

APRIL 2024

## LIGHT POLLUTION

- Artificial light at night has expanded and intensified over past decades, and recent advances in LED technology have accelerated those trends.
- Light pollution severely disrupts nocturnal ecosystems, interferes with the natural rhythms of plants and animals, mars the wilderness experience and landscape beauty, carries risks to human health and safety, and wastes energy.
- Individuals, institutions, and governments should take actions to limit light pollution, including changing light bulbs and fixtures; adopting measures governing development around biodiversity and protected areas; and creating and promoting dark-sky areas.

### What is the issue?

Light pollution is the human-made alteration of outdoor light levels from those occurring naturally. In practical terms, **light pollution is the presence of unwanted, inappropriate, or excessive artificial lighting.**

Light pollution can have a number of negative impacts, from disturbing migrating birds and newly hatched sea turtles to marring wilderness experience and landscape beauty. It can also pose risks to human health.

Despite a burgeoning awareness of light pollution and its effects, and the growing number of dark-sky places, the overall situation is getting worse. **According to a [2023 study published in Science magazine](#), the number of stars visible in the night sky decreased between 7-10% per year from 2011 to 2022.** That means that a location with 250 visible stars in 2011 would have seen a reduction to 100 visible stars over a decade.

Several factors account for the increasing light pollution.

Rural and suburban development continues apace in many countries. Alongside population growth, citizens understandably seek higher standards of living, resulting in more roads, houses, shopping plazas, and street lighting.

The type of lighting in use has also changed. LED lighting makes it very cheap to have more light – and brighter light – than ever before. Coupled with the false assumption that more light is better, homeowners and property managers are rapidly



*Rural and suburban development, coupled with brighter LED lighting, has led to an increase in light pollution across the globe. (Aaron Crowe/Flickr)*

increasing the quantity of light emitted outdoors. While the energy savings and long-term reliability of LED lights are positive attributes, there is less public awareness of limiting the luminance and spectrum of whatever lighting system is used, and to use shielding to reduce glare and light trespass onto neighbouring properties.

**According to DarkSky International, an organisation that advocates for limits on light pollution, one-third of all light in developed countries is wasted by poorly directed or unshielded lamps.**

### Why is this important?

Light pollution interferes with predator/prey relationships and plant phenology; disorients migrating birds and newly hatched sea turtles, among other species; and attracts insects to artificial lights so they more easily become prey to birds, and more.

Animals may experience temporal confusion when there is too much artificial light at night, affecting behaviour governing mating, sleep, finding food, and, of course, avoiding becoming food. Excessive artificial light can also interfere with the symbiosis that is critical to plant pollination and reproduction, and can negatively impact amphibians' foraging and reproduction habits. **Cumulatively, light pollution threatens to disrupt the functioning of ecosystems and the benefits they provide to people.**

Light pollution also interferes with amateur and research astronomy, mars wilderness experience and landscape beauty, carries risks to human health and safety, and wastes energy. Perhaps most importantly to people, it takes away the enjoyment and awe of the immensity of space, and the spiritual experience of discovering our place in the immensity of nature.

Many traditional societies incorporate features and rhythms of the night sky into their culture and seasonal practices. For example, New Zealand's Māori people consider astronomical knowledge to be a special treasure important for many aspects of society, from spiritual practices to the growing of crops, fishing and navigation, telling the time and changes in season. Even in contemporary times around the world, the cycles of the Moon, planets, meteor showers, and other celestial phenomena form a major part of social customs and story-telling. The structures of many archaeological sites reflect this importance.

Artificial light that serves no purpose is also a waste of money and energy. Reducing light pollution therefore also **benefits energy consumers financially, and helps mitigate climate change by reducing the emissions associated with energy production.**

## What can be done?

Unlike environmental challenges like climate change, species extinction, and habitat destruction, which require significant top-down responses, **meaningful action can be taken from the bottom up to address light pollution.** As much as governments can implement policies to limit light pollution – countries like France, Slovenia, and Croatia already have laws to this effect – individual homeowners can make a difference by doing as little as changing light bulbs and fixtures.

Individuals, institutions, and governments should follow the principles below to adopt nature-friendly outdoor lighting.

- **Need:** Use light only where needed. Consider how the use of light will impact the area, including wildlife interactions and habitats. Rather than permanent lights, use reflective paint or self-

luminous markers for signs, curbs, and steps. Outdoor lighting should not be used for aesthetic purposes.

- **Brightness:** Use the least amount of light needed for the activity taking place. Be aware of surface conditions as some surfaces reflect more light into the sky.
- **Colour:** Minimise blue and violet spectral components, i.e. use warm-white, yellow, or amber light. This aids night vision by all animals, including people.
- **Shielding:** Use shielding so that light does not spill beyond where it is needed. To reduce skyglow, do not use luminaires that project any light above the horizontal. Reduce glare by restricting beams to downward cones. This improves the ability of drivers and pedestrians to see into shadows.
- **Timing:** Use light only when needed. Turn lights off after use, or use active controls such as timers and motion detectors so that lights are on only when needed.
- **Encourage neighbours** to reduce their light pollution by observing these principles, especially to reduce glare and light trespass into your domain.

There is also a burgeoning world movement to establish “dark-sky places”. These are areas independently certified to have a management plan to minimise light pollution; have night skies below a certain level of skyglow; host public engagement and outreach activities related to the night; support ecological integrity; and engage with local and regional citizens, companies, and management agencies to foster good outdoor lighting practices. Most such places include protected areas, but there are exceptions. There are over [350 dark-sky places across the world](#).

### Where can I get more information?

[IUCN Dark Skies Advisory Group](#)

Welch, D. et al. (2024) [The world at night: preserving natural darkness for heritage conservation and night sky appreciation](#). IUCN World Commission on Protected Areas, Gland, Switzerland: IUCN.

[DarkSky International](#)

[Fundación Starlight](#)

[Light Pollution Abatement at the Royal Astronomical Society of Canada](#)