Light Pollution in ten minutes

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Images not credited by the author.
Wasted light that has a negative effect on the environment and human health.
Causes:

- Street lighting.
- Commercial lighting.
- Security Lighting.
- Advertising.
- Sports Lighting.
- Vanity Lighting.
Effects

- **Sky Glow** – aerosols in the atmosphere create illuminated domes of scattered light over cities that reduce stellar visibility.
- **Glare** – the blinding effect of unshielded lighting on visibility.
- **Light trespass** – unwanted light crossing property lines causing loss of amenity.
Implications

- Environmental.
- Medical.
- Social.
Environmental implications (1)

- Light, especially blue light, attract insects and kills them.
- Higher order consumers that feed on insects decline as they have less to eat.
- Fewer insects to pollinate flowers. Reduced plant diversity. Affects crops.
- Fewer plants mean less food for insects.
- Positive feedback.
- Insects decline further. Concomitant effects on higher order consumers.
Environmental Implications (2)


- Skyglow and light trespass reduces stellar visibility.
- Affects astronomical observation.
- Creeping global light pollution may prevent astronomers detecting the next asteroid strike.
- Contributes to increases CO₂ emissions leading to global warming and climate change.
- 60% of all electricity consumed is wasted on street lighting.
Medical Implications (1)

Image credit: Giuliano, V.

- Light, especially blue light, suppresses melatonin production by the pineal gland.
- Melatonin is involved in maintaining circadian rhythms – 24hr daily behaviour cycles.
- Melatonin is also oncostatic – it suppresses cancers.
- Some cancers (especially breast and prostate) more common in illuminated areas.
• Contributes to air pollution by destroying nitrate radicals that break down pollutants discharged by vehicles and factories.
• These pollutants exacerbate asthma, bronchitis, cystic fibrosis, and emphysema.
• Some energy consumed for lighting produces nanoparticles that enter the body through the respiratory and digestive systems and disrupt normal physiology.
• The deliberate floodlighting of residential properties may further lead to an increase in breast cancer.

Image credit: Y. S. Prakash, and Sadis Matalon
http://ajplung.physiology.org/content/306/5/L393
Social implications (1).

- Neighbour disputes – householders suffer loss of amenity when light trespasses on their property.
- Crime – most crime occurs in daylight, ergo criminals need light.
- Crime drops by up to 50% where lighting curfews have been introduced.
- Drops almost to zero during power failures.
• The Lighting industry aims to maximise profits by a campaign of misinformation.
• It panders to a natural fear of the dark.
• It cons the public into believing that more and brighter lights improve safety and reduces crime. *In fact lighting encourages crime.*
• Municipalities think it is acceptable to install lighting outside properties without householders’ consent.
Social implications (3)

- Alternative methods to improve road safety should be considered before lighting is installed.
- Expensive. Electricity and fuel consumed must be paid for.
- *Lighting should only be applied sparingly, on a needs must basis, where needed, when needed, in the right amounts and using appropriate smart lighting technology.*
• Lighting that cannot be construed as useful should be eliminated.
• This includes all forms of vanity lighting: Illuminated buildings and monuments, illuminated urban regeneration follies (crass “art” projects), illuminated advertising, skybeams and lasers.
Solutions (1)

Image credit: Andrej Mohar.
http://www.darkskyparks.org/docs/Lastovo2010_Mohar.pdf

- Motor vehicles have headlights!!
- 45° full cut-off lighting to reduce sky glow and prevent illumination of the cloud ceiling due to the Earth’s curvature.
- Motion operated L.E.D. lighting in residential and suburban areas.
- L.E.D. lighting filtered to eliminate blue light.
- 11p.m. till dawn curfews in residential and suburban areas. No pre-dawn lighting. Institution of winter timetables during winter months to obviate early morning lighting.
- No street lighting in rural areas unless absolutely necessary.
Solutions (2)

- Planners should consider alternative solutions to make roads safer:
- Cat’s eyes and other reflective devices.
- Reflective signage.
- Smart signage – glow-in-the-dark road markings.
- L.E.D. solar powered, motion operated road studs.
- Concrete baffles or elevated crash barriers on motorways to eliminate the glare of oncoming traffic.
- Speed limits and speed-humps on the approaches to established hazards.

- Most of these consume little or no energy, and require little maintenance.
• Pedestrians should wear bright clothing at night to make themselves visible, and should carry a torch.

• Sports facilities should be roofed over or sports enthusiasts encouraged to carry out their activities in daylight.

• Planning permission and taxes on domestic security lighting.

• Bans on vanity lighting in, or which can be seen from, residential, suburban or rural areas.

• Making light pollution a statutory nuisance in law.

• Municipalities should remove obtrusive lighting affecting properties on request.
Objections to lighting management should not be subject to a referendum or a popular vote.

Those concerned about loss of amenity need to be convinced that light pollution is a major threat to the environment and human health.

They should realise that the prevailing situation is unsustainable and can no longer be allowed to continue.

*The essence of good governance is to know what the people want, and to know what the people need, and to have the wisdom to understand the difference.*

In order to protect the planet, urgent remedial action is needed.
Conclusions

- Light pollution is very damaging to the environment and human health.
- It can easily be remedied by good lighting practice, legislation and common sense.
- It can be substantially reduced without loss of amenity or reduction in security.
- Communities and the environment will all stand to benefit: it is a win-win situation.
- Thank you.