

Original Paper

Curbing the Pollution of the Night: The Problem of Light Pollution

Sharlene A. McEvoy¹

¹ Professor of Business Law, Dolan School of Business, Fairfield University, Fairfield, CT, USA

Received: March 10, 2021 Accepted: March 31, 2021 Online Published: April 20, 2021

doi:10.22158/uspa.v4n2p80 URL: <http://dx.doi.org/10.22158/uspa.v4n2p80>

Abstract

One of the least discussed aspects of environmental law is light pollution. Air and water contamination are issues that have been addressed by laws at the federal and state levels but far less attention has been given to the issues of illumination which can have deleterious effects not only on human health but also on the ability to view the night sky. Some states have passed “Dark Skies” laws to remedy these problems.

Keywords

light pollution, nuisance, artificial lighting, zoning regulations, light trespass, energy conservation, dark skies laws

1. Introduction

In a security conscious world, many property owners resort to lights and motion sensors to deter crime. This article will discuss how harmful exterior lighting can be to the health and welfare of society, how ineffective it is in deterring crime, and how detrimental it is to the environment.

1.1 Light Pollution

If the hands of time could be turned back to the beginning of the twentieth century, in those days one could look up and see stars and planets in the night sky.

In 2021, when millions of people across the world look at the sky they cannot see the beauty of the night. Their view is obscured by the pervasive use of artificial light. While many people understand the pernicious effects of air and water and land-based pollutants, few understand that light pollution can be equally dangerous (Note 1).

The elements of light pollution include:

- 1) Glare which includes such brightness that it causes damage to the eyes.

- 2) Skyglow which is light in inhabited areas that causes too much brightness and inhibits the view of the sky (Note 2).
- 3) Light trespass which occurs when light falls on a neighboring property where the illumination is not wanted or needed (Note 3).
- 4) Light clutter which is light that is so bright or excessive that it causes mental confusion (Note 4).

2. Source of Light Pollution

With the industrialization of the world, light pollution has become an increasing problem. Consider just the impact of businesses: bright exterior and interior lights, neon signs used for advertising, offices where interior lights burn all night. High school football and baseball games used to be played during daylight hours on a Saturday morning or afternoon. Now games are played in stadiums “under the lights,” a practice which is expensive and unnecessary. Billions of dollars are spent each year on such lights (Note 5).

Most of the outdoor lighting used at night is inefficient because it is brighter than it needs to be and not properly baffled so that the light points downward. The light is thus not focusing on what needs to be illuminated. Many homes have exterior lighting that falls into this category, unnecessary and pointing toward neighboring properties that neither want nor need the illumination.

3. Effect on Human Health

For billions of years life on earth existed without artificial lighting (Note 6). There was a pattern of light and dark: the sun, moon and stars. In the twenty first century, nighttime is like the day. Too much illumination disrupts the day-night pattern which can cause problems for human health. Now the night is not truly dark and the result is a negative impact on human health. Research suggests that increasing rates of obesity, depression, diabetes, breast cancer, and sleep disorders are the result (Note 7).

The latter problem occurs because excessive nighttime lighting disrupts the human circadian rhythm—the biological clock that governs the sleep-wake pattern (Note 8). The circadian rhythm permits human beings to produce the hormone melatonin, which is key to keeping bodies healthy. “It has antioxidant properties, induces sleep, boosts the immune system, lowers cholesterol, and helps the functioning of the thyroid, pancreas, ovaries, testes and adrenal glands (Note 9). Melatonin levels are suppressed by the artificial lights glowing at night.

Particularly dangerous to human health is exposure to blue light especially at night. The LEDs used for outdoor lighting are harmful. Other sources of blue light include computer screens, televisions, and other electronic displays (Note 10).

Blue light also emanates from the compact fluorescent lightbulbs and LED lights which are purportedly more energy efficient than the incandescent light bulbs they replaced (Note 11). The problem is that these new bulbs produce blue light. A 2016 American Medical Association report raised concerns about

the blue light coming from outdoor lighting and urged that light fixtures be shielded and that the color temperature be below 3000k (Note 12). Color temperature information is available on packaging for new CFL and LED light bulbs. A low color temperature light poses less risk of harm to human health, especially to the eyes (Note 13).

Glare from unshielded outdoor lights distorts vision by reducing contrast. The eyes of older people are the most seriously affected. The problem is not only a cause of discomfort but a disabling inability to see because of the brightness of the light (Note 14).

4. Other Effects of Artificial Lighting

There are other negative effects from outside lighting. First, there is an increase in energy consumption caused by excessively bright lights when the same effect could be produced by dimmer and more appropriately placed illumination. A second problem is the disruption to wildlife. Although there are few studies on this subject, it is clear that wildlife patterns suffer from inappropriately placed lighting, which disrupts the migratory patterns of birds and has also led to the decline of fireflies (Note 15). Third, is the issue of crime and safety. There is an impulse to keep outdoor lights glowing from dusk to dawn to deter crime. This is done as a security measure but as one author explains:

“Unless you plan to sit up all night and watch your property from dusk to dawn, lighting won’t help much. It can instead light the way for any would-be intruder (Note 16).

All night lighting is expensive considering the energy costs and the price of replacing bulbs (Note 17). A security system is a more effective deterrent to criminal activity.

5. Legal Issues and Light Pollution

There are a variety of legal devices that can be used to combat light pollution. One cause of action is nuisance. Light pollution is recognized as a nuisance by most courts in the United States (Note 18). A nuisance is a continuous or recurring activity that interferes with one’s use and enjoyment of one’s property. Not all local governments have regulations curbing light pollution, so one may need to bring a lawsuit based on common law principles (Note 19).

A logical first step to solve the problem is to notify the neighbor who installed the lights. Perhaps the offender does not realize that the light is shining onto another’s property or into a bedroom window. Since the lights were probably installed during the day, the neighbor probably did not realize the impact they would have on the adjacent property and may agree to mitigate the problem (Note 20).

Should the offender resist adjusting the lights, the next step would be to retain a lawyer to send a demand letter which can serve to inform the neighbor if any zoning regulations are being violated. If there are no rules in place, the communication can threaten a nuisance suit, which can be costly for both sides, but which will get the attention of the offender and may spur a resolution of the problem (Note 21).

The Light Pollution Case Law Study researched lawsuits that involved issues related to light pollution. The study found that 949 cases were brought against local governments and states because of too much or too little lighting on public buildings. Other cases involved a third party suing a zoning commission over a decision that caused too much light to be cast on a neighboring property (Note 22). In most cases when a plaintiff sued a city or government entity for allowing too much light, the courts found that the public benefits of the lighting outweighed the harm claimed by the complainant (Note 23).

6. State Laws

Approximately twenty states, as well as the District of Columbia and Puerto Rico have passed statutes to reduce light pollution (Note 24). The states enacted these so called “dark skies” laws to promote energy conservation, public safety, aesthetic interests and astronomical research capabilities (Note 25). In many states, local governments have adopted light pollution rules as part of zoning regulations (Note 26).

While most state laws cover only outdoor lighting fixtures installed on state buildings or along highways (Note 27), those states with “dark skies” legislation require installation of shielded light fixtures which only cast light downward. Fully baffled lighting allows for the use of lower wattage bulbs which saves energy. Other laws requiring low glare or low wattage lights also limit the amount of time that those lights can be on (Note 28).

Arizona which has one of the oldest light pollution laws, requires that all outdoor light fixtures to be fully or partly baffled. The sole exceptions are emergency, construction, and airport lighting. Lights not in compliance with these rules must shut down automatically between midnight and sunrise (Note 29). Colorado mandates that when new outdoor lighting is installed, factors such as cost, energy conservation, reducing glare, minimizing light pollution, and preserving the natural night environment must be taken into account (Note 30).

New Hampshire’s priority is to preserve dark skies in order to maintain the state’s rural character. Its law encourages local governments to adopt regulations to conserve energy and minimize light pollution (Note 31).

Coastal states like Florida have different concerns such as the impact of beachfront lighting on bird and marine life. Among the issues are the effects of artificial light on hatching sea turtles which become disoriented by lights (Note 32).

Texas has a law that requires counties to reduce light pollution within five miles of a military installation if the county has at least five military bases and a population of more than one million. The purpose is to avoid interference with military training. Counties may also require permits for certain kinds of lighting, prohibit certain fixtures, require shielding of outdoor lighting and regulate the time for lights to be used (Note 33).

7. Conclusion

More needs to be done to combat light pollution. More states must pass laws like those of Arizona and Colorado, where “dark skies” legislation controls the spread of light pollution. “The night sky over many of our cities is hundreds of times brighter than a natural starlit sky. This sky glow hides the stars from out-of-sight and prevents us and all life on Earth from experiencing a natural night even hundreds of miles away from urban development.” (Note 34)

Astronomers became aware of this problem nearly fifty years ago when even the most powerful telescopes could no longer view the stars and planets clearly (Note 35). Scientists say that at least 2500 stars should be visible under normal nighttime conditions but there are only a few hundred viewable in a typical suburb and only a few dozen in a city (Note 36).

The problem is an international one. Eighty percent of the world’s population lives under skyglow. In the United States and Europe, ninety-nine percent of the population do not see a natural light (Note 37). The problem is simple: we have too much light at night “The answer is difficult: How much artificial light is appropriate?” (Note 38)

The challenge faced by twenty-first century policy makers is to provide outdoor light where and when it is needed while reducing costs, improving visibility, and minimizing any adverse effects on plants, animals, and humans caused through exposure to unnatural levels of light at night” (Note 39)

In this century darkness is a rare but valuable commodity. The lengthening of the day by artificial illumination has led to the loss of the night.

References

- Crelin, B. (2004). *Be a Good Neighbor When You Light Your Home*, N.H. Register p. H-4.
- Farkas, B. (2021). *Dealing With Light Pollution From a Neighbor: Rules and Remedies Regarding Light Pollution as a Neighborhood Nuisance*. Retrieved January 21, 2021, from <https://www.nolo.com/legal-encyclopedia/dealing-with-light-pollution>
- Harvard Law School Student Studies Light Pollution Case Law for IDA*. (2018). Retrieved January, 2021, from <https://www.darksky.org/Harvard-law-school-student-studies-light>
- International Dark Sky Association: “Light Pollution”*. (2018). Retrieved January 21, 2021, from <https://www.darksky.org/lightpollution/>
- International Dark Sky Associated “Human Health”*. (2018). Retrieved January 21, 2021, from <https://www.dark.sky.org/light-pollution/humanhealth/>
- International Dark Sky Association “Measuring Light Pollution”*. (2018). Retrieved January 21, 2021, from <https://www.darksky.org/lightpollution/measuring-light-pollution/>

- Kybas, H. A., & Wolker, F. (2014). *Redefining Efficiency for Outdoor Lighting*. Energy and Environmental Science 7 1800-1809.10 1039/CAEE00566
- States Shut Out Light Pollution*. (2016). Retrieved January 21, 2021, from <https://www.ncsl.org/research/environment-and-natural-resource>
- Stone, T. (2017). Light Pollution: A Case Study in Framing an Environmental Problem. *Ethics, Policy and Environment*, 20(3). Retrieved January 21, 2021, from <https://www.tandfonline.com/doi/full/1011080/21550085.2017.1374010>
- Tracy, S. (2020). *I Can't Sleep....Can You Turn Off the Lights?* Retrieved January 21, 2021, from <https://sitn.hms.harvard.edu/Flash/2020/I-cant-sleep-can-you-turn>

Notes

Note 1. International Dark Sky Association, "Light Pollution," <https://www.darksky.org/light-pollution/>(hereinafter "Light Pollution." Unlike air and water pollution, there are no federal statutory laws regulating light pollution. See "Harvard Law School Student Studies Light Pollution Case Law for IDA", Mar 15, 2018 <https://www.darksky.org/harvard-law-school-studentstudies-light>

Note 2. Ibid.

Note 3. Ibid.

Note 4. Ibid.

Note 5. "States Shut Out Light Pollution," <https://www.ncsl.org/research/environment-and-natural-resource> May 23, 2016.

Note 6. "Light Pollution."

Note 7. International Dark Sky Association, "Human Health" <https://www.dark.sky.org/light-pollution/human-health/> Sleep pattern disruption is also thought to interfere with genes that suppress cancer leading to an increased risk of breast, prostate, gastric and lung cancers. See Samantha Tracy "I Can't Sleep...Can You Turn Off the Lights", <https://sitn.hms.harvard.edu/Flash/2020/I-can't-sleep-can-you-turn>

Note 8. Ibid.

Note 9. Ibid.

Note 10. Ibid.

Note 11. Ibid.

Note 12. Ibid.

Note 13. Ibid.

Note 14. Ibid.

Note 15. "States Shut Out Light Pollution"

Note 16. Bob Crelin, "Be A Good Neighbor When You Light Your Home", N.H. Register Apr 2004 bcrelin@rcn.com

Note 17. Ibid.

Note 18. Brian Farkas, “Dealing With Light Pollution From a Neighbor” Rules and Remedies Regarding Light Pollution as a Neighborhood Nuisance”
<https://www.nolo.com/legal-encyclopedia/dealing-with-light-pollution>

Note 19. Ibid.

Note 20. Ibid.

Note 21. Ibid.

Note 22. “Harvard Law School Student Studies Light Pollution Case Law for IDA,” Mar 15, 2018
<https://www.darksky.org/harvard-law-school-studentstudieslight...>

Note 23. Ibid.

Note 24. “States Shut Out Light Pollution,” May 23, 2016
<https://www.ncsl.org/research/environment-and-natural-resource>.

Note 25. Ibid.

Note 26. The following is a typical zoning regulation:

Exterior Lighting. All exterior lighting in connection with all buildings, signs or other uses shall be directed away from adjoining streets and properties, shall not cause any objectionable glare observable from streets or adjacent properties and shall be of such height proportional in scale to the property and buildings the lights serve and the surrounding neighborhood... §§ 195-26. Miscellaneous Design and Use Regulations Zoning Regulations, City of Derby, CT Amended to 8/9/2010.

Note 27. “States Shut Out Light Pollution”

Note 28. Ibid.

Note 29. Ariz. Rev. Stat. Ann. 549-11-01 et seg.

Note 30. Colo. Rev. Stat. §§ 24-82-901 et seg.

Note 31. N.H. Rev. Stat. Ann. §9-E:3.

Note 32. Fla. Stat. § 161.163 Fla Admin. Code §§ 62B.55.00/et seg.

Note 33. Tex. Local Government Code Ann. §§240.032

Note 34. International Dark Sky Association “Measuring Light Pollution”
<https://www.darksky.org/light-pollution/measuring-light-pollution/>

Note 35. “States /Shut Out Light Pollution,” Mar 15, 2018.

Note 36. Ibid.

Note 37. “Light Pollution”.

Note 38. Taylor Stone, “Light Pollution: A Case Study in Framing an Environmental Problem,” Ethics, Policy and Environment Vol 20, No 3 (2017)
<https://www.tandfonline.com/doi/full/10.1080/21550085.2017.1374010>.

Note 39. Kybas, Hanel A. & Wolker, F. (2014) “Redefining Efficiency for Outdoor Lighting,” Energy and Environmental Science 7 1806-1809.10 1039/C4EE00566.