

Let There Be Light: Can Too Much Light Be a Bad Thing for a City Like Singapore?

Ever wondered how the first streetlights in Singapore came about? In 1824, some five years after the British East India Company set up a trading post on the island of *Singapura*, oil lamps containing coconut oil were installed on some bridges and major streets, at police *tannah* (police station) and on the exterior of important buildings. The paucity of sufficient street lighting meant that the “natives”, as locals were called by European residents, brought along torches with naked flames whenever they held night processions. Singapore has come a long way since, with more than 95,000 Light Emitting Diode (LED) streetlights today. But perhaps a tad too far.

In 2016, Singapore was named by a Science Advances study as the country with the worst level of light pollution in the world, at 100 percent. The study, *The New World Atlas of Artificial Night Sky Brightness*, said that Singapore’s use of artificial light exceeds the level of light pollution tolerable per capita. The study’s authors, who hail from the Light Pollution Science and Technology Institute in northern Italy, based the extent of light pollution chiefly on how brightly lit the streets of a country are and the percentage of the population exposed to artificial brightness.

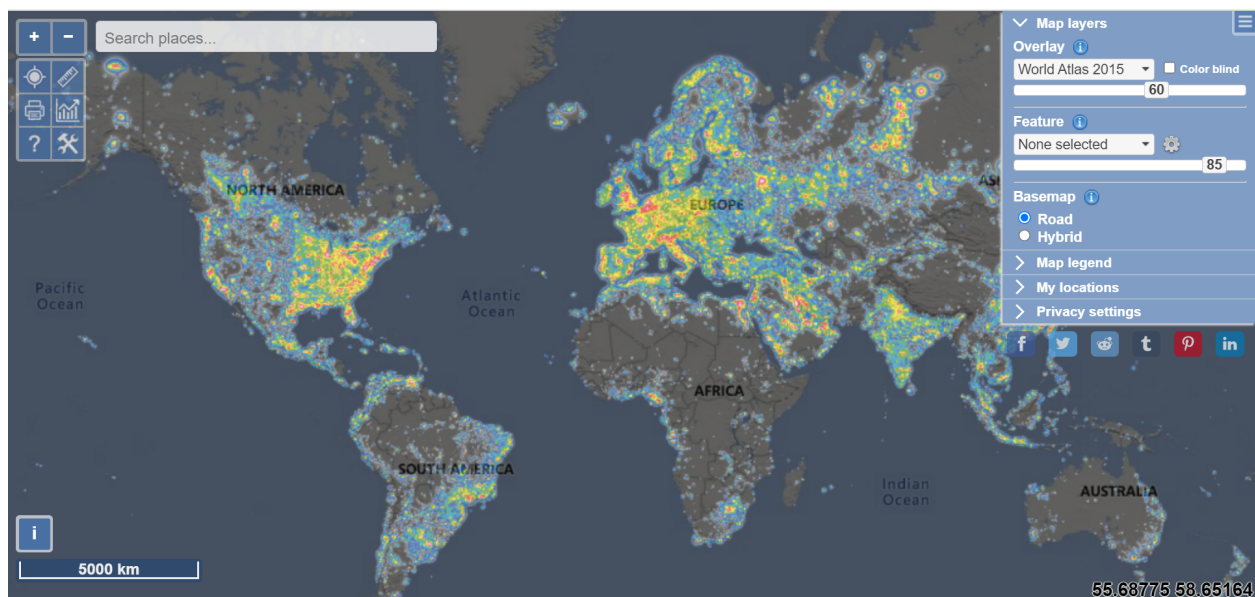


Figure 1: Light Pollution Map of the World in 2015

Source:

<https://www.lightpollutionmap.info/#zoom=6.56&lat=42.5895&lon=-76.6711&layers=B0FFFFFFFFFFF>

Light pollution has become a glaringly obvious problem, according to the *World Atlas of Night Sky Brightness*, a publicly available computer-generated map based on thousands of satellite photos. Vast areas of North America, Europe, the Middle East, and Asia are glowing with light, while only the most remote regions on Earth (Siberia, the Sahara, and the Amazon) are in complete darkness. Some of the most light-polluted countries are Singapore, Qatar, and Kuwait.

Over 80 percent of the world's population, and 99 percent of Americans and Europeans, live under sky glow. Contrary to its pleasant-sounding name, anthropogenic-induced sky glow is one of the most insidious forms of light pollution. Sky glow refers to the brightening of the night sky, mostly over urban cities, due to the electric lights of streetlamps, factories, offices, and buildings.

The three other types of light pollution according to the International Dark-Sky Association (IDA) are glare, clutter, and light trespass. Glare is inordinate brightness that can result in visual discomfort (like when driving). Clutter is bright, confusing, and excessive groupings of light sources (such as Times Square in New York City). Light trespass is when light extends into an area where it is unwanted or not needed (like a streetlamp illuminating a nearby room window).



Figure 2: Streetlights at a Traffic Junction in Singapore

Source: <https://www.todayonline.com/voices/why-does-singapore-need-so-many-lights>

To be fair, there are pros to adopting artificial lighting in a city like Singapore that never sleeps. The first advantage that lighting in public spaces confers is a feeling of safety. Studies have shown that higher light levels increase the level of reassurance — the feeling of confidence a pedestrian might gain from road lighting to walk along a road, especially if walking alone after dark. Artificial lighting also yields tangible economic benefits in a city with long working hours like Singapore's by making work tasks easier. As humans receive 80-85 percent of information through the sense of sight, appropriate lighting can reduce eye fatigue; it can also minimise workplace and traffic accidents by increasing the visibility of moving machinery and hazards.



Figure 3: A Pictorial Representation of the Circadian Rhythm

Source:

<https://www.infijoy.com/blog/rest-and-recovery/understanding-the-circadian-rhythm-for-better-sleep>

However, excessive artificial lighting also has its drawbacks, the first of which is the disruption of circadian rhythms. A circadian rhythm is a natural, internal process that regulates the sleep–wake cycle and repeats every 24 hours. Correlational studies have found that long-term exposure to light at night can cause sleep disturbances and heighten the risk of contracting cardiovascular disorders, cancer, and depression. Senior consultant ophthalmologist at Dr Leo Adult & Paediatric Eye Specialist, Dr Leo Seo Wei, agrees. "Excessive light can reduce the brain's production of melatonin, a hormone which controls sleep and wake cycles," she said.

Artificial lighting also poses ecological risks to wildlife. Nocturnal animals sleep during the day and are active at night. Light pollution alters their night-time environment by turning night into day. According to researcher Christopher Kyba, for nocturnal animals, "the introduction of artificial light probably represents the most drastic change human beings have made to their

environment". Artificial lights disrupt this nocturnal activity, interfering with reproduction and reducing populations. Other well-known impacts include the fatal attraction of moths to lamps and the disorientation of sea-turtle hatchlings on beaches flanked by lit buildings.

How then, can Singapore alleviate light pollution? One of the most straightforward ways is to use LEDs that have a lower colour temperature for outdoor lighting. Light pollution experts like the IDA recommend LEDs with colour temperatures of less than 3,000 Kelvins (or 2,726 degrees Celsius) as they emit softer and warmer light that is more benign for the environment.

Singapore can also switch off its lights for sustainability, a measure supported by 60 percent of respondents I surveyed. For years, Essex, Britain, has practised part-night lighting, where over 70 percent of its 128,000 municipal streetlights are switched off from 1 am to 5 am on Tuesdays to Sundays, and from midnight to 5 am on Mondays. The government piloted part-night lighting in two areas first to assess its impact on crime and traffic accidents. It discovered that the number of offences in the two places fell by 14 percent and 12.6 percent respectively during the time the streetlights were switched off. There was also no spike in the number of road collisions.

Thanks to ubiquitous electrification in the 1960s, Singapore glowed at night. Songs were even penned about how gorgeous Singapore was after dusk. The 1962 P. Ramlee movie *Labu dan Labi*, a comedy about two bumbling servants, features the song "Singapura Waktu Malam", a paean to Singapore after nightfall. The opening stanza goes: "Singapore at night \ Neon lights beautifully sparkling \ Glittering tall buildings \ Really magnificent without compare." As the developed world continues to grapple with light pollution, Singapore will only remain magnificent without comparison if it can strike a balance between the pros and cons of using artificial light.

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