Openbare verlichting & biodiversiteit

het proces van ver-LED-ting



Prof. Dr. **Hans Van Dyck**

Behavioural Ecology & Conservation Group
Louvain-la-Neuve

UCL UNIVERSITÉ CATHOLIQUE DE LOUVAIN

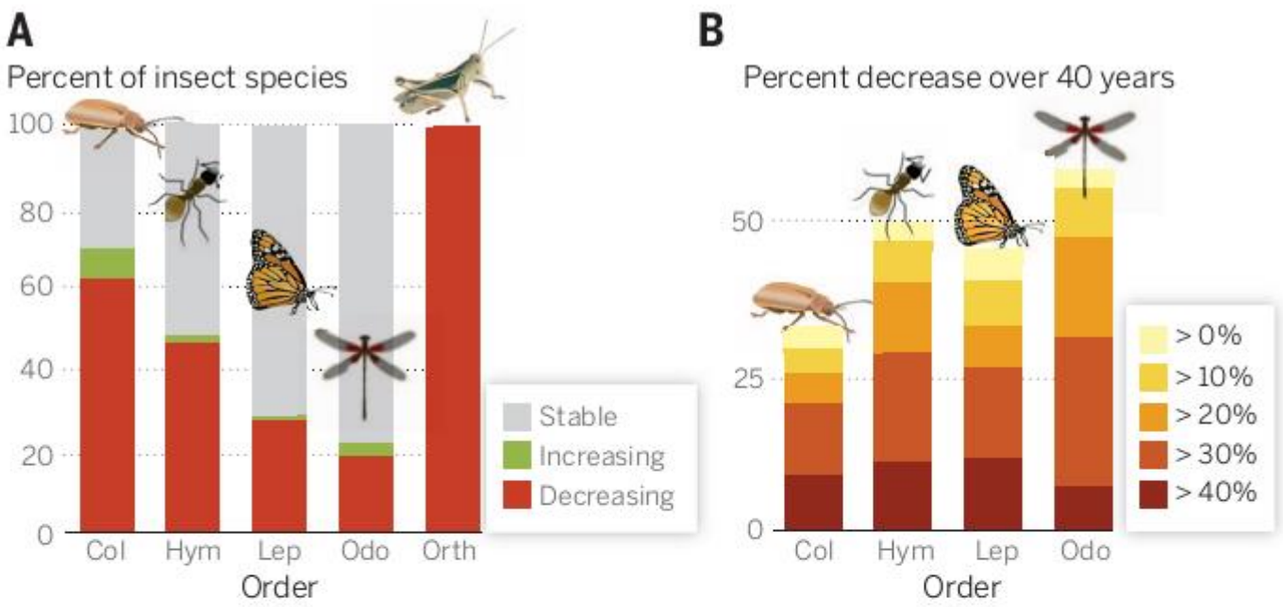
REVIEW

Defaunation in the Anthropocene

Rodolfo Dirzo,[1]* Hillary S. Young,[2] Mauro Galetti,[3] Gerardo Ceballos,[4] Nick J. B. Isaac,[5] Ben Collen[6]

Science (2014)
345: 401-406

Fig. 1. Evidence of declines in invertebrate abundance. (**A**) Of all insects with IUCN-documented population trends, 33% are declining, with strong variation among orders (*19*). (**B**) Trends among UK insects (with colors indicating percent decrease over 40 years) show 30 to 60% of species per order have declining ranges (*19*). (**C**) Globally, a compiled index of all invertebrate population declines over the past 40 years shows an overall 45% decline, although decline for Lepidoptera is less severe than for other taxa (*19*). (**D**) A meta-analysis of effects of anthropogenic disturbance on Lepidoptera, the best-studied invertebrate taxon, shows considerable overall declines in diversity (*19*).



WHERE HAVE ALL THE INSECTS GONE?

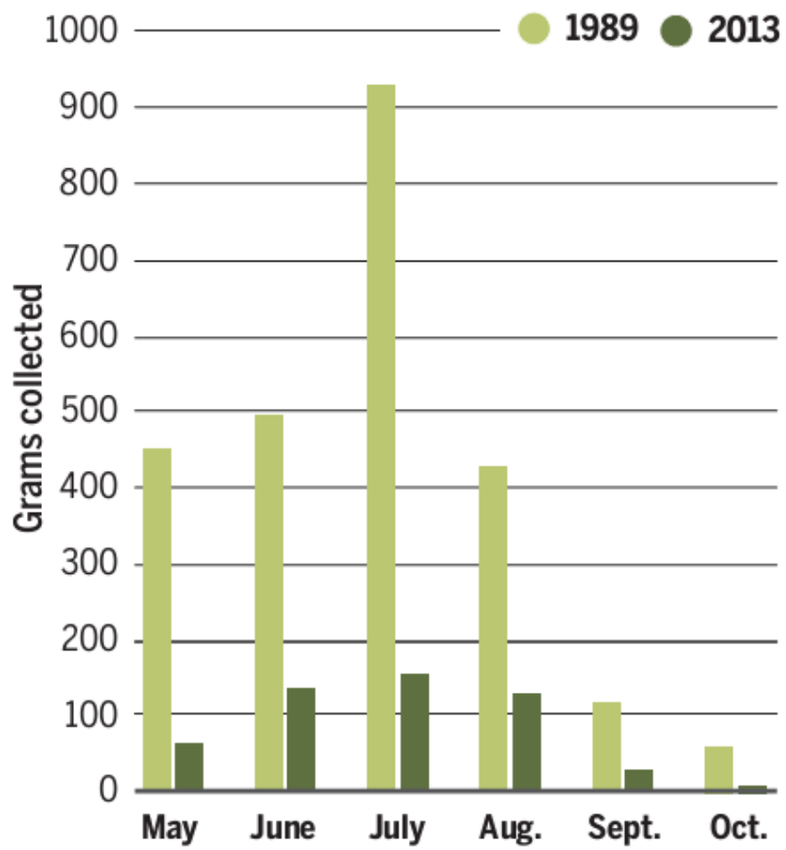
Surveys in German nature reserves point to a dramatic decline in insect biomass. Key members of ecosystems may be slipping away

By **Gretchen Vogel**, *in Krefeld, Germany*

Science (2017) 356: 576-579

Weighty disappearances

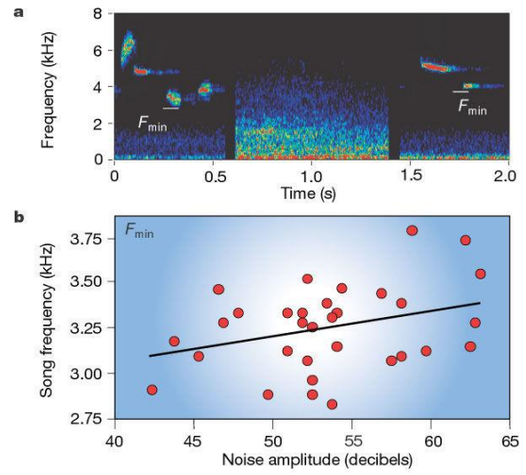
The mass of insects collected by monitoring traps in the Orbroicher Bruch nature reserve in northwest Germany dropped by 78% in 24 years.



Antropoceen: een wereld op mensenmaat

[HIREC: Human-induced rapid environmental change]

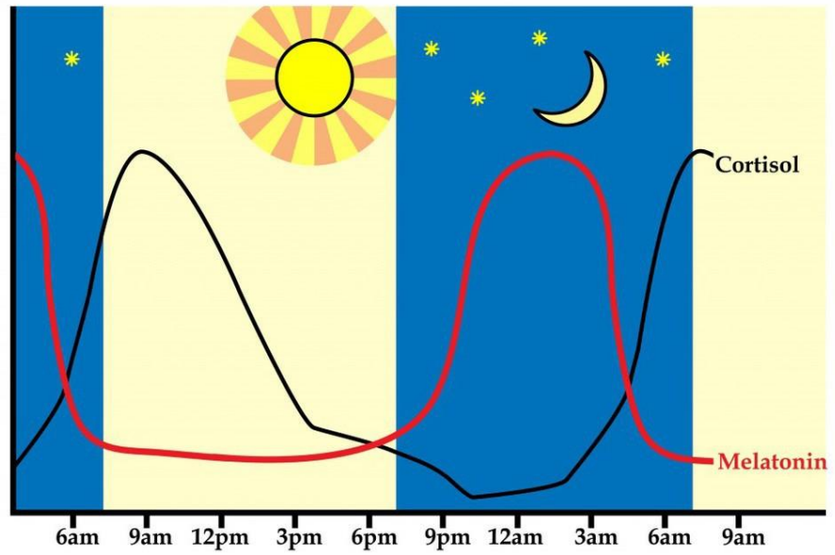
- Chemische verandering (bv. nitraatproblematiek)
- Fysische verandering
  - Geluidspollutie
  - Lichtpollutie



ALAN: artificial light at night

- Groeiende wetenschappelijke belangstelling
- Onderzoek invloed urbanisatie

Fundamentele invloed



- Verandering cyclus licht-duisternis

- Verstoring biologisch ritme:
  - Nachtelijke activiteit, kwaliteit leefgebied
  - Ritme dag-nacht
  - Ritme seizoenen

- Impact op diverse biologische niveaus (molecule, individu, populatie, soort, gemeenschap, ecosysteem)

- Invloed op mens en niet-menselijke levensvormen
  Invloed op kwaliteit leefomgeving (stressniveaus)

Impact (1): nachtrust

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DOI: 10.1111/gcb.13756

PRIMARY RESEARCH ARTICLE

WILEY Global Change Biology

Restless roosts: Light pollution affects behavior, sleep, and physiology in a free-living songbird

Jenny Q. Ouyang[1,2] | Maaike de Jong[2] | Roy H. A. van Grunsven[3,4] | Kevin D. Matson[5] | Mark F. Haussmann[6] | Peter Meerlo[7] | Marcel E. Visser[2] | Kamiel Spoelstra[2]

Universiteit Antwerpen

SCIENTIFIC REPORTS

OPEN

Light pollution disrupts sleep in free-living animals

5:13557 | DOI: 10.1038/srep13557

(2015)

Thomas Raap[1], Rianne Pinxten[1,2] & Marcel Eens[1]

Impact (2): seizoenaliteit

PHILOSOPHICAL TRANSACTIONS B

rstb.royalsocietypublishing.org

Research

Cite this article: Dominoni DM, Partecke J. 2015 Does light pollution alter daylength? A test using light loggers on free-ranging European blackbirds (*Turdus merula*). *Phil. Trans. R. Soc. B* **370**: 20140118.
http://dx.doi.org/10.1098/rstb.2014.0118

Does light pollution alter daylength? A test using light loggers on free-ranging European blackbirds (*Turdus merula*)

Davide M. Dominoni[1] and Jesko Partecke[2,3]

[1]Institute of Biodiversity, Animal Health and Comparative Medicine, University of Glasgow, Glasgow G12 8QQ, UK
[2]Department of Migration and Immuno-ecology, Max Planck Institute for Ornithology, 78315 Radolfzell, Germany
[3]Department of Biology, University of Konstanz, 78464 Konstanz, Germany

Artificial light at night is one of the most apparent environmental changes accompanying anthropogenic habitat change. The global increase in light pollution poses new challenges to wild species, but we still have limited understanding of the temporal and spatial pattern of exposure to light at night.

Impact (3): ecosysteem(diensten)

PHILOSOPHICAL TRANSACTIONS B

rstb.royalsocietypublishing.org

Research

Cite this article: Hölker F, Wurzbacher C, Weißenborn C, Monaghan MT, Holzhauer SIJ, Premke K. 2015 Microbial diversity and community respiration in freshwater sediments influenced by artificial light at night. *Phil. Trans. R. Soc. B* **370**: 20140130. http://dx.doi.org/10.1098/rstb.2014.0130

Microbial diversity and community respiration in freshwater sediments influenced by artificial light at night

Franz Hölker[1], Christian Wurzbacher[1,2], Carsten Weißenborn[1], Michael T. Monaghan[1,2], Stephanie I. J. Holzhauer[1] and Katrin Premke[1,3]

[1]Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Müggelseedamm 301/310, Berlin 12587, Germany
[2]Berlin Center for Genomics in Biodiversity Research, Königin-Luise-Strasse 6–8, Berlin 14195, Germany
[3]Leibniz Centre for Agricultural Landscape Research (ZALF), Eberswalderstrasse 84, Müncheberg 15374, Germany

An increasing proportion of the Earth's surface is illuminated at night. In aquatic ecosystems, artificial light at night (ALAN) may influence microbial communities living in the sediments. These communities are highly diverse and play an important role in the global carbon cycle. We combined field and laboratory experiments using sediments from an agricultural drainage

Journal of Ecology

British Ecological Society

Journal of Ecology 2016, **104**, 611–620 doi: 10.1111/1365-2745.12551

FUTURE DIRECTIONS

Ecological effects of artificial light at night on wild plants

Jonathan Bennie*, Thomas W. Davies, David Cruse and Kevin J. Gaston

Environment and Sustainability Institute, University of Exeter, Penryn Campus, Penryn TR10 9FE, UK

Passen soorten zich niet aan?

Ja, maar…

Kardinaalsmutsstippelmot
(*Yponomeuta cagnagella*)

BIOLOGY LETTERS

rsbl.royalsocietypublishing.org

Research

Cite this article: Altermatt F, Ebert D. 2016 Reduced flight-to-light behaviour of moth populations exposed to long-term urban light pollution. *Biol. Lett.* **12**: 20160111.
http://dx.doi.org/10.1098/rsbl.2016.0111

Global change biology

Reduced flight-to-light behaviour of moth populations exposed to long-term urban light pollution

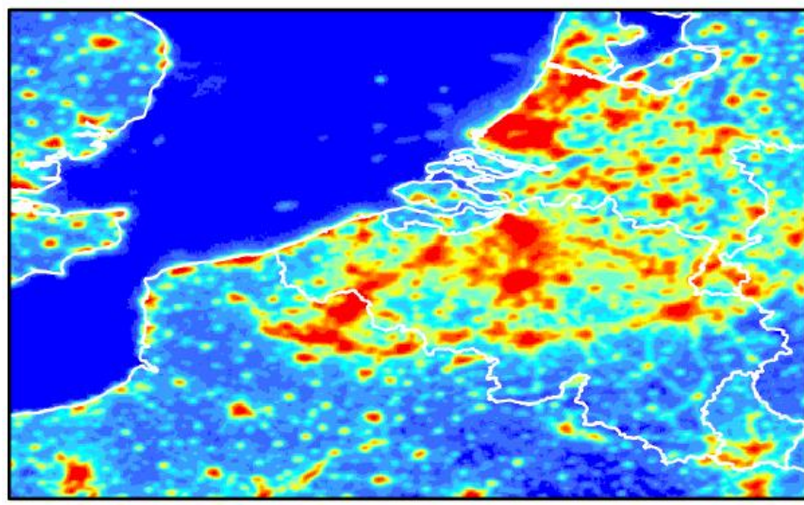
Florian Altermatt[1,2,3] and Dieter Ebert[3]

[1]Department of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, 8057 Zürich, Switzerland
[2]Department of Aquatic Ecology, Eawag, Swiss Federal Institute of Aquatic Science and Technology, Überlandstrasse 133, 8600 Dübendorf, Switzerland
[3]Department of Environmental Sciences, Zoology, University of Basel, Vesalgasse 1, 4051 Basel, Switzerland

FA, 0000-0002-4831-6958

SCIENTIFIC REPORTS

Contrasting trends in light pollution across Europe based on satellite observed night time lights



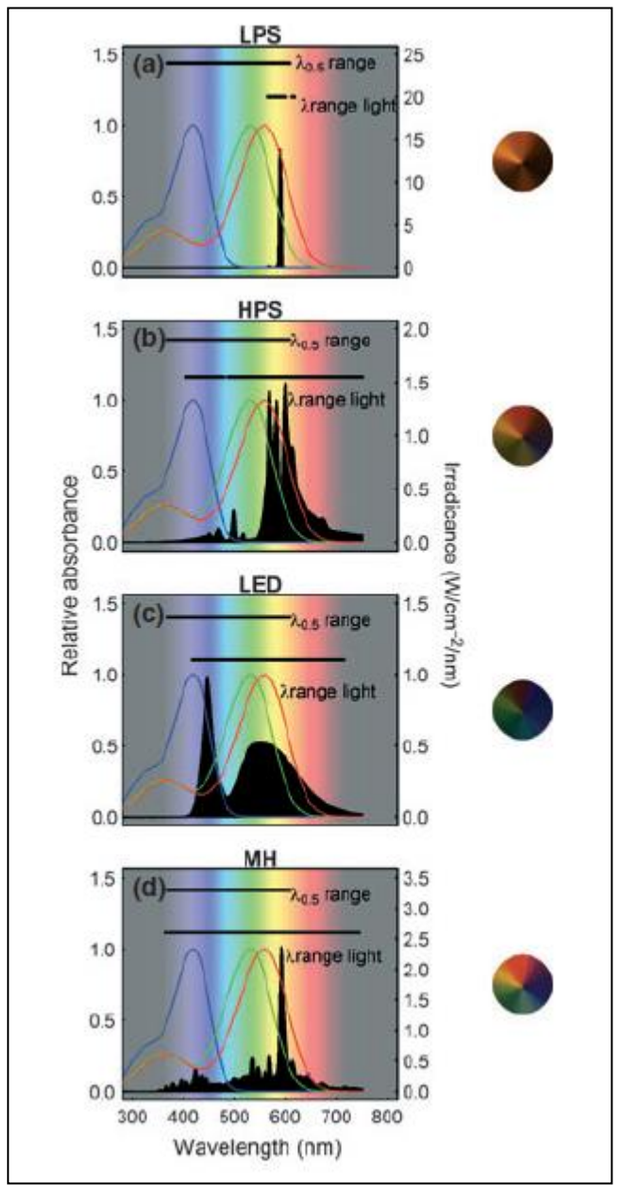
Jonathan Bennie, Thomas W. Davies, James P. Duffy, Richard Inger & Kevin J. Gaston

Environment and Sustainability Institute, University of Exeter, Penryn, Cornwall, UK TR10 9EZ.

SCIENTIFIC REPORTS | 4 : 3789 | DOI: 10.1038/srep03789 (2014)

ness (Figure 3). Belgium is unique in Europe in having lighting installations for almost the entire length of its motorway system; during the time period covered by this study lighting in the central reservations of many motorways were switched off for environmental and financial reasons for periods during the night[27]. It is

LED: milieuwinst vs biodiversiteitsverlies?



Global Change Biology

Global Change Biology (2013) **19**, 1417–1423, doi: 10.1111/gcb.12166

Artificial light pollution: are shifting spectral signatures changing the balance of species interactions?

THOMAS W. DAVIES*, JONATHAN BENNIE*, RICHARD INGER*, NATALIE HEMPEL DE IBARRA† and KEVIN J. GASTON*

**Environment and Sustainability Institute, University of Exeter, Penryn, Cornwall TR10 9EZ, UK, †Centre for Research in Animal Behaviour, School of Psychology, University of Exeter, Exeter, Devon EX4 4QG, UK*

→ Gebruiken vaker breedspectrum lampen

Ecological Applications, 24(7), 2014, pp. 1561–1568

LED lighting increases the ecological impact of light pollution irrespective of color temperature

S. M. Pawson[1,3] and M. K.-F. Bader[2]

→ LED: goed voor milieu, slecht voor natuur?

PHILOSOPHICAL TRANSACTIONS B

rstb.royalsocietypublishing.org

Research

Cite this article: Longcore T, Aldern HL, Eggers JF, Flores S, Franco L, Hirshfield-Yamanishi E, Petrinec LN, Yan WA, Barroso AM. 2015 Tuning the white light spectrum of light emitting diode lamps to reduce attraction of nocturnal arthropods. *Phil. Trans. R. Soc. B* **370**: 20140125.
http://dx.doi.org/10.1098/rstb.2014.0125

Tuning the white light spectrum of light emitting diode lamps to reduce attraction of nocturnal arthropods

Travis Longcore[1], Hannah L. Aldern[2], John F. Eggers[2], Steve Flores[2], Lesly Franco[2], Eric Hirshfield-Yamanishi[2], Laina N. Petrinec[2], Wilson A. Yan[2] and André M. Barroso[3]

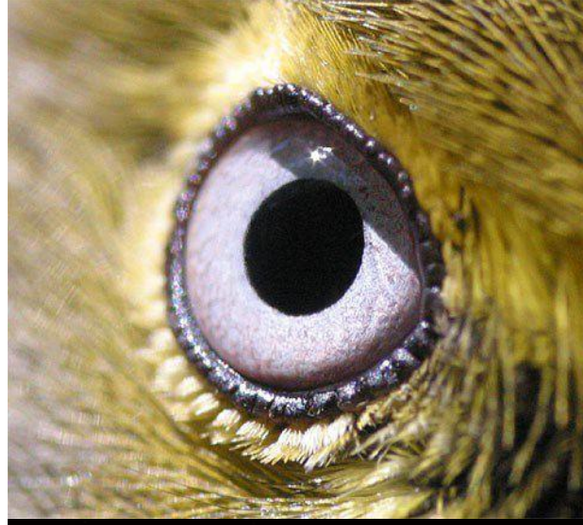
[1]Spatial Sciences Institute, University of Southern California, Los Angeles, CA, USA
[2]Institute of the Environment and Sustainability, UCLA, Los Angeles, CA, USA
[3]Philips Research Europe, Eindhoven, The Netherlands

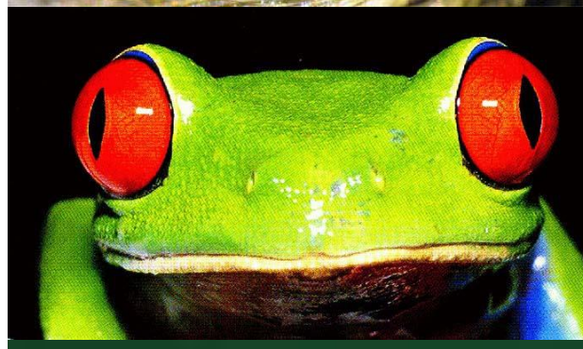
TL, 0000-0002-1039-2613

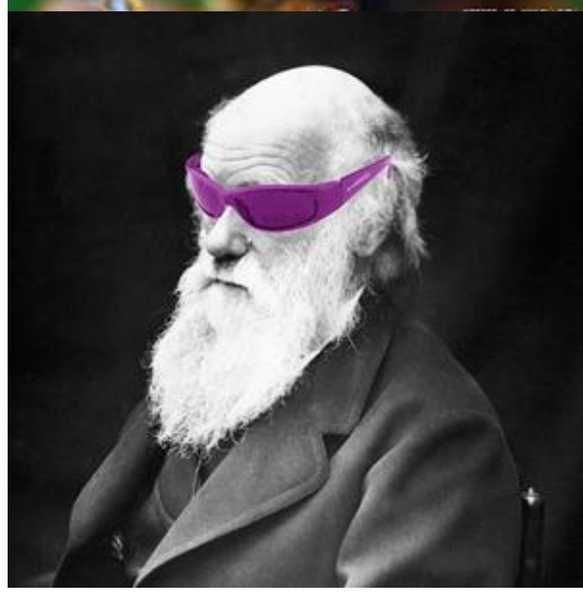
Artificial lighting allows humans to be active at night, but has many unintended consequences, including interference with ecological processes, disruption of circadian rhythms and increased exposure to insect vectors of diseases. Although ultraviolet and blue light are usually most attractive to

Kwantiteit en kwaliteit openbare verlichting: voortrekkersrol in Vlaanderen?

What you see,
is not what they get…







Zintuigelijke impact op omgeving

Natuur, biodiversiteit & menselijke gezondheid

- Belang natuurcontact – “extinction of experience” syndroom
- Nieuwe inzichten relatie (microbiële) biodiversiteit en menselijke gezondheid (fysiek & mentaal)

Landscape and Urban Planning 143 (2015) 69–75

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan

Research paper

Reducing the extinction of experience: Association between urban form and recreational use of public greenspace

Masashi Soga[a,b,*], Yuichi Yamaura[a,c], Tetsuya Aikoh[a], Yasushi Shoji[a], Takahiro Kubo[d,e], Kevin J. Gaston[b]

[a] Research Faculty of Agriculture, Hokkaido University, Nishi 9, Kita 9, Kitaku, Sapporo, Hokkaido 060-8589, Japan
[b] Environment and Sustainability Institute, University of Exeter, Penryn TR10 9FE, Cornwall, UK
[c] Forestry and Forest Product Research Institute, Matsunosato 1, Tsukuba 305-8687, Japan
[d] Division of Natural Resource Economics, Graduate School of Agriculture, Kyoto University, Oiwake, Kitashirakawa, Sakyoku, Kyoto 606-8502, Japan
[e] Center for Environmental Biology and Ecosystem Studies, National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki 305-8502, Japan

Take home messages

- Belang integratie biodiversiteitscrisis in diverse beleidsdomeinen → straatverlichting

- Vlaanderen: extreme casus lichtvervuiling

- Pleidooi voor duisternis (natuur- en bosgebied, elders)
  Pleidooi voor gerichte, functionele verlichting
  Pleidooi voor aangepast spectrum (LED)

- Gepaste communicatie over belang en problemen van kunstlicht/LED-verlichting

Dank voor uw aandacht!