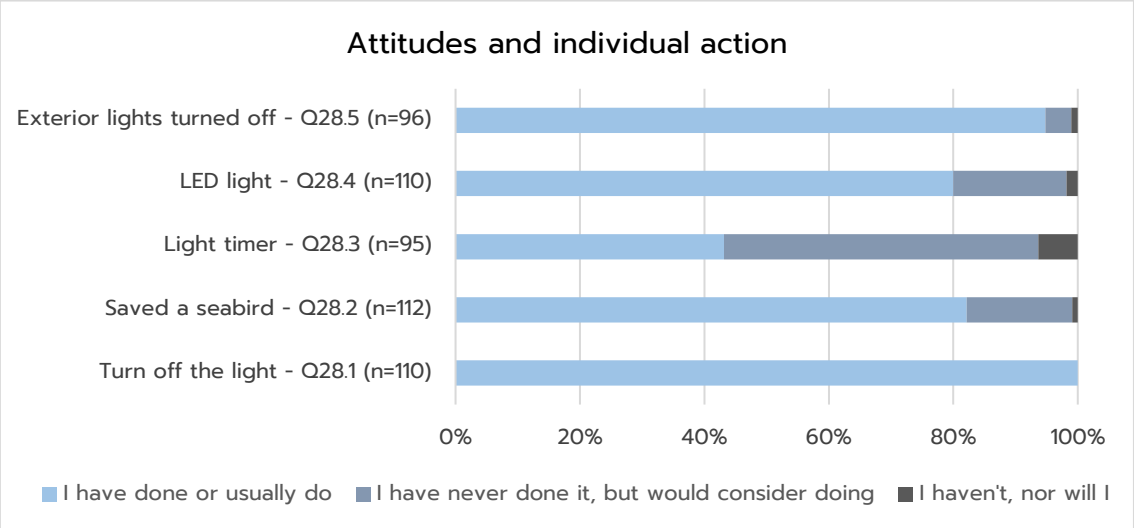

Figure 24 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents of Azores archipelago. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.

By the end of the survey, 96% of the respondents considered light pollution to be "quite or very important" in relation to people, biodiversity, and economy (n=114).

3.2 Results by target municipality

Target municipalities included five municipalities in Madeira (Câmara de Lobos, Funchal, Santa Cruz, Machico and Santana), two municipalities in Canary Islands (Buenavista del Norte and Mogán), and one in Azores (Santa Cruz da Graciosa). In addition to the results presented as follows, further information can be found from Annex E to Annex L.

3.2.1 Câmara de Lobos

The survey was completed by 217 Câmara de Lobos residents. Of those, 71% identified as female and 29% as male, and has a mean age of 45.0 years old (SD=17.0). The sample is mostly urban (57%), with 43% living in rural areas or small parishes. About 65% said to have completed high school or had a higher level of education. A comprehensive characterization of the sample is present in Annex E, as well as detailed results.

Lighting characterization at the respondents' residence

When assessing the Bortle night sky brightness scale, 76% said to live under "Suburban sky" (Bortle 5) or more polluted night skies. Public lighting was considered the strongest light source at their neighbourhood by 75% of respondents. During winter time, PL was mostly used from 18:00 and 00:00, and after 07:00. From 01:00 to 06:00 it was used by less than 11% of the respondents (n=174).

Perceptions on light pollution and ALAN

Out of 217 respondents, 59% have heard about light pollution, out of those, 85% considered it to be a "quite or very important" issue regarding people, biodiversity, and economy. And only 14% knew projects or initiatives tackling light pollution (n=214).

Most respondents are aware that artificial light can negatively affect the three main animal groups targeted by LIFE Natura@night project. A large majority either tends to agree or totally agrees that artificial light has negative effects on bats (88%, n=153), seabirds (83%, n=174) and insects (77%, n=143). The importance of observing the night sky ranked high amongst respondents, with 91% of them tending or totally agreeing with the statement (n= 205) (Q23.9, Table 1). Yet, most respondents (65%, n=190), preferred white over yellow lights.

Preferences regarding ALAN

From the lighting types presented in question Q24, respondents were most bothered by commercial lights, followed by light signs, lighting in sports areas and roads. Over 65% considered not to be bothered by ornamental, festive and Christmas lights, and public parks and gardens' lighting. In addition, lights in residential areas and public parks and gardens were regarded as the most indispensable (54% and 57%, respectively). At least 54% considered all other lighting infrastructure to be dispensable or reducible, more so for commercial lights, light signs, and ornamental lighting (>76%).

Support for changes in public lighting

As for the proposed measures to reduce light pollution in question Q27 (Table 1), most respondents were against switching off public lights in their street from 00:00 to 06:00 (58%, n=199), but in favour of its reduction (84%, n=207). All other measures, such as changing lights to protect wildlife or reducing festive lighting, were also highly supported, with over 68% agreeing to it.

Attitudes and individual action

Respondents reported to adopt simple behaviours such as a turning off the lights when not using them, turning off exterior lights and using LED lights. Out of 195 respondents, 92% had saved seabird or would consider doing it. In the end of the survey, 89% of respondents (n=217) considered light pollution to be an "quite or very important" issue regarding people, biodiversity, and the economy.

3.2.2 Funchal

A total of 529 residents from Funchal participated in the survey. Among them, 54% identified as female, while 45% identified as male, and the average age was 44.7 years (SD=14.9). The majority of the sample resided in urban areas, with 80% living in a city and the remaining 20% in small parishes, rural areas or villages. Ca. 81% of respondents said to have completed high school or a higher level of education. For a thorough description of the sample and detailed results please refer to Annex F.

Lighting characterization at the respondents' residence

Upon evaluating the Bortle night sky brightness scale, 85% of respondents reported residing under suburban (Bortle 5) or even more heavily light-polluted night skies. Public lighting was identified as the predominant light source in their neighbourhood by 84% of respondents. During the winter season, the predominant use of PL was reported to occur between 18:00 and 00:00, as well as after 07:00. Between 01:00 and 06:00, usage reported by 8% or less respondents (n=455).

Perceptions on light pollution and ALAN

Among the 527 respondents, 73% were familiar with the concept of light pollution. Of those, 94% deemed it to be a "quite or very important" matter concerning people, biodiversity, and the economy. Additionally, 26% were already aware of projects or initiatives aimed at addressing light pollution (n=520).

A significant portion of respondents demonstrated awareness regarding the potential negative impact of artificial light on nocturnal biodiversity. The majority either "tends to agree" or "totally agrees" that artificial light has detrimental effects on seabirds (93%, n=460), bats (92%, n=438), and insects (82%, n=407). Approximately 55% acknowledged that artificial light can influence their own sleep (n=517). However, 58% expressed a preference for white light over yellow light. At last, 90% (n=486) believe, to some extent, that authorities display limited concern regarding light pollution.

Preferences regarding ALAN

Among the lighting types presented in question Q24, respondents expressed the highest level of discomfort with commercial lights, followed by light signs, lighting in sports areas, and on roads (with at least 64% indicating some level of discomfort). Approximately half of the respondents stated they were not bothered by ornamental, festive and Christmas lights, as well as lighting in public parks and gardens, and residential areas. Regardless of the reported level of inconvenience, commercial area lighting, light signs, and ornamental lighting were deemed dispensable or reducible by at least 84% of the respondents. Conversely, approximately half of the sample considered lights from residential areas, roads, and public parks and gardens to be indispensable.

Support for changes in public lighting

When presented with a series of measures to reduce light pollution, respondents displayed substantial levels of endorsement for the majority of them. While there was opposition to the idea of turning off street lighting from 00:00 to 06:00 (72%, n=498), a significant majority were in favour of its reduction during the same time frame (81%, n=512), as well as for all other measures proposed (with support exceeding 72% in all instances). Among others, these included diminishing festive lighting, adopting warmer-coloured lights, and deactivating public lighting in and around protected areas.

Attitudes and individual action

Respondents reported to adopt simple behaviours such as a turning off the lights when not using them (98%), turning off exterior lights (86%) and using LED lights (85%). Out of 502 respondents, 20% had saved seabird grounded by light pollution and 76% expressed willingness to do so. In the end of the survey, 94% of respondents (n=529) considered light pollution to be an "quite or very important" issue regarding people, biodiversity, and the economy.

3.2.3 Machico

The survey enlisted the participation of 401 residents from Machico. Among them, 66% identified as female, while 34% identified as male, with an average age of 42.3 years (SD=16.8). The sample was fairly evenly distributed across different residential settings: city (36%), village (25%), small parish (20%), and rural area (20%). About 73% said to have completed high school or a higher level of education. For an in-depth overview of the sample characteristics and other results please see Annex G.

Lighting characterization at the respondents' residence

In the assessment of the Bortle night sky brightness scale, it was determined that 83% of respondents inhabit areas characterized by suburban (Bortle 5) or more intensely light-polluted night skies. PL as identified as the primary source of illumination in their respective neighbourhoods by 76% of participants. Considering the time of the year with less natural

light, the prevalent use of public lighting was reported between 18:00 and 00:00, and after 06:00. Only 4% or fewer reported utilizing public lighting between 01:00 and 05:00 (n=335).

Perceptions on light pollution and ALAN

Out of 399 respondents, 62% demonstrated familiarity with the concept of light pollution. Of those (n=246), 90% regarded it to be a "quite or very important" matter concerning people, biodiversity, and the economy. Most Machico residents sampled did not know of any projects or initiatives addressing light pollution (84%, n=393).

Preferences regarding ALAN

In Q24, respondents were most bothered by commercial lights, followed by signs, sports area, and road lighting (at least 63% expressed some level of discomfort). Ornamental lighting for buildings and monuments, parks and gardens, and residential areas were found to be the least bothersome (with at least 62% stating they were not bothered by them). In terms of necessity, 56% (n=352) considered lights in residential areas indispensable, while 55% (n=350) held the same view for public parks and gardens' lighting. For all other six types of lighting, a majority of respondents deemed them reducible or dispensable (51% for road lighting, and 64% or more for all others).

Support for changes in public lighting

In general, the measures outlined in question Q27 received substantial endorsement from respondents of Machico. The proposal to modify lighting for wildlife protection garnered the highest level of support, with 90% in favour. While 61% expressed opposition to turning off public lights from 00:00 to 06:00, 89% favoured a reduction during this period. Other proposed measures also received significant support, including the reduction of festive lighting (73%), the implementation of motion sensors in parks and public gardens (87%), and the deactivation of lighting in and around protected areas (73%).

Attitudes and individual action

Respondents reported to adopt simple behaviours such as a turning off the lights when not using them (98%), turning off exterior lights (88%) and using LED lights (77%). Out of 380 respondents, 17% had saved seabird grounded by light pollution and 77% expressed willingness to do so. At the conclusion of the survey, 89% of respondents (n=401) regarded light pollution as a "quite or very important" concern encompassing people, biodiversity, and the economy.

3.2.4 Santa Cruz

The survey involved 530 participants from Santa Cruz. Of these, 69% identified as female, while 31% identified as male, with an average age of 43.2 years (SD=13.7). In terms of urbanization, 42% resided in a city, 12% in a village, 26% in a small parish, and 20% in a rural area. At least 85% of participants had completed high school or had a higher level of education. For a detailed summary of sample characteristics and additional findings, please refer to Annex H.

Lighting characterization at the respondents' residence

When assessing night sky brightness using the Bortle scale, 84% believed to live under suburban (Bortle 5) or more intensely light-polluted night skies. PL was identified as the primary source of illumination in their respective neighbourhoods by 81% of participants. The predominant use of public lighting was reported between 18:00 and 00:00, as well as after 07:00. Only 8% or fewer reported using PL between 01:00 and 06:00 (n=437), considering the period of the year with less natural light.

Perceptions on light pollution and ALAN

Among the 527 respondents, 74% were familiar with the concept of light pollution. Of those, 93% deemed it to be a "quite or very important" matter concerning people, biodiversity, and the economy. Additionally, 21% were already aware of projects or initiatives aimed at addressing light pollution (n=514).

Awareness of negative effects on nocturnal biodiversity was high among respondents, with 92% acknowledging effects on seabirds (n=466) and bats (n=431), and 81% for insects (n=396). Views on the influence of artificial light on sleep were divided, with 50% agreeing with the statement on Q23.2, and 50% disagreeing. Furthermore, 92% and 94% expressed at least some level of agreement with statements from questions Q23.8 and Q23.9, respectively, showing to attribute high level of importance to watching the night sky and to the right to see the stars and the Milky Way. Out of 464 respondents, 65% expressed a preference for white light over yellow light, and 81% (n=486) believe, to some extent, that authorities display limited concern regarding light pollution.

Preferences regarding ALAN

Out of the eight types of lighting presented in question Q24, commercial lights, light signs and lights from sports areas emerged as the most bothersome, with 72% or more respondents indicating at least some level of inconvenience. On the other hand, most were not bothered by festive and Christmas lights (57%), ornamental lights on buildings or monuments (64%), lights on residential areas (52%), or in public parks or gardens (61%). When assessing the need for such lights, 92% considered that commercial areas lighting could be reduce or were dispensable, followed by light signs (86%), ornamental lights (83%), lights in sports areas (69%) and festive and Christmas lighting (68%). Lights from roads, residential areas and public parks and gardens were considered indispensable by roughly half of the respondents.

Support for changes in public lighting

Among the eight measures presented, seven were supported by at least 71% of respondents. Although there was opposition to turning off street lighting from 00:00 to 06:00 (58%, n=476), a substantial majority favoured its reduction during the same period (85%, n=509). Notably, 93% of respondents backed changes in public lighting to protect wildlife, and even the reduction of festive lighting received extensive support (78% in favour).

Attitudes and individual action

Respondents reported already carrying out simple individual actions such as turning off the lights when not using them (98%), turning off exterior lights (90%) and using LED lights (81%). Out of 497 respondents, 12% had saved a seabird affected by light pollution and 85% expressed willingness to do so. By the end of the survey, 94% of respondents (n=530) deemed light pollution to be a "quite or very important" issue concerning people, biodiversity, and the economy.

3.2.5 Santana

The survey was completed by 140 Santana residents. Of those 66% identified as female, while 34% identified as male, and the average age was 45.9 years (SD=17.9). The sample was more rural than urban, with most residing in rural areas or small parishes (78%) (n=138), and 68% said to have completed high school or had a higher level of education. For a detailed summary of sample characteristics and additional findings, please refer to Annex I.

Lighting characterization at the respondents' residence

When assessing night sky brightness using the Bortle scale, 68% assessed the sky at their residence as suburban (Bortle 5) or with a higher level of light pollution. PL was identified as the primary source of illumination in their respective neighbourhoods by 74% of participants. PL was reportedly most used between 18:00 and 00:00, as well as after 07:00. Only 8% or fewer reported using public lighting between 01:00 and 06:00 (n=112), considering winter time.

Perceptions on light pollution and ALAN

Out of 136 respondents, 63% demonstrated familiarity with the concept of light pollution, and of those (n=86), 85% regarded it to be a "quite or very important" matter concerning people, biodiversity, and the economy. Most Santana residents sampled, did not know of any projects or initiatives focusing light pollution (87%, n=133).

Respondents were aware that artificial light could have negative effects on nocturnal species. In fact, 97% either "totally agree" or "tend to agree" with this statement for seabirds (n=119), 91% for bats (n=115), and 77% for insects (n=109). The possibility of observing the night sky was considered important by 91% of the respondents, and 89% agreed, at least to some degree, that people should be able to view the stars and Milky Way from their homes. On the other hand, 55% disagreed, to some extent, that artificial light affects their sleep, and 75% preferred white light over yellow. Additionally, 80% believed, at least partially, that authorities show limited concern about light pollution.

Preferences regarding ALAN

Most respondents found lights from commercial areas (67%), roads (61%), light signs (61%), and sports areas (56%) to be somewhat bothersome. Conversely, lights in residential areas, public parks and gardens, used for ornamentation of buildings and monuments, and festive or Christmas lights did not seem to bother most participants (62% or more). Regarding

dispensability, 55% considered lights in residential areas indispensable, 54% held the same view for public parks and gardens' lighting, and 52% for road lighting. For the other five types of lighting, most deemed them reducible or dispensable (at least 60% of respondents in all cases).

Support for changes in public lighting

In general, the measures outlined in question Q27 garnered considerable support from respondents in Santana. The proposal to implement motion sensors in public parks and gardens received the highest level of support, with 90% in favour. While 57% expressed opposition to turning off public lights from 00:00 to 06:00, 84% favoured a reduction during this period. Other proposed measures also received significant support, including changing lights to protect wildlife (84%), and turning off lighting in and around protected areas (73%). The reduction in festive lighting and the use of yellow/warm colour lights were also supported, though to a slightly lesser extent (64% and 56% respectively).

Attitudes and individual action

Survey participants indicated to adopt simple behaviours such as switching off unused lights (98%), turning off exterior lights (87%) and using LED lights (69%). Out of 134 respondents, 19% reported to have saved a seabird grounded by light pollution and 72% expressed willingness to do so. At the conclusion of the survey, 89% of respondents (n=140) regarded light pollution as a "quite or very important" concern encompassing people, biodiversity, and the economy.

3.2.6 Buenavista del Norte

The survey enlisted the participation of 42 residents from Buenavista del Norte. Among them, 69% identified as female, while 31% identified as male, with an average age of 47.7 years (SD=14.7). Most of the sample stated to live in small parishes (61%), 20% in a village, 17% in a rural area and 2% in a city. Regarding education, 81% of the respondents had completed high school or attained a higher level of education. For an in-depth overview of the sample characteristics and other results please see Annex J.

Lighting characterization at the respondents' residence

In the assessment of the Bortle night sky brightness scale, it was determined that 71% of respondents inhabit areas characterized by suburban (Bortle 5) or more intensely light-polluted night skies. PL as identified as the primary source of illumination in their respective neighbourhoods by 90% of participants. Considering the time of the year with less natural light, the prevalent use of PL was reported between 18:00 and 23:00. Merely 5% or fewer reported utilizing public lighting between 00:00 and 08:00 (n=37).

Perceptions on light pollution and ALAN

Among the 42 respondents, 88% were familiar with the concept of light pollution. Of those, 95% deemed it to be a “quite or very important” matter concerning people, biodiversity, and

the economy. Additionally, 36% were aware of projects or initiatives aimed at addressing light pollution (n=39).

Awareness of negative effects on nocturnal biodiversity was high among respondents, with 100% acknowledging effects on insects (n=29), 97% on seabirds (n=39), and 92% for bats (n=37). Out of 40 participants, 53% agreed, to some extent, that artificial light affects their sleep.

Respondents showed to attribute high level of importance to watching the night sky and to the right to see the stars and the Milky Way, with 98% and 85% expressing at least some level of agreement with statements from questions Q23.9 and Q23.8, respectively. Out of 33 respondents, only 21% expressed a preference for white light over yellow light. Additionally, 73% believe, to some extent, that authorities show limited concern regarding light pollution.

Preferences regarding ALAN

Most respondents found lights from commercial areas (80%), roads (76%), sports areas (80%), festive and Christmas lights (66%), ornamental lights (55%), light signs (71%), and sports areas (56%) to be somewhat bothersome. Conversely, lights in residential areas and in public parks and gardens did not seem to bother most participants (58% and 54%, respectively).

Regarding dispensability, 53% considered lights in residential areas indispensable, while 49% held the same view for public parks and gardens' lighting. Road lights were deemed to be reducible or dispensable by 62% or respondents. The same views were true for all other types of lighting by at least 80% of respondents (lights in sports areas, commercial areas, signs, festive and Christmas settings and with ornamental purposes).

Support for changes in public lighting

Among the eight measures presented, seven were supported by at least 71% of respondents. Although there was opposition to turning off street lighting from 00:00 to 06:00 (83%, n=40), a substantial majority favoured its reduction during the same period (95%, n=42). Notably, 98% of respondents backed changes in public lighting to protect wildlife, and the use of yellow/warm colour lights. Reduction of festive lighting was supported by 95% of respondents.

Attitudes and individual action

Respondents reported already carrying out simple individual actions such as turning off the lights when not using them (100%), turning off exterior lights (79%) and using LED lights (74%). Out of 41 respondents, 37% had saved seabird affected by light pollution and 56% expressed willingness to do so. By the end of the survey, 98% of respondents (n=40) deemed light pollution to be a "quite or very important" issue concerning people, biodiversity, and the economy.

3.2.7 Mogán

The survey was conducted with 50 Mogán residents, with an average age of 42.0 (SD=13.9). Among them, 40% identified as female, while 60% identified as male. The sample was predominantly urban, with 28% residing in a city, 48% in a village, 20% in a small parish and 4% in a rural area. Regarding education, 90% of the respondents had completed high school or obtained a higher level of education. For a detailed overview of the sample characteristics and other results please see Annex K.

Lighting characterization at the respondents' residence

When assessing night sky brightness using the Bortle scale, 72% assessed the sky at their residence as suburban (Bortle 5) or with a higher level of light pollution. PL was identified as the primary source of illumination in their respective neighbourhoods by 70% of participants, while lights from commercial areas and neighbours were cited by 9% each. PL was reportedly most used between 19:00 and 02:00, as well as after 06:00. Only 8% or fewer reported using public lighting before 19:00 and between 03:00 and 05:00 (n=50), considering winter time.

Perceptions on light pollution and ALAN

Out of 49 respondents, 84% had heard about light pollution before. Of those (n=41), 93% regarded it to be a "quite or very important" matter concerning people, biodiversity, and the economy. Of Mogán residents sampled, 31% knew of projects or initiatives focusing light pollution (n=49).

Respondents were aware that artificial light could have negative effects on nocturnal species. In fact, 100% either "totally agree" or "tend to agree" with this statement for seabirds (n=46), 95% for bats (n=44), and 91% for insects (n=45). Additionally, 73% agreed that artificial light affected their sleep, and 61% believe intensity of light had increased in the three years prior.

In terms of stargazing-related issues, 98% believed people should be able to view the stars and Milky Way from their homes, and 90% considered the possibility of observing the night sky important. Only 29% preferred white over yellow lights, and 94% believed, at least partially, that authorities show limited concern about light pollution.

Preferences regarding ALAN

Among the various types of lighting infrastructure presented, lights from residential areas were found the less bothersome (60% considered not to be bothered). All other types of lighting were considered disturbing, to some degree, by at least 60% of respondents. Additionally, most respondents (>53%) considered all types of lighting to be reducible or dispensable. In fact, over 83% felt that way regarding commercial, ornamental and festive lighting, as well as lights from sports areas and signs.

Support for changes in public lighting

Among the eight measures presented, seven received support from at least 82% of respondents. Although there was opposition to turning off street lighting from 00:00 to 06:00

(69%, n=48), a substantial majority favoured its reduction during the same period (82%, n=50). Notably, 94% of respondents supported switching off lights near an in protected areas, and 96% agreed to changes in public lighting to protect wildlife. Additionally, 87% were in favour of using yellow/warm colour lights, and 84% agreed to the reduction of festive lighting.

Attitudes and individual action

Respondents reported already adopting simple individual actions such as turning off the lights when not in use (98%), using LED lights (92%) and turning off exterior lights (62%). Out of 49 respondents, 22% had saved seabird affected by light pollution and 65% expressed willingness to do so. By the end of the survey, 82% of respondents (n=49) deemed light pollution to be a "quite or very important" issue concerning people, biodiversity, and the economy.

3.2.8 Santa Cruz da Graciosa

A total of 64 residents completed the survey. Mean age of respondents was 42.1 (SD=13.1), where 50% identified as male and the other 50% as female. The sample was predominantly rural, with 36% living in rural areas, 36% in a small parish and 28% in a village. In terms of education, 86% of the respondents had completed high school or obtained a higher level of education. For a detailed overview of the sample characteristics and other results please see Annex L.

Lighting characterization at the respondents' residence

When assessing night sky brightness using the Bortle scale, 56% categorized the sky at their residence as "Suburban sky" (Bortle 5) or with a higher level of light pollution, while 44% considered it to be "Suburban/Rural transition" (Bortle 4) or less. Public lighting was identified as the primary source of illumination in their respective neighbourhoods by 95% of participants, and was reportedly most used between 18:00 and 23:00, as well as after 06:00. Only 8% or fewer reported using public lighting between 00:00 and 05:00 (n=59), considering winter time.

Perceptions on light pollution and ALAN

Out of 63 respondents, 70% had heard about light pollution before. Of those (n=44), 91% regarded it to be a "quite or very important" matter concerning people, biodiversity, and the economy. Among the 63 respondents, 37% had heard about a project or initiative focused on dealing with light pollution (n=49).

Respondents were aware that artificial light could have negative effects on nocturnal species. In fact, 97% either "totally agreed" or "tended to agree" with this statement for seabirds (n=60), 86% for bats (n=50), and 77% for insects (n=47). Additionally, 47% agreed that artificial light affected their sleep. In terms of stargazing-related issues, 93% considered the possibility of observing the night sky important, and 89% believed people should be able to view the stars and Milky Way from their homes, and. About 55% preferred white over yellow lights, and 75% believed, at least partially, that authorities show limited concern about light pollution.

Preferences regarding ALAN

Among the various types of lighting presented, lights from commercial and sports areas, public roads and light signs were the most bothersome (for at least 76% of respondents). On the other hand, lights from residential areas, parks and gardens, as well as ornamental and festive and Christmas lights were considered less bothersome. Additionally, most respondents (>56%) considered all types of lighting to be reducible or dispensable. Over 79% felt that way regarding festive and Christmas lights, as well as commercial, ornamental light and light signs.

Support for changes in public lighting

Among the eight measures presented, seven were supported by at least 78% of respondents. Although there was opposition to turning off street lighting from 00:00 to 06:00 (64%, n=55), a substantial majority favoured its reduction during the same period (95%, n=58). Notably, 92% agreed to changes in public lighting to protect wildlife. Additionally, 80% were in favour of using yellow/warm colour lights, 82% agreed to the reduction of festive lighting, and 78% supported the switching off public lighting in and near protected areas.

Attitudes and individual action

Respondents reported already adopting simple individual actions such as turning off lights when not using them (100%), turning off exterior lights (96%) and using LED lights (77%). Out of 62 respondents, 79% had saved a seabird affected by light pollution and 19% expressed willingness to do so. By the end of the survey, 95% of respondents (n=64) deemed light pollution to be a "quite or very important" issue concerning people, biodiversity, and the economy.

4. DISCUSSION AND CONCLUSION

The responses in this survey were primarily collected from residents in the project's partner municipalities, using various methods and interviewers with varying levels of experience. It is worth noting that respondents may have been influenced by the presence of the interviewer, potentially impacting the candour of their responses. Additionally sampling effort and level of involvement of stakeholders, project partners and the community varied across the three archipelagos, which is reflected in the response numbers. Therefore, any generalizations made for the broader population should be approached with caution.

Despite this consideration, the survey gathered a large number of responses across the archipelagos of Madeira, Canary Islands and Azores, with completion rates between 64% and 72%, at archipelago level. This robust dataset provides valuable insights into the public's perspectives on light pollution and on possible solutions. The outreach achieved through this survey, engaging 2,207 individuals, also effectively served to promote awareness of the LIFE Natura@night project and the broader issue of light pollution.

Overall, results indicate a high level of awareness among respondents of the three archipelagos regarding light pollution and its effects. At archipelago and municipality level, there appears to be heightened concern regarding biodiversity, particularly for seabirds. Across datasets, a great level of importance attributed to observing the night sky, and measures to protect wildlife were very welcomed by participants. Additionally, ambitious light pollution mitigation measures, such as the reduction of PL from 00:00 to 06:00, were widely supported.

These results, alongside levels of acceptance for reduction of several ALAN sources and the support demonstrated for other mitigation measures, show the population can be instrumental in demanding ambitious light pollution mitigation measures, and in protecting natural darkness.

Madeira archipelago

Respondents from the archipelago of Madeira are distributed by more urbanized areas, such as cities and villages, which is expected, considering that most respondents are from municipalities with higher levels of urbanization, such as Funchal, Santa Cruz, Machico and Câmara de Lobos. Their assessment of the night sky as highly polluted (Fig. 4) is unsurprising, given the concentration of urbanization and associated ALAN in coastal areas, where most of the respondents resided. While most respondents expressed satisfaction with the level of lighting at their residential areas, they identified public lighting as the predominant source, and a majority favoured its reduction.

There is an apparent high level of awareness regarding light pollution's impact on nocturnal biodiversity, although awareness of its effects on human sleep appears to be lower. This was especially high for seabirds, which may reflect the efforts of SPEA and other organizations in environmental education in the last decades, focusing on seabirds and light pollution. It may

also be related to the knowledge and likability attributed to each group presented, that can be higher for seabirds than for bats and insects.

Additionally, there is a clear preference for white light, despite being generally considered more harmful than yellow light. There was also a general belief that authorities are not sufficiently concerned about light pollution. These findings suggest that greater efforts can be made to educate people on the effects of ALAN on sleep and overall human well-being, as well as to promote better lighting practices. Furthermore, local authorities already taking action to mitigate light pollution in the region can improve their messaging and outreach to its citizens in order to change their citizen's perception.

Residents of the Madeira archipelago expressing lower levels of inconvenience caused by lighting in residential areas, roads, public parks and gardens may be influenced by the perceived safety that is commonly associated with lighting in public spaces (Marchant, 2004; Steinbach et al., 2015). The minimal inconvenience levels reported with ornamental lights and Christmas and festive lights may be related to level of intensity and to cultural significance (e.g.: Christmas lights in Madeira Island draw many tourists). Conversely, higher levels of inconvenience caused by lights in commercial areas, light signs and sports areas may be linked to the intensity of light used. Yet, a large proportion of the sample believes all lighting types presented to be reducible or even dispensable, demonstrating promising support of such future measures and regulations.

In terms of the measures to reduce light pollution, there was overwhelming support for seven of the eight proposed. Reduction of public lighting from 00:00 to 06:00 was widely supported, mostly aligning with the period when public lighting is less commonly used, as indicated by respondents.

Regarding individual actions and attitudes, most respondents said to make simple steps, such as turning off unused lights and switching off exterior lighting. While the motivation behind these actions may vary, whether for energy conservation or driven by a desire to reduce light pollution and protect biodiversity, it's noteworthy that 95% of respondents expressed willingness to save a seabird grounded by light pollution.

In addition to the agreeableness towards reducing ALAN and to implement mitigation measures, there was a high level of importance attributed to the issue of light pollution and its impact on people, biodiversity, and the economy. Results at municipal level are similar, and differences observed among municipalities may be due to their differences in levels of urbanization and socio-economic context.

Canary Islands archipelago

Sample size for Canary Islands was reduced (n=218) and any conclusions drawn should take this into account. It's noteworthy that the sample was well-balanced in terms of gender, education, and urbanization level. The high level of night sky brightness attributed by

respondents aligns with expectations, given the highly developed and widespread tourism sector, which leads to significant ALAN across the archipelago.

Among all the datasets, respondents from the Canary Islands were the ones who most frequently considered the light at their place of residence to be excessive. In the future, it will be interesting to understand whether this perception is linked to a heightened understanding of public lighting and light pollution, or it reflects actual higher levels of illumination, when compared to the other archipelagos assessed. Much like in the other regions, public lighting was identified as the predominant source of light in their neighbourhoods, and it was noted to be consistently present throughout the night. As such, public lighting should be addressed as an important source of light pollution in residential areas, and it is worth noting that respondents widely supported its reduction during periods of lower usage.

The respondents expressed a high level of awareness regarding light pollution and its impact on both nocturnal biodiversity and human sleep. Interestingly, unlike in other datasets, respondents from the Canary Islands do not exhibit a preference for white light. This difference may be attributed to the enforcement of laws aimed at safeguarding night skies and natural darkness, such as the "Ley del Cielo," which has been in effect for over 30 years.

Respondents also showed high levels of inconvenience caused by all lighting infrastructure types presented, and mostly agreed to its reduction. However, similarly to Madeira archipelago results, this was less evident for lighting in residential areas, parks, gardens and roads, which were considered more indispensable. As mentioned above, this may result of believes and values of safety associated with light.

Although participants generally oppose the idea of switching of public lighting from 00:00 to 06:00, over 90% support its reduction in the same period, which aligns with the period of lower usage of public lighting indicated by participants. Additionally, all measures proposed received wide-ranging support, indicating that local municipalities can adopt ambitious strategies in the efforts against light pollution, knowing they have the support of their constituents.

Regarding individual actions and attitudes, most respondents reported taking simple steps, such as turning off lights that were not in use and switching off exterior lights. It is worth noting that discerning the underlying motivation for these actions can be challenging, as they may be driven solely by a desire to save energy, or they may also stem from a commitment to reducing light pollution and safeguarding biodiversity.

The results, similar to the ones observed for Buenavista del Norte and Mogán, show that citizens are highly aware of the consequences of light pollution, are willing to see changes in public lighting and ALAN, and can support ambitious measures aimed at reducing light pollution.

Azores archipelago

The survey was responded by 114 Azores residents, and inferences and conclusions drawn must take this sample size into consideration.

In contrast to the Canary Islands and Madeira archipelagos, the sample in the Azores was predominantly rural, which aligns with the islands' development and urbanization context. This factor may also account for the lower level of night sky brightness reported by respondents.

Public lighting was identified as the predominant source of light in their neighbourhoods for most respondents and was consistently present throughout the night. Interestingly, only a quarter of respondents deemed the light levels at their residence to be excessive, with 75% expressing satisfaction. This perception may also be linked to the sense of safety often associated with well-lit environments.

The respondents demonstrated a high level of awareness regarding light pollution, with a significant majority (81%) indicating familiarity with the concept. This heightened awareness, coupled with the recognition of the negative effects of ALAN on seabirds, may be related to the large population of Cory's shearwater nesting in its islands and great efforts in environmental education conducted by the government and local NGOs, such as SPEA. Additionally, the longstanding community-based campaign "SOS Cagarro" aimed at rescuing seabirds affected by light pollution, has been in place since 1995, further contributing to this awareness and understanding among the population.

Similar to the other archipelagos, lights from residential areas, parks, public gardens, and roads are perceived as less bothersome and more indispensable. This perception may be linked to the association of light with safety. Conversely, lights from commercial areas and light signs were deemed highly bothersome and dispensable by respondents. This highlights that private lighting can also contribute to light pollution and suggests that residents may be supportive of efforts to reduce it.

Like in the cases of Madeira and Canary Islands, there is opposition to switching off street lighting from 00:00 to 06:00, but there is a high level of support for its reduction, coinciding with the period when public lighting use was less reported. Respondents were very supportive of other mitigation measures using technological innovations (e.g.: motion sensors or changes in intensity).

Adoption of individual actions for mitigation of light pollution is reported by a high proportion of respondents, but it was not possible to assess motivation behind such behaviours. The amount of respondents that said to already have saved a grounded seabird by light pollution was very high, unlike what was observed for the other archipelagos. This may be explained by the large community-based project "SOS Cagarro", that engages citizens in the rescue campaign of grounded Cory's shearwater.

Levels of awareness regarding light pollution are similar for Santa Cruz da Graciosa and may be related to the abundant presence of this species, and the work developed under the

scope of LIFE Natura@night project. This showcases that Cory's shearwater may serve as an ambassador to create awareness on light pollution, expanding the efforts to protect nocturnal biodiversity and human welfare.

Conclusion

This study provided important insight into people's perception on light pollution and their preference as well as on support and tolerance for changes in public lighting. It has also revealed important knowledge gaps and misperceptions regarding artificial light and its effects – such as the belief that white light is superior to yellow light, or that artificial light does not impact sleep. Additionally, it has highlighted opportunities for education and awareness, as well as identified messaging challenges faced by local authorities already dedicated to light pollution reduction.

In conclusion, the comprehensive analysis of data from various archipelagos and target municipalities consistently demonstrates a high level of awareness regarding light pollution and its adverse effects. Demonstrated concern for wildlife suggests that biodiversity can play an instrumental role in gathering support and acceptance for ambitious mitigation measures. Seabirds, and Cory's shearwater in particular, may server as flagship species in fighting light pollution, due to its presence and recognition in all three archipelagos.

Results underline the public's capacity to endorse ambitious measures for ALAN reduction, serving as an important ally in the fight against light pollution. Support from the public can be further bolstered through effective information campaigns elucidating the reasons behind such changes and their benefits for people, biodiversity, and the economy.

This study highlights the importance of transforming the future of public lighting into an integrated and participated processes, involving a range of stakeholders, including local communities, policymakers and NGOs, as is being done in project LIFE Natura@night. Furthermore, it may accelerate the pace of changes to tackle light pollution, as the wide support shown for mitigation measures and high level of awareness of citizens will incentive local and regional governments to act and to be more ambitious in the efforts they already develop. Ultimately, we hope this report will serve as an inspiration for stakeholders and decision makers in various regions and countries to join the fight against light pollution, ultimately benefiting biodiversity and their communities.

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ANNEX

A – Survey questionnaire – Portuguese version

Inquérito de sensibilização sobre Poluição Luminosa

Olá,

Gostaríamos de o convidar a participar no nosso inquérito do projeto LIFE Natura@night sobre a Poluição Luminosa. Este inquérito irá levar aproximadamente 10 minutos a responder, é voluntario e não existem riscos associados à participação. Contudo, se não se sentir confortável poderá desistir de responder a qualquer momento. A sua opinião é muito importante.

A suas respostas são confidenciais e os dados serão sempre tratados de modo agregado. Se tiver qualquer questão sobre este inquérito, contacte a **Yasmin Redolosis** (SPEA-Açores) por e-mail para **yasmin.redolosis@spea.pt** ou **Tânia Costa** (SPEA-Madeira) por e-mail para **tania.costa@spea.pt**

Muito obrigada pelo seu tempo e apoio!

Por favor, inicie o inquérito carregando no botão *Começar* em baixo.

Caraterização dos inquiridos

Para podermos analisar melhor a informação recolhida, gostaríamos de colocar algumas questões sobre si

Poluição Luminosa_LIFE-Naturaatnight

QuestionPro

* É residente nos Açores, na Madeira ou nas Canárias?

- ◯ Sim
- ◯ Não, estou apenas de visita

* Em qual arquipélago reside?

- ◯ Açores
- ◯ Madeira
- ◯ Canárias

Qual é a sua ilha? - R.A. Madeira

- ◯ Madeira
- ◯ Porto Santo

Qual é a sua ilha? - R.A. Açores

- ◯ Corvo
- ◯ Faial
- ◯ Flores
- ◯ Graciosa
- ◯ Pico
- ◯ Terceira
- ◯ Santa Maria
- ◯ São Miguel
- ◯ São Jorge

Qual é a sua ilha? - R.A Canárias

El Hierro
Fuerteventura
Gran Canaria
Lanzarote

* Por favor, indique o seu município de residência - R.A Madeira

- Calheta
- Câmara de Lobos
- Funchal
- Machico
- Ponta do Sol
- Porto Moniz
- Porto Santo
- Ribeira Brava
- Santa Cruz
- Santana
- São Vicente

* Por favor, indique o seu município de residência - R.A. Açores

- Angra do Heroísmo
- Calheta
- Corvo
- Horta

- Lagoa
- Lajes das Flores
- Lajes do Pico
- Madalena
- Nordeste
- Ponta Delgada
- Povoação
- Praia da Vitória
- Ribeira Grande
- Santa Cruz da Graciosa
- Santa Cruz das Flores
- São Roque do Pico
- Velas
- Vila do Porto
- Vila Franca do Campo

Por favor, indique o seu município de residência - R.A. Canárias

Adeje [TF]
Agaete [GC]
Agüimes [GC]
Agulo [GO]

* Qual é a sua idade?

* Género

- ◯ Feminino
- ◯ Masculino
- ◯ Não binario

* Habilitações literárias

- ◯ Ensino básico
- ◯ Ensino secundário / profissional
- ◯ Licenciatura
- ◯ Mestrado
- ◯ Doutoramento
- ◯ Outra

* O seu horário de trabalho inclui o trabalho à noite?

◯ Sim ◯ Não ◯ NR (Prefiro não responder)

* Pertence a alguma associação em prol do ambiente?

◯ Sim ◯ Não ◯ NR

* Costuma realizar observações astronómicas ou de estrelas?

- ◯ Sim, sou astrónomo (amador ou profissional)
- ◯ Gosto de observar as estrelas regularmente

○ Gosto de observar as estrelas pontualmente ○ Não, nunca ○ NR

• Realiza alguma destas outras atividades noturnas na natureza?

☐ Trilhos noturnos ☐ Observação de fauna noturna ☐ Não, nenhuma

☐ Outro

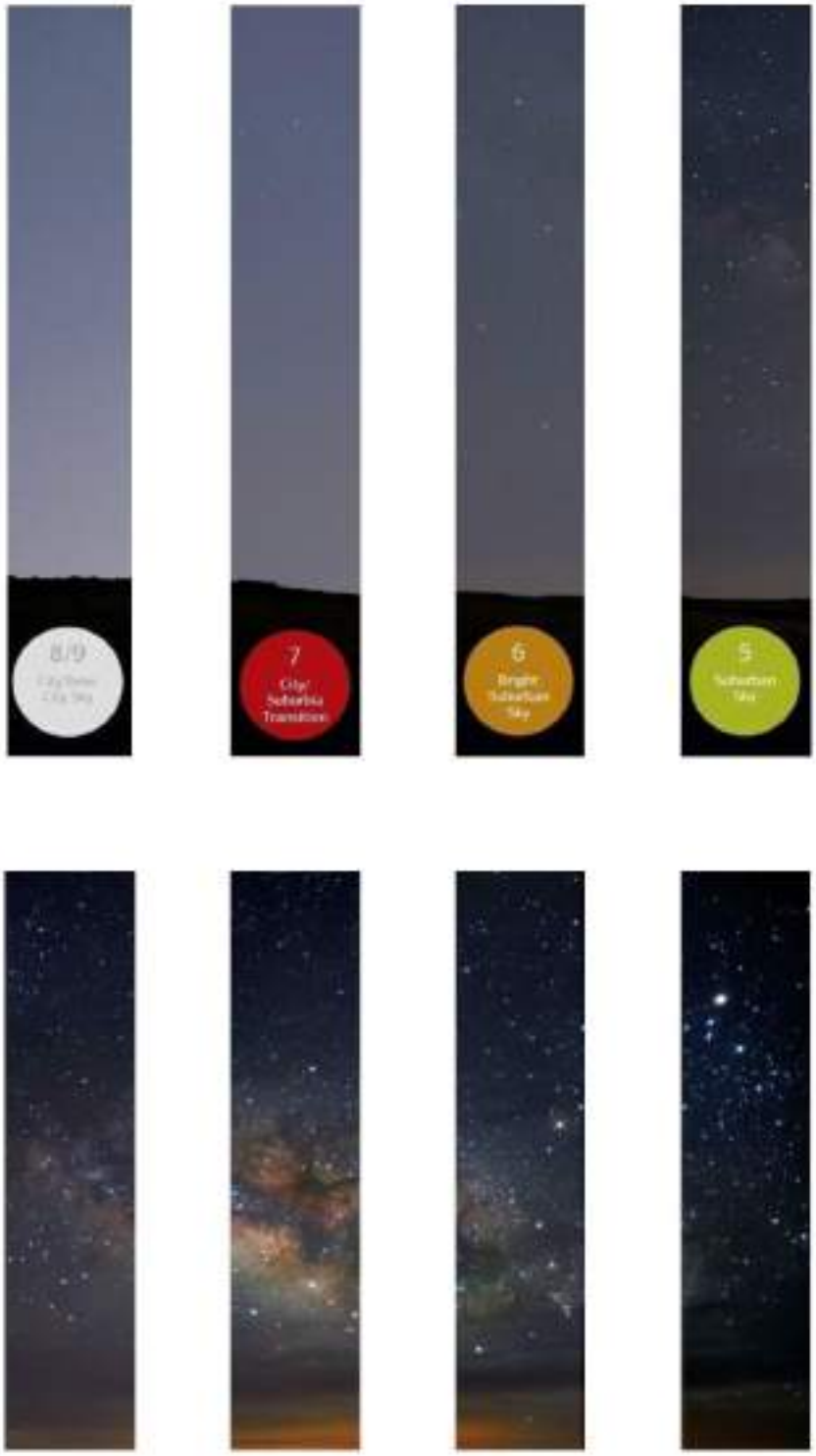
A iluminação noturna no seu local de residência

As próximas questões são referentes a iluminação noturna no seu local de residência ou estadia temporária nos arquipélagos dos Açores ou da Madeira

• Como carateriza o seu local de residência?

○ Zona rural ○ Freguesia pequena ○ Vila ○ Cidade ○ NR

• Qual destas imagens aproxima melhor o céu noturno que consegue observar desde a sua residência?


8/9
7
6
5

• Qual é a fonte de luz mais forte na sua vizinhança à noite?

- [ ] As luzes da minha casa
- [ ] As luzes dos vizinhos
- [ ] Luzes do comércio local
- [ ] Iluminação pública
- [ ] Luzes do trânsito
- [ ] Outro

• É uma fonte de luz permanente toda a noite?

- ○ Sim
- ○ Não
- ○ Intermitente
- ○ NR

• Acha que a iluminação na sua zona de residência é ...

- ○ Insuficiente
- ○ Boa
- ○ Excessiva
- ○ Outro

• No seu quotidiano, caso execute atividades noturnas, qual é o horário que usufrui da iluminação pública? (tendo em conta a época do ano com menos luz natural, por exemplo o Inverno)

- [ ] 18:00
- [ ] 19:00
- [ ] 20:00
- [ ] 21:00
- [ ] 22:00
- [ ] 23:00
- [ ] 24:00
- [ ] 1:00
- [ ] 2:00
- [ ] 3:00
- [ ] 4:00
- [ ] 5:00
- [ ] 6:00
- [ ] 7:00
- [ ] 8:00
- [ ] NR

Poluição Luminosa

* Já ouviu falar de Poluição Luminosa?

- ◯ Sim
- ◯ Não
- ◯ NR

Como definiria a Poluição Luminosa

* Na tua opinião, qual a importância da poluição luminosa para a biodiversidade, pessoas e economia?

- ◯ Não é importante
- ◯ É pouco importante
- ◯ É bastante importante
- ◯ É muito importante

* Conhece algum projeto/iniciativa que trabalhe sobre esta problemática?

- ◯ Sim
- ◯ Não
- ◯ NR

Em relação à pergunta anterior, pode dar-nos um exemplo de um projecto/iniciativa de trabalho sobre esta questão?

Indique a sua opinião sobre as seguintes questões

	Concordo totalmente	Tendo a concordar	Tendo a discordar	Discordo totalmente	NR
A intensidade da iluminação noturna perto da minha casa tem aumentado nos últimos três anos	○	○	○	○	○
A iluminação artificial afeta o meu sono	○	○	○	○	○
A iluminação artificial afeta negativamente as aves marinhas, p. ex. os cagarros/cagarras	○	○	○	○	○
Os pássaros diurnos (merlo, pardal, pisco) cantam durante a noite onde moro	○	○	○	○	○
A iluminação artificial afeta negativamente os insetos	○	○	○	○	○
A iluminação artificial afeta negativamente os morcegos	○	○	○	○	○
As autoridades estão pouco preocupadas com o tema da poluição luminosa	○	○	○	○	○
Todas as pessoas deveriam poder observar estrelas e a Via Láctea desde as suas casas	○	○	○	○	○
A possibilidade de observar o céu noturno é importante para mim	○	○	○	○	○
Prefiro a iluminação noturna branca à luz amarela	○	○	○	○	○

O que é a Poluição Luminosa?

Antes de continuar, gostaríamos de lhe dar alguma informação sobre a Poluição Luminosa

A poluição luminosa consiste na luz exterior artificial excessiva, mal direcionada ou intrusiva. Pode levar o encadeamento em pessoas ou animais, podendo causar desorientação e colisão com infraestruturas, à disrupção do ritmo circadiano e da qualidade do sono, à interferência em processos naturais como a fotossíntese e migração natural, e à redução da nossa capacidade de observar o céu noturno.
Além dos impactes ecológicos e na saúde humana, a poluição luminosa gera um elevado desperdício de energia.

Sabia que 50% da energia produzida para iluminação pública é desperdiçada?

Ao reduzir esta ameaça poderemos diminuir os impactes para as pessoas e para a vida selvagem, mas também a despesa feita com iluminação pública.

Além disso, reduzimos as emissões de gases de efeito estufa causadores das Alterações Climáticas.

A Poluição Luminosa pode ser de vários tipos:

- **Encandeamento** - desconforto visual que resulta de luminárias mal orientadas ou sem proteção. Pode afetar pessoas e animais, levando que sejam ofuscados e desorientados, podendo colidir com infraestruturas.
- **Luz intrusiva** – luz mal direcionada para objetos ou áreas onde não é necessária a iluminação, como o interior das habitações ou áreas sensíveis. Podem impactar a qualidade de vida e o ritmo circadiano ao dificultar o descanso durante o sono.
- **Luz desordenada** – excesso de luminárias e/ou luminosidade em relação às necessidades reais.
- **Brilho difuso** – luz difusa das luminárias emitida diretamente para o céu ou refletida por estruturas ou estradas. Reduz a nossa capacidade de ver o céu noturno e interfere nos processos naturais, como a fotossíntese e a migração animal.

☐ Li e compreendi o texto

Preferências de iluminação noturna

Agora, gostaríamos conhecer a sua opinião sobre a necessidade e importância de diferentes tipos de iluminação exterior à noite que podemos encontrar

Dos seguintes tipos de iluminação, quais considera que incomodam?

Iluminação rodoviária

-- Selecionar --

Sinais luminosos

-- Selecionar --

Iluminação ornamental de edifícios e monumentos

-- Selecionar --

Iluminação de zonas comerciais

-- Selecionar --

Iluminação festiva e de natal

-- Selecionar --

Iluminação em áreas desportivas

-- Selecionar --

Iluminação em parques e jardins públicos

-- Selecionar --

Iluminação de zonas residenciais

-- Selecionar --

Dos seguintes tipos de iluminação, quais considera que são dispensáveis?

Iluminação rodoviária

-- Selecionar --

Sinais luminosos

-- Selecionar --

Iluminação ornamental de edifícios e monumentos

-- Selecionar --

Iluminação de zonas comerciais

-- Selecionar --

Iluminação festiva e de natal

-- Selecionar --

Iluminação em áreas desportivas

-- Selecionar --

Iluminação em parques e jardins públicos

-- Selecionar --

Iluminação de zonas residenciais

-- Selecionar --

Já assistiu a alguma destas alterações na iluminação pública? Se sim, diga-nos a sua preferência

	Não assisti	Não concordo	Concordo	NR
Mudança de lâmpadas tradicionais para LED branca	○	○	○	○
Mudança de lâmpadas tradicionais para LED amarela	○	○	○	○
Redução do número de luminárias acessas	○	○	○	○
Apagões pontuais por motivos ambientais	○	○	○	○
Instalação de temporizadores	○	○	○	○
Instalação de sensores de movimento nas luzes	○	○	○	○

De modo a reduzir a Poluição Luminosa, quais destas medidas considera adequadas

	A favor	Contra	NR
Desligar as luzes da sua rua a entre as 00h00 e as 6h00 da manhã	○	○	○
Reduzir as luzes da sua rua entre as 00h00 e as 6h00 da manhã	○	○	○
Desligar a iluminação pública nas áreas protegidas e perto delas	○	○	○
Utilizar lâmpadas com cores amarelos/quentes	○	○	○
Alterar as luzes da minha freguesia para proteger a vida selvagem	○	○	○
Colocar sensores de movimento nos parques e jardins públicos	○	○	○
Reduzir as iluminações festivas	○	○	○

Mas também há ações que podemos fazer para reduzir a Poluição Luminosa e promover a eficiência energética. Quais das seguintes já fez ou pensa fazer?

	Já fiz ou costumo fazer	Nunca fiz, mas consideraria fazer	Nem fiz, nem vou fazer	NR
Quando saio de uma divisão da casa, apago a luz	○	○	○	○
Já salvei uma ave marinha encandeada	○	○	○	○
Tenho temporizador nas luzes exteriores da minha casa	○	○	○	○
Todas as lâmpadas da minha casa são LED	○	○	○	○
Desligo as luzes do meu jardim quando não estou lá	○	○	○	○

O projeto LIFE Natura@night

O projeto LIFE Natura@night tem como objetivo reduzir a poluição luminosa que afeta as áreas protegidas dos arquipélagos da Madeira, Açores e Canárias, e mitigar os seus impactos nas espécies protegidas ao nível da UE. Ao trabalhar com autoridades locais, pescadores e comunidade para reduzir a poluição luminosa, estaremos também a implementar iluminação mais eficiente, contribuindo para uma melhor gestão de recursos e combatendo as alterações climáticas.

O que faremos?

- Estudar os impactes na biodiversidade;
- Mapear a poluição luminosa;
- Apostar em iluminação mais eficiente;
- Contribuir para a regulamentação da iluminação;
- Travar a perda de biodiversidade;
- Sensibilizar para proteger;

Saiba mais em: www.naturaatnight.spea.pt

* Na tua opinião, qual a importância da poluição luminosa para a biodiversidade, pessoas e economia?

- ◯ Não é importante
- ◯ É pouco importante
- ◯ É bastante importante
- ◯ É muito importante

Tem algum comentário que gostaria de fazer sobre este tema?

Gostaria de saber mais sobre este tema e colaborar no projeto? Se sim, deixe-nos o seu contacto

Nome

Apelido

Email

Para o podermos contactar, precisamos que concorde com a política de privacidade da SPEA

☐ Concordo

B – Survey questionnaire – Spanish version

Encuesta de sensibilización sobre la contaminación lumínica

¡Hola!

Nos gustaría invitarle a participar en nuestra encuesta del proyecto **LIFE Natura@night** sobre la contaminación lumínica. Esta encuesta tardará aproximadamente 10 minutos en completarse, es voluntaria y no hay riesgos asociados a la participación. Sin embargo, si no se siente cómod@, puede retirarse en cualquier momento. Su opinión es muy importante.

Sus respuestas son confidenciales y los datos se tratarán siempre de forma agregada. Si tiene alguna pregunta sobre esta encuesta, póngase en contacto con **Javier Romero** a través del email a **jromero@seo.org**

¡Muchas gracias por su tiempo y apoyo!

Por favor, inicie la encuesta pulsando el botón *Comenzar.*

Caracterización de los encuestados

Contaminación lumínica_LIFE-Naturaatnight

QuestionPro

Para analizar mejor la información recogida, nos gustaría hacerle algunas preguntas sobre usted

* ¿Es usted residente en cualquiera de los archipiélagos de las Azores, Madeira o Canarias?

- Sí
- No, estoy solo de visita

* ¿En qué archipiélago reside?

- Azores
- Canarias
- Madeira

¿A qué isla pertenece? - R.A. Madeira

- Madeira
- Porto Santo

¿A qué isla pertenece? - R.A. Açores

- Corvo
- Faial
- Flores
- Graciosa
- Pico
- Terceira

- ◯ Santa Maria
- ◯ São Miguel
- ◯ São Jorge

¿A qué isla pertenece? - R.A Canarias

El Hierro
Fuerteventura
Gran Canaria
Lanzarote

* Por favor, indique el municipio en el cual resida - R.A Madeira

- ◯ Calheta
- ◯ Câmara de Lobos
- ◯ Funchal
- ◯ Machico
- ◯ Ponta do sol
- ◯ Porto Moniz
- ◯ Porto Santo
- ◯ Ribeira Brava
- ◯ Santa Cruz
- ◯ Santana
- ◯ São Vicente

* Por favor, indique el municipio en el cual resida - R.A. Açores

- ◯ Angra do Heroísmo

- Calheta
- Corvo
- Horta
- Lagoa
- Lajes das Flores
- Lajes do Pico
- Madalena
- Nordeste
- Ponta Delgada
- Povoação
- Praia da Vitória
- Ribeira Grande
- Santa Cruz da Graciosa
- Santa Cruz das Flores
- São Roque do Pico
- Velas
- Vila do Porto
- Vila Franca do Campo

Por favor, indique el municipio en el cual resida - R.A. Canarias

Adeje [TF]
Agaete [GC]
Agüimes [GC]
Agulo [GO]

* ¿Qué edad tiene?

* Género

- ◯ Femenino
- ◯ Masculino
- ◯ No binario

* Cualificaciones académicas

- ◯ Educación primaria
- ◯ Educación secundaria / profesional
- ◯ Licenciatura
- ◯ Maestrado
- ◯ Doctorado
- ◯ Otra

* ¿Su horario de trabajo incluye el trabajo nocturno?

◯ Si ◯ No ◯ Prefiero no responder (NR)

* ¿Pertenece a alguna asociación para el medio ambiente?

◯ Si ◯ No ◯ NR

* ¿Suele hacer observaciones astronómicas o de estrellas?

- ○ Sí, soy astrónomo (aficionado o profesional)
- ○ Me gusta observar las estrellas regularmente
- ○ Me gusta observar las estrellas puntualmente
- ○ No, nunca
- ○ NR

* ¿Realiza alguna de estas otras actividades nocturnas en la naturaleza?

- ☐ Rutas nocturnas
- ☐ Observación de fauna nocturna
- ☐ No, ninguna
- ☐ Otra

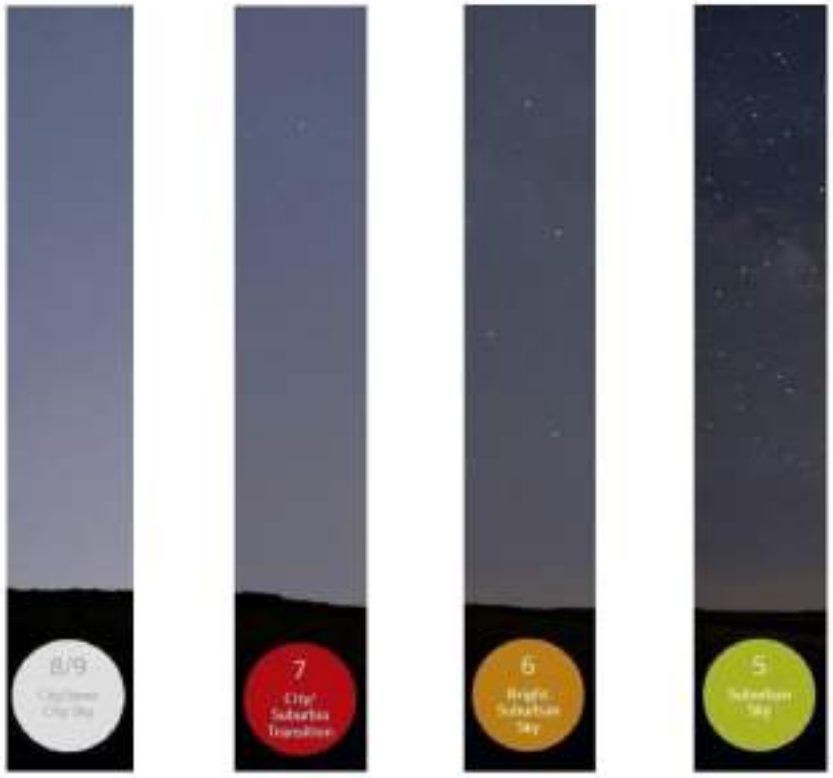
La iluminación nocturna en su lugar de residencia

Las siguientes preguntas se refieren a la iluminación nocturna en su lugar de residencia o de estancia temporal en las Azores, Madeira o Canarias

* ¿Cómo caracteriza su lugar de residencia?

- ○ Zona rural
- ○ Pueblo pequeño
- ○ Pueblo
- ○ Ciudad
- ○ NR

* ¿Cuál de estas imágenes se aproxima mejor al cielo nocturno que puedes observar desde tu lugar de residencia?



Contaminación lumínica_LIFE-Naturaatnight

QuestionPro

* ¿Cuál es la fuente de luz más intensa en tu barrio por la noche?

- [ ] Las luces de mi casa
- [ ] Luces de los vecinos
- [ ] Luces de la tienda local
- [ ] Alumbiado público
- [ ] Semáforos
- [ ] Otra

* ¿Es una fuente de luz permanente durante toda la noche?

- ◯ Si
- ◯ No
- ◯ Intermitente
- ◯ NR

* ¿Cree que la iluminación de su zona de residencia es ...?

- ◯ Insuficiente
- ◯ Buena
- ◯ Excesiva
- ◯ Otro

* En su vida diaria, ¿A qué horas hace uso del alumbrado público? (teniendo en cuenta la época del año con menos luz natural, por ejemplo, en invierno)

- [ ] 18:00
- [ ] 19:00
- [ ] 20:00
- [ ] 21:00
- [ ] 22:00
- [ ] 23:00
- [ ] 24:00
- [ ] 1:00
- [ ] 2:00
- [ ] 3:00
- [ ] 4:00
- [ ] 5:00
- [ ] 6:00
- [ ] 7:00
- [ ] 8:00
- [ ] NR

Contaminación lumínica

* ¿Alguna vez ha oído hablar de la contaminación lumínica?

- ◯ Si
- ◯ No
- ◯ NR

¿Cómo definiría la contaminación lumínica?

Que grado de importancia crees que tiene la contaminación lumínica para la biodiversidad, las personas y la economía?

- ◯ No es importante
- ◯ Poco importante
- ◯ Bastante importante
- ◯ Muy importante

* ¿Conoce algún proyecto/iniciativa que trabaje en esta temática?

- ◯ Si
- ◯ No
- ◯ NR

En relación a la pregunta anterior, nos puede dar un ejemplo del proyecto/iniciativa que trabaja sobre esta problemática?

Indique su opinión sobre las siguientes cuestiones:

	Totalmente de acuerdo	Tiendo a estar de acuerdo	Tiendo a estar en desacuerdo	Muy en desacuerdo	NR
La intensidad de la iluminación nocturna cerca de mi casa ha aumentado en los últimos tres años	○	○	○	○	○
La luz artificial afecta a mi sueño	○	○	○	○	○
La iluminación artificial afecta negativamente a las aves marinas (p.e. a las pardelas)	○	○	○	○	○
Los pájaros diurnos (mirlo, gorrión, petirrojo) cantan por la noche donde yo vivo	○	○	○	○	○
La iluminación artificial afecta negativamente a los insectos	○	○	○	○	○
La iluminación artificial afecta negativamente a los murciélagos	○	○	○	○	○
Las autoridades están poco preocupadas por la contaminación lumínica	○	○	○	○	○
Todo el mundo debería poder observar las estrellas y la Vía Láctea desde su casa	○	○	○	○	○
La posibilidad de observar el cielo nocturno es importante para mí	○	○	○	○	○
Prefiero que la iluminación nocturna sea de color blanca que amarilla	○	○	○	○	○

¿Qué es la contaminación lumínica?

Antes de continuar, nos gustaría darle alguna información sobre la contaminación lumínica:

La contaminación lumínica consiste en una luz exterior artificial excesiva, mal dirigida o intrusiva. Puede provocar el deslumbramiento de personas o animales, lo que puede causar desorientación y colisiones con las infraestructuras, la alteración del ritmo circadiano y de la calidad del sueño, la interferencia con procesos naturales como la fotosíntesis y la migración, y también la reducción de nuestra capacidad de observar el cielo nocturno.

Además de los impactos ecológicos y sobre la salud humana, la contaminación lumínica genera un alto nivel de desperdicio de energía.

¿Sabía que el 50% de la energía producida para el alumbrado público se desperdicia?

Si reducimos esta amenaza, podemos reducir el impacto sobre las personas y la fauna, pero también el gasto del alumbrado público.

Además, reducimos las emisiones de gases de efecto invernadero que provocan el Cambio Climático.

La contaminación lumínica puede ser de varios tipos:

- **Deslumbramiento** - molestias visuales derivadas de luminarias mal orientadas o sin protección. Puede afectar a las personas y a los animales, provocando su deslumbramiento y desorientación, y puede ocasionar colisiones con las infraestructuras.

- **Luz intrusiva** – luz mal dirigida sobre objetos o áreas donde no se necesita iluminación, como el interior de las viviendas o las zonas sensibles. Pueden afectar a la calidad de vida y al ritmo circadiano al dificultar el descanso durante el sueño.

- **Luz desordenada** – exceso de luminarias y/o luminosidad en relación con las necesidades reales.

- **Brillo difuso** – la luz difundida de las luminarias es emitida directamente hacia el cielo o reflejada por estructuras o carreteras. Reduce nuestra capacidad de ver el cielo nocturno e interfiere en procesos naturales como la fotosíntesis y la migración de los animales.

☐ Leí y comprendí el texto

Preferencias de iluminación nocturna

Ahora, nos gustaría conocer tu opinión sobre la necesidad e importancia de los diferentes tipos de iluminación exterior nocturna que podemos encontrar

De los siguientes tipos de iluminación, ¿Cuáles le son molestos?

Iluminación de carreteras

-- Seleccionar --

Carteles luminosos

-- Seleccionar --

Iluminación de edificios y monumentos

-- Seleccionar --

Iluminación de áreas comerciales

-- Seleccionar --

Iluminación navideña y/o festiva

-- Seleccionar --

Iluminación de las zonas deportivas

-- Seleccionar --

Iluminación de parques y jardines públicos

-- Seleccionar --

Iluminación de zonas residenciales

-- Seleccionar --

¿Que piensa de los siguientes tipos de iluminación?

Iluminación de carreteras

-- Seleccionar --

Carteles luminosos

-- Seleccionar --

Iluminación de edificios y monumentos

-- Seleccionar --

Iluminación de áreas comerciales

-- Seleccionar --

Iluminación navideña y/o festiva

-- Seleccionar --

Iluminación de las zonas deportivas

-- Seleccionar --

Iluminación de parques y jardines públicos

-- Seleccionar --

Iluminación de zonas residenciales

-- Seleccionar --

¿Ha visto alguno de estos cambios en el alumbrado público? En caso afirmativo, indíquenos su preferencia

	No presenciado	No estoy de acuerdo	Estoy de acuerdo	NR
Cambiar las bombillas tradicionales por las LED blancas	○	○	○	○
Cambiar las bombillas tradicionales por las LED amarillas	○	○	○	○
Reducción del número de luminarias encendidas	○	○	○	○
Apagado puntual por motivos medioambientales	○	○	○	○
Instalación de temporizadores	○	○	○	○
Instalación de sensores de movimiento en las luces	○	○	○	○

Para reducir la contaminación lumínica, ¿Cuál de estas medidas consideraría adecuada?

	A favor	En contra	NR
Apagar el alumbrado público entre las 00:00 y las 06:00 de la mañana	○	○	○
Atenuar las luces de la calle entre las 00:00 y las 06:00 de la mañana	○	○	○
Apagar el alumbrado público en las zonas protegidas y sus alrededores	○	○	○
Utilizar lámparas con colores amarillos (luz cálida)	○	○	○
Cambiar las luces de mi municipio para proteger la vida salvaje	○	○	○
Instalar sensores de movimiento en parques y jardines públicos	○	○	○
Reducir la iluminación festiva	○	○	○

Pero también hay acciones que podemos llevar a cabo para reducir la contaminación lumínica y promover la eficiencia energética. ¿Cuáles de las siguientes acciones ha realizado o está considerando realizar?

	Lo hago/suelo hacer normalmente	Nunca lo he hecho, pero consideraría hacerlo	Nunca lo he hecho, y no lo pretendo hacer	NR
Cuando salgo de una habitación de la casa, apago la luz	○	○	○	○
Ya he rescatado alguna vez una ave marina deslumbrada	○	○	○	○
Tengo un temporizador en las luces exteriores de mi casa	○	○	○	○
Todas las bombillas de mi casa son LED	○	○	○	○
Apago las luces de mi jardín cuando no estoy allí	○	○	○	○

El proyecto LIFE Natura@night

El proyecto LIFE Natura@night tiene como objetivo reducir la contaminación luminica que afecta a las zonas protegidas de los archipiélagos de Madeira, Azores y Canarias y así, mitigar su impacto en las especies protegidas a nivel de la UE. Pretendemos trabajar con las autoridades locales, empresas y la comunidad local para reducir la contaminación lumínica, además de implementar una iluminación más eficiente, contribuyendo a una mejor gestión de los recursos y a la lucha contra el cambio climático.

¿Qué vamos a hacer?

- Estudiar los impactos en la biodiversidad;
- Mapear la contaminación luminica;
- Invertir en una iluminación más eficiente;
- Contribuir a la regulación del alumbrado;
- Disminuir la pérdida de biodiversidad;
- Sensibilizar a la población para proteger nuestro Medio Ambiente;

Sepa mas en: www.naturaatnight.spea.pt

Que grado de importancia crees que tiene la contaminación lumínica para la biodiversidad, las personas y la economía?

- ○ No es importante
- ○ Poco importante
- ○ Bastante importante
- ○ Muy importante

¿Tiene algún comentario que quiera hacer sobre este tema?

¿Le gustaría saber más sobre esta temática y colaborar en el proyecto? Si es así, déjenos sus datos de contacto

Nombre

Apellido

Email

Para que podamos ponernos en contacto con usted, necesitamos que acepte la política de privacidade de SPEA

- ☐ Estoy de acuerdo

C – Survey dissemination examples in local, regional, and national media

Example 1: https://www.rtp.pt/madeira/politica/inquerito-sobre-a-poluicao-luminosa-em-elaboracao-audio-_108834

Example 2: https://www.publico.pt/2023/01/28/azul/noticia/vamos-apagar-luzes-contar-estrelas-ajudar-ciencia-2035884

Example 3: https://acores.rtp.pt/graciosa-online/poluicao-luminosa/

Example 4: https://www.dnoticias.pt/2023/1/12/343955-spea-quer-saber-quao-bem-consegue-ver-o-ceu-estrelado-na-sua-localidade/

Example 5: https://seo.org/como-de-brillante-es-el-cielo-nocturno-bajo-el-que-vives/

Example 6: https://naturaatnight.spea.pt/inquerito-poluicao-luminosa

Example 7: https://et-al.pt/2023/02/19/poluicao-luminosa-na-madeira/

Example 8: https://machicoambiente.pt/ambiente-online/informacoes/noticias/destaque/1625-inquerito-natura-night

D – Bortle scale

Source: SKYGLOW

E – Câmara de Lobos complementary results

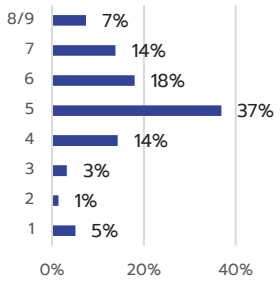
Sample characterization

Table E1 | Complementary results on sample characterization of Câmara de Lobos respondents.

	Question	Categories	Responses	n
Sample characterization	Q5 – Age	18 to 24 years old	11%	217
		25 to 34 years old	22%	
		35 to 44 years old	20%	
		45 to 54 years old	21%	
		55 to 64 years old	12%	
		≥ 65 years old	14%	
	Q7 – Education level	Basic school	33%	217
		High school	33%	
		Bachelor's degree	23%	
		Master's degree	8%	
		PhD	-	
		Other	3%	
	Q8 – Does your work schedule include night work?	Yes	23%	211
		No	77%	
	Q9 – Do you belong to any environmental association?	Yes	7%	215
		No	93%	
	Q10 – Do you usually observe the stars or participate in astronomical observations?	Yes, I'm astronomer	0%	213
		I like to observe the stars regularly	15%	
		I like to watch the stars occasionally	51%	
		No, never	34%	
	Q11 – Do you do any of these other nocturnal activities in nature?	Nocturnal trails	5%	217
		Observation of nocturnal fauna	2%	
		No, none	91%	
		Other	2%	
	Q12 – How would you characterize your place of residence?	City	39%	214
		Village	18%	
		Small parish	27%	
		Rural area	16%	

Lighting characterization at the respondents' residence

Table E2 | Complementary results on characterization of lighting at respondent's residence for Câmara de Lobos respondents.

	Question	Categories	Responses	n
Characterization of lighting at respondent' s residence	Q13 – Assessment of night sky brightness using Bortle scale	8/9 – City sky/Inner city		217
		7 – City/Suburbia transition		
		6 – Bright suburban sky		
		5 – Suburban sky		
		4 – Suburban/Rural transition		
		3 – Rural sky		
		2 – Dark sky		
		1 – Excellent dark sky		
	Q14 – What is the strongest light source in your neighbourhood at night	Lights from my house	10%	195
		Lights from the neighbours	7%	
		Lights from local businesses	3%	
		Public lighting	75%	
		Traffic lights	3%	
		Other	2%	
	Q15 – Is it a permanent light source throughout the night?	Yes	78%	192
		No	19%	
		Intermittent	3%	
	Q16 – You think the level of lighting where you live is...	Insufficient	5%	217
		Good	82%	
		Excessive	13%	
		Other	-	

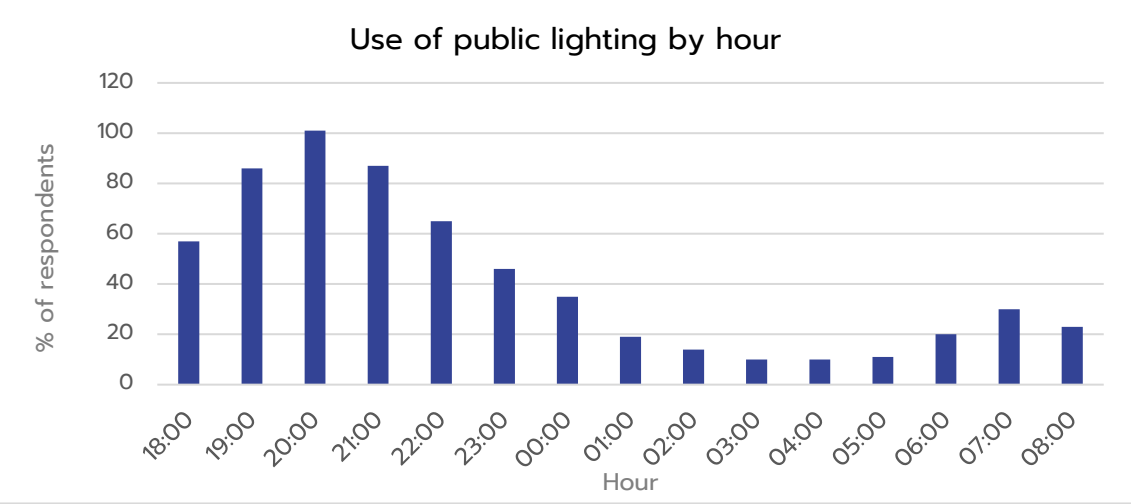


Figure E1 | Use of public lighting by hour, reported by Câmara de Lobos respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=174).

Perceptions on light pollution and ALAN

Table E3 | Complementary results on perceptions of light pollution and ALAN for Câmara de Lobos respondents.

	Question	Categories	Responses	n
Perceptions on light pollution and ALAN	Q18 – Have you ever heard of Light Pollution	Yes	59%	217
		No	41%	
	Q19 – Assessment of knowledge on definition of light pollution	Yes	71%	119
		Partial	16%	
		No	7%	
	Q21 – Do you know of any project/initiative that works on this issue?	Yes	14%	214
		No	86%	
	Q22 – Can you give an example of a project/initiative working on this issue?	Governmental	12%	25
		Academia/research	-	
		SPEA	64%	
		NGO	-	
		Astronomy	-	
		Environmental education	4%	
		More than one	4%	
		Unspecified	16%	

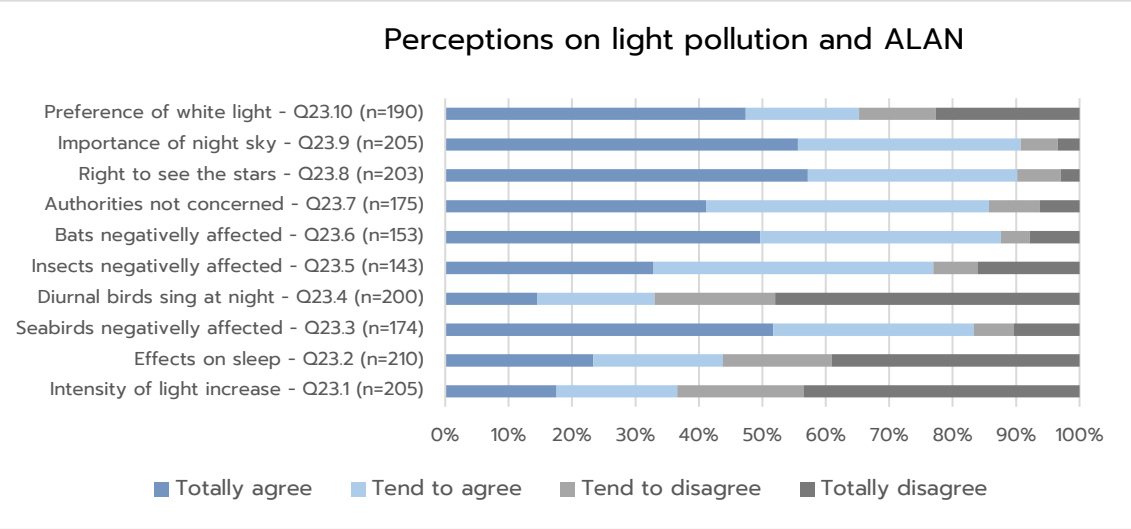


Figure E2 | Perceptions on light pollution and ALAN among respondents from Câmara de Lobos. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

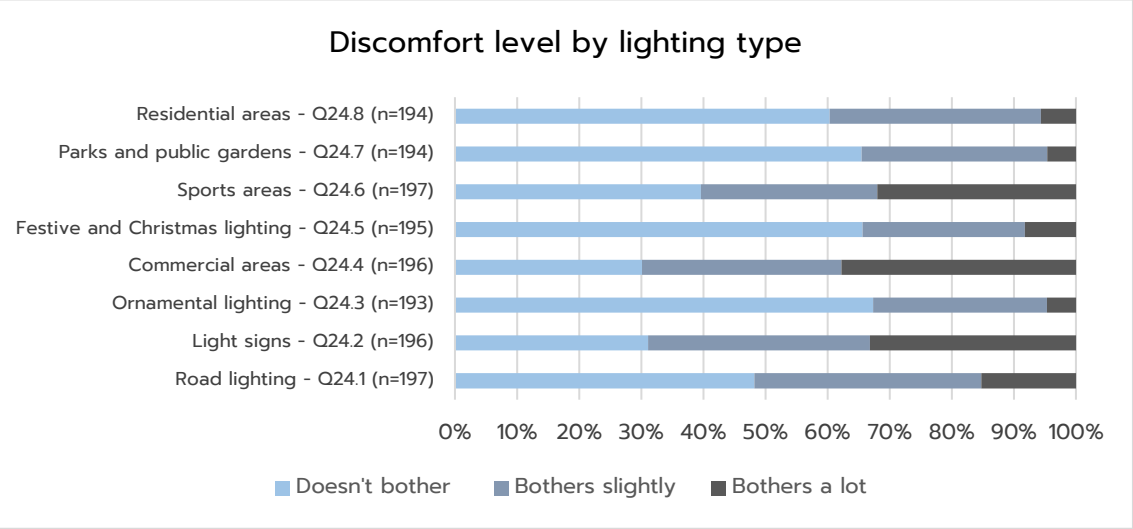


Figure E3 | Discomfort level reported by Câmara de Lobos respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

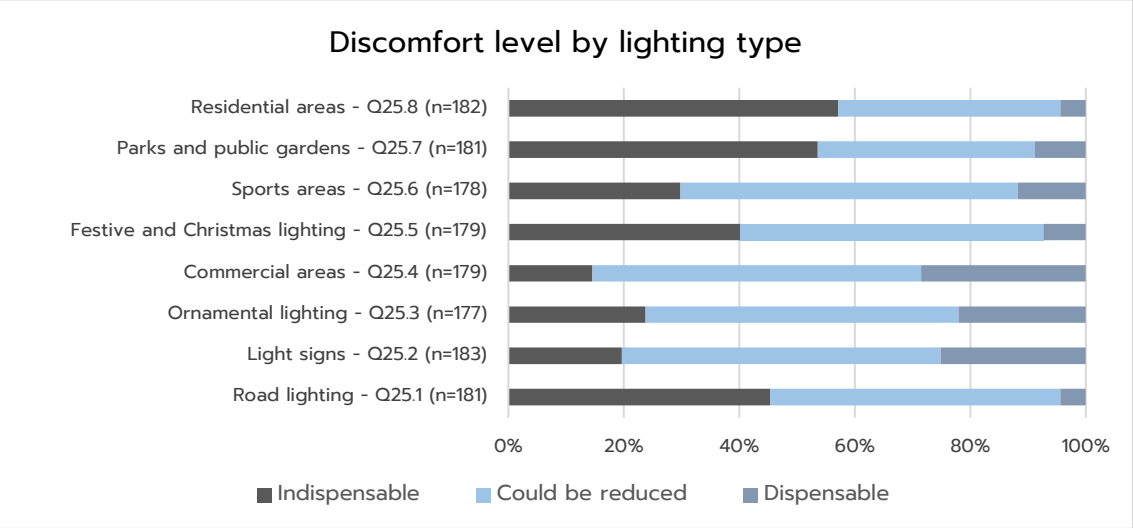


Figure E4 | Perceived necessity of different lighting types by respondents from Câmara de Lobos. The horizontal bars represent percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

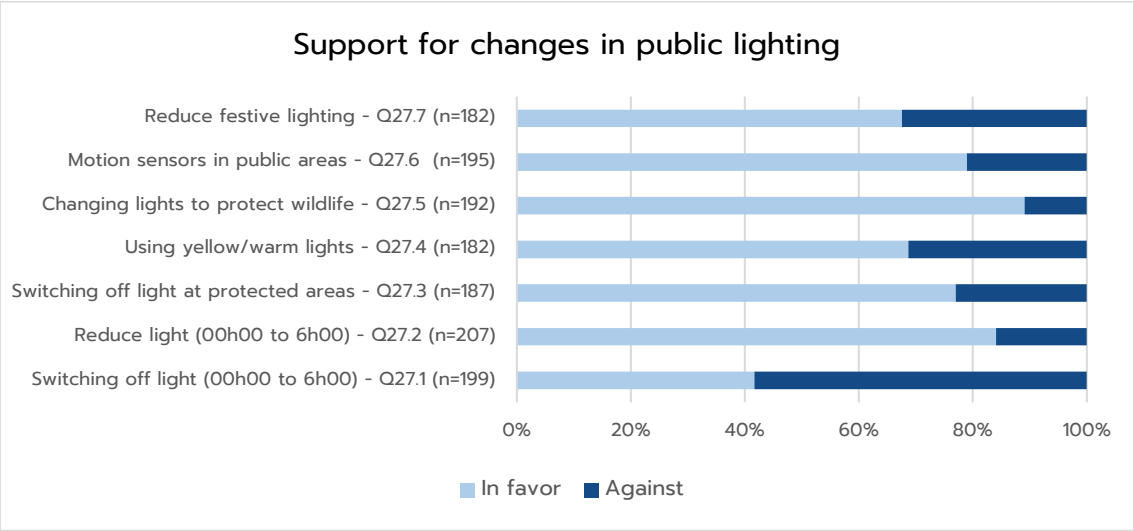


Figure E5 | Support for light pollution mitigation measures in public lighting reported by Câmara de Lobos respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

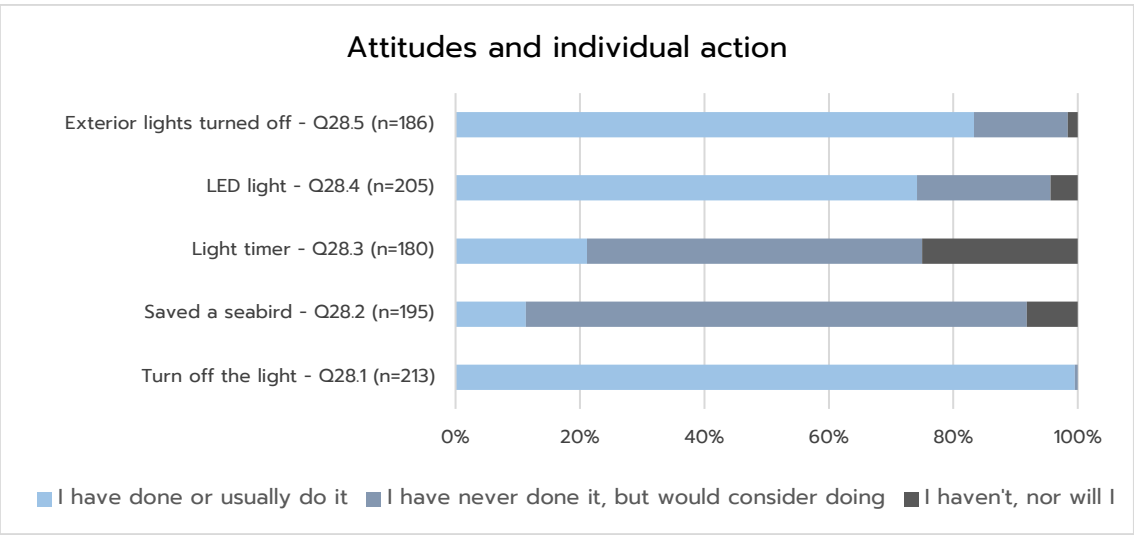


Figure E6 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents from Câmara de Lobos. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.

F – Funchal complementary results

Sample characterization

Table F1 | Complementary results on sample characterization of Funchal respondents.

	Question	Categories	Responses	n
Sample characterization	Q5 – Age	18 to 24 years old	13%	529
		25 to 34 years old	13%	
		35 to 44 years old	21%	
		45 to 54 years old	28%	
		55 to 64 years old	18%	
		≥ 65 years old	7%	
	Q7 – Education level	Basic school	18%	529
		High school	28%	
		Bachelor's degree	39%	
		Master's degree	12%	
		PhD	2%	
		Other	1%	
	Q8 – Does your work schedule include night work?	Yes	20%	515
		No	80%	
	Q9 – Do you belong to any environmental association?	Yes	9%	526
		No	91%	
	Q10 – Do you usually observe the stars or participate in astronomical observations?	Yes, I'm astronomer	-	526
		I like to observe the stars regularly	15%	
		I like to watch the stars occasionally	52%	
		No, never	33%	
	Q11 – Do you do any of these other nocturnal activities in nature?	Nocturnal trails	9%	529
		Observation of nocturnal fauna	6%	
		No, none	84%	
		Other	2%	
	Q12 – How would you characterize your place of residence?	City	80%	528
		Village	1%	
		Small parish	14%	
		Rural area	5%	

Lighting characterization at the respondents' residence

Table F2 | Complementary results on characterization of lighting at respondent's residence for Funchal respondents.

	Question	Categories	Responses	n
Characterization of lighting at respondent' s residence	Q13 – Assessment of night sky brightness using Bortle scale	8/9 – City sky/Inner city	10%	529
		7 – City/Suburbia transition	22%	
		6 – Bright suburban sky	30%	
		5 – Suburban sky	24%	
		4 – Suburban/Rural transition	9%	
		3 – Rural sky	2%	
		2 – Dark sky	2%	
		1 – Excellent dark sky	3%	
	Q14 – What is the strongest light source in your neighbourhood at night	Lights from my house	8%	464
		Lights from the neighbours	3%	
		Lights from local businesses	3%	
		Public lighting	84%	
		Traffic lights	1%	
		Other	1%	
	Q15 – Is it a permanent light source throughout the night?	Yes	85%	456
		No	13%	
		Intermittent	2%	
	Q16 – You think the level of lighting where you live is...	Insufficient	8%	
		Good	76%	
		Excessive	15%	
		Other	1%	

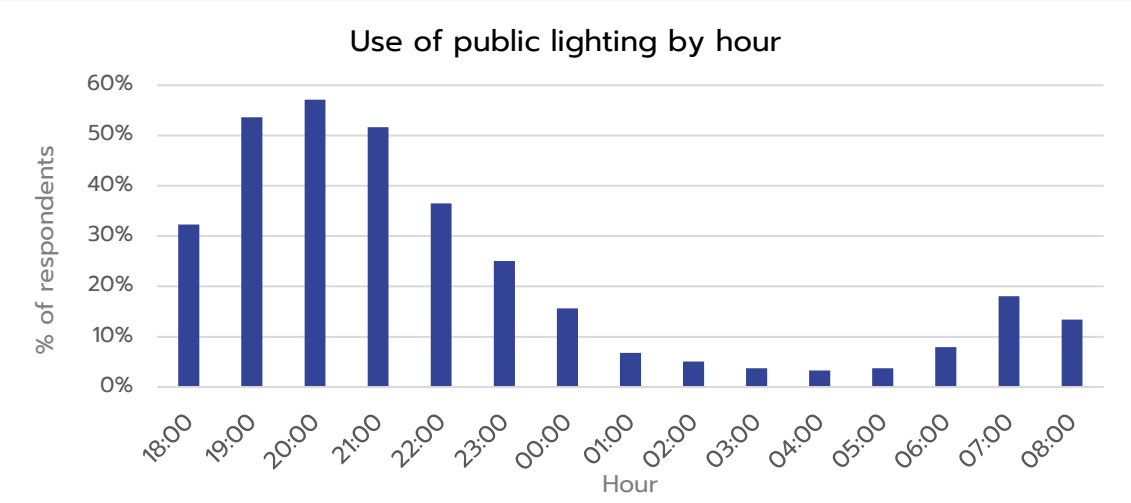


Figure F1 | Use of public lighting by hour, reported by Funchal respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=455).

Perceptions on light pollution and ALAN

Table F3 | Complementary results on perceptions of light pollution and ALAN for Funchal respondents.

	Question	Categories	Responses	n
Perceptions on light pollution and ALAN	Q18 – Have you ever heard of Light Pollution	Yes	73%	527
		No	27%	
	Q19 – Assessment of knowledge on definition of light pollution	Yes	83%	333
		Partial	14%	
		No	3%	
	Q21 – Do you know of any project/initiative that works on this issue?	Yes	26%	520
		No	74%	
	Q22 – Can you give an example of a project/initiative working on this issue?	Governmental	8%	123
		Academia/research	2%	
		SPEA	62%	
		NGO	-	
		Astronomy	1%	
		Environmental education	2%	
		More than one	6%	
		Unspecified	20%	

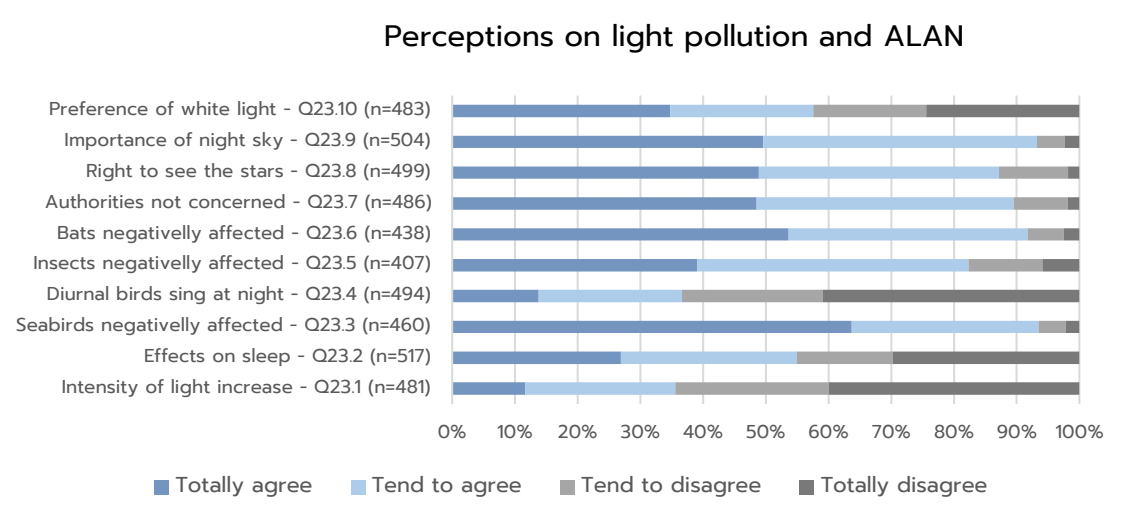


Figure F2 | Perceptions on light pollution and ALAN among respondents from Funchal. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

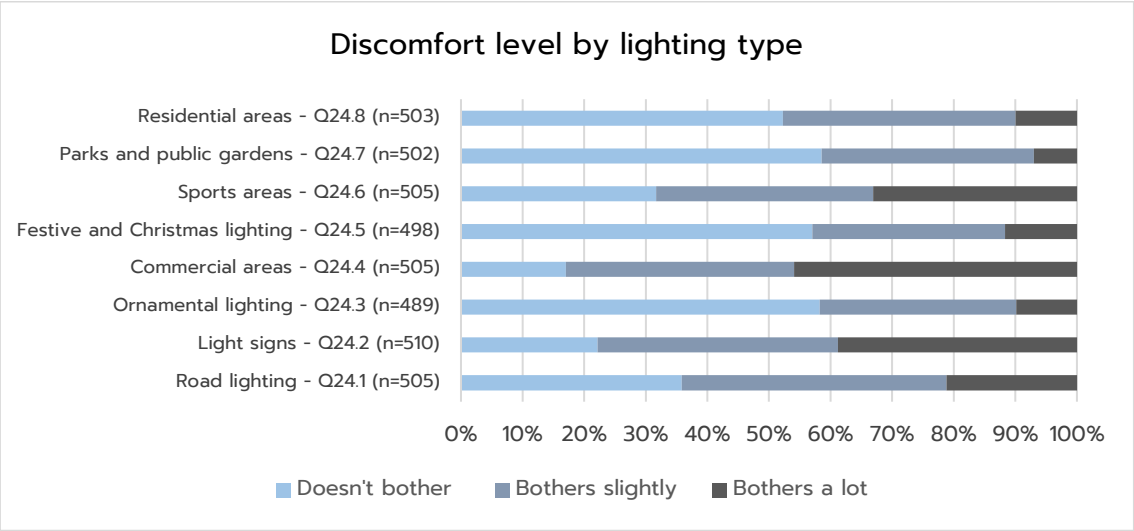


Figure F3 | Discomfort level reported by Funchal respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

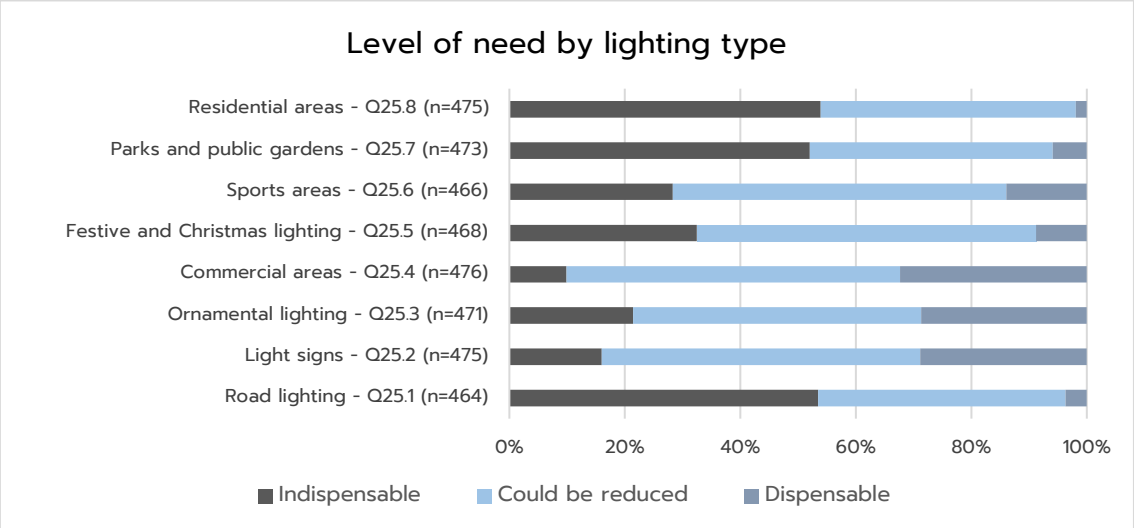


Figure F4 | Perceived necessity of different lighting types by respondents from Funchal. The horizontal bars represent percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

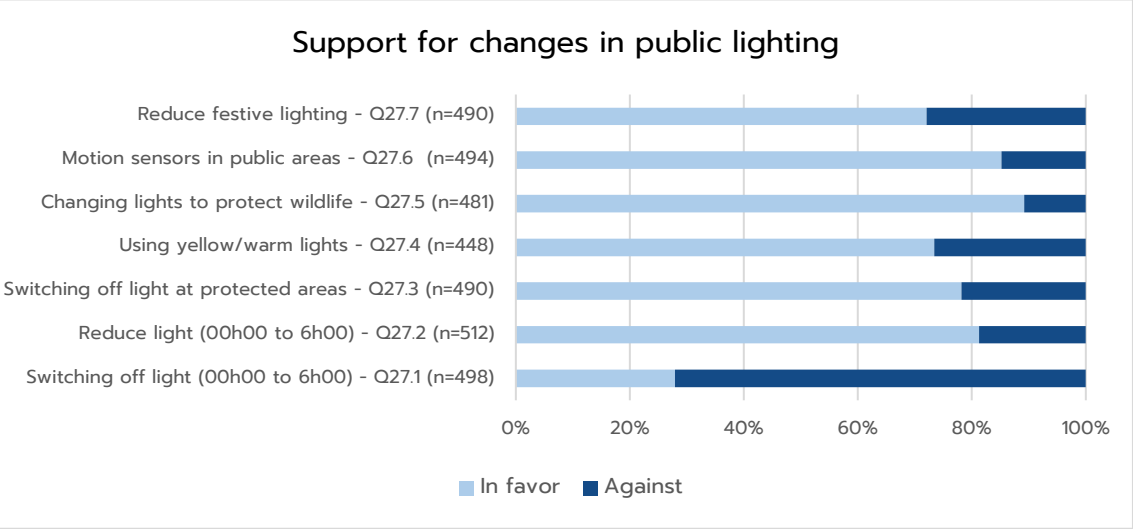


Figure F5 | Support for light pollution mitigation measures in public lighting reported by Funchal respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

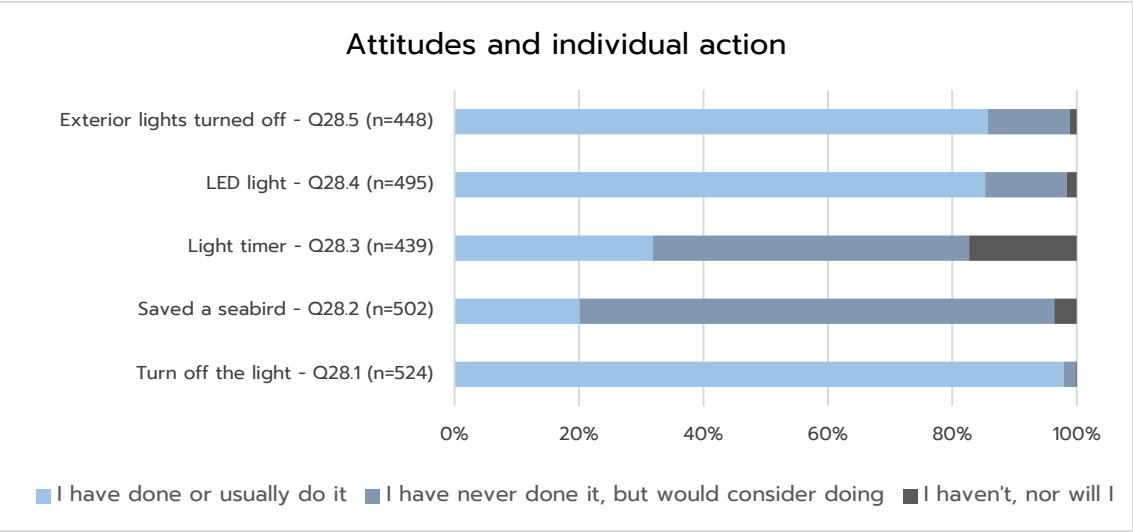


Figure F6 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents from Funchal. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.

G – Machico complementary results

Sample characterization

Table G1 | Complementary results on sample characterization of Machico respondents.

	Question	Categories	Responses	n
Sample characterization	Q5 – Age	18 to 24 years old	16%	401
		25 to 34 years old	17%	
		35 to 44 years old	28%	
		45 to 54 years old	14%	
		55 to 64 years old	12%	
		≥ 65 years old	12%	
	Q7 – Education level	Basic school	24%	401
		High school	37%	
		Bachelor's degree	26%	
		Master's degree	10%	
		PhD	1%	
		Other	3%	
	Q8 – Does your work schedule include night work?	Yes	20%	392
		No	80%	
	Q9 – Do you belong to any environmental association?	Yes	5%	398
		No	95%	
	Q10 – Do you usually observe the stars or participate in astronomical observations?	Yes, I'm astronomer	1%	396
		I like to observe the stars regularly	17%	
		I like to watch the stars occasionally	44%	
		No, never	39%	
	Q11 – Do you do any of these other nocturnal activities in nature?	Nocturnal trails	7%	401
		Observation of nocturnal fauna	5%	
		No, none	88%	
		Other	1%	
	Q12 – How would you characterize your place of residence?	City	36%	400
		Village	25%	
		Small parish	20%	
		Rural area	20%	

Lighting characterization at the respondents' residence

Table G2 | Complementary results on characterization of lighting at respondent's residence for Machico respondents.

	Question	Categories	Responses	n
Characterization of lighting at respondent' s residence	Q13 – Assessment of night sky brightness using Bortle scale	8/9 – City sky/Inner city	4%	363
		7 – City/Suburbia transition	18%	
		6 – Bright suburban sky	26%	
		5 – Suburban sky	34%	
		4 – Suburban/Rural transition	13%	
		3 – Rural sky	1%	
		2 – Dark sky	1%	
		1 – Excellent dark sky	2%	
	Q14 – What is the strongest light source in your neighbourhood at night	Lights from my house	12%	363
		Lights from the neighbours	5%	
		Lights from local businesses	3%	
		Public lighting	76%	
		Traffic lights	2%	
		Other	2%	
	Q15 – Is it a permanent light source throughout the night?	Yes	72%	360
		No	23%	
		Intermittent	5%	
	Q16 – You think the level of lighting where you live is...	Insufficient	11%	401
		Good	79%	
		Excessive	10%	
		Other	<1%	

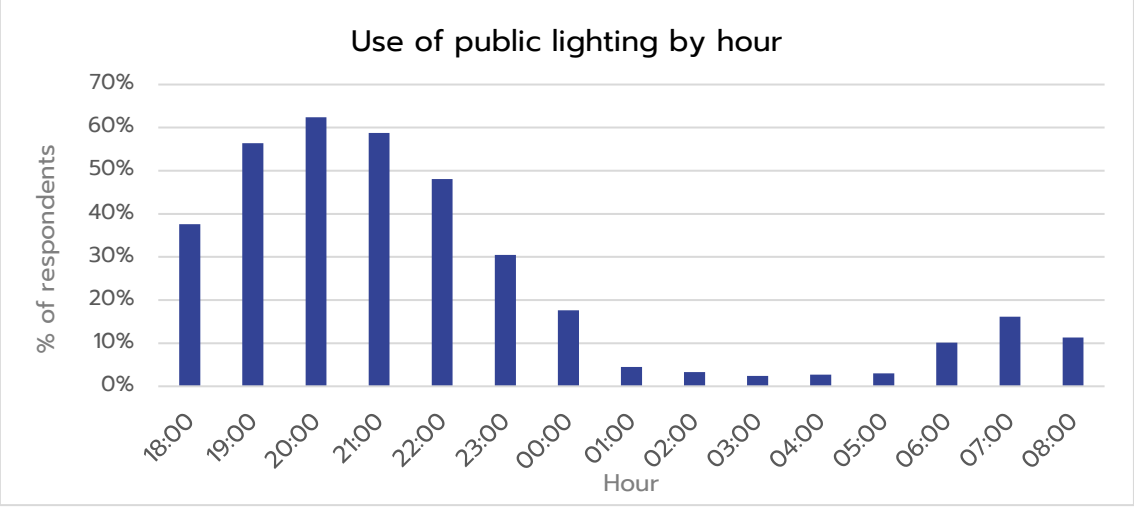


Figure G1 | Use of public lighting by hour, reported by Machico respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=335).

Perceptions on light pollution and ALAN

Table G3 | Complementary results on perceptions of light pollution and ALAN for Machico respondents.

	Question	Categories	Responses	n
Perceptions on light pollution and ALAN	Q18 – Have you ever heard of Light Pollution	Yes	62%	399
		No	38%	
	Q19 – Assessment of knowledge on definition of light pollution	Yes	80%	213
		Partial	14%	
		No	6%	
	Q21 – Do you know of any project/initiative that works on this issue?	Yes	16%	393
		No	84%	
	Q22 – Can you give an example of a project/initiative working on this issue?	Governmental	9%	53
		Academia/research	-	
		SPEA	60%	
		NGO	2%	
		Astronomy	2%	
		Environmental education	-	
		More than one	8%	
		Unspecified	19%	

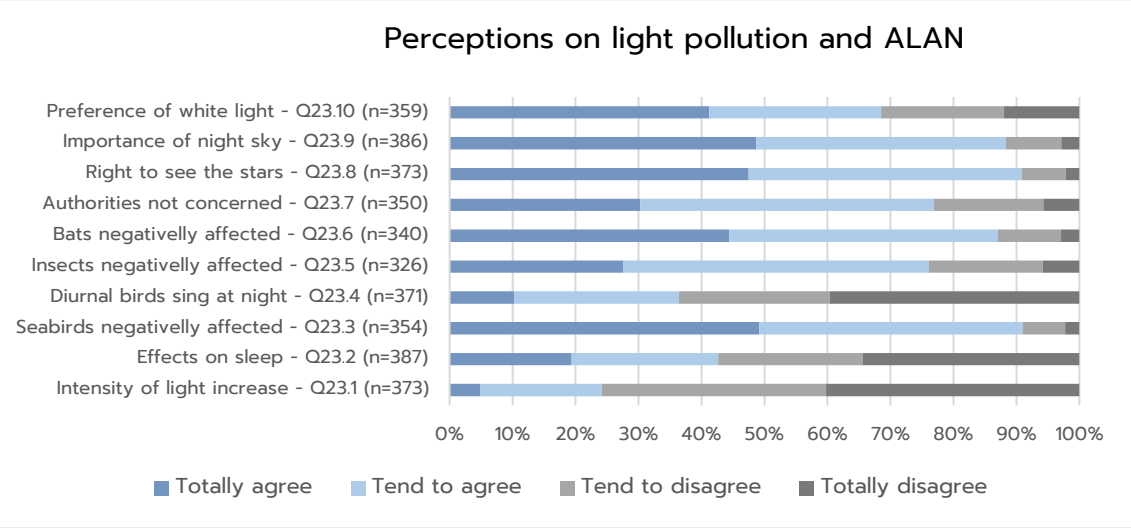


Figure G2 | Perceptions on light pollution and ALAN among respondents from Machico. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

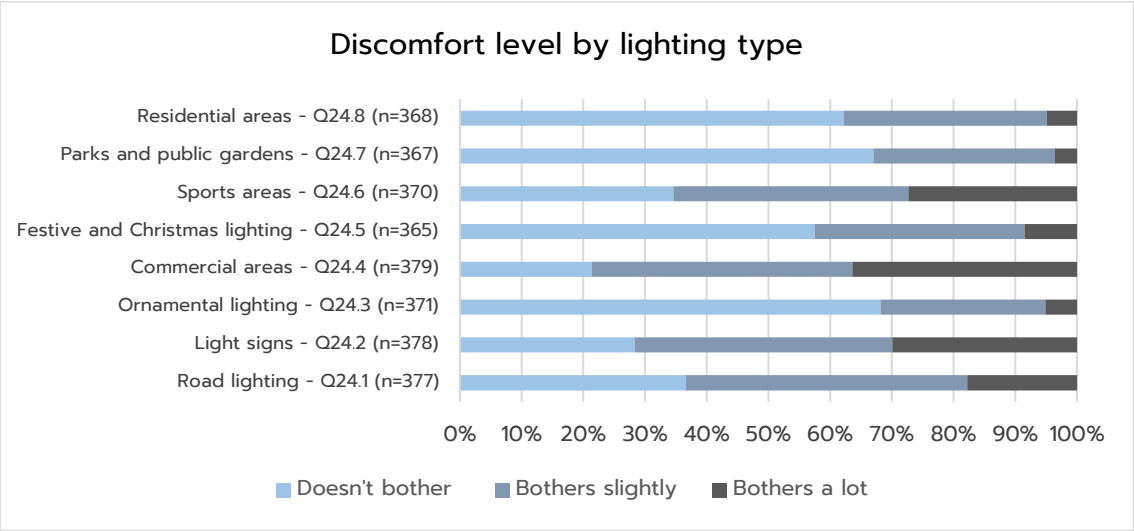


Figure G3 | Discomfort level reported by Machico respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

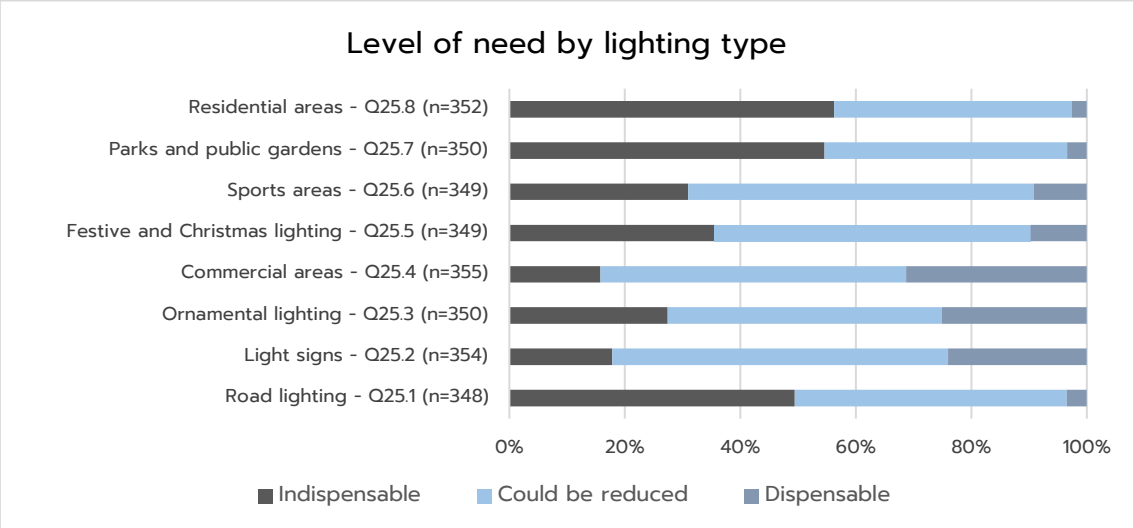


Figure G4 | Perceived necessity of different types of lighting by respondents from Machico. The horizontal bars represent percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

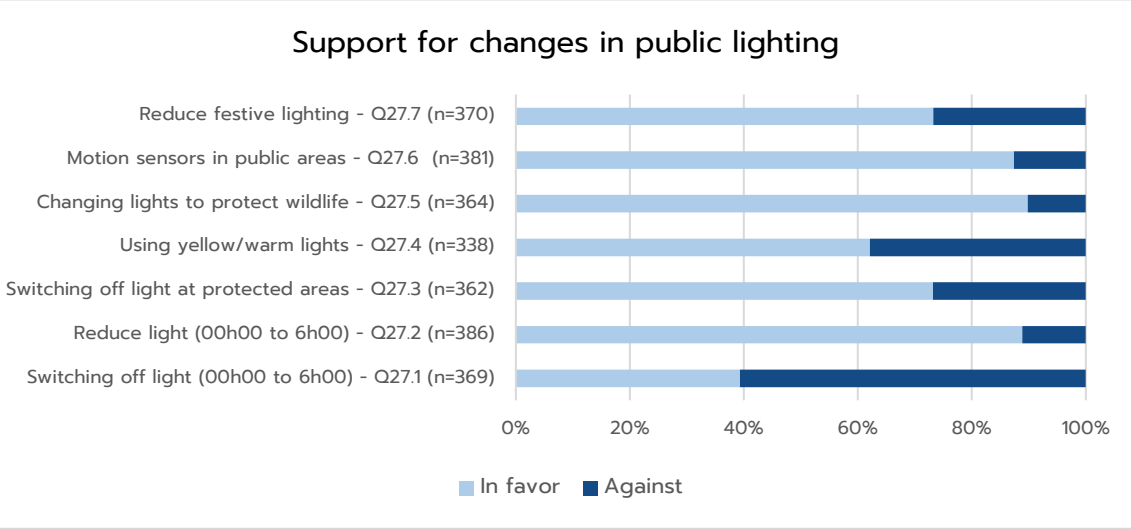


Figure G5 | Support for light pollution mitigation measures in public lighting reported by Machico respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

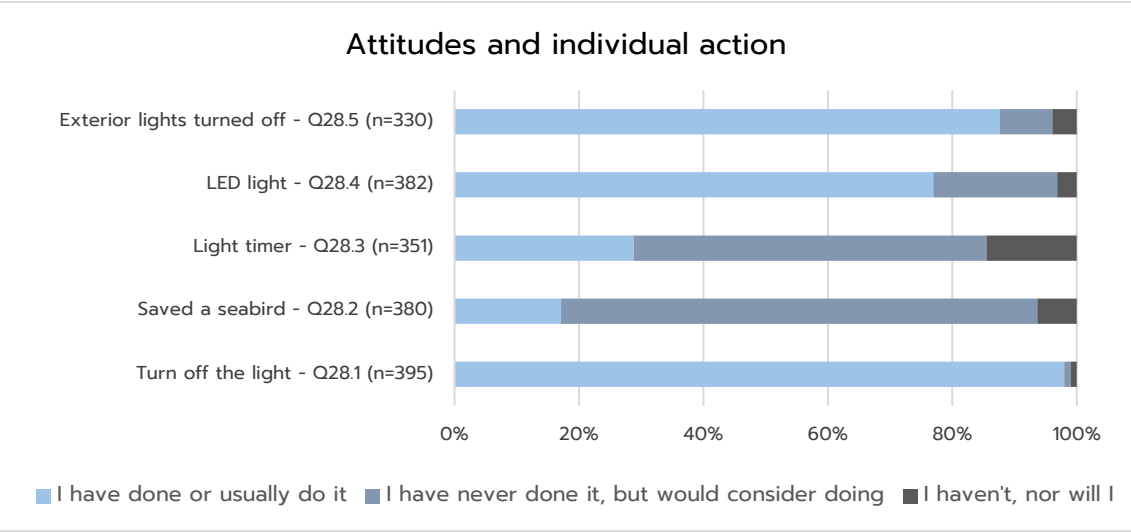


Figure G6 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents from Machico. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.

H – Santa Cruz complementary results

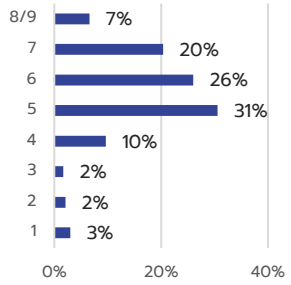
Sample characterization

Table H1 | Complementary results on sample characterization of Santa Cruz respondents.

	Question	Categories	Responses	n
Sample characterization	Q5 – Age	18 to 24 years old	10%	530
		25 to 34 years old	14%	
		35 to 44 years old	30%	
		45 to 54 years old	28%	
		55 to 64 years old	10%	
		≥ 65 years old	7%	
	Q7 – Education level	Basic school	15%	530
		High school	38%	
		Bachelor's degree	37%	
		Master's degree	9%	
		PhD	1%	
		Other	1%	
	Q8 – Does your work schedule include night work?	Yes	25%	525
		No	75%	
	Q9 – Do you belong to any environmental association?	Yes	6%	525
		No	94%	
	Q10 – Do you usually observe the stars or participate in astronomical observations?	Yes, I'm astronomer	1%	524
		I like to observe the stars regularly	19%	
		I like to watch the stars occasionally	46%	
		No, never	35%	
	Q11 – Do you do any of these other nocturnal activities in nature?	Nocturnal trails	6%	530
		Observation of nocturnal fauna	5%	
		No, none	88%	
		Other	2%	
	Q12 – How would you characterize your place of residence?	City	42%	526
		Village	12%	
		Small parish	26%	
		Rural area	20%	

Lighting characterization at the respondents' residence

Table H2 | Complementary results on characterization of lighting at respondent's residence for Santa Cruz respondents.

	Question	Categories	Responses	n
Characterization of lighting at respondent' s residence	Q13 – Assessment of night sky brightness using Bortle scale	8/9 – City sky/Inner city		530
		7 – City/Suburbia transition		
		6 – Bright suburban sky		
		5 – Suburban sky		
		4 – Suburban/Rural transition		
		3 – Rural sky		
		2 – Dark sky		
		1 – Excellent dark sky		
	Q14 – What is the strongest light source in your neighbourhood at night	Lights from my house	10%	480
		Lights from the neighbours	4%	
		Lights from local businesses	1%	
		Public lighting	81%	
		Traffic lights	3%	
		Other	2%	
	Q15 – Is it a permanent light source throughout the night?	Yes	80%	469
		No	18%	
		Intermittent	2%	
	Q16 – You think the level of lighting where you live is...	Insufficient	9%	530
		Good	80%	
		Excessive	10%	
		Other	1%	

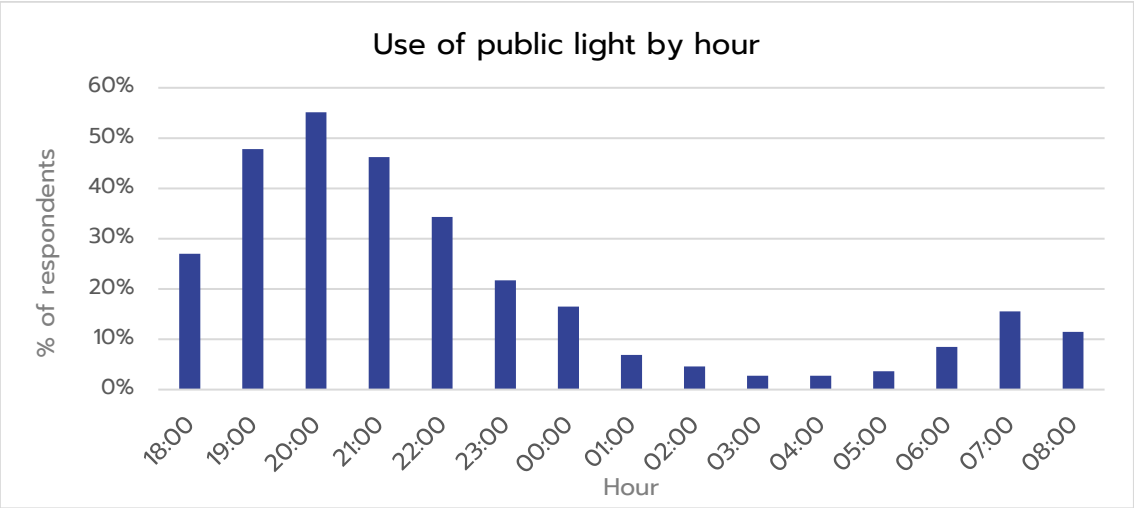


Figure H1 | Use of public lighting by hour, reported by Santa Cruz respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=435).

Perceptions on light pollution and ALAN

Table H3 | Complementary results on perceptions of light pollution and ALAN for Santa Cruz respondents.

	Question	Categories	Responses	n
Perceptions on light pollution and ALAN	Q18 – Have you ever heard of Light Pollution	Yes	74%	527
		No	26%	
	Q19 – Assessment of knowledge on definition of light pollution	Yes	78%	345
		Partial	19%	
		No	3%	
	Q21 – Do you know of any project/initiative that works on this issue?	Yes	21%	514
		No	79%	
	Q22 – Can you give an example of a project/initiative working on this issue?	Governmental	7%	102
		Academia/research	-	
		SPEA	64%	
		NGO	1%	
		Astronomy	2%	
		Environmental education	-	
		More than one	4%	
		Unspecified	23%	

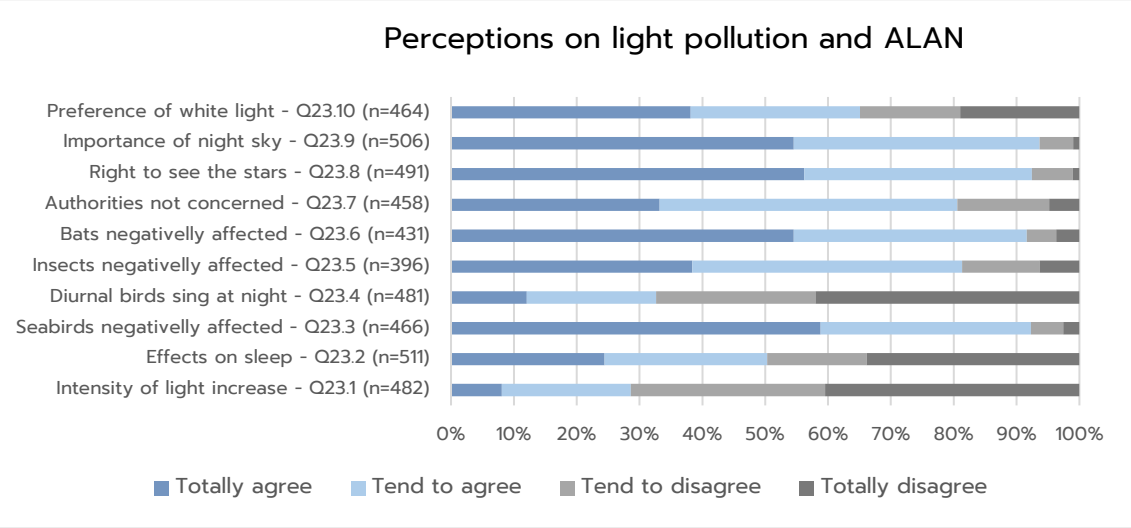


Figure H2 | Perceptions on light pollution and ALAN among respondents from Santa Cruz. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

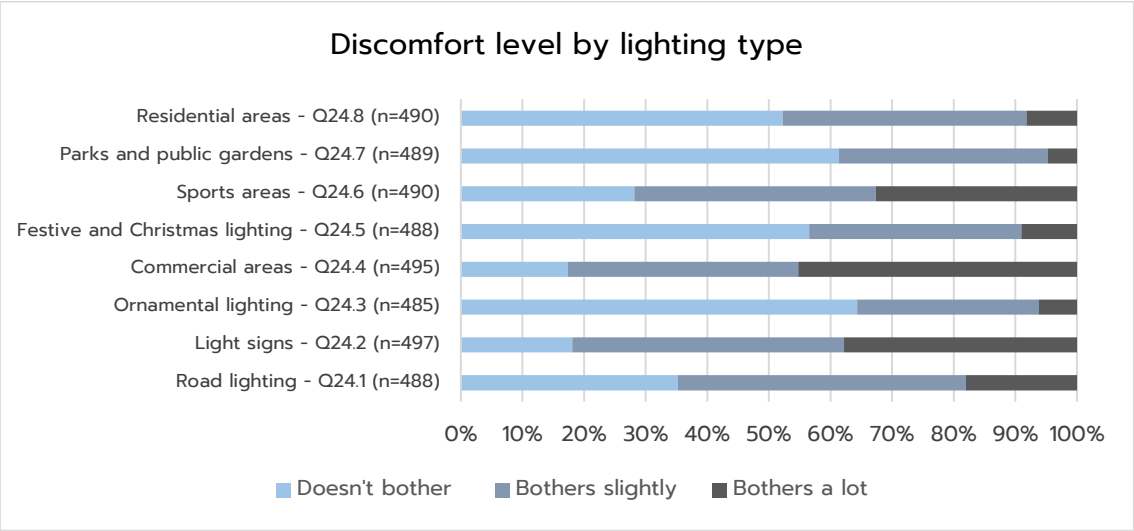


Figure H3 | Discomfort level reported by Santa Cruz respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

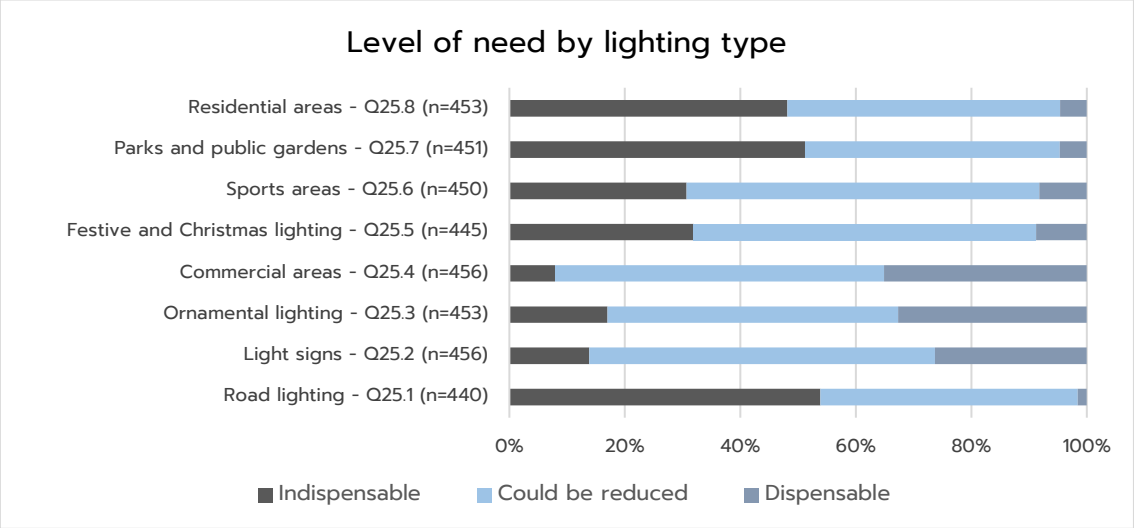


Figure H4 | Perceived necessity of different types of lighting by respondents from Santa Cruz. The horizontal bars represent percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

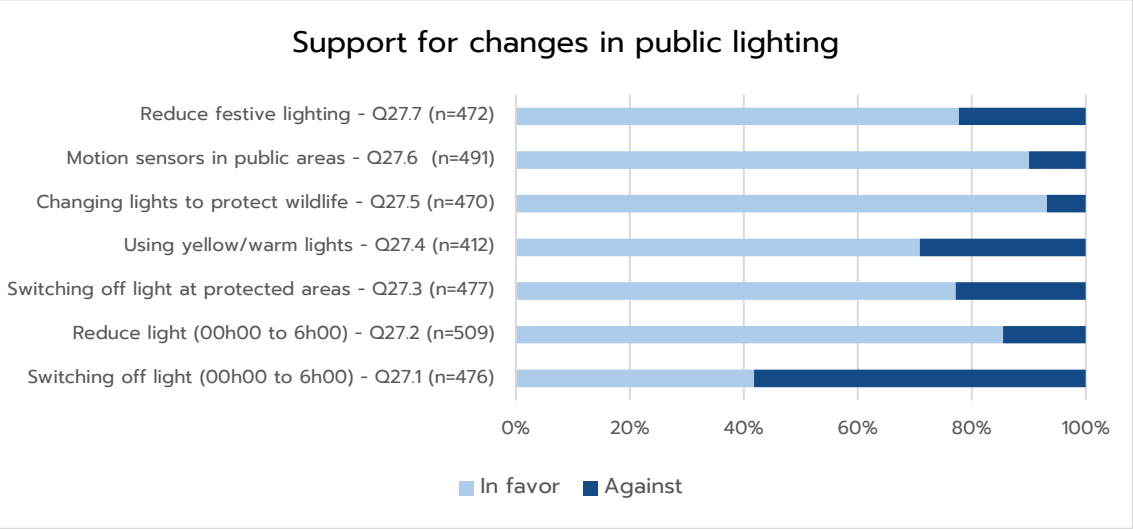


Figure H5 | Support for light pollution mitigation measures in public lighting reported by Santa Cruz respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

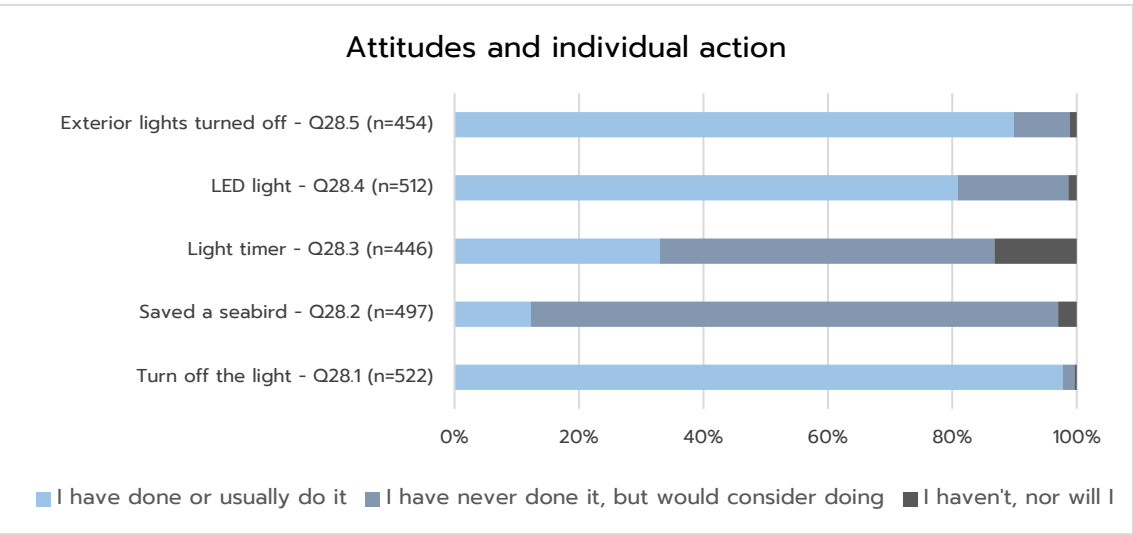


Figure H6 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents from Santa Cruz. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.

Sample characterization

Table I1 | Complementary results on sample characterization of Santana respondents.

	Question	Categories	Responses	n
Sample characterization	Q5 – Age	18 to 24 years old	14%	140
		25 to 34 years old	17%	
		35 to 44 years old	18%	
		45 to 54 years old	19%	
		55 to 64 years old	14%	
		≥ 65 years old	19%	
	Q7 – Education level	Basic school	29%	140
		High school	36%	
		Bachelor's degree	21%	
		Master's degree	11%	
		PhD	-	
		Other	4%	
	Q8 – Does your work schedule include night work?	Yes	20%	140
		No	80%	
	Q9 – Do you belong to any environmental association?	Yes	2%	140
		No	98%	
	Q10 – Do you usually observe the stars or participate in astronomical observations?	Yes, I'm astronomer	<1%	137
		I like to observe the stars regularly	15%	
		I like to watch the stars occasionally	32%	
		No, never	53%	
	Q11 – Do you do any of these other nocturnal activities in nature?	Nocturnal trails	7%	140
		Observation of nocturnal fauna	2%	
		No, none	88%	
		Other	3%	
	Q12 – How would you characterize your place of residence?	City	13%	138
		Village	9%	
		Small parish	25%	
		Rural area	52%	

Lighting characterization at the respondents' residence

Table I2 | Complementary results on characterization of lighting at respondent's residence for Santana respondents.

	Question	Categories	Responses	n
Characterization of lighting at respondent' s residence	Q13 – Assessment of night sky brightness using Bortle scale	8/9 – City sky/Inner city	8%	140
		7 – City/Suburbia transition	10%	
		6 – Bright suburban sky	17%	
		5 – Suburban sky	33%	
		4 – Suburban/Rural transition	14%	
		3 – Rural sky	7%	
		2 – Dark sky	4%	
		1 – Excellent dark sky	6%	
	Q14 – What is the strongest light source in your neighbourhood at night	Lights from my house	15%	131
		Lights from the neighbours	2%	
		Lights from local businesses	4%	
		Public lighting	74%	
		Traffic lights	4%	
		Other	2%	
	Q15 – Is it a permanent light source throughout the night?	Yes	76%	131
		No	21%	
		Intermittent	3%	
	Q16 – You think the level of lighting where you live is...	Insufficient	7%	140
		Good	85%	
		Excessive	8%	
		Other	-	

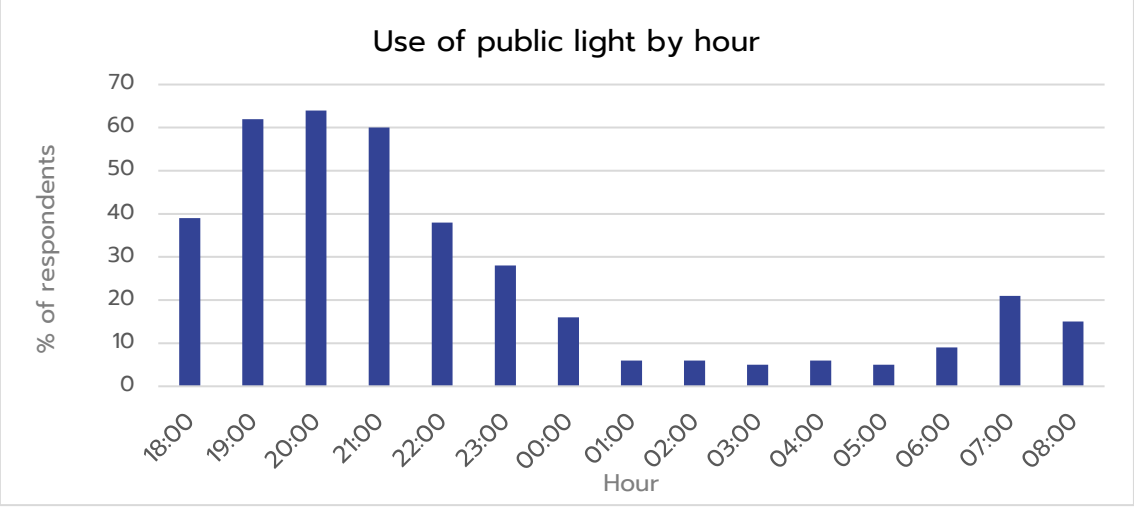


Figure I1 | Use of public lighting by hour, reported by Santana respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=112).

Perceptions on light pollution and ALAN

Table I3 | Complementary results on perceptions of light pollution and ALAN for Santana respondents.

	Question	Categories	Responses	n
Perceptions on light pollution and ALAN	Q18 – Have you ever heard of Light Pollution	Yes	63%	136
		No	37%	
	Q19 – Assessment of knowledge on definition of light pollution	Yes	75%	78
		Partial	19%	
		No	6%	
	Q21 – Do you know of any project/initiative that works on this issue?	Yes	13%	136
		No	87%	
	Q22 – Can you give an example of a project/initiative working on this issue?	Governmental	5%	18
		Academia/research	-	
		SPEA	67%	
		NGO	-	
		Astronomy	-	
		Environmental education	-	
		More than one	-	
		Unspecified	28%	

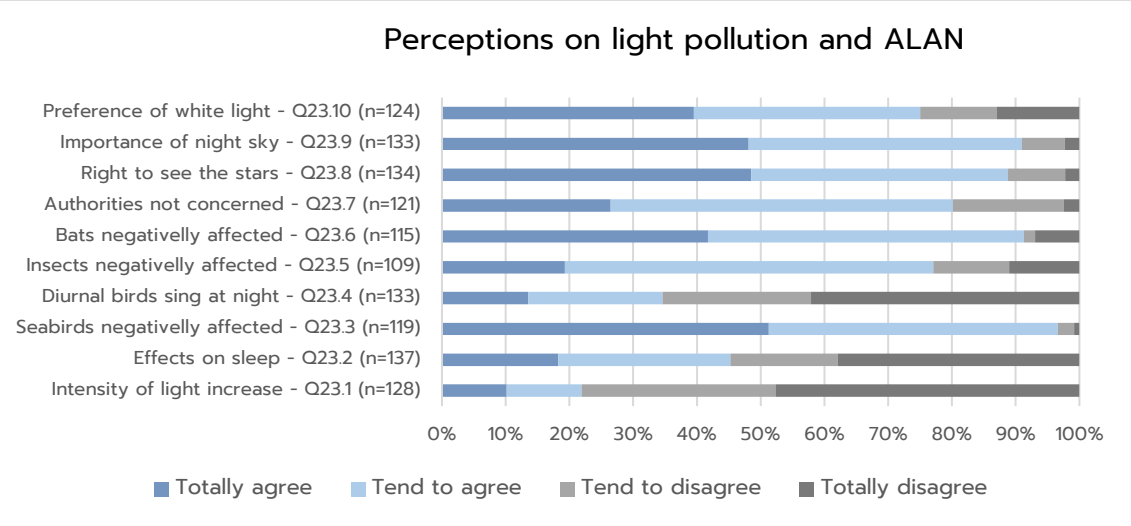


Figure I2 | Perceptions on light pollution and ALAN among respondents from Santana. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

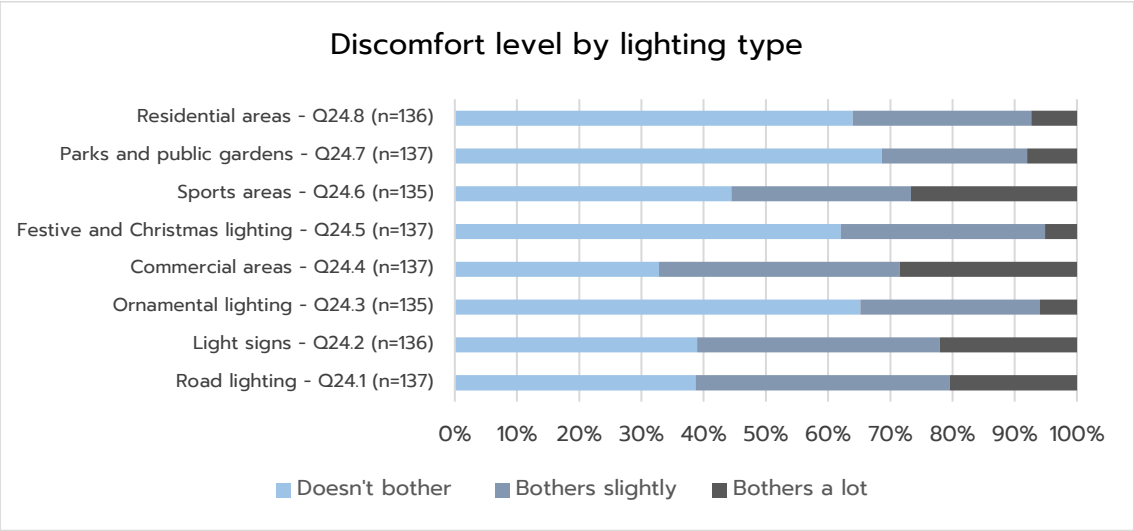


Figure I3 | Discomfort level reported by Santana respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

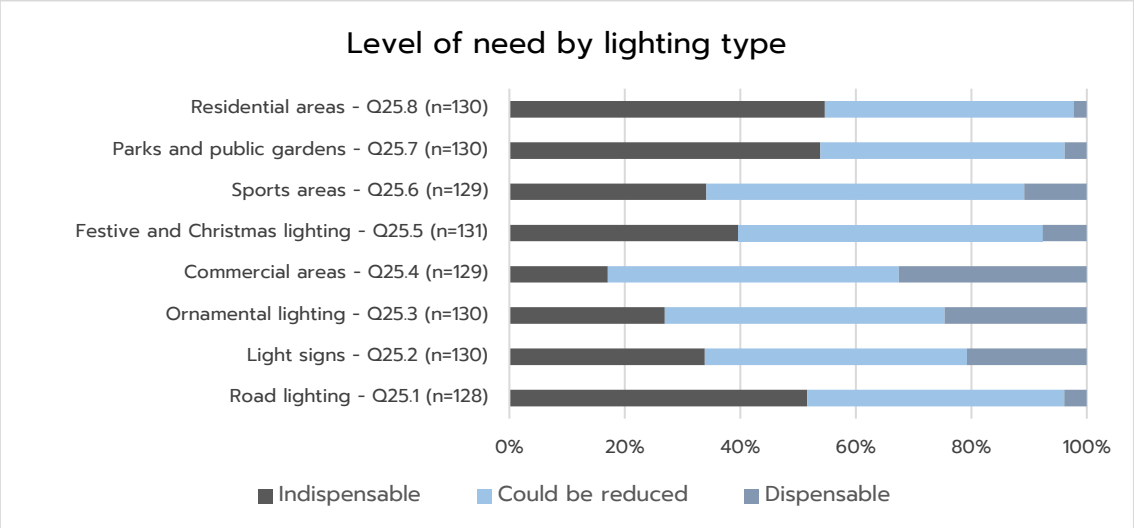


Figure I4 | Perceived necessity of different lighting types by respondents from Santana. The horizontal bars represent percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

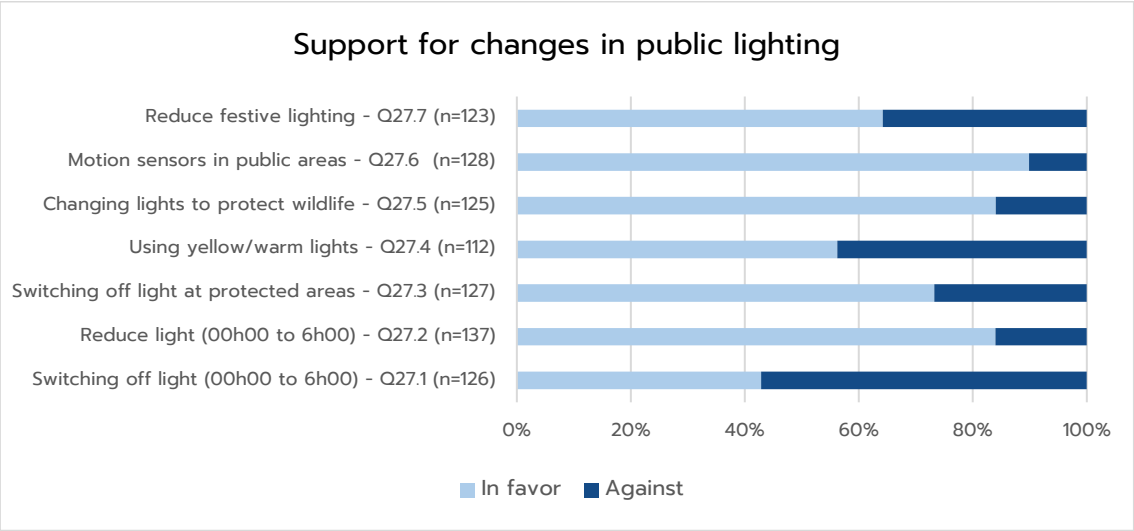


Figure I5 | Support for light pollution mitigation measures in public lighting reported by Santana respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

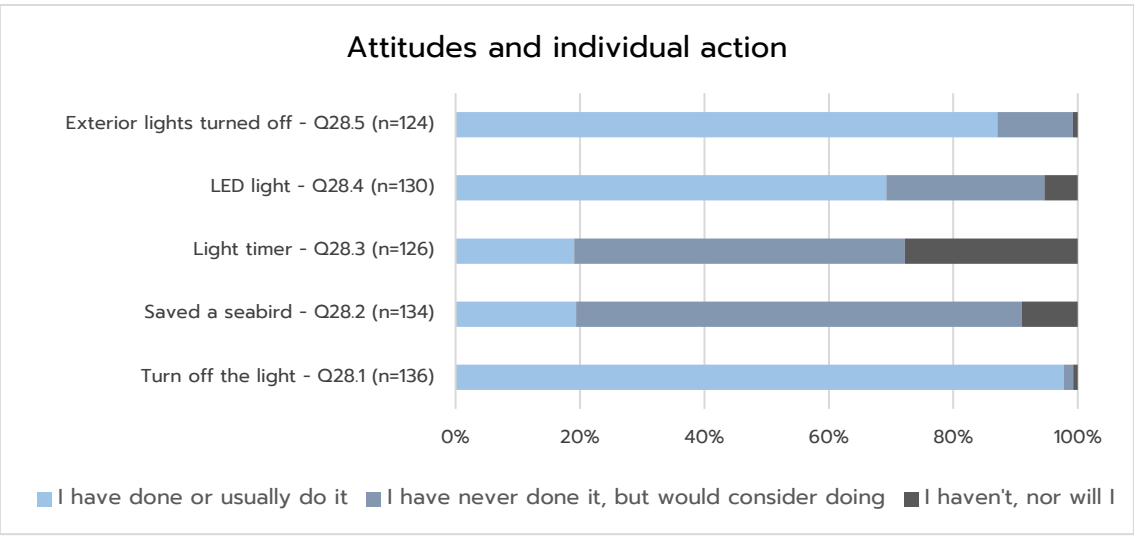


Figure I6 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents from Santana. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.

J – Buenavista del Norte complementary results

Sample characterization

Table J1 | Complementary results on sample characterization of Machico respondents.

	Question	Categories	Responses	n
Sample characterization	Q5 – Age	18 to 24 years old	10%	42
		25 to 34 years old	7%	
		35 to 44 years old	24%	
		45 to 54 years old	24%	
		55 to 64 years old	21%	
		≥ 65 years old	14%	
	Q7 – Education level	Basic school	12%	42
		High school	48%	
		Bachelor's degree	26%	
		Master's degree	5%	
		PhD	2%	
		Other	7%	
	Q8 – Does your work schedule include night work?	Yes	22%	40
		No	78%	
	Q9 – Do you belong to any environmental association?	Yes	7%	41
		No	93%	
	Q10 – Do you usually observe the stars or participate in astronomical observations?	Yes, I'm astronomer	-	42
		I like to observe the stars regularly	24%	
		I like to watch the stars occasionally	57%	
		No, never	19%	
	Q11 – Do you do any of these other nocturnal activities in nature?	Nocturnal trails	17%	42
		Observation of nocturnal fauna	7%	
		No, none	76%	
		Other	-	
	Q12 – How would you characterize your place of residence?	City	2%	41
		Village	20%	
		Small parish	61%	
		Rural area	17%	

Lighting characterization at the respondents' residence

Table J2 | Complementary results on characterization of lighting at respondent's residence for Buenavista del Norte respondents.

	Question	Categories	Responses	n
Characterization of lighting at respondent's residence	Q13 – Assessment of night sky brightness using Bortle scale	8/9 – City sky/Inner city	2%	41
		7 – City/Suburbia transition	7%	
		6 – Bright suburban sky	29%	
		5 – Suburban sky	33%	
		4 – Suburban/Rural transition	17%	
		3 – Rural sky	5%	
		2 – Dark sky	0%	
		1 – Excellent dark sky	7%	
	Q14 – What is the strongest light source in your neighbourhood at night	Lights from my house	2%	41
		Lights from the neighbours	5%	
		Lights from local businesses	-	
		Public lighting	90%	
		Traffic lights	-	
		Other	2%	
	Q15 – Is it a permanent light source throughout the night?	Yes	80%	41
		No	10%	
		Intermittent	10%	
	Q16 – You think the level of lighting where you live is...	Insufficient	24%	42
		Good	67%	
		Excessive	10%	
		Other	-	

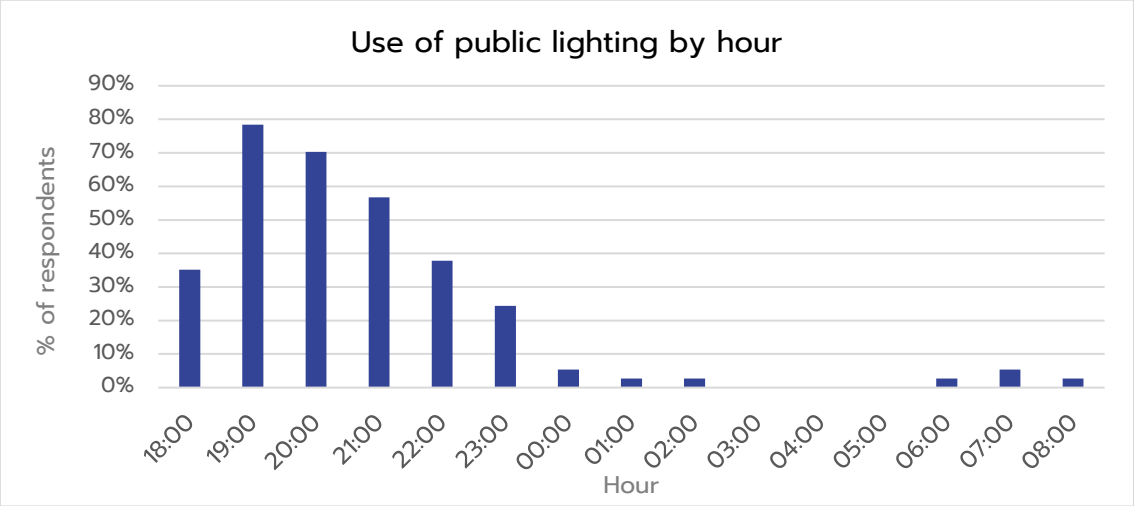


Figure J1 | Use of public lighting by hour, reported by Buenavista del Norte respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=37).

Perceptions on light pollution and ALAN

Table J3 | Complementary results on perceptions of light pollution and ALAN for Buenavista del Norte respondents.

	Question	Categories	Responses	n
Perceptions on light pollution and ALAN	Q18 – Have you ever heard of Light Pollution	Yes	88%	42
		No	12%	
	Q19 – Assessment of knowledge on definition of light pollution	Yes	77%	35
		Partial	23%	
		No	-	
	Q21 – Do you know of any project/initiative that works on this issue?	Yes	36%	39
		No	64%	
	Q22 – Can you give an example of a project/initiative working on this issue?	Governmental	-	11
		Academia/research	-	
		SEO	27%	
		NGO	18%	
		Astronomy	36%	
		Environmental education	9%	
		More than one	-	
		Unspecified	9%	

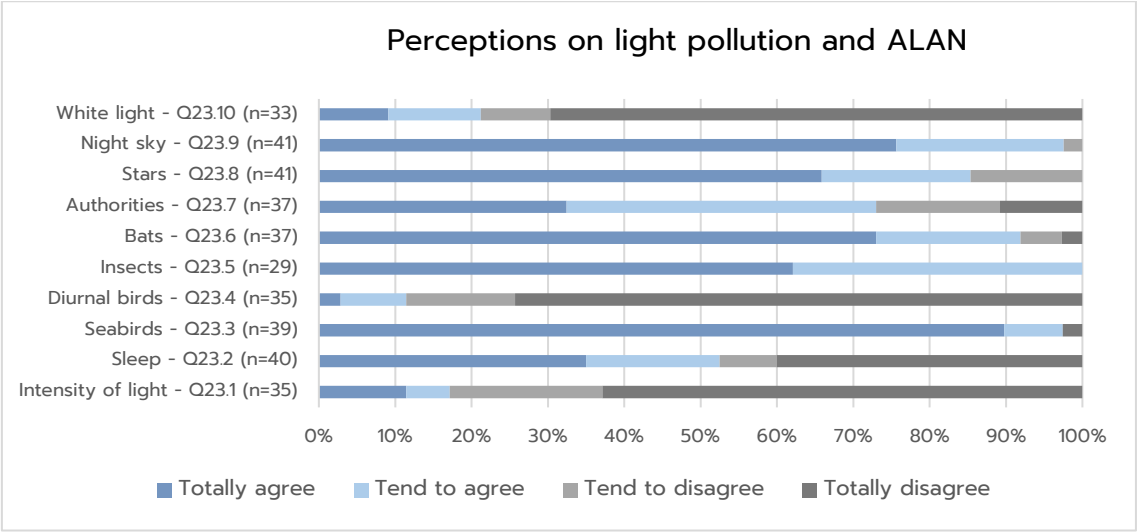


Figure J2 | Perceptions on light pollution and ALAN among respondents from Buenavista del Norte. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

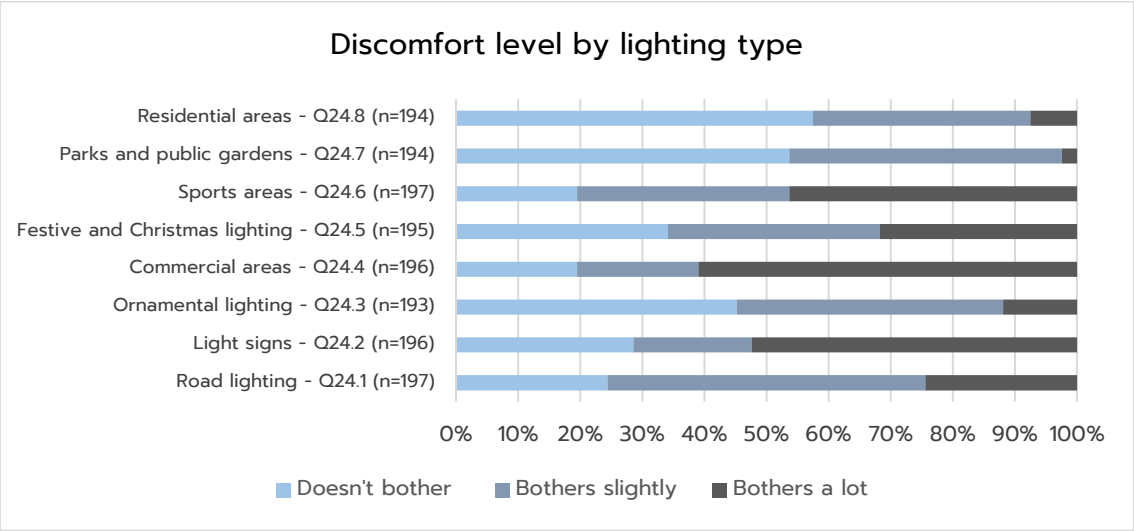


Figure J3 | Discomfort level reported by Buenavista del Norte respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

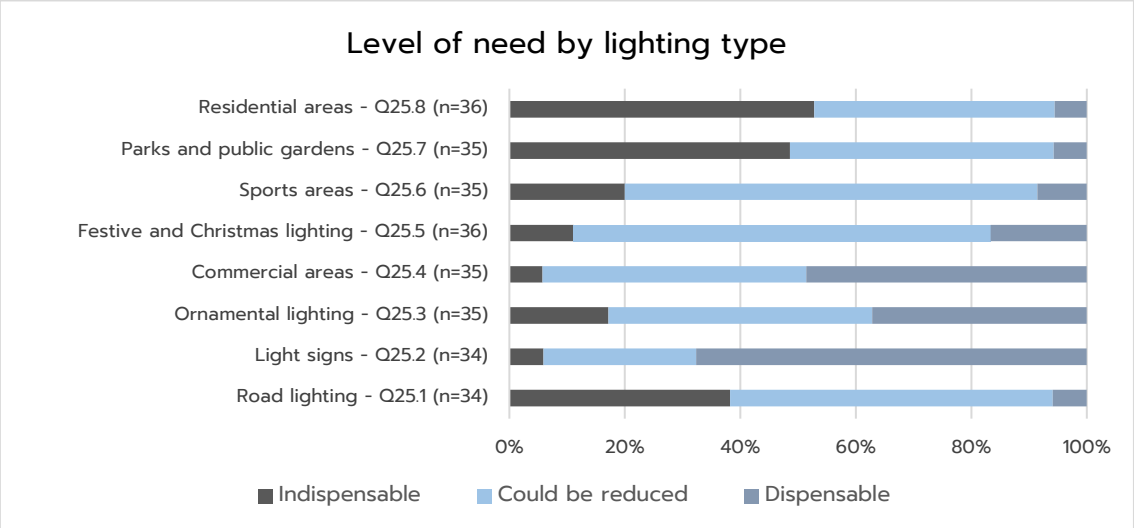


Figure J4 | Perceived necessity of different types of lighting by respondents from Buenavista del Norte. The horizontal bars represent percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

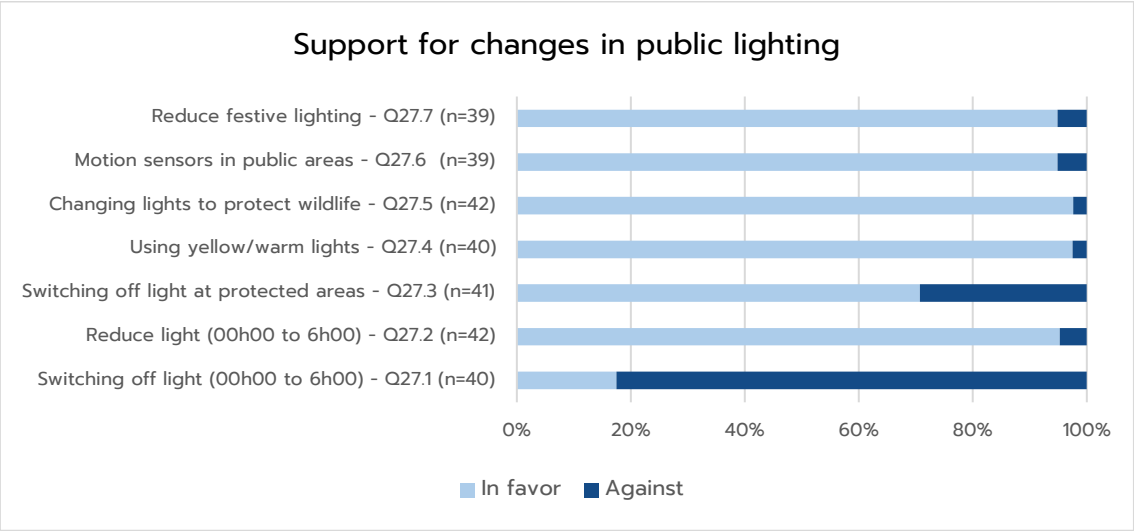


Figure J5 | Support for light pollution mitigation measures in public lighting reported by Buenavista del Norte respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

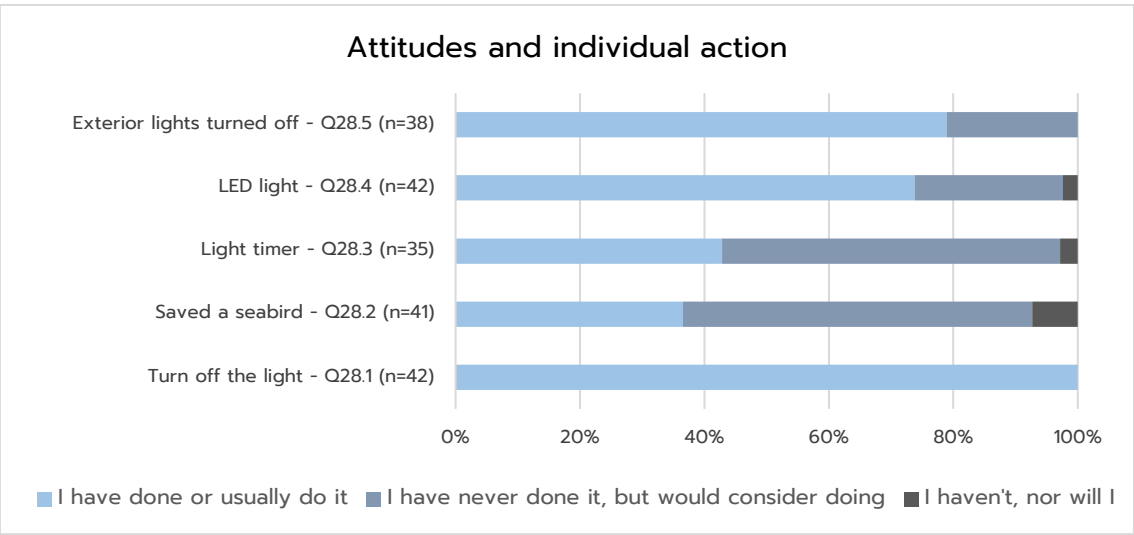


Figure J6 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents from Buenavista del Norte. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.

K – Mogán complementary results

Sample characterization

Table K1 | Complementary results on sample characterization of Mogán respondents.

	Question	Categories	Responses	n
Sample characterization	Q5 – Age	18 to 24 years old	12%	50
		25 to 34 years old	20%	
		35 to 44 years old	20%	
		45 to 54 years old	30%	
		55 to 64 years old	14%	
		≥ 65 years old	4%	
	Q7 – Education level	Basic school	4%	50
		High school	42%	
		Bachelor's degree	30%	
		Master's degree	12%	
		PhD	6%	
		Other	6%	
	Q8 – Does your work schedule include night work?	Yes	28%	50
		No	72%	
	Q9 – Do you belong to any environmental association?	Yes	10%	50
		No	90%	
	Q10 – Do you usually observe the stars or participate in astronomical observations?	Yes, I'm astronomer	2%	50
		I like to observe the stars regularly	28%	
		I like to watch the stars occasionally	56%	
		No, never	14%	
	Q11 – Do you do any of these other nocturnal activities in nature?	Nocturnal trails	22%	50
		Observation of nocturnal fauna	20%	
		No, none	64%	
		Other	2%	
	Q12 – How would you characterize your place of residence?	City	28%	50
		Village	48%	
		Small parish	20%	
		Rural area	4%	

Lighting characterization at the respondents' residence

Table K2 | Complementary results on characterization of lighting at respondent's residence for Mogán respondents.

	Question	Categories	Responses	n
Characterization of lighting at respondent' s residence	Q13 – Assessment of night sky brightness using Bortle scale	8/9 – City sky/Inner city	4%	50
		7 – City/Suburbia transition	14%	
		6 – Bright suburban sky	22%	
		5 – Suburban sky	32%	
		4 – Suburban/Rural transition	22%	
		3 – Rural sky	4%	
		2 – Dark sky	2%	
		1 – Excellent dark sky	0%	
	Q14 – What is the strongest light source in your neighbourhood at night	Lights from my house	-	23
		Lights from the neighbours	9%	
		Lights from local businesses	9%	
		Public lighting	70%	
		Traffic lights	-	
		Other	13%	
	Q15 – Is it a permanent light source throughout the night?	Yes	88%	24
		No	8%	
		Intermittent	4%	
	Q16 – You think the level of lighting where you live is...	Insufficient	4%	50
		Good	44%	
		Excessive	52%	
		Other	-	

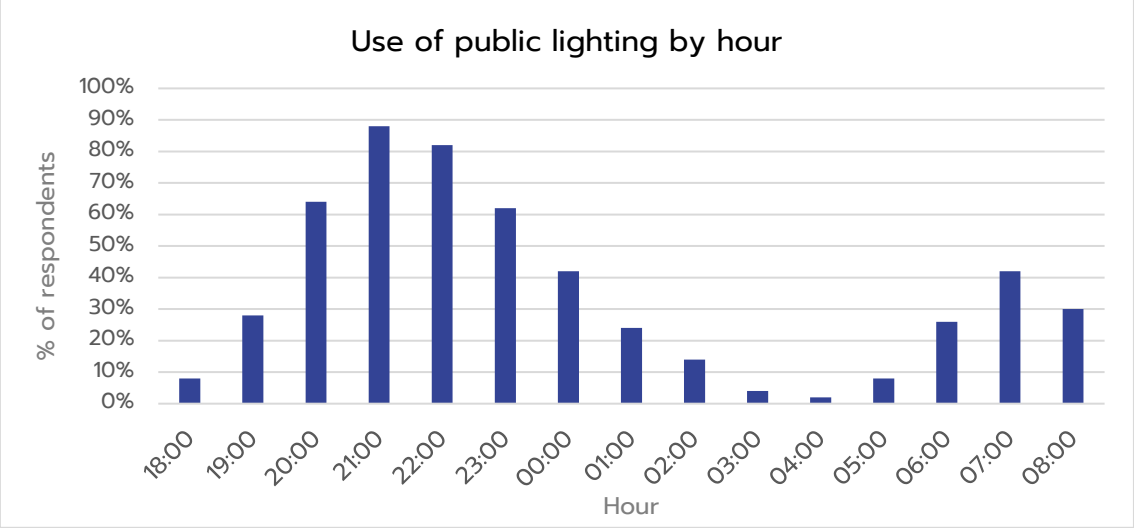


Figure K1 | Use of public lighting by hour, reported by Mogán respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=50).

Perceptions on light pollution and ALAN

Table K3 | Complementary results on perceptions of light pollution and ALAN for Mogán respondents.

	Question	Categories	Responses	n
Perceptions on light pollution and ALAN	Q18 – Have you ever heard of Light Pollution	Yes	84%	49
		No	16%	
	Q19 – Assessment of knowledge on definition of light pollution	Yes	88%	40
		Partial	10%	
		No	3%	
	Q21 – Do you know of any project/initiative that works on this issue?	Yes	31%	49
		No	69%	
	Q22 – Can you give an example of a project/initiative working on this issue?	Governmental	7%	14
		Academia/research	-	
		SEO	64%	
		NGO	-	
		Astronomy	14%	
		Environmental education	-	
		More than one	-	
		Unspecified	14%	

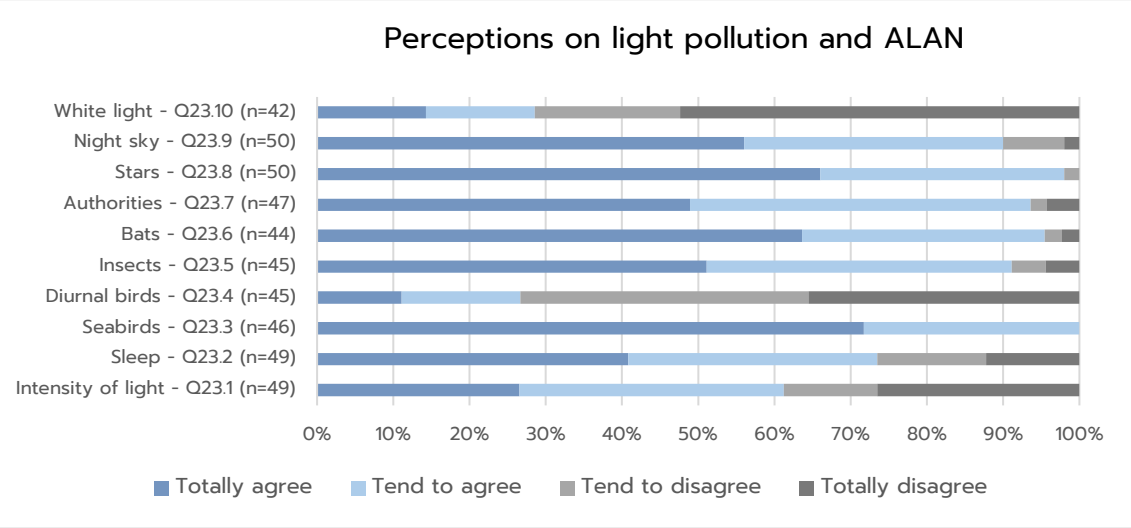


Figure K2 | Perceptions on light pollution and ALAN among respondents from Mogán. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

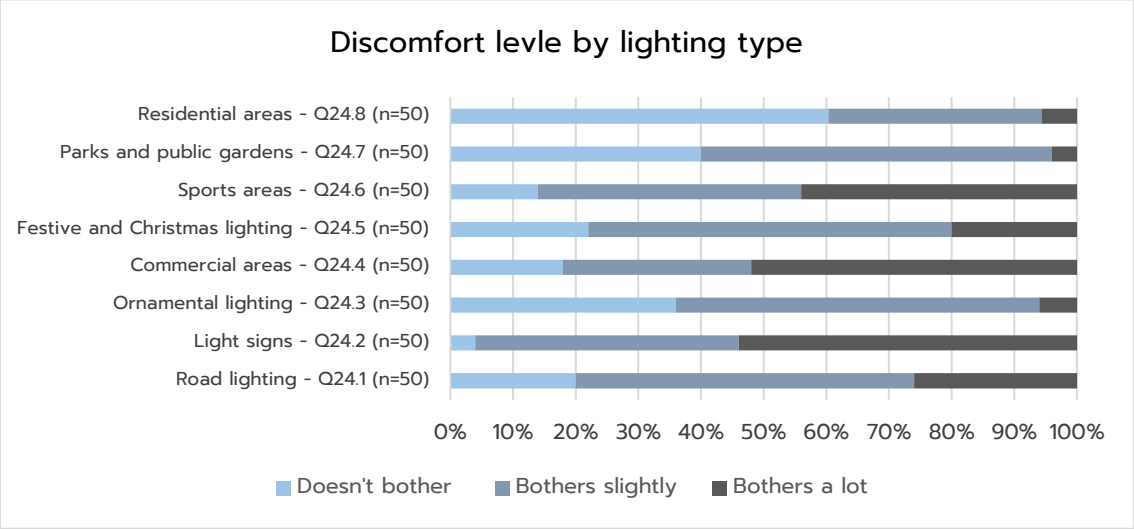


Figure K3 | Discomfort level reported by Mogán respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

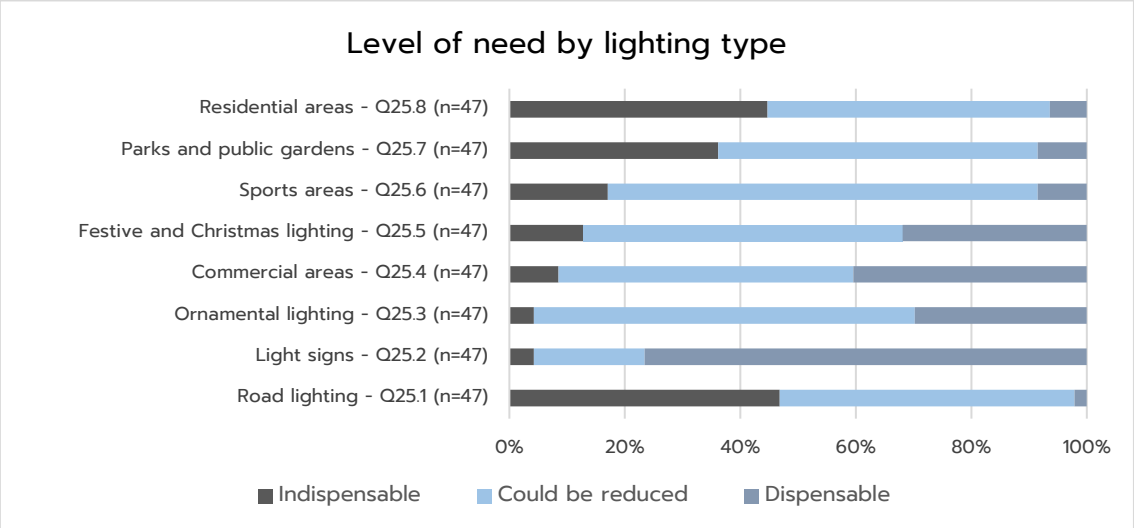


Figure K4 | Perceived necessity of different types of lighting by respondents from Mogán. The horizontal bars represent percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

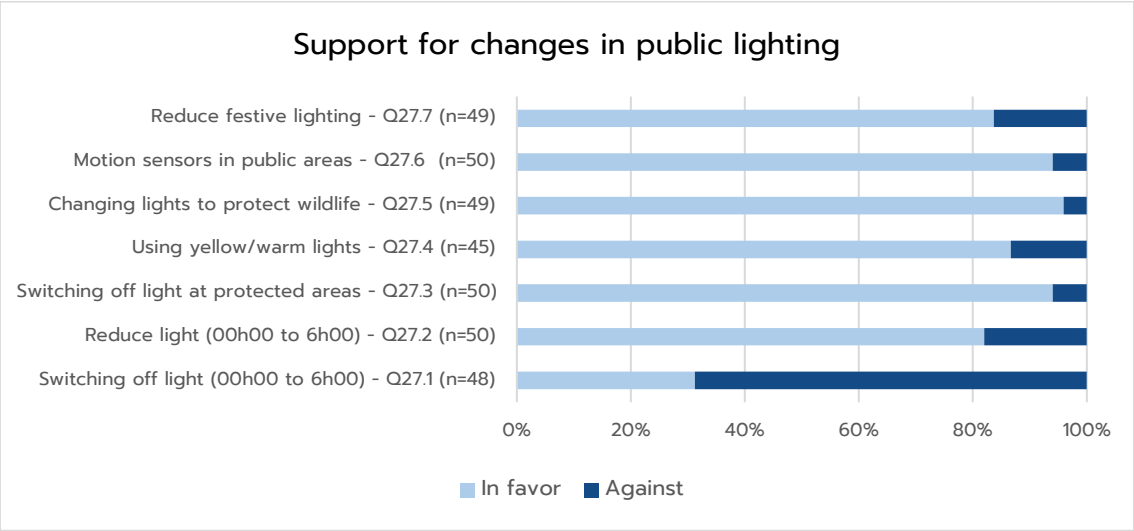


Figure K5 | Support for light pollution mitigation measures in public lighting reported by Mogán respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

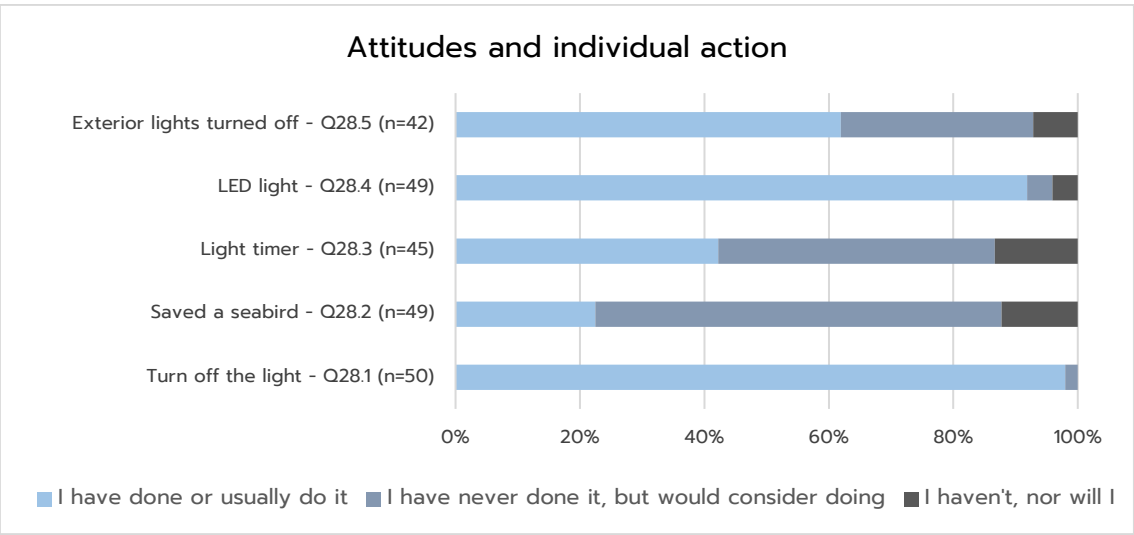


Figure K6 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents from Mogán. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.

L – Santa Cruz da Graciosa complementary results

Sample characterization

Table L1 | Complementary results on sample characterization of Santa Cruz da Graciosa respondents.

	Question	Categories	Responses	n
Sample characterization	Q5 – Age	18 to 24 years old	8%	64
		25 to 34 years old	28%	
		35 to 44 years old	28%	
		45 to 54 years old	17%	
		55 to 64 years old	14%	
		≥ 65 years old	5%	
	Q7 – Education level	Basic school	11%	64
		High school	48%	
		Bachelor's degree	34%	
		Master's degree	2%	
		PhD	2%	
		Other	3%	
	Q8 – Does your work schedule include night work?	Yes	16%	61
		No	84%	
	Q9 – Do you belong to any environmental association?	Yes	13%	63
		No	87%	
	Q10 – Do you usually observe the stars or participate in astronomical observations?	Yes, I'm astronomer	-	63
		I like to observe the stars regularly	16%	
		I like to watch the stars occasionally	49%	
		No, never	35%	
	Q11 – Do you do any of these other nocturnal activities in nature?	Nocturnal trails	8%	64
		Observation of nocturnal fauna	8%	
		No, none	86%	
		Other	2%	
	Q12 – How would you characterize your place of residence?	City	-	64
		Village	28%	
		Small parish	36%	
		Rural area	36%	

Lighting characterization at the respondents' residence

Table L2 | Complementary results on characterization of lighting at respondent's residence for Santa Cruz da Graciosa respondents.

	Question	Categories	Responses	n
Characterization of lighting at respondent's residence	Q13 – Assessment of night sky brightness using Bortle scale	8/9 – City sky/Inner city	2%	64
		7 – City/Suburbia transition	6%	
		6 – Bright suburban sky	8%	
		5 – Suburban sky	41%	
		4 – Suburban/Rural transition	28%	
		3 – Rural sky	5%	
		2 – Dark sky	6%	
		1 – Excellent dark sky	5%	
	Q14 – What is the strongest light source in your neighbourhood at night	Lights from my house	-	58
		Lights from the neighbours	-	
		Lights from local businesses	2%	
		Public lighting	95%	
		Traffic lights	3%	
		Other	-	
	Q15 – Is it a permanent light source throughout the night?	Yes	95%	57
		No	5%	
		Intermittent	-	
	Q16 – You think the level of lighting where you live is...	Insufficient	3%	64
		Good	81%	
		Excessive	16%	
		Other	-	

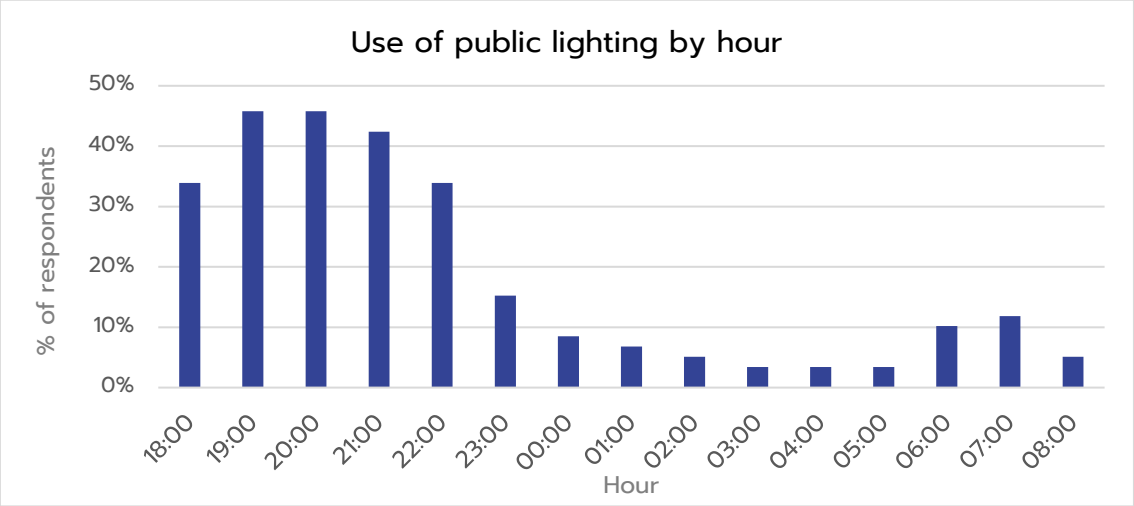


Figure L1 | Use of public lighting by hour, reported by Santa Cruz da Graciosa respondents, considering winter time, from 18:00 to 08:00. Vertical bars represent the percentage of respondents selecting each of the hours presented (n=59).

Perceptions on light pollution and ALAN

Table L3 | Complementary results on perceptions of light pollution and ALAN for Santa Cruz da Graciosa respondents.

	Question	Categories	Responses	n
Perceptions on light pollution and ALAN	Q18 – Have you ever heard of Light Pollution	Yes	70%	63
		No	30%	
	Q19 – Assessment of knowledge on definition of light pollution	Yes	85%	40
		Partial	13%	
		No	2%	
	Q21 – Do you know of any project/initiative that works on this issue?	Yes		
		No		
	Q22 – Can you give an example of a project/initiative working on this issue?	Governmental	27%	22
		Academia/research	-	
		SPEA	32%	
		NGO	-	
		Astronomy	-	
		Environmental education	-	
		More than one	14%	
		Unspecified	27%	

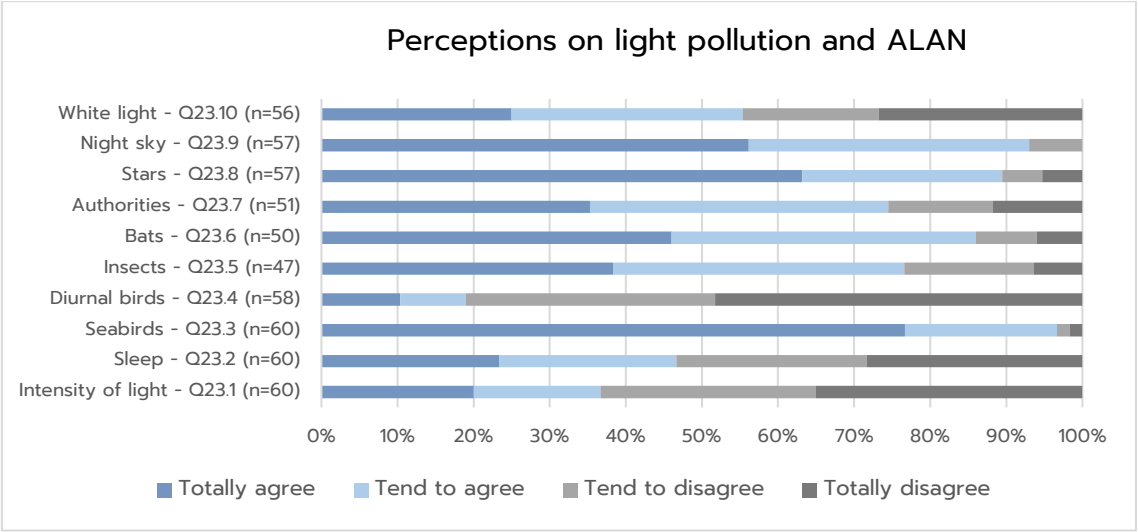


Figure L2 | Perceptions on light pollution and ALAN among respondents from Santa Cruz da Graciosa. Horizontal bars depict the percentages of responses corresponding to each statement, with "n" representing the total number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question in presented in Table 1.

Preferences regarding ALAN

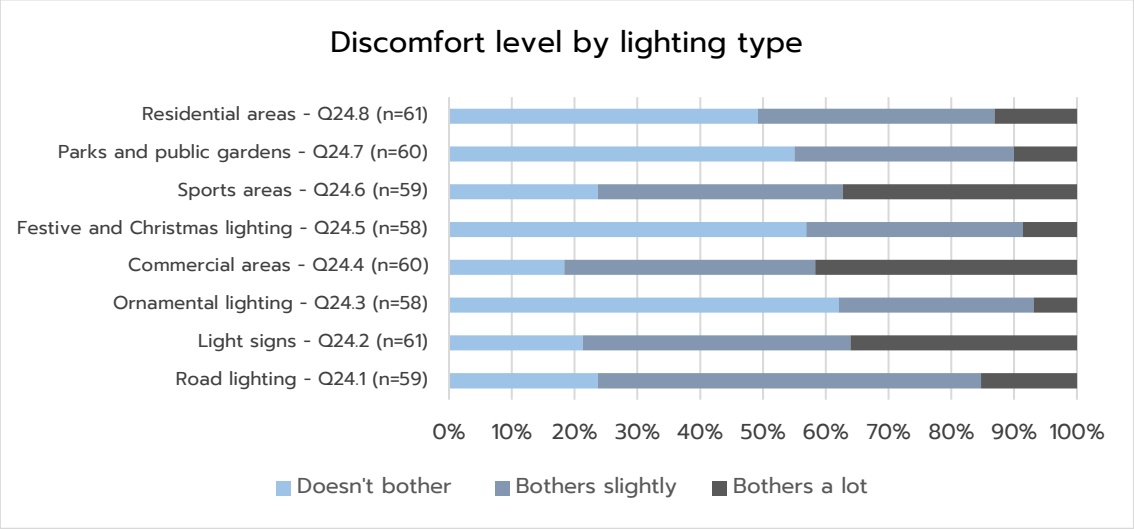


Figure L3 | Discomfort level reported by Santa Cruz da Graciosa respondents, by lighting type. The horizontal bars indicate the percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. The statements are represented by keywords and code numbers, and the fully phrased question (Q24) can be found in Table 1.

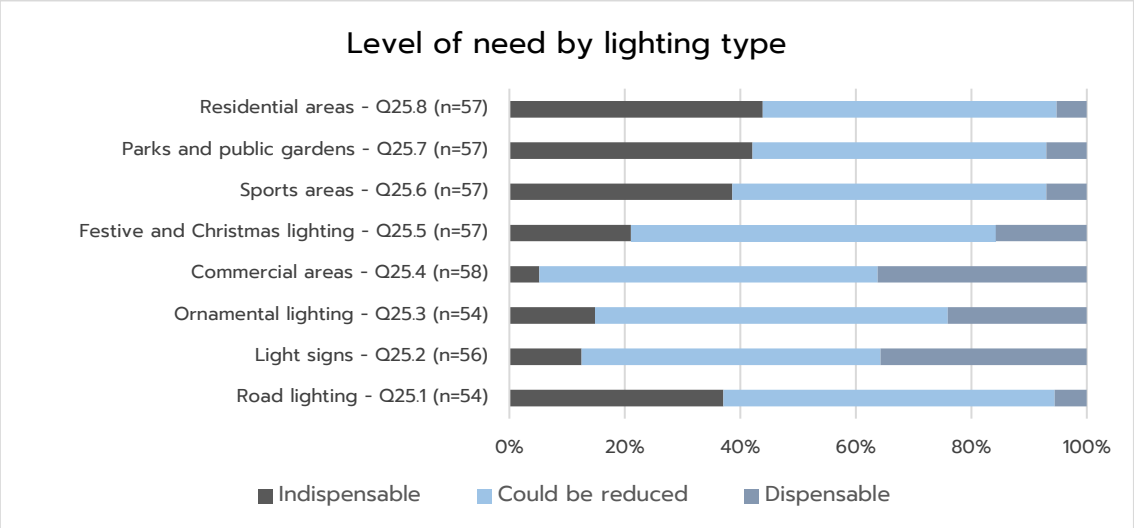


Figure L4 | Perceived necessity of different lighting types by respondents from Santa Cruz da Graciosa. The horizontal bars represent percentage distribution of answers for each type of light, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and the fully phrased question can be found in Table 1, question Q25.

Support for changes in public lighting

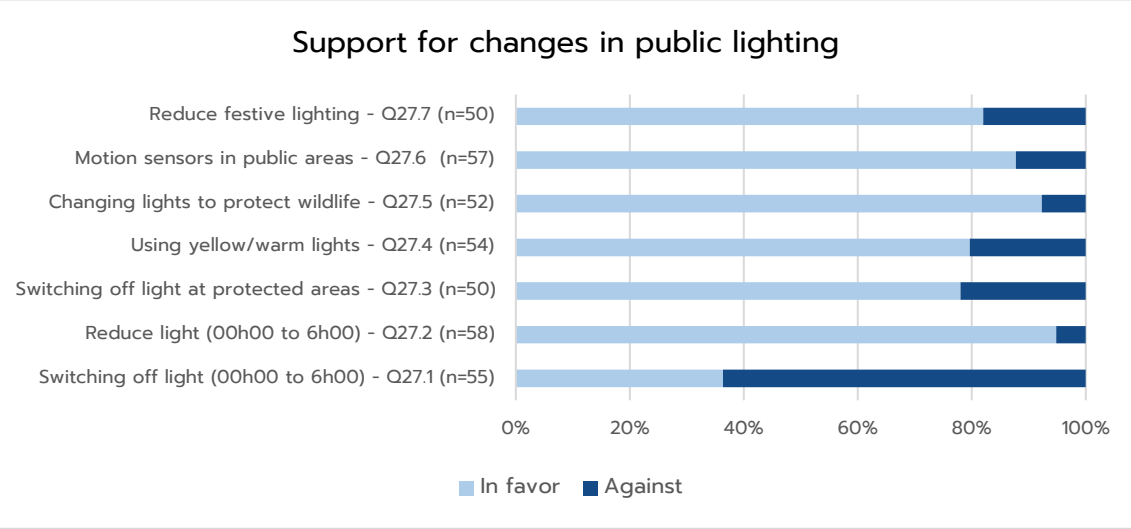


Figure L5 | Support for light pollution mitigation measures in public lighting reported by Santa Cruz da Graciosa respondents. The horizontal bars represent the distribution of responses, in percentage, for each measure, and "n" represents the number of respondents. Statements are represented by keywords and code numbers, and the fully phrased questions can be found in Table 1, question Q27.

Attitudes and individual action

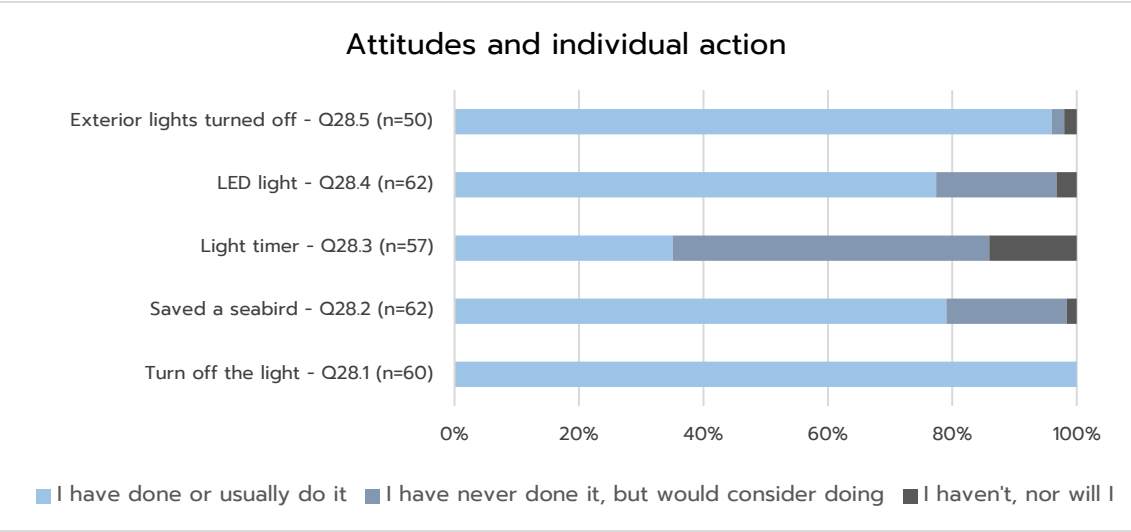


Figure L6 | Attitudes and individual actions to reduce effects of light pollution and improve energy efficiency, from respondents from Santa Cruz da Graciosa. Horizontal bars represent percentage distribution of responses for each lighting type, and "n" represents the number of respondents for each statement. Statements are represented by keywords and code numbers, and are fully phrased in Table 1, question Q28.