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LIGHT POLLUTION EFFECTS ON WILDLIFE AND ECOSYSTEMS

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For billions of years, all life has relied on Earth's predictable rhythm of day and night. It's encoded in the DNA of all plants and animals. Humans have radically disrupted this cycle by lighting up the night. Plants and animals depend on Earth's daily cycle of light and dark rhythm to govern life-sustaining behaviors such as reproduction, nourishment, sleep and protection from predators.Scientific evidence suggests that artificial light at night has negative and deadly effects on many creatures including amphibians, birds, mammals, insects and plants.

What is light pollution?

Light pollution is the excessive and prolonged use of artificial lights, in a way that results in brightening of night skies, disrupting natural cycles and activities of wildlife, health problems in humans, as well as preventing humans from observing stars and other planets.

In other definitions, it does not only have to do with the sky, but anywhere that artificial lights are used, where they are not intended to. Other terms often used for light pollution are 'photopollution' and 'luminous pollution'. Note that this is not only a city center problem. There is also light pollution when you use too much light in your compound that affects the comfort and health of your neigbours. This could be your outdoor light 's intrusion into other people's bedrooms. This can be called nuisance. Too much light indoors also is classified as indoor light pollution if it is wasteful and it has effect on the health of people living in that room.

What are the types of light pollution?

Light pollution comes in many forms. The most common include the following:

- **Sky glow:**

This is the bright orange-pink glow that hangs over cities and towns in the night. Sky glow could be caused by natural factors, but also often caused by inefficient and artificial lights shining needlessly into the sky, and further scattered by airborne dust particles, gas and water droplets. Sky glow is better seen during poor weather conditions where more particles are present in the atmosphere. Astronomers are having increasing problems with sky glow as it interferes with the viewing of celestial (outer space) objects. For example, at the Mars Hill Observatory in Flagstaff, Arizona, sky brightness is reported to have increased by 0.5 magnitude from 1976 to 1988

- **Glare:**

  This is the effect produced when the eyes are exposed to bright light. If a bright flashlight is directed at your face in a dark place, you notice that it almost blinds you and suddenly you cannot see other objects or shadows around you. This is particularly dangerous when driving, because bright lights from cars coming towards you reduce your vision and puts pedestrians and other road users at risk. The most common causes of glare include bright streetlights and car lights.

- **Light trespass (Spillover):**

  This occurs when light goes over its intended range. Think of your neighbor's security light shining through your bedroom windows and lighting up your room all night. Light spillover is a very common subject of complaint by many residential dwellers and is a problem that can be easily fixed with the right lighting equipment. Main sources of light trespass include dusk-to-dawn lights, sports field lighting and commercial lighting.

Artificial Lights Disrupt the World's Ecosystems

Nocturnal animals sleep during the day and are active at night. Light pollution radically alters their nighttime environment by turning night into day.

According to research scientist Christopher Kyba, for nocturnal animals, "the introduction of artificial light probably represents the most drastic change human beings have made to their environment.

"Predators use light to hunt, and prey species use darkness as cover," Kyba explains "Near cities, cloudy skies are now hundreds, or even thousands of times brighter than they were 200 years ago. We are only beginning to learn what a drastic effect this has had on nocturnal ecology."Glare from artificial lights can also impact wetland habitats that are home to amphibians such as frogs and toads, whose nighttime croaking is part of the breeding ritual. Artificial lights disrupt this nocturnal activity, interfering with reproduction and reducing populations.

Artificial Lights Can Lead Baby Sea turtles to their Demise

Sea turtles live in the ocean but hatch at night on the beach. Hatchlings find the sea by detecting the bright horizon over the ocean. Artificial lights draw them away from the ocean. In Florida alone, millions of hatchlings die this way every year.

Artificial Lights have Devastating Effects on Many Bird Species. Birds that migrate or

hunt at night navigate by moonlight and starlight. Artificial light can cause them to wander off course and toward the dangerous nighttime landscapes of cities. Every year millions of birds die colliding with needlessly illuminated buildings and towers. Migratory birds depend on cues from properly timed seasonal schedules. Artificial lights can cause them to migrate too early or too late and miss ideal climate conditions for nesting, foraging and other behaviors.

Ecosystems: Everything is Connected

Many insects are drawn to light, but artificial lights can create a fatal attraction. Declining insect populations negatively impact all species that rely on insects for food or pollination. Some predators exploit this attraction to their advantage, affecting food webs in unanticipated ways.

What are the effects of light pollution?

- **Waste of resources:**

  It costs a lot of money to light up homes, public places, sports and commercial places. Apart from the fact that tax payers pay needlessly for this, the nation uses millions of tons of oil and coal to produce the power needed to light the sky. Meanwhile, the environmental cost of producing this energy is another worrying issue that can be discussed at another time. In the USA, 8% of its total energy is used for outdoor lighting, and out of that, 80% is used for commercial and public exterior lighting

  In Indian metro cities 35% of energy use for commercial lights i.e for mall, hordings, street lights & this is total waste of resources.

- **Health implications:**

  Disability glare, eye strain, loss of vision and stress that people get from glare and spillovers are worth mentioning. Our eyes naturally adjust during day and night so we can see things properly. Too much light can harm our eyes and also the harm the hormones (such as melatonin) that does this job.

How can light pollution be reduced or prevented?

Unlike other pollution matters, light pollution has not been considered as a major issue until recently. The good news is that, the solutions that experts suggest are not as complex and difficult as those of air and water pollution. Light pollution can be significantly reduced by some engineering and structural design policies and considerations. Besides that, education will be needed to get the message across and get people more informed about the issue and take the step of becoming part of the solution.

Here are a few things Governments and Researcher can do:

1. Researcher must invest and use new lighting technology that uses the full cut-off concept. This way, lights escaping upwards from large commercial places, stadiums, theaters and public places will be reduced. For example about 50% of road light fittings in the India have reached their lifespan and need changing. This is a good time to engage new technology to ensure that the replaced fittings will not cause too much light pollution
2. Government policies on the use of lights must be stepped in a way that forces consumers to buy more energy-reduced light (and also not too much bright lights). These policies must be enforced.

   Research shows that too much lights does not necessarily improve visibility. This means that smart choices can be made to improve visibility in the night without splashing too much light into the sky.
3. Individuals must also begin to install motion sensor-lights and bulbs in their homes, so that they are not kept on all night. Garden and landscape lights must be used effectively and should not be too bright to bother others.
4. It is important that education of light pollution and its consequences are stepped up and taught in all schools, just as water, land and air pollution.
5. The government should launch a scheme in which if one person buys a Light efficient LED bulb then the person will get a certain discount in electricity bill.