

Light pollution

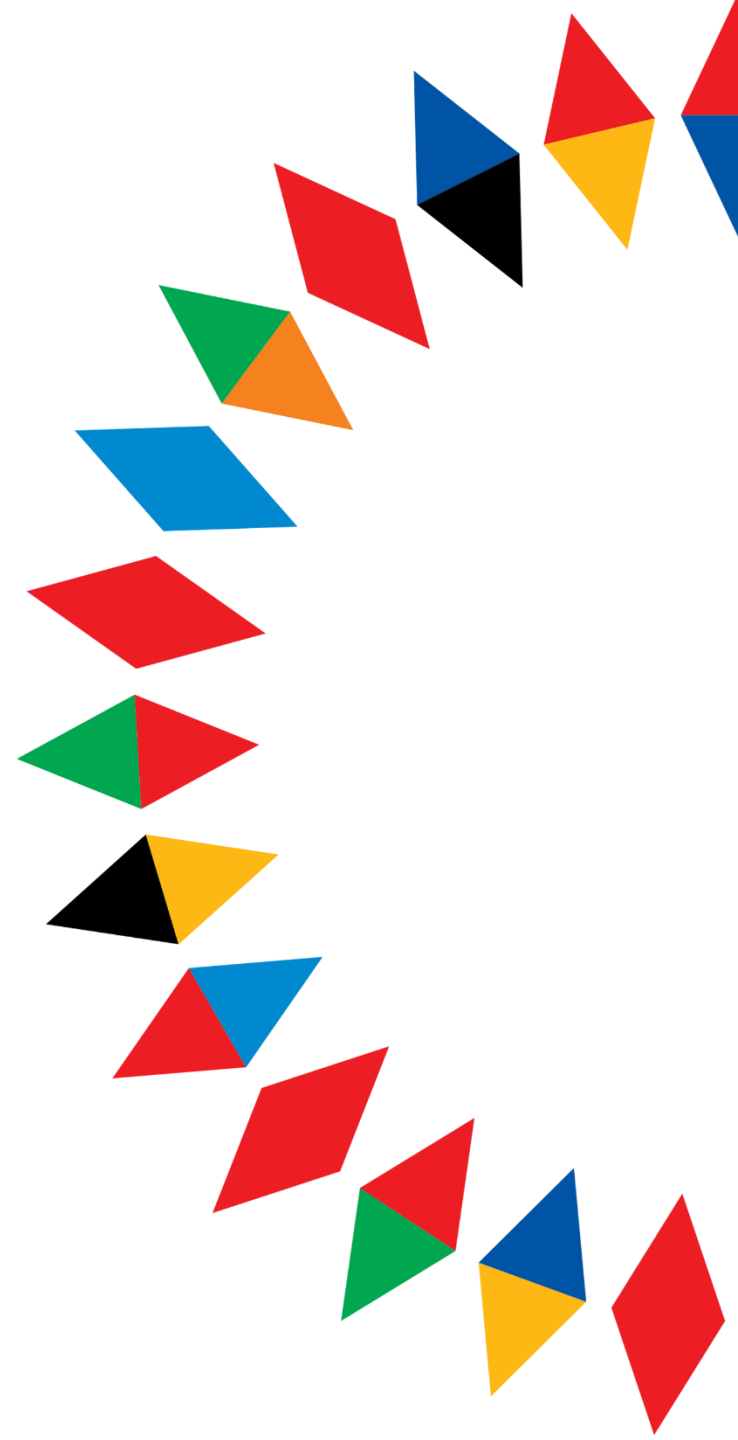
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Ministry of the Environment

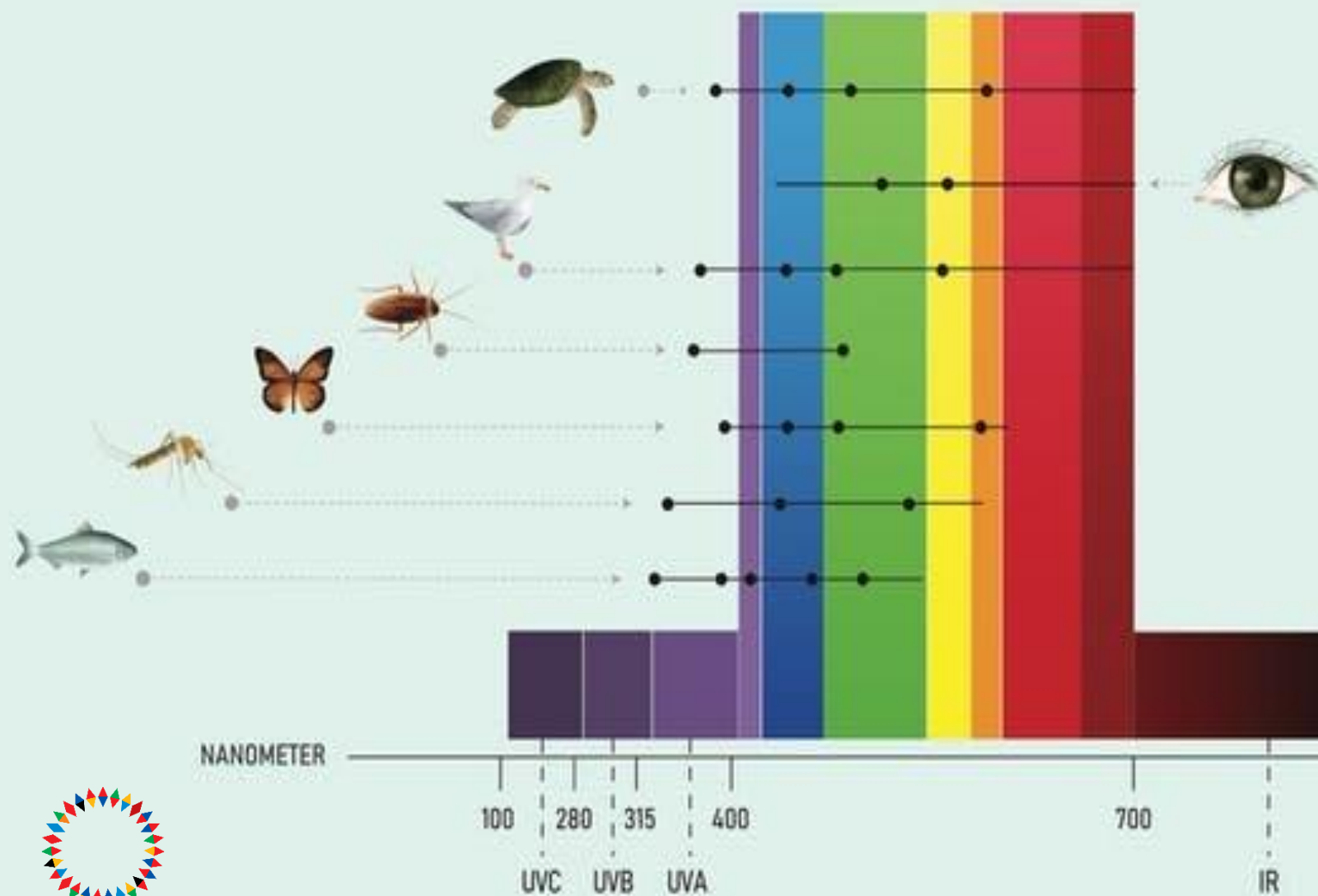


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Light....
A good servant,
but a bad master



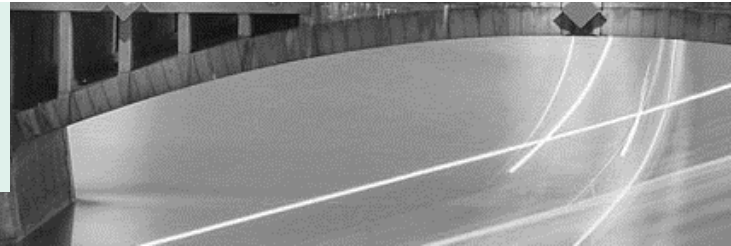


Hölker et al. (2010)	Estimated number of described species ^a	Nocturnal species (%)
Vertebrates		
Mammals	5 488	63.8
Primates (incl. H. sapiens)	432	31.0
Bats	1100	100.0
Birds	9 990	19.6
Reptiles	8 969	16.6
Amphibians	6 433	93.3
Fishes	30 700	14.1
Subtotal	61 580	28.0
Invertebrates		
Insects	950 000	49.4
Lepidopterans	180 000	77.8
Coleopterans	500 000	60.0
Crustaceans	40 000	50.0
Arachnids	98 000	5.0
Molluscs	81 000	b
Corals	2 175	c
Others	61 209	?
Subtotal	1 232 384	64.4

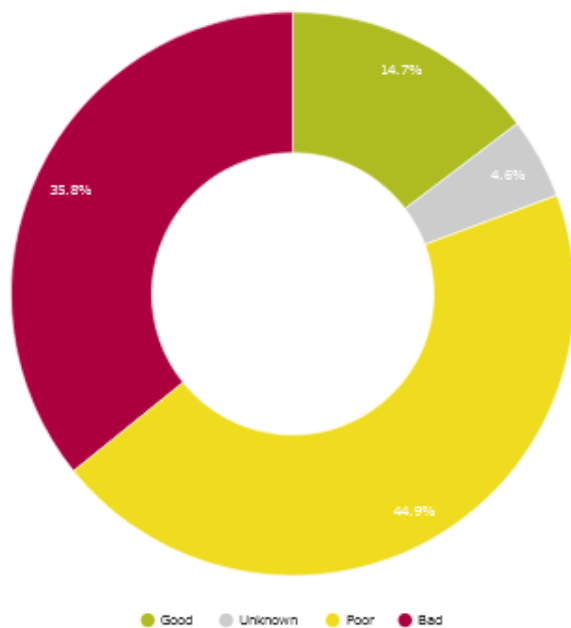


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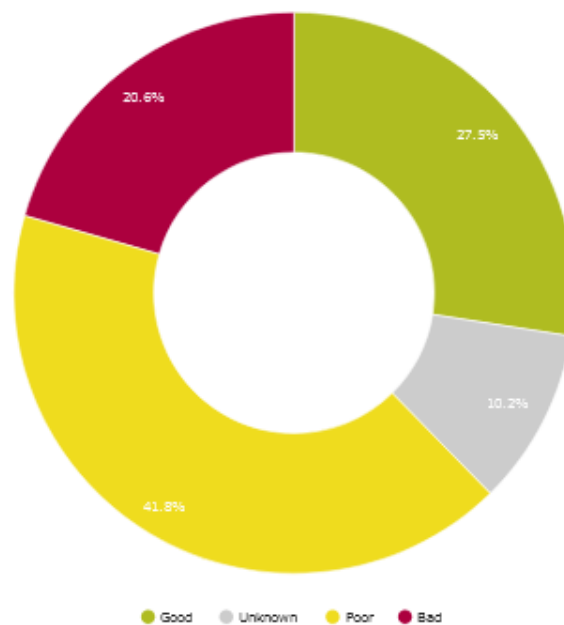
Campos (2017)



Conservation status of habitats at EU level, 2013-2018



Conservation status of species at EU level, 2013-2018



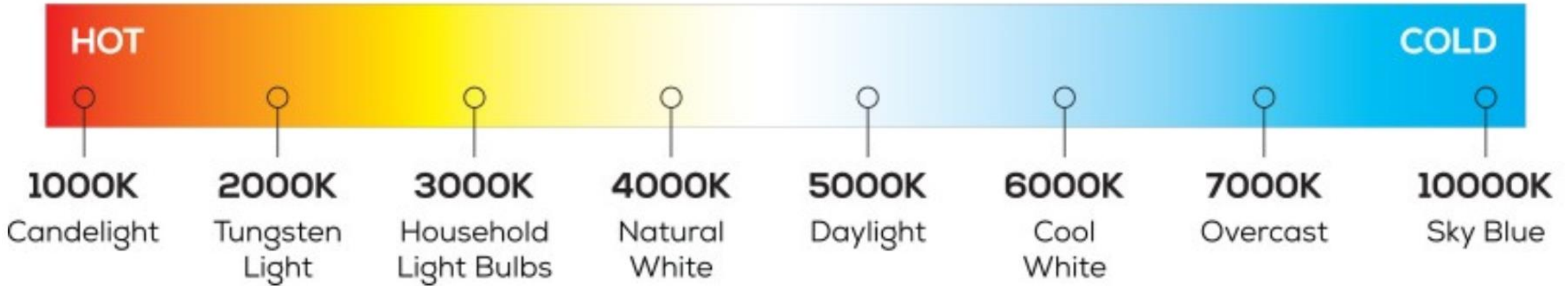
EEA (2020)

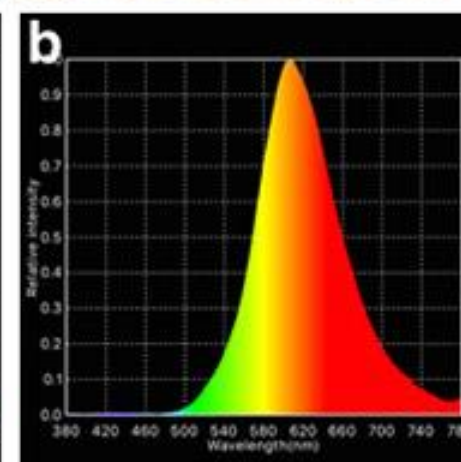
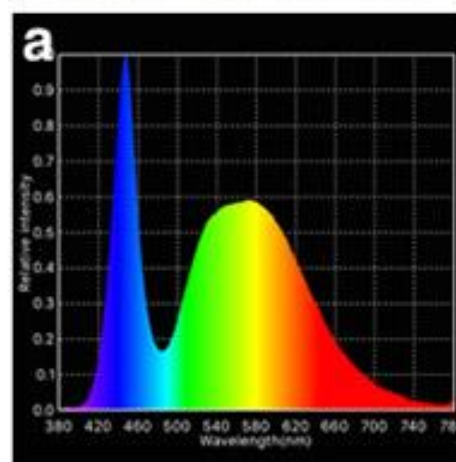
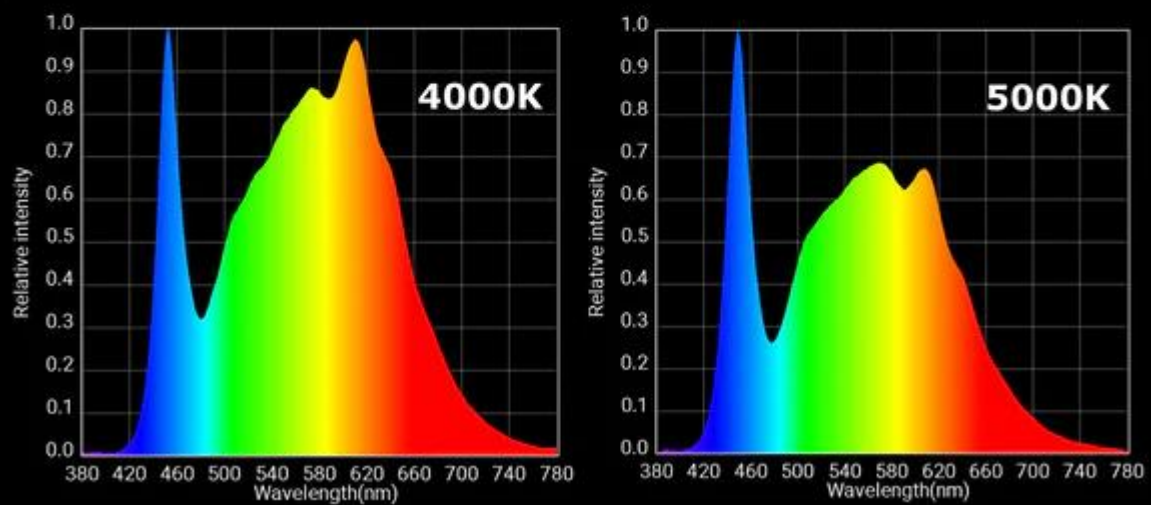
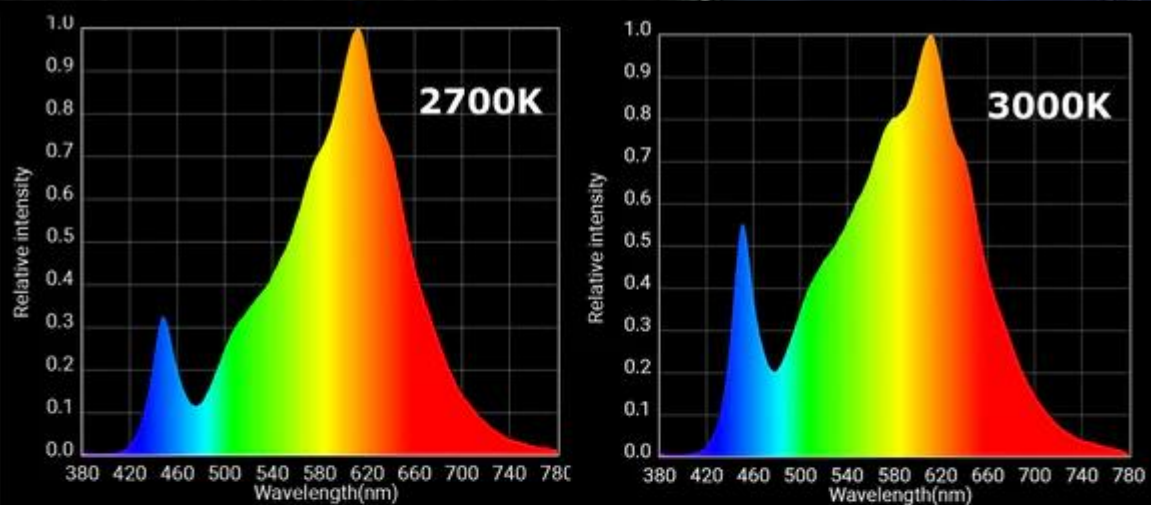


Table 13. General guide to effect of different spectral bands of light on different species

	UV	Violet	Blue	Green	Yellow	Orange	Red	IR
wavelength (nm)	<400	400-420	420-500	500-575	575-585	585-605	605-700	>700
freshwater fish	x	x	x	x	x	x	x	
marine fish	x	x	x	x				
shellfish (zooplankton)	x	(x)	(x)					
amphibia&reptiles	x	x	x	>550	x	x	x	x
birds	x	x	x	x		x	x	x
mammals (excluding bats)	x	x	x	x			x	
bats	x	x	x	x				
insects	x	x	x	x				

note: (x) = assumed possible but not identified in literature Biodiv (2015)





Light pollution = set of adverse effects of artificial light

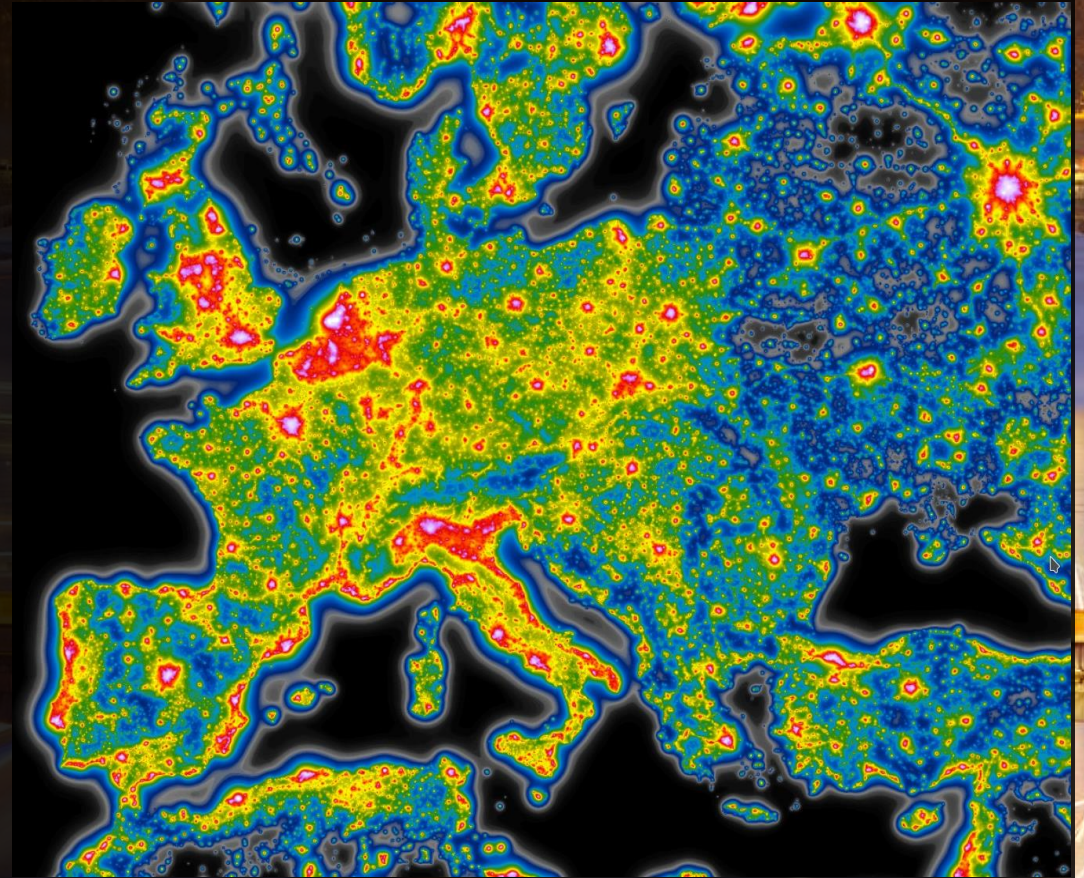
ECOLOGY & HEALTH

- Disturbed sleep – melatonin and other hormones, circadian rhythm
- Attraction to light – predator/ prey relations, exhaustion, mating behaviour
- Loss of sense of direction – migratory species
- Seasonal desynchronisation – defoliation

LEDs give false signals that it is daytime + equally long day all year

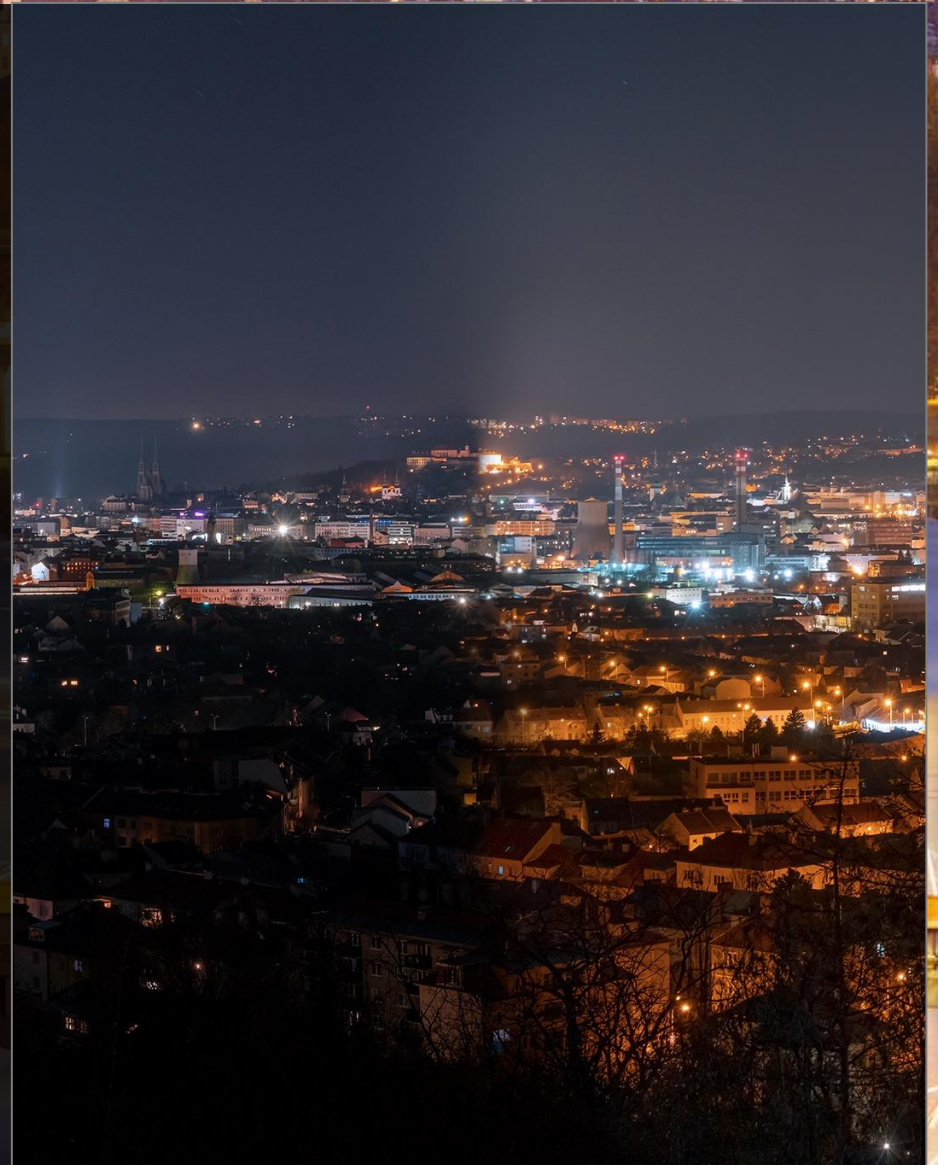
Waste of ENERGY – 15% of EU energy consumed by lighting, as much as 50% wasted), unnecessary emissions.

Majority of EU population has little chance to experience true night sky.



Sources of artificial light at night

- Public lighting and road lighting
- Outdoor sports grounds
- Industrial/working sites and private business properties (parking lots)
- Architectural lighting
- Advertising and billboards
- Private buildings and properties



Approach in the Czech Republic

2017 Interministerial working group on Light Pollution
Information to the Government
Lighting manual for municipalities
Subsidy scheme

2018 Action Plan on Light Pollution

Act no. 114/1992 Coll., on Nature and landscape protection

2020 International webinar – „Light Pollution 2020“
EIA – manual for authorised persons

2020 Public hearing in the Senate - „Negative effects of light pollution“

2021 State Environmental Policy 2030

Webinar „Light Pollution 2021“ – EU Green Week

Updated „Simple Lighting manual“

Research project – „Influence of light pollution on sensitive animal species, ecosystems and landscape in Czechia“

2022 Technical standard committee

?/2023 Building Act and Decree

Light pollution – European Level

- Problem recognition
- Transboundary issue
- Mutual learning
- Monitoring
- **Simple solution (?):**
 - Light only **where** it is needed
 - Light only **when** necessary
 - Use of the least harmful light spectrum and intensity (ALARA)

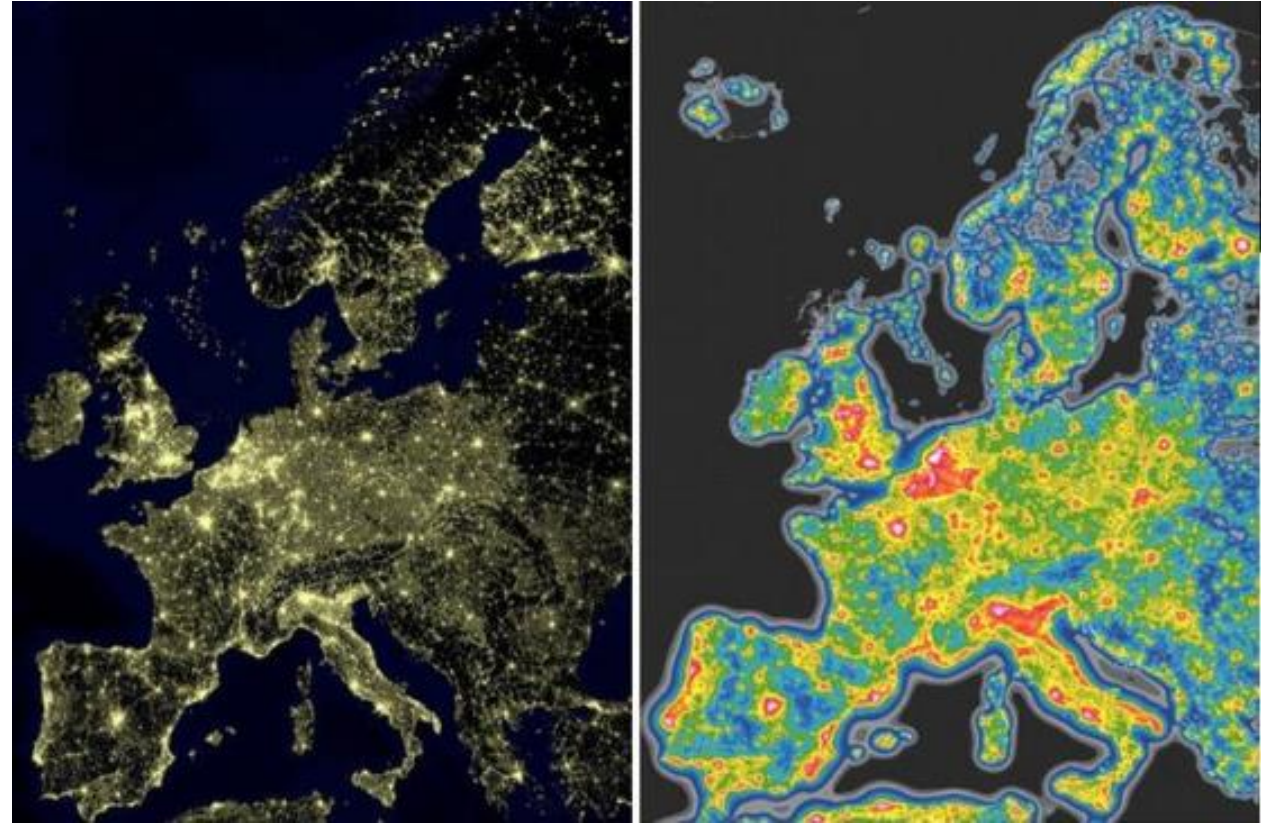


Image source: Donatello, Shane & Quintero, Rocío & Gama Caldas, Miguel. (2019). Revision of the EU Green Public Procurement Criteria for Road Lighting and traffic signals Technical report and criteria proposal. 10.2760/372897.



Light pollution reduction measures in Europe



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Country	Legislation ¹	Standard	Manual ²	Other ³
Austria	X	✓	✓	✓
Belgium	X	✓	✓	✓
Bulgaria	X	✓	X	X
Croatia	✓	X	X	✓
Cyprus	X	X	X	✓
Czech Republic	(✓)	(✓)	✓	✓
Denmark	(✓)	X	✓	✓
Estonia	X	X	X	✓
Finland	(✓)	X	(✓)	X
France	✓	X	X	✓
Germany	✓	X	✓	✓
Greece	✓	X	X	✓
Hungary	(✓)	X	✓	✓
Iceland	X	X	X	✓
Ireland	X	X	✓	✓
Italy	✓	✓	X	X
Latvia	(✓)	X	X	✓
Liechtenstein	X	X	X	✓
Lithuania	X	X	X	X
Luxembourg	X	X	✓	✓
Malta	✓	✓	(✓)	✓
Netherlands	(✓)	X	✓	✓
Norway	X	X	✓	X
Poland	X	X	X	✓
Portugal	X	X	✓	✓
Romania	X	X	X	✓
Slovakia	(✓)	X	X	✓
Slovenia	(✓)	X	✓	✓
Spain	✓	X	✓	✓
Sweden	✓	(✓)	✓	X
Switzerland	(✓)	✓	✓	✓
United Kingdom	✓	X	✓	✓

Call for European concerted action – Brno Appeal

Conclusions clues for action

- acknowledgement of the problem and need to protect the night environment
- need to address light pollution in environmental policies and legislation
- use available permitting and assessment instruments to address the problem
- review available lighting standards and initiate new standards if needed
- explore light pollution control mechanisms and provide funding support
- review the Green Public Procurement criteria for Road Lighting
- review the Ecodesign requirements for light sources
- support research on light pollution impacts
- develop common indicators and monitoring approaches
- promote awareness raising

Policy coherence

Energy Efficiency first

Do No Harm principle





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Thank you for your attention.

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