

Whitening the Sky: light pollution as a form of cultural genocide

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Abstract

Light pollution is actively destroying our ability to see the stars and disconnecting people from their deep-time connection to the sky, acting as a form of ongoing cultural and ecological genocide for Indigenous people around the world. Many traditional knowledge systems are based on the stars and peoples' ability to observe and interpret them for a range of practical, social, and scientific purposes is critical. Efforts to reduce, minimise, or eliminate light pollution are being achieved with varying degrees of success, but the increased use of blue-light emitting LEDs as a cost-effective solution is worsening problems related to human health, wildlife, and astronomical heritage for the benefit of capitalistic economic growth. We provide a brief overview illustrating some of the important connections that Aboriginal and Torres Strait Islander people maintain with the stars, as well as the worsening damage growing light pollution is causing to this ancient knowledge. We propose a transdisciplinary approach to solving the issues of growing light pollution, using a foundation based on Indigenous philosophies and decolonising methodologies.

Keywords: Dark Sky Studies, light pollution, Indigenous Knowledge, Aboriginal Australia, Torres Strait Islanders, Decolonising Methodologies.

Introduction

Cultures across space and time formed a close connection to the sky, whether it be through a philosophical, spiritual, and/or scientific perspective (Ruggles 2009; Ruggles 2015). In most cases, such as with Indigenous cultures in Australia, this perspective encompasses all three in an inextricable fashion (Clarke 2007). The stars are used to preserve and inform complex knowledge systems, which are used for a variety of purposes, including navigation, food economics, forecasting weather, predicting seasonal change, informing social structure, and serving as a mnemonic for committing information to memory and passing it to successive generations across long periods of time (Hamacher 2012; Norris 2016; Kelly 2015).

In Australia, the cosmos is the foundation for numerous Indigenous knowledge systems and Origin stories (Tindale 2005). For Indigenous Australians, the stars communicate history, laws, ethics, and moral values. Ngarinyin elder, David Mowaljarlai, said that “Everything is written twice – on the ground and in the sky” (Mowaljarlai and Malnic 1993), a description

shared by Indigenous peoples around the world (e.g. Lee 2016). For example, the celestial emu is one of the most widespread Aboriginal asterisms across Australia (Fuller et al. 2014). It is not made up of the bright stars, but rather of the dark dust lanes in the Milky Way, between the Coalsack nebulae in Crux and the galactic centre in Scorpius and Sagittarius (Gullberg *et al.* 2020; Fig. 1). The visibility and position of the emu in the sky throughout the year informs Aboriginal people about the behaviour of the bird (referencing both sexes, depending on the time of year it is visible), the changing seasons, navigational pathways, and social practices (Fuller *et al.* 2013). This “dark constellation” - as well as the Magellanic Clouds, globular and open star clusters, nebulae, fainter stars, and aurorae - are being eradicated from view by increasing light pollution.

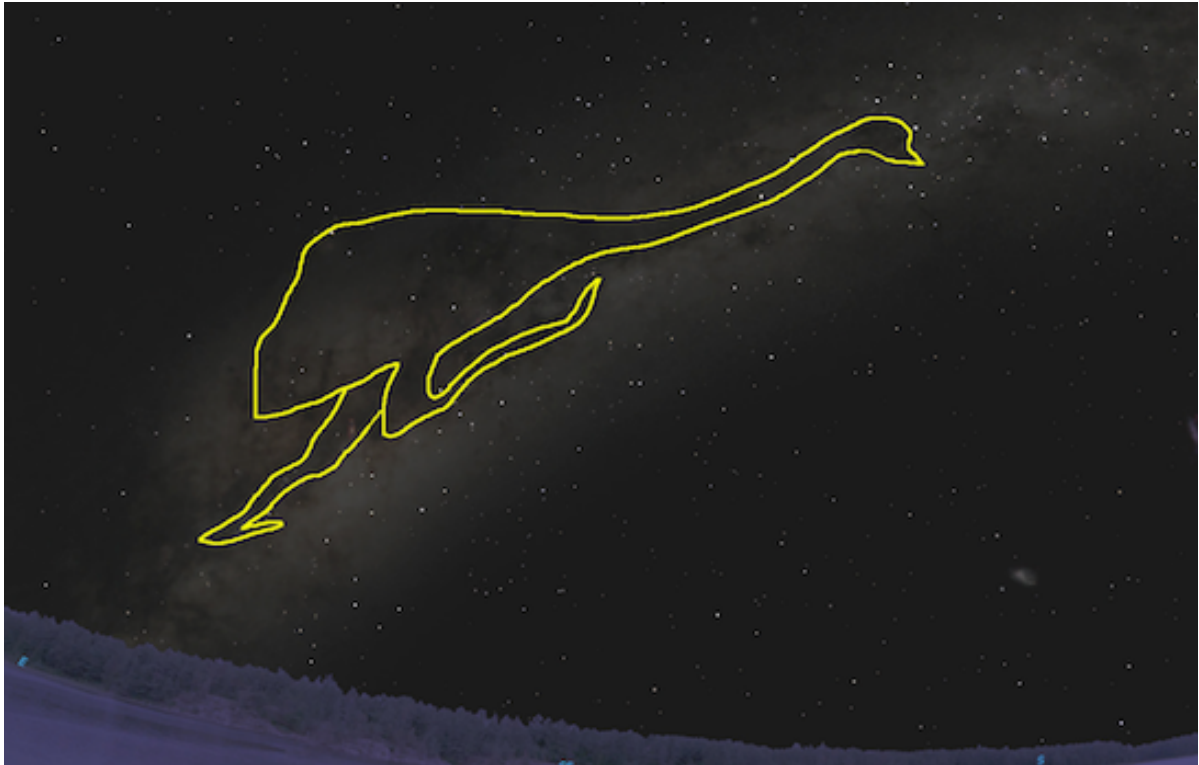


Fig. 1: The celestial emu, Gawarrgay, as described in Kamilaroi traditions of northern New South Wales, Australia. Image: Ghillar Michael Anderson and Robert Fuller, after Fuller *et al.* (2014a).

Traditionally, the concept of light pollution holds special significance to Aboriginal Australians. For example, the Gonnai Aboriginal people in east Gippsland, Victoria share oral traditions that describe the dynamic between the Moon man hunting the celestial emu. When the Moon rises in the sky, the glow of its light makes the emu “hide away” (Thorpe 2019), returning to visibility when the Moon sets. But modern light pollution is impacting the visibility the emu and other fainter celestial objects altogether, making them impossible to see in urban areas, regional cities, and – increasingly – in remote communities.

While our connection to the visible sky is fading under urban expansion and increased lighting (Falchi *et al.* 2016), steps are being taken in some areas to reconnect the populace to the inspiration of the cosmos and traditional knowledge of the stars. In the city of Melbourne, mosaics on popular walkways near Port Philip Bay show the celestial emu, with information provided in plaques about its meaning in the local Boon Wurrung Aboriginal language (Fig. 2). However, more steps must be taken so that people can see the emu in the sky itself.



Fig. 2: The Boon Wurrung view of the emu in the sky, as a mural on a coastal pathway along Port Philip Bay near Brighton, Victoria. Image: D.W. Hamacher.

Preserving Dark Skies

Aside from the general trend of urban expansion, one of the major issues causing excessive light pollution and associated negative impacts is the increased use of LED lighting in homes and businesses, streetlights, and car headlamps. In addition to the threat this places on Indigenous connections to the sky, increased lighting and the use of blue-rich LEDs, is having a negative impact on human health, wildlife, and our collective connection to the stars (e.g. Ticleanu and Littlefair 2015). For example, *Ginan*¹ (Epsilon Crucis), the fifth star of the Southern Cross – arguably the most well-known constellation in Australia – is barely visible (if at all) in the skies over major metropolitan areas. It is therefore of critical importance to ensure that skies be kept clear and dark to enable this connection to be maintained.

The development of Dark Sky preserves around the world is helping to moderate this issue. The Warrumbungle National Park, home to Australia’s largest optical observatory at Siding Spring as well as Kamilaroi Aboriginal cultural sites linked to the Seven Sisters (Pleades), is Australia’s first registered Dark Sky Park (New South Wales Parks & Wildlife Services 2019). Despite this status, the area is under significant threat from the glow of distant cities and the large flares from coal-seam gas (fracking) in the Pilliga National Forest to the north (Fig. 3; Milman, 2014). Light pollution from fracking flares is an apt demonstration of

¹ The name *Ginan* is a Wardaman Aboriginal name from the Northern Territory, meaning “dilly bag filled with songs of knowledge”. It was approved as the official name of this star by the International Astronomical Union’s Working Group on Star Names in 2017, of which the first author (DWH) is a member (Hamacher 2018).

ongoing theft and destruction of Aboriginal land leading to the erasure of the night sky for the financial gain of colonial interests.

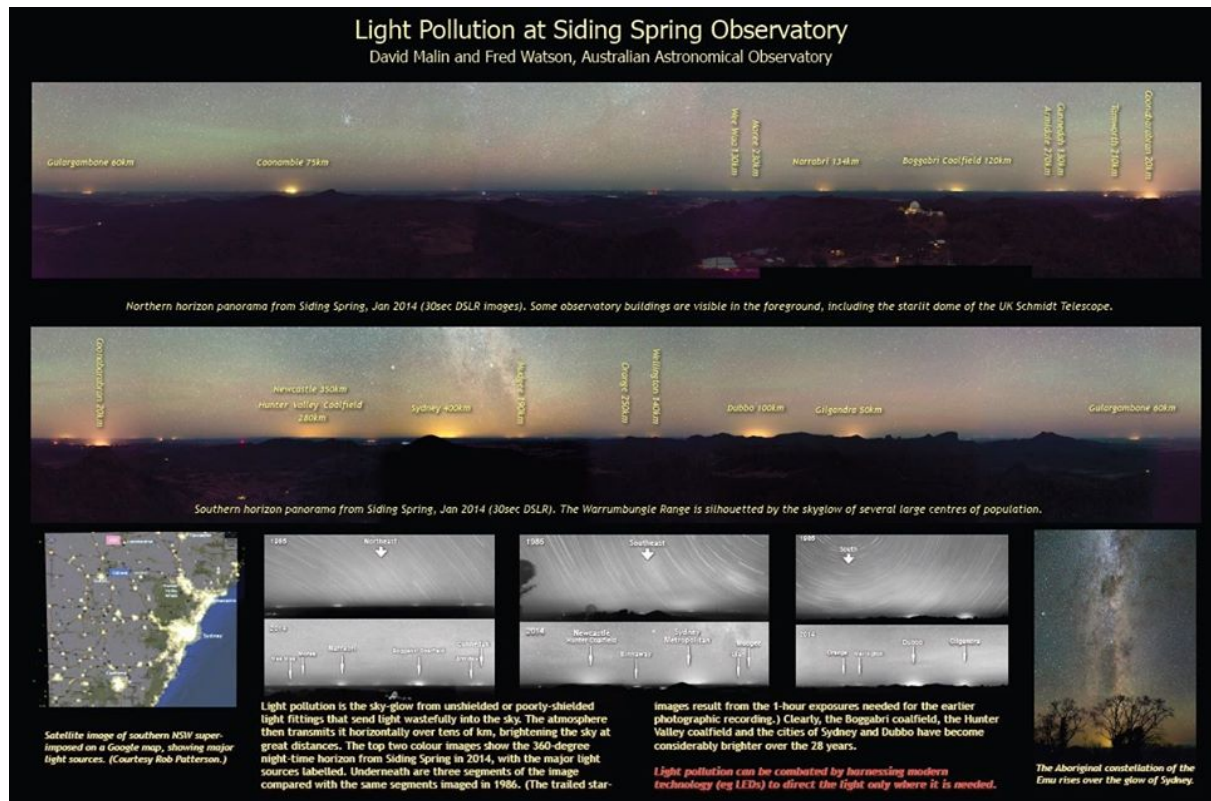


Fig. 3: Light pollution visible from Siding Spring Observatory over time, with increasing threats derived from regional cities and coal seam gas flares. Image: David Malin and Fred Watson, Australian Astronomical Observatory.

Dark sky parks set criteria to ensure dark skies, such as the modification of lighting so that it faces downwards, fitting lights with shields, replacing or disconnecting upward facing lights, placing lights in public areas on a timer to reduce the length of their use, and eliminating street lighting altogether in the Dark Sky Park areas (New South Wales Parks & Wildlife Services, 2019). While these measures are highly beneficial, an increasing number of metropolitan and regional councils and organisations are switching to LED lights for their low energy usage, low cost, and apparent “green” status. Because of their low cost, many councils use more of them, causing a greater increase in light pollution (Dvorsky 2017).

Many of the most commonly used LED lights emit a substantial portion of their light in the blue end of the spectrum, which is damaging to our visibility of the sky and to the health of humans and wildlife (Royal Society Te Apārangi 2018). Organisations such as the *Australian Dark Sky Alliance* (www.australasiandarkskyalliance.org) and industrial lighting companies like *WE-EF* (www.weef.de), are working together to find solutions to this problem, which include the use of low-impact amber LEDs (which emit a majority of their light in the red/yellow end of the spectrum), covering street lights at the top to avoid direct exposure to the sky, angling street lights downward, and reducing light scatter (Elsahragy and Kim 2015).

The development of dark sky reserves is a great step towards raising awareness of the importance of preserving dark skies, particularly in rural areas, but additional work is needed to improve lighting in large population centers. An example of a community which has put a

high priority on maintaining their dark night skies is the city of Flagstaff, Arizona in the USA, which was designated a Dark Sky city in 2001 (City of Flagstaff, 2017). A major driving force behind this was the presence of numerous astronomical observatories in the area, but the community's lighting policies also enables the general public to see dark, clear skies, something not afforded to people in most other metropolitan areas. If substantial and sustainable progress is to be made in maintaining dark night skies, more cities will need to address the way they light their communities, as light pollution is visible far outside city limits.

Finding Solutions Using a Trans-Disciplinary Approach

Light pollution is driven by economic growth and urban expansion (e.g. Chaiwat 2016). How can we maintain a connection to the stars when we cannot see them? How can we reduce or eliminate light pollution to preserve astronomical heritage and knowledge, reduce the detrimental effects of excess light on the health of humans and wildlife? Accomplishing this requires solutions drawn from trans-disciplinary research. Trans-disciplinary research is conducted by investigators from different disciplines working jointly to create new conceptual, theoretical, methodological, and translational innovations that integrate and move beyond discipline-specific approaches to address a common problem (Aboelela *et al.* 2007). This research strategy creates a wholistic approach to scholarship intended to arrive at expanded research outcomes (Nicolescu 2008).

Transdisciplinary innovations related to Dark Sky Studies are driven by collaborations between astronomers, ecologists, engineers, industrial designers, heritage consultants, landscape architects, artists, and health professionals (see Ardavani *et al.* 2020), but rarely involve Indigenous communities. We argue that a decolonising approach must be adopted, using Indigenous theoretical and methodological foundations and philosophies (e.g. Tuhiwai-Smith 2013; Nakata 2002; Nakata 2010), as opposed to focusing strictly on the “whitewashed” Western philosophies that dominate modern academic discourse (see Rutledge 2019). Doing so would reflect a more sustainable and humanistic approach to solving these issues.

With regard to the colonisation of Indigenous peoples and degradation of Indigenous land (including water and sky), the expansion of light pollution, fuelled by industry and government, is arguably an ongoing continuation of cultural genocide – a concept often described as “slow violence”. This can operate as a major threat multiplier by “fuelling long-term, proliferating conflicts in situations where the conditions for sustaining life become increasingly but gradually degraded” (Nixon 2011). Given that Indigenous cultures in places like Australia maintain close and essential connections with the stars, the very foundation of Indigenous cosmology, knowledge systems, social structure, and the library of oral traditions is being actively destroyed by encroaching light pollution. In addition, LED lights emitting in the blue spectrum may also contribute to health issues by disturbing circadian rhythms (Akacem *et al.* 2016; Ayaki *et al.* 2016) and negatively impact the health and behaviour of nocturnal wildlife (Altermatt and Ebert 2016). This poses ethical issues that must be addressed through government and industry practice.

Light pollution is damaging the humans and wildlife connection to the stars and our need for dark skies. This is especially problematic in places where the Indigenous population has maintained a complex, deep-time knowledge system around the stars that encapsulates the foundation of their cosmology and epistemology. The whitewashing of the night sky through

colonial policy and practice without regard to Indigenous people, land, or culture is an ongoing form of cultural genocide (Genocide Museum n.d.).

Preserving dark skies globally extends beyond the benefit of economic growth, colonial interests, or scientific objectives (e.g. astrophysical observatories). It directly impacts the ongoing survival and prosperity of our human connection to the sky and the deep astronomical knowledge systems of the world's Indigenous peoples. Solutions to this must be transdisciplinary in nature and include Indigenous voices and philosophies that utilise a decolonising framework.

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