

The Absence of Legal framework on Light Pollution in India: A Case for a Dedicated Environmental Law

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ABSTRACT

Light, an essential component of human progress and safety, has increasingly become a source of environmental concern in the modern era. Artificial illumination, once a symbol of development and technological advancement, has now evolved into a pervasive form of pollution that disrupts natural systems and human well-being. Light pollution, broadly understood as the excessive, misdirected, or intrusive use of artificial light, is no longer confined to urban skylines but extends across rural landscapes, ecosystems, and even protected areas.

The rapid pace of urbanization, industrialization, and infrastructural growth has significantly intensified the use of artificial lighting. Streetlights, commercial establishments, residential complexes, and digital advertising displays contribute to an ever-brightening night sky. While such illumination serves legitimate purposes such as safety, security, and economic activity, its unregulated and excessive use has led to unintended and often overlooked consequences. Unlike other forms of pollution, light pollution is less visible as a legal and policy concern, yet its effects are deeply pervasive, cutting across ecological boundaries and affecting both human and non-human life. From an environmental perspective, light pollution alters the natural cycles of day and night that have governed life on Earth for millennia. The disruption of these cycles interferes with fundamental biological processes, including circadian rhythms, which regulate sleep, metabolism, and hormonal balance in living organisms. ALAN can suppress the production of melatonin, a hormone critical for maintaining healthy sleep patterns, thereby contributing to a range of health issues such as insomnia, fatigue, and increased stress levels. Emerging scientific evidence also links prolonged exposure to artificial light with more serious conditions, including metabolic disorders and certain types of cancer, highlighting the need for a closer examination of its public health implications.

Keywords: environment, light pollution, human health, ecology, dark sky reserve, artificial lighting.

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INTRODUCTION

The growing awareness of light pollution as a grave environmental issue calls for legal and policy frameworks to adapt accordingly. ALAN has detrimental consequences to ecosystems and humans. These consequences include impairment of humans' circadian rhythms and degradation of ecosystems and biodiversity. These scientific findings severely demonstrate the

negative effects of excessive lighting & many downsides of inadequately directed lighting. Unfortunately, the consequences of light pollution have received a marginal level of focus in legal discourse, particularly in developing jurisdictions such as India. This reality highlights the need to develop policies focused on regulatory frameworks to address the issue.¹

The focus of environmental law has been on pollution of air, water, soil and other forms of pollution that are tangible and often easily measurable. Conventional forms of pollution are often visible, measurable, and have been associated with industrial activities & associated with economic growth and development. Light pollution, on the other hand, is a newer type of environmental pollution that is difficult to measure, occurs almost everywhere and is often viewed in the light of progress as opposed to it being a type of pollution. This perception has resulted in almost no regulations to address the issue. The bigger challenge is to develop frameworks that view provision of light as a public service to the community and as a possible source of pollution that require legal regulations to address the issue.²

People have focused on the need for regulating artificial lights. International treaties on lighting pollution are clearly focused on environmental damage but offer the possibility for the protection of the natural environment. Those treaties, particularly regarding the protection and sustainability of development and management of the ecosystem and its components, explain the regulation of artificial lighting that destroys natural habitats. The International Dark-Sky Association and others have made the most of various light exposure education and development of guides that have been nationally and regionally significant, particularly in the developed world.

In the US, there are many open light pollution regulations. These are implemented on the states and local levels and can be followed by ordinances. Arizona and California, for example, have implemented regulations around “dark sky” education, as well as the reduction of light exposure & promotion of the use of shielded and energy efficient systems. These interventions are tied to light pollution control and balance the effects of development and environmental protection. There are other measures aimed at promoting the conservation of natural habitats & encouragement of local populations to implement these interventions.³

The EU has implemented a more comprehensive policy for light pollution by integrating it into its environmental and public health policies. Member countries like France and Italy have created regulations with strict enforcement for the timing, quantity, and placement of artificial light. These regulations, & enforcement policies for them, also support the EU’s policies for biodiversity and energy. The European model points to success in addressing light pollution through a preventive and coordinated approach within environmental governance as a strategy.⁴

By contrast, light pollution has been the subject of legislative silence in the Indian legal system.

Art. 21 of the Indian Constitution, which has been given a liberal interpretation over the years to incorporate the right to a pollution-free environment, does not mention light pollution. Although the Environment (Protection) Act, 1986, and other environmental legislation that give regulatory authority in a wide range of ways may include light pollution, the provisions of the legislation would almost certainly go unused without the creation of relevant rules, regulations, and standards. The same is true of substantive laws in the other

¹Komal Kaushik, Soumya Nair & Arif Ahamad, *Studying Light Pollution as an Emerging Environmental Concern in India*, 11 J. Urb. Mgmt. 392 (2022).

²Tanya Kaur Bedi, Kshama Puntambekar & Singh Sonal, *Light Pollution in India: Appraisal of Artificial Night Sky Brightness of Cities*, 23 Env’t Dev. & Sustainability 1 (2021).

³Vikas Kumar, et al., *Spatial-Temporal Expansion and Determinants of Light Pollution in India’s Riparian Habitats*, 98 Env’t Impact Assessment Rev. 106952 (2023).

⁴ *Id.*

relevant fields of wildlife and urban development that do not consider the environmental and health effects from artificial light.

Judicial engagement with light pollution remains unaddressed, whereas other aspects of Indian environmental law have benefited from transformative judicial engagement of this kind. Courts have been unafraid to creatively expand environmental rights by tackling issues such as noise, air, and water pollution and defense of ecosystems. The comprehensive analysis of the current jurisprudential trend indicates the incorporation of light pollution is possible, provided there is strategic litigation and judicial activism. However, there are no precedents to draw from, suggesting a need for more advocacy and activism of this kind.⁵

Looking beyond the borders of a nation, many legal systems have developed in parallel and face some of the same issues, but the solutions they have come to are remarkably varied because of the same problem of light pollution. Regions that have developed and regulated light pollution have stretched legislative frameworks, but still face issues with enforcement, legislation that is too generalized, technology, and other issues that need policy prioritization. For India to further develop legislation in regard to this issue, it is paramount to look at the issues of policy, environmental sustainability, and light pollution.

LIGHT POLLUTION AND THE LEGAL FRAMEWORK

Light pollution is a difficult phenomenon to categorize in environmental law in the same way that many other pollutants, like air, water, and soil pollutants, can be categorized. Since light is immaterial and often perceived as a benign product of development as opposed to detrimental environmental externality, the recognition of light pollution in law has been rather limited. However, with advances in science tracing light pollution to its ecological, environmental, and medical consequences, there is a demand to reframe ALAN as a pollution category in law.⁶

Light pollution is characterized by unwarranted, drawn-out, or misplaced artificial light affecting natural darkness. The four key types of light pollution include glare, skyglow, light trespass, and clutter. **Glare** is intense brightness resulting in discomfort and impaired visibility. This is dangerous for night drivers. **Skyglow** is the illumination of the night sky by artificial light, resulting in the extinction of starlight, altering natural night cycles, and disturbing creatures that rely on the night.⁷

Light trespass is undesired artificial light intrusion. This is observed in homes or natural environments. **Clutter** is an over, congested, and turbulent grouping of bright lights that is apparent in urban areas. This is urban **over-illumination** observed in retail or entertainment areas that causes disorientation for creatures reliant on darkness. These ideas are pivotal in defining various forms of light pollution for jurisprudential purposes, including the examination and control of light pollution.

One of the main barriers to accommodating light pollution within the field of environmental law is that light pollution is intangible. Many fields of environmental law are founded on clear-cut rules on limits, thresholds, or metrics on the level of damage. Light pollution, on the other hand, relies on discomfort, sleep disruptions, and disturbances to ecosystems, which are qualitative and subjective. Recent advances, such as satellite technology and systems to measure luminance, enhance our ability to quantify the artificial light present in our environment; there is still the absence of legal guidance on the subject because there are no

⁵Chun Kit Law, Savannah Yan Tsing Lai & Joseph Hung Kit Lai, *Light Pollution Control: Comparative Analysis of Regulations Across Civil and Common Law Jurisdictions*, 13 Laws 74 (2024).

⁶Ying Hao et al., *A Review of the Characteristics of Light Pollution: Assessment Technique, Policy, and Legislation*, 17 Energies 2750 (2024).

⁷Fabio Falchi et al., *Limiting the Impact of Light Pollution on Human Health, Environment and Stellar Visibility* (2020), arXiv, <https://arxiv.org/abs/2007.02063>.

standards and no agreed metrics and thresholds. This regulatory gap often results in inertia, & policies that should be implemented remain on hold until definitions and metrics are developed and formalized.⁸

Integrating light pollution into environmental legislation is not impossible. **The principle of precaution** is relevant in this context. This principle states that, when it comes to protecting the environment, one should act ahead of time, even in the absence of scientific proof to support the complete destruction of ecosystems. AI-guided environmental damage is one example. This principle dictates that in the absence of closure on light pollution's effects on ecosystems and human health, there should not be inaction. If this principle were in the regulatory framework, lawmakers would be required to limit damaging practices of artificial lighting. This is even in the absence of definitive proof and data.

The **"polluter pays" principle** can also be applied when regulating light pollution. The principle assigns the financial burden of managing an environmental issue to the parties responsible for that issue. With light pollution, this can mean the obligation to adopt more environmentally responsible lighting practices that fall on commercial users, industries, and urban developers. An example is showing that businesses that use advertising displays, and architectural lighting, and are responsible for excessive light, are able to use shields, light less, and implement time restrictions on their lights. While the burden of the financial cost incurred by light pollution is placed on the individual, the extra burden is on businesses. Thus, the use of light pollution is incentivized, & sustainable use of commercial practices is encouraged.⁹

The regulations of light pollution are also defensible by the **principles of sustainable development**. Combined with an understanding of the needs to protect the ecosystems & needs for the regular the economy, & development of society, in using light for safe infrastructure and for the economy, there is an understanding to balance the use of lighting and to safely light the environments efficiently and energy conservatively, and with controlled and limited light.¹⁰

Another important aspect of the legal outlook on light pollution deals with its placement as a type of **"sensory pollution"**. Light pollution is the analog of noise pollution as it alters the sensory experience of the environment as opposed to adding a substance to the environment. Just as noise is considered a pollutant under environmental law, so too should light. The disruption of natural conditions, the irritation of human beings, & alteration of the behaviors of various life forms on the earth all characterize both light and noise pollution. If the legislative and judicial control of noise pollution in the environment is testimony to the control of sensory pollution of the environment, then it makes it all the more likely that light pollution will be categorized as the third type of environmental pollution.

To incorporate light pollution into environmental law, it will be important to recognize that light pollution is the result of artificial light that crosses many fields of policy. These are the policy fields of urban planning, control of the generation of energy, control of public health, and control of the effects artificial light has on animals & environment. There is a dilemma with respect to the control of artificial and natural light pollution, as many if not most of the policies that actually control light pollution lack a control over horizontal and vertical integration.¹¹

⁸Salvador Bará & Fabio Falchi, *Artificial Light at Night: A Global Disruptor of the Night-Time Environment* (2023), arXiv, <https://arxiv.org/abs/2311.02098>.

⁹Salvador Bará, Carmen Bao-Varela & Fabio Falchi, *Light Pollution and the Concentration of Anthropogenic Photons in the Terrestrial Atmosphere* (2022), arXiv, <https://arxiv.org/abs/2210.14131>.

¹⁰ *Id.*

¹¹Pranjal Choudhary & Sudhish Kumar, *Severity of Light Pollution and Its Multifaceted Impact: A Mini Review on the Dark Side of Light* (2023), arXiv, <https://arxiv.org/abs/2310.19753>.

From the perspective of fundamental rights, light pollution can be connected to the basic rights that make up a healthy ecosystem. Where the interpretation of the right to life under Art. 21 is broad, as in the case of India, the effects of harmful environmental pollution that affect a community's health, well-being, and balance on ecosystems are protected by the Constitution. Disruption of privately-owned spaces by the invasion of artificial light, the disruption of sleep, & destruction of nature can be seen as a violation of the right to a healthy ecosystem. Framing light pollution in a rights-based perspective gives it substance and legal standing and serves as a basis for judicial activism and public interest litigation.

Globally, it is true that there is no light pollution-specific treaty, but the existing environmental legislation offers some indirect support for controlling light pollution. Various international legally binding commitments to the conservation of biodiversity, the reduction of climate change, & support of the sustainable development agenda invariably require the reduction of activities that disrupt the natural ecosystems of the planet. Moreover, the nonbinding guidelines prepared by a number of organizations such as the International Dark-Sky Association set practical rules on how light pollution can be reduced by using the least amount of light possible, directing the light downward, and eliminating the use of light with a high blue spectrum which alters biological ecosystems. While legally non-binding, the guidelines provide the necessary standards for the legislation and policies a country wishes to adopt.¹²

Public awareness and participation are key to effective legal conceptualization of light pollution. While other environmental pollutants are obvious to the general public, light pollution is a kryptonite to environmental awareness. This lack of awareness is what allows excessive lighting to become a cultural norm. The persistence of light pollution will continue until legal policies integrate ways to educate communities and motivate civic engagement.

Responsibility should be exercised by both individuals and institutions, and that is what will ultimately close the gap on lax legal policies.¹³

There are also significant challenges to the enforcement of light pollution laws. Even in jurisdictions that do have light pollution laws, the compliance is said to be remotely executed due to lax enforcement policies. The naturally decentralized nature of light pollution also decentralizes enforcement in a typical regulatory model. It is proposed that enforcement policies be adjusted to adopt structural incentives for compliance, subsidized enforcement, and tax-exempt compliance. Overhead enforcement of light pollution laws can be accomplished through emerging technologies that shift enforcement responsibility from policymakers legally to the public and to the lighting standards.

The socio-legal conceptualization of light pollution requires the dynamic intersection of science, law, and tech. Socio-legal conceptualization begins with the recognition of light pollution being the sensory pollution of light. The legal tools for conceptualization are flexible, & socio-legal challenges are the adaptation and appropriateness of an environmental light pollution conceptualization.¹⁴

CONCLUSION

The legal framework governing environmental protection in India provides an indirect foundation for addressing emerging ecological concerns regarding such pollution. Statutes such as the Environment (Protection) Act, 1986, the Air (Prevention and Control of Pollution)

¹²Abdul Jabbar Haque, *Law of Public Nuisance for Environment Protection in India: A Critique Through Judicial Interpretation*, 4 J.L. Torts & Consumer Prot. L. 1 (2021).

¹³C.M. Abraham & Armin Rosencranz, *An Evaluation of Pollution Control Legislation in India*, 11 Colum. J. Env't L. 67 (1986).

¹⁴Benjamin Singh, *Assessing the Impact of Light Pollution on Ocular Health: Projecting Legal-Policy Measures*, 8 Indian J. Health & Med. L. 9 (2025).

Act, 1981, & Wildlife (Protection) Act, 1972 collectively establish environmental governance structure. However, none of these legislations explicitly recognize artificial light as an environmental pollutant, nor do they prescribe standards for illumination control, sky glow reduction, or nocturnal ecological protection. Judicial interpretation of Art. 21 has significantly expanded the scope of environmental rights to include the right to a healthy and pollution-free environment, but this expansion remains general and has not yet been extended to the specific domain of light pollution.

A comparative perspective highlights that while jurisdictions such as Slovenia, Czech republic, France, Croatia, Italy, they incorporate light pollution within planning and nuisance frameworks and addresses it through decentralized local regulations, India continues to rely on fragmented and indirect mechanisms. This results in a regulatory vacuum where enforcement is minimal and largely incidental. The absence of explicit legal recognition thus represents a significant gap in India's environmental jurisprudence, underscoring the need for dedicated legislative or regulatory intervention to address the growing ecological and public health impacts of artificial lighting.

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