

Diurnal organisms/humans:

They are disturbed in their night's rest. Permanent lack of sleep leads to exhaustion and even illness.

Nocturnal creatures:

More than 60% of all creatures are nocturnal. They are disturbed in their nocturnal activities (pollination, reproduction, foraging). They are blinded, displaced, distracted, irritated – behavioural changes occur. For countless insects, light even becomes a deadly trap.

Plants:

In many plants, the rhythm of production of fragrance and nectar is disturbed. Or the seasonal vegetation rhythm shifts. Trees, for example, bloom earlier and shed their foliage too late in the autumn: the large amount of light suggests that it is still summer. Frost damage is the result.

Pollination in danger

Insects are not only the largest and most important food source in the animal kingdom, but also the most important pollinators. Almost all wild and cultivated plants depend on them. Thus, insects are indispensable.

Wild bees make the most extensive contribution here, followed by more than 3000 species of butterflies, of which over 90% are nocturnal.

If the excess of nocturnal light prevents them from pollinating, our entire ecosystem is ultimately threatened. Diurnal insects cannot compensate for this pollination deficit.

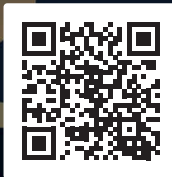
The result: a decrease in food supply for all animal species and a reduction in biodiversity. For us humans, extensive **crop failures** are the direct consequence.

The biomass of flying insects has declined by almost 80% in the last three decades. Nocturnal light pollution is one of the main reasons for this dramatic development.

This flyer shows what simple measures each of us can take to counteract the negative consequences of light pollution.



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After sunset

Nocturnal light pollution and the drastic consequences for environment, people and nature. But each individual can do something to curb them!

After sunset ...

... we turn on the lights.

More often and for longer. Our nights are getting brighter and brighter. In Europe, by about 6%, worldwide by almost 10% per year. This is called **light pollution**.

Vast amounts of light radiate unnecessarily towards the sky. Through scattering effects in the atmosphere, immense “light domes” form over populated areas. There it is in parts over 4000% brighter compared to the naturally dark night sky. These domes of light shine hundreds of kilometres and illuminate the night even where it would normally be dark.

This “lighting madness” not only consumes vast amounts of energy and makes the starry sky disappear, but has even more serious consequences. For example:

- More than 100 billion insects die during the summer by Germany's street lamps alone (death from exhaustion due to the constant orbiting of the light, burning or attracted predators)
- Millions of migratory birds crash into house facades on their nocturnal routes due to disorientation (two-thirds of all migratory birds migrate at night)

Out of rhythm

For around three billion years, **the daily light/dark rhythm** has been firmly anchored in the genes of almost all organisms. It controls almost all vital processes. Especially waking and sleeping phases as well as cell repair and regeneration. All this gets out of sync when it doesn't get really dark at night.

As a result, entire ecosystems are faltering. As they are all closely connected, the consequences are far-reaching. In animals and plants, it can lead to real “burn-out” phenomena and ultimately even to species extinction.

But we humans also suffer from too much wrong light at the wrong time.

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6 ways to soften outdoor light

With simple means, everyone can make their contribution to reducing nocturnal light pollution:

- 1 Intensity**
Use the lowest possible lumen values (lm). For larger areas, it is better to use several weak light sources than one single very bright light source. Too bright light blinds the eyes (a safety hazard). In the darker environment then you see less and more poorly. This reduces the feeling of security.
 - 2 Direction**
Only downwards. Avoid stray light to the side and especially upwards (using shielded housings or LED reflector lamps). Thus, for the same brightness on the ground, a weaker light source is sufficient.
 - 3 Colour**
The yellower, the better. Do not exceed colour temperatures of 2700 Kelvin.
 - 4 Mounting height**
The lower, the better. This reduces glare and stray light into the environment and a weaker light source is sufficient for the same brightness on the ground.
 - 5 Duration**
Use lighting only when and only as long as you need it. This is where motion detectors can help. Avoid continuous light and switch off at 10 p.m. at the latest (timer).
 - 6 Necessity**
Use lighting only for orientation and making paths safe. Outdoor lighting for decorative purposes should generally be avoided – especially in gardens. Do not direct light onto trees, natural areas or ponds.
-  **Extra tip:** Close blinds/curtains. This keeps the light in the room and the night darker.

All this keeps insects away from the house, protects diurnal and nocturnal creatures, makes the starry sky shine again and also saves a lot of energy and CO₂.

Lighting is also a question of colour

In the evening and at night, only yellowish to orange lighting with low intensity should be used. The reason: the more **blue components** are contained in the spectrum of a bright light source,

- the stronger the glare (safety hazard)
- the more intensive the formation of light domes in the atmosphere
- the stronger the attraction to insects (causing their death)
- the poorer the sleep of diurnal organisms

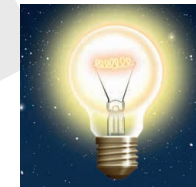
1700 to 2200 Kelvin Light colour “amber”

No or very few blue components – highly recommended, cosy.



2700 to 3000 Kelvin Light colour “warm white”

Low blue content – recommended, a good compromise.



4000 to 5000 Kelvin Light colour “neutral white”

Significant blue components – problematic.



5000 to 6500 Kelvin Light colour “cool white” or “daylight white”

Very high blue content – should be taboo.



Guideline for maximum brightness for LED outdoor lighting:

- Unshielded: approx. 500 lumen (equivalent to approx. 5 watt)
- Shielded: approx. 800 lumen (equivalent to approx. 8 watt)

The human rhythm out of sync

The rhythmic change between light (day) and dark (night) is determined by the sunlight in combination with the earth rotation. All organisms follow this.

However, as the nights become brighter and brighter, this change can be perceived less and less. The lives of animals and plants get out of sync – with the consequences described.

But we humans also react. Sleep problems occur and the melatonin balance can be disturbed. The “darkness hormone” melatonin is indispensable for almost all organisms because it controls many body functions, repair and regeneration processes as well as the waking/sleeping rhythm. Moreover, it is an effective antioxidant.

For a healthy, restful sleep, therefore:

One to two hours before going to bed, bright and above all bluish light should be avoided.

Such light inhibits melatonin production and causes it to start with a significant time delay. As a result, falling asleep and the quality of sleep are noticeably impaired. A dark sleeping environment is therefore of no use if you have previously stood in the bright bathroom light, looked into bright screens for too long or were exposed to the light of dazzling street lamps and car headlights while driving.

If sleep is persistently disturbed, it has been proven that serious diseases such as obesity, depression, cardiovascular disease, weakening of the immune system, diabetes or even cancer can occur. One of the many studies on this topic shows, amongst other things, that the consumption of sleeping tablets is significantly increased in heavily lit places.

