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The Night Sky and the Risks of Light Pollution

PAR SAMUEL CHALLÉAT · PUBLIÉ 02/01/2018 · MIS À JOUR 19/12/2018



***The First World Atlas of the Artificial Night Sky Brightness*, published in 2001 by Pierantonio Cinzano, Fabio Falchi and Christopher D. Edvige, stands out in the history of the 'dark-sky movement'. Still today, it is a seminal reference work of collective research and one of the most cited studies on light pollution.**

Fifteen years later, the publication of *The New World Atlas of Artificial Night Sky*

Brightness marks a new phase. This massive attention this study received in the media shows that the negative effects of artificial lighting are no longer only a problem for experts: this is now a public problem. This study also shows that, when trying to quantify light pollution, it is hard to go beyond the artificial indicator of "whether we can see the Milky Way with the naked eye." This standard has been inherited from the history of struggles against light pollution by amateur astronomers.

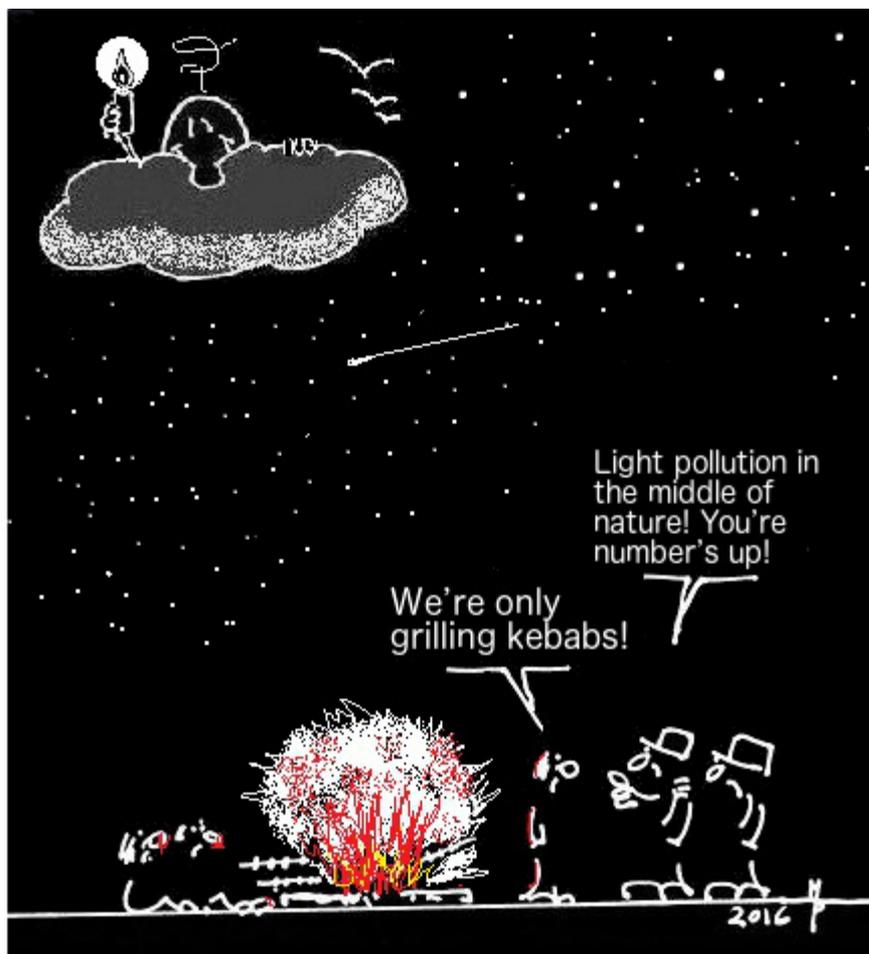
This new atlas of artificial lighting offers us the occasion to explore how urban lighting was transformed into an environmental problem with global impact, and to bring to light the solutions that are currently proposed, especially in France.

From Professional Observatories to Amateur Astronomy

Seeing light pollution as an environmental problem and addressing it in public policies are not self-evident: challenging the doxa of public lighting through regional policies resulted from the slow construction of artificial lighting as a harmful object,

begun in the United States by professional astronomers at the end of the 1950s. In 1958, the city of Flagstaff in Arizona, close to Lowell Observatory, decided to regulate street lighting to protect the night sky. Then in 1972, Tucson, also situated in Arizona near Kitt Peak Observatory, followed suit.

While there was a local desire to safeguard scientific research, there was also a more general trend involved: on both sides of the Atlantic, the 1970s were years of the massive development of the automobile, urban sprawl, and low electricity production costs. This led to a functionalist view of street lighting that was more and more powerful, increasing the size and intensity of the bright halo. This period was also one of growing global environmental awareness, accompanied by the notion that technology could pose risks.

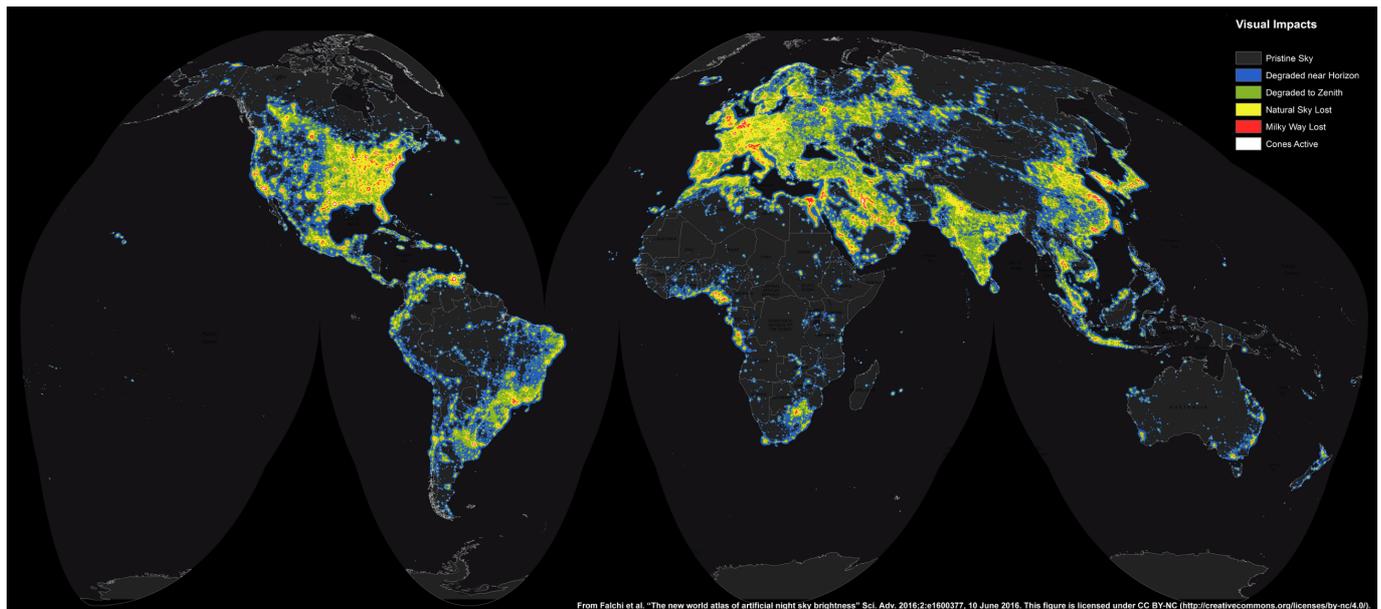


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In May 1976, in the editorial of the Bulletin de la Société Astronomique de France, entitled "Pollution and Astronomy," Jean-Claude Pecker wrote: "We know the problems that we face today, with the pollution of cities, water, air...pollution that, if we are not careful, comes from the development of industrial techniques, population growth, and new technologies, whose consequences we sometimes don't predict."

In this context, the idea of light pollution took shape around an environmental good: the starry sky, with its socio-cultural and scientific benefits. In reaction to losing access to that sky, different astronomy and lighting networks and groups took up action. At a congress at Grenoble in 1976, the International Astronomical Union  adopted a

resolution to protect astronomical sites. Its collaboration with the International Commission on Illumination led to practical recommendations in 1980 aimed at decreasing the bright halo close to observatories. Amateur astronomers entered the game and conveyed these professional concerns into their local communities. In 1993, they came together to sign a charter to preserve the night-time environment. In France, this activism led to the creation of a Centre for the Protection of the Night Sky, which in 1998 would become the Association Nationale pour la Protection du Ciel Nocturne [↗](#).



From Astronomy to ‘Night-time Environment’

At the end of 2006, this association made a significant change that was representative of the evolution in the struggle over light pollution by integrating its name with the notion of night environment. Paul Blu, its president, justified this decision: “We have to stop exposing our flank to rejections of our arguments, which are provoked by our name emphasising the protection of the night sky. To do this, we must change the name of the association and give it an environmental connotation.” By widening the question beyond astronomy and merely protecting the starry sky, the association had a clear strategic aim: put light pollution on the political agenda of the Grenelle Environment Roundtable.

In public actions such as the Grenelle with rather vague objectives, sometimes multiple meanings and ambiguity are needed to bring together and find compromise

among ideas and interests. Thus, this concept of the 'night environment' was meant to rally together several objects, phenomena, and human and non-human systems and to serve as the common point for synthesising the demands of astronomers and scientific research since the 1980s in ecology and medicine. The damage to the night environment therefore included socio-cultural aspects (accessibility to the starry sky), ecological ones (species and systems affected by artificial light, at various scales of time and space), even health concerns (disturbances of Circadian rhythms, hormonal imbalances).



A Socio-technical and Environmental Controversy

From that time on, light pollution has become part of the required budget reductions for local governments and part of public policy for the energy transition; the issue is no longer limited to one group fighting to preserve its domain. It has now become a socio-technical and environmental controversy, and is treated as such by government authorities. This generalisation of the issue results from the creation and involvement of broader groups, for example with citizen science projects for the general public and school children (see the programme [Globe at Night](#)). Without educating the public, it is very difficult to successfully undertake public action.

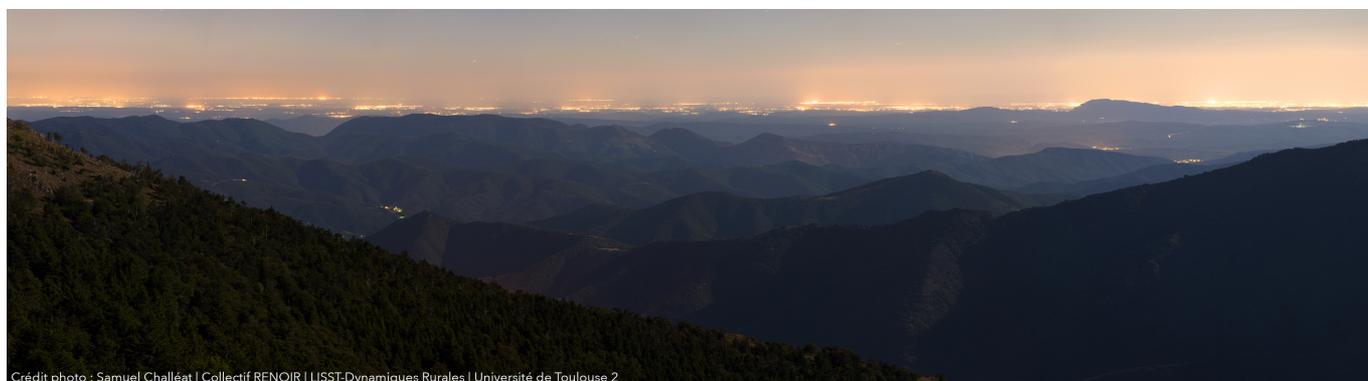
It is perhaps through this filter that we should (re)read the two world atlases of artificial night sky brightness, while keeping in mind that a scientific publication, even when modelling lighting footprints, can both question political policies and supply tools for public action. We can then suggest some answers to the question about the “seeing the Milky Way with the naked eye” indicator, although there is still a common desire for light pollution to break out of the historical preserve of astronomy.



In Search of a Synthetic Indicator

The first element in fact concerns indicators, and this problem exists regardless of the environmental domain involved. Indicators are often reductionist or oversimplified, subject to controversy, and sometimes ineffective yardsticks for action when they involve a complex system, such as for the ecological and health effects of artificial lighting.

We must therefore keep in mind that an indicator is only one way among other others to describe reality. And to describe, is to choose. Here, this means choosing what we measure, what we know how to demonstrate, and what we want to display, but also what we don't know how or want to show: for example, the still-shocking lack of knowledge about the broad spatio-temporal effects of light on ecosystems and human health. Without that knowledge, we may suppose that biotopes and peoples evolving under a sky in which the Milky Way can be seen by the naked eye are relatively unaffected by the harmful effects of artificial lighting. In this sense, that indicator may offer a good synthetic compromise.



Intrinsically linked to the first, a second way to answer this question means constructing and diversifying the groups of the general public involved and calls upon

the role of the media as intermediary. Mapping the visibility of the Milky Way and media campaigns on the percentage of people who have completely lost the visual link with this landscape marker, in fact humanizes scientific research, which is complex and demanding when modelling the diffusion of artificial light in the atmosphere. This means getting closer to the everyday lives and experiences of people: a yellow-orange sky for some, a starry night for others. And in so doing, this makes it easier for the media to take up the problem of light pollution.

However, after having made the public aware of the problem, we must not forget to pay attention to the problems of the public. For example, we should not scorn the lighting needs expressed by certain users, or the growing demands for modern lighting. For example, LED technology is slowly overcoming its youthful mistakes and today, we can find sources at 2700 K whose flux is often mastered.

We must also accept that the fight against light pollution is no longer the private reserve of some associations still influenced by the astronomy community. Inhabitants, elected representatives, urban planning engineers, design firms, researchers – all these people are part of the urban lighting fabric. We must remain open to all kinds of expertise and pay attention to the various uses of night-time when, for example, setting up locally agreed-upon policies on reducing lighting levels, even cutting off lighting during certain time periods.

It is the attention given to what users do *with* and *at* night that will enable us to adapt lighting norms to local needs in a way that incorporates local specificities and needs. This work has resulted in new tools, such as the International Dark Sky Reserve [↗](#), adapted to astronomers' needs and working towards improving the quality of the night environment.



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