

The argument for switching off lights at night

Laura Paddison 20 July 2021

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(Image credit: Fabrice Coffrini/AFP/Getty Images)

Picture

The light pollution produced by street lamps, advertising boards, flood lights and our homes is so bad that 80% of the world's population lives in the haze of a perpetual glow in the hours of darkness.

It started like any other day for Stephen Maciejewski. He woke up at 04:30 and by 05:30 he was in downtown Philadelphia ready to start his patrol. Maciejewski – a volunteer with the conservation non-profit Audubon Pennsylvania – has walked the exact same route for years, looking for birds lying on the pavement.

The unfortunate creatures end up there after crashing into the city's brightly-lit skyscrapers. Maciejewski bags and labels dead birds and scoops up those that are simply dazed, moving them out of the way of hurrying commuters.

But the morning of Friday 2 October 2020 was different. Maciejewski was kneeling on the pavement picking up a clutch of dead birds when someone ran up and pointed out another cluster around the corner. A few minutes later, someone else told him about a pile further up the street.

"After a while I just couldn't keep up... it got so overwhelming that I stopped putting them in individual bags," he says.

"I just put them in a big plastic bag." It was clearly upsetting for Maciejewski – his voice cracks with emotion as he reveals that he ended up collecting around 400 dead birds that day. Usually he would expect to pick up 20.

The deaths were the result of a mass collision event, caused by a combination of overnight conditions: a low cloud ceiling, fog and rain. "The birds were flying fairly low," says Jason Weckstein, the associate curator of ornithology at the Academy of Natural Sciences of Drexel University. Normally migratory birds use celestial cues such as the stars to help them navigate. Disorientated by cloud and fog, however, they are thought to have been drawn off course by the city

lights and smashed into the glass buildings. In total, around 1,500 birds died that night. "They were able to see the [city] lights and the lights attract them in," says Weckstein.

Picture

These are just some of the birds collected by Stephen Maciejewski in Philadelphia on 2 October 2020 (Credit: Stephen Maciejewski)

Pictures taken by Maciejewski of the colourful neotropical birds lying on the city streets, travelled around the world. It was a turning point for Philadelphia, says Connie Sanchez, the program manager for bird-friendly buildings at the National Audubon Society. "There was a lot of media attention, the public truly noticed."

The deaths were a catalyst for a city-wide effort to tackle the impact of light pollution on birds. In March, a coalition including the Audubon Society and the Academy of Natural Sciences of Drexel University announced "Lights Out Philly", where building owners, managers, residents and tenants agreed to turn off or dim city lights between midnight and 06:00 during key migration periods. Between April and the end of May and again from August to November, the city's skyline will dim along with 39 "Lights Out" initiatives across the US.

It is estimated that between 100 million and one billion birds die every year from flying into buildings in the US, with artificial lights thought to play a major role in the death toll. But the effects of light pollution on the natural world is thought to be far greater still.

It "is not a national issue, it's not a state issue, it's not a city issue – this is a worldwide issue," says Weckstein. And it's not just affecting birds.

The Sun is basically like a clock, says Brett Seymoure a behavioural ecologist at Washington University in St Louis. The reliable rhythm of night and day gives plants and animals signals for natural cycles of feeding,

mating, migrating and navigating. Humans are altering this natural rhythm by flooding the world with artificial light.

The era of electric lighting, which began in the late 19th Century, allowed humanity to extend days into the night with the flick of a switch. As technology has progressed, it has only become simpler and cheaper to light up the world more brightly.

But the light that beams from skyscrapers, office blocks, streetlights and homes doesn't just light what we need – it spills into the habitats of animals and it scatters into the atmosphere, creating a sky glow that can [extend around 150 miles](#) (241km) from large towns and cities.

[More than 80%](#) of the world lives under light polluted skies, a figure that rises to over 99% for European and US populations. And it's getting worse, light pollution is growing [attwice the rate](#) of global population increase.

"By creating light pollution we're masking one of the most important information-givers that is natural to us," says Seymoure.

In 2019, Seymoure co-authored a [study](#) that found artificial light – from street lamps and car lights to enormous gas flares from oil extraction – was a key driver of the "[insect apocalypse](#)" – the alarming decline of insect populations around the world. Most people have seen lightbulbs lure and trap moths along with other insects, which often end up being eaten by lurking predators or die from exhaustion.

But artificial light has an impact on almost every part of insects' behaviour. Light pollution, for example, can [change the foraging behaviour](#) of nocturnal insects, making it harder for them to find food, and for creatures such as [fireflies](#), which rely on bioluminescence to attract a mate, artificial light can confuse males and make it difficult for them to find females.

Picture

Most people are aware of the effect that artificial lighting can have on insects but it can affect other wildlife too (Credit: Kunakos/Getty Images)

The impacts of light pollution spill into almost every ecosystem. Artificial light can affect fish by [suppressing melatonin](#), the hormone that controls sleep patterns, setting an internal clock for processes like reproduction and growth. It disrupts the [nesting behaviour of turtles](#) and draws newly-hatched marine turtles away from the sea, increasing the risk they will die before they ever reach the water. Some species of bats associate [artificial light with predators](#), meaning in brightly-lit cities they can be left with "nowhere for them to go," says Steph Holt, biodiversity training manager at the Natural History Museum. Researchers in the Red Sea found that even coral reefs are [damaged by light pollution](#).

"Every single creature that has been studied in terms of the relationship between light and those creatures' habits has found detrimental impacts," says Ruskin Hartley, executive director of the International Dark-Sky Association (IDA), the world's leading authority on light pollution.

That includes us. Humans may create light pollution, but we don't [escape its harmful effects](#). Artificial light affects our melatonin levels, altering our natural circadian rhythm and putting sleep patterns out of whack. Exposure to artificial light at night has also been linked to [diabetes](#), [mood disorders](#) and an [increased risk](#) of breast, prostate, and [other cancers](#).

"There are also huge intangible costs," said Paul Bogard, author of *The End of Night: Searching for Natural Darkness in an Age of Artificial Light*. "What do we lose when we can't walk out and come face to face with the universe?"

Scientists are only just beginning to understand the myriad impacts of light pollution. But while the problem is complex, the solution is not and we could implement it right now. "Once you shield the light, once you dim it, once you turn it off, it's gone," says Ruskin. Not only does it prevent damage to wildlife and people, it's also more efficient – saving money and reducing planet-warming carbon emissions.

It's not about turning out every light at night though. "Modern life requires lighting, it's changed so much about our lives," says West. "Let's have light," says Bogard, "but let's use it responsibly and intelligently rather than just blasting it all over the place."

A recently published study by biologists who spent two decades studying how light pollution from a building

in Chicago affected birds found that [turning off lights at night could have a dramatic effect](#). Halving the number of windows that were illuminated during the hours of darkness decreased bird collisions by 11 times during the spring migration and six times during the autumn migration. Overall, the researchers estimate that dimming the building in this way cut bird deaths by 60%.

But there are some who argue we should be trying to dim the amount of light we produce on a far grander scale.

Samyukta Manikumar grew up surrounded by dark skies in Kenya. A deep appreciation of the power of darkness led her to a career designing astro-tourism experiences, teaching people about the spiritual significance of the stars.

The night sky is woven deeply into some Kenyan communities, says Manikumar. "Local tribes and local cultures make worldviews out of looking at the skies," she says. Some use them to predict rains and harvest times or to schedule rituals such as weddings. "It's such a rich history that's being lost because we're losing the ability to see the sky," Manikumar adds.

Picture

The glow given off by large towns and cities at night can often be seen for many miles around (Credit: Dneutral Han/Getty Images)

In Kenya, as in many countries, there is a strong association between lighting and development, says Manikumar. But she likes to frame dark skies protection as an [opportunity](#) for Kenya, tapping into a burgeoning astro tourism industry.

Astro-tourism has roots in the UK, too. The Yorkshire Dales National Park has been running dark skies festivals since 2016 and in December 2020, the park together with the [North York Moors](#) became "[dark sky reserves](#)" — a designation given by the IDA as part of its "international dark sky places" programme.

"Between us, we're the darkest area in Europe," says Kathryn Beardmore, director of park services at the Yorkshire Dales National Park. She hopes designation will help boost the numbers of people visiting off season to see the starry skies.

"There's something very deep-seated looking up into the night sky in terms of our place in the galaxy," says Beardmore. This connection to stars shouldn't just be confined to the world's darkest places, says Hartley. The IDA also works with towns and cities that commit to protecting their skies through measures such as shielding lights so they point downwards instead of spilling upwards into the sky, adding timers and dimmers, and avoiding the blue-white light spectrum, which increases glare and has a [greater adverse impact](#) on wildlife.

Flagstaff, Arizona shows what urban areas can do, says Megan Eaves, a London-based writer and delegate for the IDA.

The small city in the US southwest is the [world's first international dark sky place](#), receiving its IDA designation back in 2001. "Everything has been modified and done thoughtfully and it's been done with the right kinds of light bulbs, the right kinds of shielding, the right kinds of timers," says Eaves. "And actually, it just feels so nice being there."

Picture

The annual lights out that occurs on Earth Day each year dramatically reduces the amount of light pollution in cities around the world (Credit: Sergei Savostyanov/Getty Images)

An additional benefit of reducing light pollution is that it can cut costs. Tucson, Arizona, home to both the IDA and astronomical observatories, finished converting [nearly 20,000 sodium street lights](#) to dimmable, energy efficient LED lights in 2018. Since then, the city has cut its total light emissions by 7% and knocked more than \$2m (£1.4m) off its annual energy bills.

Even so, a study published last year looking at how much light from Tucson was visible from space revealed that the city's street lights contributed only 18% of the light pollution. The [smart street lighting reduced this to 13%](#), but the bulk of the light emanating out from the city came from advertising billboards, floodlights,

buildings with their lights on, facade lighting, parking lots and sports stadiums.

Artificial light may be increasing but so is awareness of its impacts and so is action. "It feels like we're at a bit of a tipping point," says Holt.

In some countries this has translated into legislation. Slovenia [passed a national law](#) to reduce light pollution in 2007, requiring outdoor lighting to be shaded and not exceed certain levels of brightness. Puerto Rico, which has three bioluminescent bays, passed light pollution legislation in 2008. France introduced laws on outdoor lighting in 2019, leading to a [6% decrease](#) in light pollution, and the same year [Croatia](#) passed a law restricting lighting levels. At least [17](#)

[US states](#) and the District of Columbia have some form of light pollution legislation.

In the UK, politicians formed an [all-parliamentary group](#) for dark skies protection, which released a [policy plan](#) in December aimed at reducing light pollution and supporting more dark sky places in the country.

Individuals can act, too, says West. We often think light pollution is about street lamps, billboards and brightly-lit commercial buildings, but don't think about the impacts of their homes. Simple measures can make a big difference. Closing curtains at night so the light doesn't escape across the naturally dark realm of the back garden, only lighting what needs to be lit and focusing security lights carefully.

Picture

The city of Tucson, Arizona, has dimmed its streetlights to reduce light pollution, but the bulk of it comes from other sources (Credit: Getty Images)

Getting people to actually make these changes, however, may require them to change their relationship with the night.

Seymoure likes to joke that he decided to study light pollution because, unlike knotty problems like plastics pollution or climate change, the solution is easy. "In theory, tonight we could have no light pollution," he says. It took him a while to realise just how hard it is to motivate people to act.

Part of this may be down to the way people understand darkness. There is an assumption that more light is better and safer, because we lack the nighttime visual ability. But, counterintuitively, says Seymoure, a lot of light at night can actually decrease safety, creating shadows and glare.

"We have this kind of embedded social idea that darkness equals evil and I think that really screws us up," said Eaves, who organised a mass online stargazing movement last year. She wants to uproot these conceptions by getting people to look upwards.

Covid lockdowns may have helped her mission. People have been "feeling more of a desire to connect to nature and especially those of us who are stuck in really urban areas and cramped quarters", she says. "I think we all felt that loss greatly over the course of the last year and stargazing has been one way that people have started to connect." They've been able to see more too. A nationwide star count run by the UK's countryside charity, the CPRE (formerly known at the Campaign to Protect Rural England), found a [10% decrease in severe light pollution](#) in February 2021 compared to the same month last year.

Hartley hopes a reimagining of humanity's relationship with natural darkness will increase momentum in the fight to preserve it. "With everything else that the planet is facing," he says, "this is just one additional stress to the whole ecosystem that we could take care of immediately."

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