

Dear Colleague,

this survey is part of a wider research project: With "**Light Pollution - A Global Discussion**", we hope to gather **expert perspectives on the topic of "light pollution"** from around the world, and to initiate debates about possible solutions as well as trans-disciplinary collaborations.

Artificial lighting is used for many good reasons. These range from providing orientation and visibility in the dark to communicating information and creating atmospheres. Artificial illumination can, however, be perceived as excessive and have unwanted effects such as blocking the view of the stars or causing disturbance to humans, animals and ecosystems. These **negative effects are commonly described as "light pollution"**.

One goal of this survey is to better **understand where you, as an expert, draw the line between useful and excessive lighting**. In addition, we hope to gain an overview of ongoing initiatives in different countries, ranging from dark sky parks to governmental regulation.

Your answers to this survey will feed into a **book publication and a policy report for the German parliament**. They will also help set the agenda for a series of **group discussions among selected participants**. If you are interested in joining these discussions, please let us know at the end of this survey.

We thank you very much in advance for taking the time and for sharing your knowledge and opinions! **It will take you about 30 minutes to answer our questions**. We will ask you to share your expert opinions and to give us some background information about yourself. Your feedback will be treated with **strict confidentiality and analyzed in accordance with scientific standards and data protection regulations**.

☐ I agree and would like to continue

In this survey, we use the term “lighting” to refer to artificial lighting at night in outdoor spaces from all sorts of sources, including functional lighting, illuminated buildings and indoor lighting shining out.

To begin with, we would like to know more about your relation with lighting.

1. Which of the following area(s) best describe(s) your light-related activity or activities?

Please select **all activities that apply** (you can select more than one) and also indicate **in what form** and **for how long** you have engaged in the activity/activities that you have chosen.

☐ **Architectural and decorative lighting design (indoor/outdoor)**

☐ [In what form?] -

☐ [For how long?] -

☐ **Functional light planning (e.g. for streets and parking lots)**

☐ [In what form?] -

☐ [For how long?] -

☐ **Development of urban lighting concepts/master plans**

☐ [In what form?] -

☐ [For how long?] -

☐ **Light art/artistic work using light**

☐ [In what form?] -

☐ [For how long?] -

☐ **Marketing and/or sale of lighting products**

☐ [In what form?] -

☐ [For how long?] -

☐ **Lighting technology research and development**

☐ [In what form?] -

☐ [For how long?] -

☐ **Research on lighting (design, usage and/or effects)**

☐ [In what form?] -

☐ [For how long?] -

☐ **Environmental protection related to lighting**

☐ [In what form?] -

☐ [For how long?] -

☐ **Raising awareness for light pollution**

☐ [In what form?]

☐ [For how long?]

☐ **Politics related to lighting (in any form, at any level)**

☐ [In what form?]

☐ [For how long?]

☐ **Education related to lighting as professor/teacher**

☐ [In what form?]

☐ [For how long?]

☐ **Education related to lighting as student**

☐ [In what form?]

☐ [For how long?]

☐ **Other, please specify:**

☐ I don't know.

☐ None of the above.

2. Are you active in any groups, societies or associations that deal with lighting?

Please select the applicable category from the list below and specify the organization.

☐ **Light engineering/illuminating engineering organizations**

☐ CIE – International Commission on Illumination.

☐ IES – Illuminating Engineering Society

☐ SLL – Society of Light and Lighting

☐ Other light engineering organizations:

☐ **Lighting design organizations**

☐ IALD – International Association of Lighting Design

☐ LSF – Concepteurs Lumière sans Frontières

☐ Other lighting design organizations:

☐ **Dark sky organizations**

☐ IDA – International Dark-Sky Association

☐ IDA local/regional chapter:

☐ Starlight Initiative

☐ Other dark sky organizations:

☐ **Other environmental, scientific or civic organizations that deal with questions of lighting:**

☐ No, I am not active in any groups, societies or associations that deal with lighting.

3. Where do you carry out your light-related projects/activities?

Country 1:

Country 2:

Country 3:

Country 4:

Country 5:

In more than five countries. Please only specify where you are mainly active:

Which category applies best to the place(s) in which you carry out your main light-related activity?

☐ Urban area(s)

☐ Suburban area(s)

☐ Rural area(s)

☐ Other, please specify:

☐ I don't know.

Looking at lighting practices world-wide, we find that technological, political, economic and societal developments have an impact on how we illuminate our world at night. We have listed a number of trends below and would like to know:

4. To what extent do the following trends play a role in your light-related activitie(s)?

...independently of whether you choose to engage with them or they simply affect your work.

The introduction of LED lighting in outdoor spaces

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

The introduction of dynamic, digitally controlled and/or “smart” lighting systems

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

The provision of lighting infrastructures in areas that so far have none (reduction of “light poverty”)

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

Energy saving strategies (for financial savings and/or climate change mitigation)

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

New regulations for lighting and lighting products

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

Increasing facade lighting (including media facades and architectural illuminations)

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

Increasing awareness of light pollution

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

Increase in integrated/holistic urban light planning (including master plans)

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

Encouragement of night-time tourism/economy (including light festivals)

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

Encouragement of dark-sky tourism (e.g. to dark sky parks)

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

Other, please specify:

no role at all ☐ ☐ ☐ ☐ ☐ very big role ☐ I don't know ☐

5. When did you first hear of the concept of light pollution?

Please **first** tick the box and then choose the period of time, if applicable.

- ☐ Just now, through this survey
- ☐ [Please choose period of time] -
- ☐ I don't know.

**6. Was there anything in particular that brought the topic to your awareness?
(e.g. a specific event, project, item of information, personal experience or research)**

If yes, please specify:

7. On a very general level, what is your personal opinion regarding light pollution?

Please choose the statement that best reflects your personal view on this issue.

- ☐ Outdoor lighting is never pollution.
- ☐ All outdoor lighting after dark is a form of pollution.
- ☐ Whether outdoor lighting after dark is pollution or not depends on the situation.
- ☐ I don't know.

8. In which situations do you consider lighting as pollution?

Please choose all statements with which you agree. If you find the list incomplete, you may add more arguments at the end of the list.

Lighting is pollution when...

- ☐ light enters areas where it is unwanted.
- ☐ it produces glare.
- ☐ it obscures the visibility of the stars.
- ☐ it is colorful.
- ☐ it is moving or blinking.
- ☐ the color temperature of the light is above [Please choose Kelvin] .
- ☐ light sources are strong in the blue spectrum.
- ☐ lights are installed close to bodies of water.
- ☐ lights are installed in natural areas.
- ☐ lights are installed close to observatories.
- ☐ nobody is around to use the light.
- ☐ Other, please specify:

-
- ☐ I don't know.

In public discourses, light pollution is associated with numerous problematic issues.

9. In your opinion, why should light pollution be reduced? Please indicate how important you find the following issues.

People cannot experience natural darkness and star-filled skies

not at all
important

☐
☐
☐
☐
☐

very
important

I doubt this is
an issue

☐

I don't know

☐

People's sleep is negatively affected

not at all
important

☐
☐
☐
☐
☐

very
important

I doubt this is
an issue

☐

I don't know

☐

People are endangered due to glare/distraction

not at all
important

☐
☐
☐
☐
☐

very
important

I doubt this is
an issue

☐

I don't know

☐

Animals are negatively affected

not at all
important

☐
☐
☐
☐
☐

very
important

I doubt this is
an issue

☐

I don't know

☐

People are not aware that lighting can have negative effects.

not at all
relevant

☐
☐
☐
☐
☐

very relevant

I don't know

☐

It is hard to define when lighting is pollution.

not at all
relevant

☐
☐
☐
☐
☐

very relevant

I don't know

☐

Light-emitting diodes (LEDs) are introduced without consideration of negative side-effects.

not at all
relevant

☐
☐
☐
☐
☐

very relevant

I don't know

☐

Ecosystems are negatively affected

not at all
important

☐☐☐☐☐

very
important

I doubt this is
an issue

☐

I don't know

☐

Waste of energy

not at all
important

☐☐☐☐☐

very
important

I doubt this is
an issue

☐

I don't know

☐

Others, please specify:

not at all
important

☐☐☐☐☐

very
important

I doubt this is
an issue

☐

I don't know

☐

10. Based on your experience, can you give an example of a situation in which a person or group publicly complained about lighting causing pollution?

If there is an internet link or a documentation of the case, please share the keywords or source with us. This will help us share knowledge on a global scale.

Yes, I can give an example:

☐

☐ No, I cannot give an example.

In recent years, individuals, governments, professional or civic groups have taken a variety of measures to avoid or reduce light pollution.

11. To which extent would you recommend the following measures to avoid/reduce light pollution?

Use lighting concepts/integrated light planning

not at all ☐ ☐ ☐ ☐ ☐ ☐ very strongly | I don't know ☐

Apply more adequate technology

not at all ☐ ☐ ☐ ☐ ☐ ☐ very strongly | I don't know ☐

Promote best practice lighting projects, e.g. in municipalities

not at all ☐ ☐ ☐ ☐ ☐ ☐ very strongly | I don't know ☐

Improve voluntary standards for lighting applications and products

not at all ☐ ☐ ☐ ☐ ☐ ☐ very strongly | I don't know ☐

Create binding regulations and legal frameworks

not at all ☐ ☐ ☐ ☐ ☐ ☐ very strongly | I don't know ☐

Educate light planners and lighting designers

not at all ☐ ☐ ☐ ☐ ☐ ☐ very strongly | I don't know ☐

Educate and inform end users

not at all ☐ ☐ ☐ ☐ ☐ ☐ very strongly ☐ I don't know ☐

Allow more people to experience naturally dark nights (e.g. in dark sky parks)

not at all ☐ ☐ ☐ ☐ ☐ ☐ very strongly ☐ I don't know ☐

Other, please specify:

not at all ☐ ☐ ☐ ☐ ☐ ☐ very strongly ☐ I don't know ☐

12. Would you like to offer a short explanation for why you find specific measures more recommendable than others?

If yes, please specify:

Another open question is: Who is responsible for avoiding or reducing light pollution?

13. In your opinion, to which degree are the following actor groups responsible for avoiding or reducing light pollution?

Politicians and public administrations

not at all responsible ☐ ☐ ☐ ☐ ☐ ☐ very much responsible ☐ I don't know ☐

Standardization committees

not at all responsible ☐ ☐ ☐ ☐ ☐ ☐ very much responsible ☐ I don't know ☐

Lighting designers/planners

not at all responsible ☐ ☐ ☐ ☐ ☐ very much responsible | I don't know ☐

Lighting manufacturers

not at all responsible ☐ ☐ ☐ ☐ ☐ very much responsible | I don't know ☐

Individual consumers

not at all responsible ☐ ☐ ☐ ☐ ☐ very much responsible | I don't know ☐

Others, please specify:

not at all responsible ☐ ☐ ☐ ☐ ☐ very much responsible | I don't know ☐

14. Can you give an example of a lighting application that avoids or reduces light pollution in an ideal way?

If there is an internet link or documentation of the case, please share the keywords or source with us. This will help us share knowledge on a global scale.

Yes, an ideal example is...

☐

☐ I cannot give an example.

15. In your light-related activity, do you actively take precautions/action to avoid or reduce light pollution?

If yes, please specify:

☐

☐ No, I don't.

☐ I don't know.

16. Based on your experience, when do demands for lighting clash with the aim to prevent light pollution?

Such conflicting interests occur when...

☐

☐ I have not experienced such conflicting interests.

☐ I don't know.

The following statements give possible reasons for why it may be difficult to avoid or reduce light pollution in practice. We are interested in your judgement regarding these potential obstacles.

17. Based on your experience, how relevant are the following potential obstacles to avoiding/reducing light pollution in practice?

Avoiding/reducing light pollution raises concerns about public safety.

not at all
relevant

☐
☐
☐
☐
☐

very relevant

I don't know

☐

In lighting projects, efforts to avoid/reduce light pollution are low on the priority list.

not at all
relevant

☐
☐
☐
☐
☐

very relevant

I don't know

☐

Avoiding/reducing light pollution means higher investment costs.

not at all
relevant

☐☐☐☐☐

very relevant

I don't know

☐

Lighting manufacturers do not offer the right products for avoiding/reducing light pollution.

not at all
relevant

☐☐☐☐☐

very relevant

I don't know

☐

Existing lighting standards make it difficult to avoid/reduce light pollution.

not at all
relevant

☐☐☐☐☐

very relevant

I don't know

☐

People are not aware that lighting can have negative effects.

not at all
relevant

☐☐☐☐☐

very relevant

I don't know

☐

It is hard to define when lighting is pollution.

not at all
relevant

☐☐☐☐☐

very relevant

I don't know

☐

Light-emitting diodes (LEDs) are introduced without consideration of negative side-effects.

not at all
relevant

☐☐☐☐☐

very relevant

I don't know

☐

Your own statement:

not at all
relevant

☐☐☐☐☐

very relevant

I don't know

☐

With regard to light pollution, LEDs (light-emitting diodes) are discussed as an ambivalent innovation.

18. How do you see the relationship between LED lighting and light pollution?

This can regard aspects such as the LED spectrum, the light distribution of LED sources, illumination levels, and dynamic options such as dimming or sensor-based solutions. You can choose both options (more and less).

☐

It contributes to **more light pollution**. Please specify:

☐

It contributes to **less light pollution**. Please specify:

☐

LED lighting does not make a difference regarding light pollution.

☐

I don't know.

It is frequently suggested that using “the right light at the right place at the right time” can help avoid light pollution.

19. Do you have a vision for how to achieve the ideal of “the right light at the right place at the right time” that you would like to share with us?

Yes, my vision is:

☐

☐

I don't have a vision.

☐

I don't know.

We are nearly at the end. But before we ask you a few final questions about yourself, please let us know:

20. Is there anything you would like to add on the topic of light pollution?

If yes, please specify:

21. Are there any questions or aspects that should, in your opinion, be discussed in more detail (e.g. in our upcoming series of thematic expert discussions)?

If yes, please specify:

To conclude, we have a few personal questions that will help us interpret the results of this questionnaire.

22. Where do you currently live?

Postal code:

Country:

Which category applies best to your place of residence?

☐ Urban area

☐ Suburban area

☐ Rural area

☐ Other, please specify:

☐ I don't know.

23. If you think of nighttime in your everyday surroundings, how would you describe the situation during cloudless, clear nights?

Please choose the statements that best describe the situation as you experience it.

☐ I can see the Milky Way and many stars.

☐ I can see some stars, but not the Milky Way.

☐ I can't see any stars.

☐ I don't know.

24. Which of the initially mentioned light-related activities is your main occupation/your job?

☐ My main occupation/job is: [Please choose an activity]

☐ None of the above, my main occupation/job is:

☐ Other, please specify:

25. What did you study or learn in your professional training?

If you have learned or studied more than one profession, please choose the area and discipline that is most relevant for your light-related activity.

26. In which year were you born?

[Please choose year]

27. Are you...?

☐ Female

☐ Male

☐ Other

We plan to invite some participants of this survey to take part in our expert group discussions. We also offer you to inform you about the outcomes of this study. Are you interested?

If you are interested, please indicate your name and your e-mail address. This information is optional. If you choose to share your name and contact information, we will treat this information as strictly confidential. Your contact details will be used exclusively for recruiting participants for our expert discussions and for sending you information on our publications. They will NOT affect the results of this survey.

☐ **I would be interested in participating in one of the group discussions.**

☐ My name is:

☐ My Email is:

☐ **I would like to receive further information about the project.**

☐ My name is (if not already indicated):

☐ My Email is (if not already indicated):

☐ No, thank you.

If you have any further comments on this survey or project, please feel free to share your thoughts here:

Again, we thank you very much for your time and participation!

**With the best of wishes,
Etta Dannemann, Josiane Meier and Nona Schulte-Römer**