



Marine Light Pollution

For Prelims: [Artificial lighting](#), [corals](#) and [plankton](#)

For Mains: Artificial Light at Night (ALAN) - significance and associated issues, Impact of artificial lightning on organisms, [Light Pollution](#)

Source: [DTE](#)

Why in News?

The impact of [artificial lighting](#) on land-based life (humans, fireflies, and birds) has been known for quite some time.

- However, a recent US-based study has argued to consider light pollution's influence on coastal [marine organisms](#) as well which affects everything from **whales to fish, corals, and plankton**.

What is Artificial Lighting in the Marine Environment?

- **About:**
 - Artificial lighting refers to the light that is produced from **artificial sources such as candles, fire, electricity, etc.**
 - Ecologists and biologists have long recognized that artificial light at night can have adverse effects on the health of humans and terrestrial wildlife.
 - Recent research is showing that **marine life is also sensitive to artificial light**, including extremely low levels and certain wavelengths, **particularly blue and green light.**
- **Marine Light Pollution:** When this **artificial light is used excessively or poorly**, it becomes [light pollution](#) and disrupts the natural patterns of wildlife, contributing to the **increase in carbon dioxide (CO₂)** in the atmosphere.
 - The scientists found that 1.9 million km² of the ocean experience biologically significant amounts of artificial light pollution to a depth of 1 metre.
 - This represents about **3% of the world's Exclusive Economic Zones (EEZs)**.
 - Significant areas of the ocean are seeing **light exposures to depths of 10 metres, 20 metres, or more.**
 - In areas with very clear water, the light at night can reach depths of more than 40 metres.
- **Sources:**
 - **Coastal development** (e.g., buildings, streetlights, billboards, ports, piers, docks and, light house).
 - **Vessels** (e.g., fishing and merchant marine vessels), harbours and offshore infrastructure such as oil rigs.
 - Some of the common types of artificial lights in the marine environment are **LED, fluorescent, metal halide, and plasma lamps.**
 - **White LEDs produce broad spectrum light that is sensed by a wide range**

of organisms and have a peak at short wavelengths (blue and green light) to which many marine organisms are particularly sensitive.

Note:

- The **Earth is getting artificially brighter, at a rate of 2.2% per year**. As a result of these brighter nights, the impacts of **artificial light at night (ALAN)** have become an increasing focus in terrestrial ecology.
 - As per studies, [non-natural light increased the brightness of Skyglow](#), by 9.2-10% every year between 2011 and 2022
- Research has shown that **ALAN is a major form of anthropogenic pollution** that can affect a wide range of biotic processes, including physiology, behaviour, animal movements, species interactions, community structure and reproduction.

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LIGHT POLLUTION DEVASTATES WILDLIFE.

Plants and animals depend on Earth's daily light and dark cycle to govern life-sustaining behaviors. Research shows that artificial light at night has adverse and even deadly effects on many species.



LIGHT POLLUTION CAN MAKE YOU LESS SAFE.

There is no clear scientific evidence that increased outdoor lighting deters crime. Poor outdoor lighting can decrease personal safety by making victims and property more visible to criminals.



LIGHT POLLUTION WASTES ENERGY AND MONEY.

As much as 50% of outdoor lighting is wasted, which increases greenhouse gas emissions, contributes to climate change, and renders us all more energy-dependent.



LIGHT POLLUTION MAY HARM YOUR HEALTH.

Studies suggest that artificial light at night negatively affects human health by increasing our risks for obesity, sleep disorders, depression, diabetes, breast cancer, and more.



LIGHT POLLUTION ROBS US OF OUR HERITAGE.

Our ancestors experienced a night sky that inspired science, religion, philosophy, art, and literature. Now, millions of children across the globe will never know the wonder of the Milky Way.

How does Artificial Lighting Affect the Marine Ecosystem?

- **Disruption of Normal Cycles:** As per the study, it already took marine organisms an **evolution of over millions of years to adapt to natural light** and now the threat of ever-increasing anthropogenic light pollution has been posing several threats to them.
 - Artificial light can easily **wash out the glow of moonlight and starlight consequently disrupting their hormonal cycles, inter-species behaviour, and reproduction cycles.**
- **Illustration:** For instance, to lay their eggs, **female sea turtles** try to find a quiet, dark spot and avoid light. However, due to artificial lighting, they may end up not coming ashore at all.
 - Moreover, their hatchlings head toward inland lights instead of moonlight on the water and then die of dehydration or starvation.
- **LEDs Worsening the Impact:** The ever-growing usage of LED lighting is also altering the very nature of artificial light.
- **Suggestion:**
 - Encouraging land-based **Lights Out efforts** (local, state, and regional campaigns to darken skies) to help [migrating birds](#) that are drawn to light at night. It will also benefit marine systems near coastal cities.
 - **Increasing the usage of red light in coastal areas** as much as possible and **putting up barriers to shield the coastline from artificial light.**
 - Red light, having the longest wavelength in the visible spectrum, doesn't penetrate as far into the water.

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