

# 1 Dark skies

## Meanings, challenges, and relationships

*Tim Edensor and Nick Dunn*

### **Histories of dark skies**

A fascination with the night sky is integral to the story of what it is to be human. The history of our relationship with dark skies is diverse and rich, a connection across space and time that has shaped and been shaped by society, culture, and religion, as well as science. Beyond the astronomical, scientific understandings about the universe, the stars, planets, and moon have proved inspiration for artists, poets, and philosophers. As a realm in which we search for meaning, dark skies have been integral to how we commune with our hopes and fears. And while there is no definitive theory as to how or why humans started to relate to dark skies, a growing body of evidence across a range of disciplines suggests that it is plausible that it began at about the same time as recognisably modern humans evolved, around 70,000 years ago (Clark, 2020, p. 4). Before the advent of modern science, the relationship between an individual and the night sky was typically immediate and powerful. With no light pollution to obstruct the view, the stars were conspicuous, and cosmic understandings were shaped by common beliefs that the conditions of dark skies revealed what was happening on Earth.

In their significant work on exploring Australian Aboriginal meanings and uses of dark skies, Karlie Noon and Krystal De Napoli (2022) investigate cultural interpretations and practices that go back at least 65,000 years. To Western thinking, stories based on astronomical figures may appear mythical; however, they contain much that is practical. Noon and de Napoli demonstrate the highly sophisticated, complex, and diverse ways in which different Indigenous communities have used the star-studded sky to provide a guide for navigation, mark times for hunting, journeying, and collecting, and demarcate seasonal ceremonies and rituals. Across millennia, elements in the night sky have been scripted into the land, generating tales that explain the mythic origins of landforms and trigger the enactment of travel, song cycles, dance, and art. Importantly, these oral traditions avoid the reifications generated by writing down authoritative knowledge, with understandings and practices remaining dynamic, evolving, protean, and multiple.

More specifically, Noon and de Napoli (2022, p. 43) show how knowledge from the skies has informed “interrelations between ecological, medicinal, celestial and technological knowledge”, understandings that are simultaneously relational,

practical and cyclic, that mark weather patterns (through star scintillation, for instance), the fruiting of edible plants and the related migratory routes that lead animals to consume food sources.

Such networks of associations spread across space and time but are necessarily situated amongst particular Indigenous groups and spaces. And while the ever-changing positions in the firmament mark out daily, seasonal, and annual fluctuations, they also inscribe much longer, millennium-spanning changes. For shifting alignments in the sky, over 13,000-to-26,000-year cycles are registered through oral traditions that testify to the longevity of knowledge and the ancient witnessing of celestial processes. These extensive temporalities are also underlined by the continuing importance of faint dark sky constellations; those gaps in which stars cannot be seen are sites of enduring knowledge. With the advent of light pollution, many such cosmic spaces can now rarely be discerned. Best known of these dark realms is the widespread phenomenon known as the Dark Emu, a bird-shaped hole in the Milky Way and the focus of diverse myths from different Aboriginal nations. By following the progress of the bird across the sky throughout the year, the most auspicious time to collect emu eggs, visit waterholes, and move camps are identified.

Noon and de Napoli consider that such ancient, intimate knowledge of the cosmos can inform contemporary approaches to environmental change. These land-sky associations strongly resonate with the emergence of contemporary relational and vitalist thinking across the social sciences. Moreover, they regard preservation of this knowledge as essential, for it constitutes an element of “space heritage” that encompasses a vast cosmological archive of knowledge, stories, and practices. At present, the more intimate areas of knowledge are not disclosed to those outside Indigenous communities but retained by the appropriate knowledge keepers.

In later prehistoric times, a plethora of Neolithic stone circles, burial chambers, and cairns have been construed by many archaeologists as relating to astronomical events such as solstices, lunar and solar phases, and the location of star constellations. Indeed, Ronald Hutton (2018) details the rise of archaeoastronomy as a means to explore whether such sites, most notably Stonehenge, were devised as ancient observatories and their design informed by advanced celestial knowledge. Such studies remain inconclusive. However, the significance of these cosmic associations is central to a range of post-Christian countercultural, pagan, and new age groups as sites of ancient wisdom that stand in opposition to conventional academic knowledge and scientific ways of thinking.

In considering the numerous myths and legends that focused upon the night sky in ancient times, Patrick McCafferty (2018, p. 24) conceives the sky to be “a tapestry embroidered by human imagination”, containing stars that “might be viewed as bright dots that can be joined to create a skyscape of characters and imaginary objects”. While these patterns have diminished as objects of scientific classification, their mythic potential lingers in popular astrological imagery wherein celestial bodies and their movements influence the individual and mark their place in the universe and Earth through the star signs system. Earlier conceptions identify stars, moon, sun, and planets as potent cosmic forces that delineate

mythic deities and events, some of which might influence earthly occurrences. For instance, the moon for Romans was the two-horned goddess Luna, for the Maya it was a goddess or rabbit, while for Hindus its eclipse was caused by it being periodically swallowed by the demigod Rahu. Myths have also congregated around comets, meteors, and fireballs in ancient Greek and Roman cultures, the Bible, the Ramayana, the Norse Ragnarok, and the Persian Shahnameh, typically serving as signs of superhuman and supernatural battles, travels, and chases or as portents foretelling of the advent of war, famine, and plague. In focusing specifically on darkness, ancient Greeks practised necromancy and Dionysian and sacrificial rituals in the dark that were associated with the wholly lightless conditions of the Underworld, in contradistinction to the variable darkness of earthly night-time (Boutsikas, 2017).

April Nowell and Nancy Gonlin (2020) investigate how archaeological research can reveal how everyday, sacred, and productive nocturnal ancient cultures that fashioned artefacts, symbols at important sites were carried out, refuting the over-emphasis on diurnal practices and beliefs. In advancing understandings about the integral place of dark skies in prehistoric and later cultures, their edited collection (Gonlin and Nowell, 2018) explores the “archaeology of the night” through essays that focus on the diverse, complex nocturnal historical practices and understandings of Polynesian, Native American, Indian, South American, African, and Arabian cultures, collectively refuting any overdetermined, universalist conceptions about the meanings of dark skies and darkness. Indeed, a host of recent accounts focus on the very particular cultural historical practices and meanings organised around dark skies.

Guy Bordin (2020) shows how before their conversion to Christianity and its binary notions of light as good and darkness as evil, North Baffin Inuit of the eastern Canadian Arctic construed darkness as conducive to sociability, storytelling, play, rituals, and festivity. In Maori cultures, such cosmological traditions continue, with rituals of praying, drumming, and chanting into the night (Lees, 2022). In her chapter for this book, Neha Khetrpal provides a fascinating anthropological account of the dense Indian pre- and post-Vedic myths that identify the patterns formed by constellations, stars, and celestial groups, storied imaginaries that have influenced the production of material cultures. These astronomical interpretations were changed to accommodate agricultural cycles as they shifted from hunting and gathering and were aligned with the phases of the moon and menstruation, embodied in pottery, seals, and figurines that guided these and other economic and cultural practices.

Strikingly, Khetrpal shows how the Pleiades, embedded in ancient Indian religious and mythic systems, represents the story of the Seven Sisters, a commonality that is separately configured across cultures from widely diverse spatial and historical contexts. Significantly, she also demonstrates that the previously dominant lunar myths that centre upon female celestial characters and female power, often embodied in the figure of *Śakti*, were relegated in importance with the arrival of Aryan myths that privileged sun gods. The solar replaced the lunar, and the daytime triumphed over the night in the gendered reconfiguration of belief and myth.

The modern urge to look at our prehistorical relationship with dark skies has its origins in the work of Alexander Marshack, an American journalist turned archaeologist. Marshack's interest was sparked on 4 October 1957 when Sputnik 1, the world's first spacecraft, was launched by the Soviet Union. Yet what distinguished Marshack from many of his contemporaries was not just a keen interest in the technological advancements that had made this possible but something more primal—he was fascinated by what had driven humans to desire to “touch” the night sky. In his attempt to explain the emotional pull of dark skies, Marshack (1972) sought to identify when our relationship with them began. This research took him back tens of thousands of years ago to the time prior to civilisation and agriculture, to when humans lived in hunter-gatherer communities.

Other forces have sought to diminish the potent myths and practicalities that have surrounded dark skies. Indeed, as long ago as 2,400 years ago, in Greek philosopher Plato's Book VII of *The Republic*, he hypothesised that our eyes were formed for the study of the night sky. Rather than being awestruck by its wonder, he encouraged us to understand the order within its celestial arrangements. Much later, during the 16th and 17th centuries, astronomers profoundly altered ancient understandings, their scientific discoveries creating a state of uncertainty that was characterised by the German sociologist Max Weber as “disenchantment”. The emergence of this astronomical knowledge resonated with his view that the Enlightenment initiated the process through which our enchantment with the world was replaced by scientific rationality. Weber argued that we lost something of the sublime that inspired our imaginations and emotionally connected us to the night sky and other wonders of nature (Jenkins, 2000, pp. 11–32), a loss that affected us on a fundamental level. A critical change concerned our perception of the night sky, which could no longer be viewed as a firmament, effectively a two-dimensional pattern of stars and planets, but rather a three-dimensional realm of inconceivable size. Yet this disenchanting disconnection brought new, different kinds of awareness, as scientific discoveries made the cosmos—previously regarded as unknowable—increasingly tangible. This idea was both exhilarating and alarming, and the combination of pleasure and fear was irresistible to philosophers who had long been preoccupied with what they referred to as the sublime, a relationship which continued to endure. The rebirth of astrology in the early 20th century, for example, fascinated the psychoanalyst Carl Jung (1976) who considered the night sky to be the ideal psychological mirror of our innermost thoughts.

Throughout history, the stars have provided humans with increased understanding about the world and the universe within which it sits. This has enabled significant scientific discoveries to be made and contributed toward accurate systems of navigation. Yet the dark skies movement, besides being informed by scientific astronomical explorations and spectacles of the night sky is part of a process of re-enchantment with dark, nocturnal space, as amply demonstrated by the chapters in this book. This is further borne through the recognition that ancient myths can tell us about relating to the dark skies in more sustainable, less rational and enchanted ways, allowing us to rediscover more varied, complex perspectives through which to experience them.

### The multiple meanings of darkness: its ambiguities and its relationship to light

While mythic stories about the cosmic significance of the night sky have forever circulated, happenings on the nocturnal landscapes of Earth have been shrouded in different kinds of beliefs and legends. Before the advent of widespread artificial illumination, darkness shaped the enduring human experience of the night, largely ameliorated only by minimal forms of illumination, such as fire, sputtering candles, and rushlights. It is little wonder that in certain cultural, historical contexts, the dark night became associated with negative attributes, saturated with fear and superstition. As Galinier *et al.* (2010, p. 820) contend, since medieval times, darkness has symbolised “pagan obscurantism—deviancy, monstrosity, diabolism”. Sinister hobgoblins, ghouls, ghosts, witches, demons, dark elves, and the devil himself might be discerned in murky, shadowy forms. Superstitious beliefs were supplemented by influential biblical passages that underlined binary distinctions between a malign darkness and a godly realm of light. Yet perceptions of the dangers posed by darkness were not merely imaginary. As Roger Ekirch (2005, p. 123) details, numerous very real hazards lay in wait for those who ventured out after nightfall, who might have to negotiate piles of rubbish, ditches full of waste, and overhanging timbers, not to mention violent criminals. And those venturing beyond the city might stumble into “fallen trees, thick underbrush, steep hillsides and open trenches”.

Schlör (1998, p. 57), meanwhile, emphasises the dominance of light over dark in considering the urban night, “our image of the night in the big cities is oddly enough determined by what the historians of lighting say about *light*. Only with artificial light, they tell us, do the contours of the nocturnal city emerge: the city is characterized by light”. It is perhaps unsurprising with this backdrop of understanding that the role of darkness in urban areas is typically met with negative perceptions. Extensive illumination has been championed because it affords visibility and orientation, deterring potential wrongdoers, and so darkness remains associated with the fearful and dangerous (Brands, Schwanen and Van Aalst, 2015). Yet this is highly ambiguous; there is growing awareness that light renders potential targets visible and disarms visibility outside areas of bright illumination. Despite powerful orthodoxies that greater levels of street lighting reduce crime, no evidence shows this to be the case. Indeed, as Green *et al.* (2015) remark, lower levels of light make the identification of likely victims more difficult to discern, and they further contend that the impact of street dimming schemes promote an increase neither incidences of crime nor road traffic accidents.

Dystopian nocturnal imaginaries have informed apocalyptic visions of the future. In exemplifying an early representation of end times, Tiffany Francis cites Byron’s extraordinarily poem from 1816, *Darkness*, in which he portrays a cataclysmic ending as the light of Earth is extinguished and life sputters out, returning to the darkness of the universe. Such scenarios are reiterated in a range of contemporary fictional and filmic science fiction works, as darkness descends across the Earth, concealing alien and unseen threats, sparking resonances with ghost stories and horror movies.

Despite these negative representations of darkness, Robert Williams (2008, p. 514) adopts a broader perspective, contending that dark spaces are “constituted by social struggles about what should and should not happen in certain places during the dark of the night”. For though orthodox conventions about the desirability of banishing darkness are often articulated and enacted by the powerful, who regard gloomy spaces with anxiety and suspicion, others have sought darkness positively, regarding it as conducive to a range of cultural practices. In the dark, persecuted minorities, marginal groups, and the lower classes may escape domineering masters and carve out time and space so that they may temporarily achieve “freedom from both labour and social scrutiny” (Ekirch, 2005, p. 227). Galinier *et al.* discuss how the Mesoamericans and Andeans who escaped the violence of Spanish imperial power confined their “indigenous knowledge and practices to the hidden recesses of the night” (2010, p. 828), and Palmer (2000) mentions how African-American slaves forged a collectivity in the darkness. As illumination has expanded it has been resisted by “the traditional inhabitants of the night: servants, apprentices and students . . . tavern visitors, prostitutes”, musicians, mystics, and bohemian pleasure-seekers (Koslofsky, 2011, p. 278). Criminals and political and religious dissidents also seek gloom, for “under cover of darkness spirits roam, plots are hatched, raids are executed and the dangerous escape” (Lees, 2022, p. 153).

These diverse and often divergent understandings underline the contested, ambiguous, and multiple meanings of darkness and the different subjective feelings that it raises. Those who seek darkness to engage in quiet, reflective meditation contrast with others who feel fear and suspicion about what may lurk unseen; a brightly illuminated urban commercial area may lure shoppers but might be regarded as a realm of surveillance and exclusion by more marginal residents of the city. Such different perspectives call for a thorough reassessment of the multiple, changing, and contested qualities attributed to darkness, and the chapters in this book provide an array of suggestions about how we might more productively encounter dark spaces.

### *The relationship of darkness with light, the advent of artificial illumination*

It is difficult to imagine the affects and meanings that circulated amongst human communities in the absence of artificial light. The use of fire would have created pools of light, offering some safety against the threat of predatory creatures and reducing fear of the unseen. Firelight would have stood out against the blackness of the darkest nights and would have profoundly intensified the experience of numerous festivals. The Celtic festivals of Imbolc, Beltane, Lughnasadh, and Samhain, which marked the annual equinoxes and solstices, were celebrated with home fires, bonfires, and flaming torches, elements subsequently appropriated and celebrated by contemporary Wiccans and neo-pagans. Later, the darkness was periodically punctuated by fireworks and the lighting of beacons, and the widespread illumination provided over several nights by the lights of the Hindu festival of Diwali. Besides these modest practices to animate the night, the dark landscape itself could

contain lights of uncertain provenance, notably marsh gas or will-o'-the-wisp that summoned up supernatural forces, as well as celestial phenomena such as meteor showers and comets. The mystery of such illuminated forms in the night sky do not merely belong to the past; they are contemporaneously expressed by inexplicable celestial phenomena often conjured as unidentified flying objects, signs of the spacecraft of technologically advanced visitors from other galaxies.

Undoubtedly, as these examples demonstrate, and as Wolfgang Schivelbusch (1988) claims, perceptions of artificial lighting at night have consistently fused the literal and symbolic. Yet the reduction in darkness perpetrated by illumination has diminished its power to contain the mythical, the inexplicable and the sacred. This underlines the potency of gaslight and subsequently electric light in coming to define “a new landscape of modernity” (Nasaw, 1999, p. 8) that transformed the city from a dark realm into a brightly illuminated, more tightly regulated space. Craig Koslofsky (2011) calls the expansion of social and economic activity into the night through the spread of illumination “nocturnalisation”, while Murray Melbin (1978) refers to the “colonisation” of the night. As Bille and Sørensen (2007, pp. 272–273) note, these processes are further underpinned by the metaphorical quest by Enlightenment scientists and thinkers to “shed light on all things” in the pursuit of “truth, purity, revelation and knowledge”; the ideals of “illumination, objectivity and wisdom” are synonymous. Such ideals bolstered colonial Eurocentric ideas that Africa was the “Dark Continent”, replete with animist and idolatrous faiths, ignorance, and barbarism, “primitive” qualities that could be overcome by the colonial civilising mission, malign associations that were transmuted to the slums of “darkest London”.

Besides serving to demonise darkness as its opposite, illumination also contributed to the production of a phantasmagoric realm (Collins and Jervis, 2008) that defamiliarised, excited, and transcended ordinary ways of sensing. A host of unlit structures and spaces were imperceptible while illuminated buildings stood out, new colours were introduced to the nightscape, light was refracted in puddles and windows, and scale and proportion were difficult to determine. Much modern space was thus transformed “into a perceptual laboratory” (McQuire, 2008, p. 114), becoming a dream-like, often fantastical realm, especially with the advent of illuminated shop windows, pleasure gardens and amusement parks, and seasonal light festivals. In one sense, this extensive illumination produces a new kind of nocturnal sublime that persists, as Jean Baudrillard (1986, p. 51) observes,

There is nothing to match flying over Los Angeles by night. A sort of luminous, geometric, incandescent immensity, stretching as far as the eye can see, bursting out from the cracks in the clouds . . . This [city] condenses by night the entire future geometry of the networks of human relations, gleaming in their abstraction, luminous in their extension, astral in their reproduction to infinity.

In contemporary times, light festivals continue to transform and enchant nocturnal landscapes in which unheralded or unnoticed features are brought to

attention, peculiar illuminated sculptures appear, odd atmospheres are generated by the judicious use of coloured lights and areas of darkness, and buildings are dematerialised by shape-shifting projections (Edensor, 2017). Such creative techniques defamiliarise places while drawing attention to their specific qualities, while promoting interactivity and conviviality. Yet such installations possess most power when positioned against a dark background, made more potent in the absence of other ambient illumination. Thus, darkness remains central to such experiences.

One further point needs to be made about the reconfiguration of the relationship between light and dark. For in addition to its aesthetic pleasures, and besides its economic, way-finding, and regulatory advantages, hierarchical notions were consolidated wherein brightly lit commercial and wealthier residential areas came to contrast with the dark neighbourhoods of the poor. As Joachim Schlör (1998, p. 65) notes, the brighter the light in the centres, “the more starkly do the outlines of the darker regions stand out”. Darkness became “a symbol and a determinant of urban differentiation” (Otter, 2008, p. 335) in which poorer, gloomy realms were “disregarded and disparaged in relation to the new” (Brox, 2010, p. 104), seemed to comprise “another country” to the brightly illuminated shop windows, signs, theatre entrances, homes, and pubs in the commercial centres. Such distinctions have also been etched through the racialisation of space, as Harrison exemplifies in his account of the city of Rocky Mount in North Carolina, where the distribution of electric lighting was iniquitously deployed across urban space. Deemed necessary to prevent crime in commercial areas and white districts, illumination was regarded as unnecessary for black areas.

As Savela (2023) notes in his discussion of the Finnish city of Turku’s redevelopment schemes, the deployment of light to mark out areas of privilege, exclusivity, and power endure, with brilliantly illuminated advertisements predominating in a way that would not be possible in the more cluttered visual array of the daytime. And in East London, the low-grade illumination of industrial areas, retail centres, and working-class housing estates continue to dramatically contrast with the brilliant corporate logos shining atop the large towers of Canary Wharf and the subtle, minimalist lighting schemes of recent upmarket residential developments (Ebbensgaard and Edensor, 2021). Strikingly, hierarchical differentiations are being inverted; in an over-illuminated world darkness may now be sought as a marker of status that differentiates wealthy from poorer, light-bound subjects and spaces (Sloane, 2016).

As the chapters in this book reveal, despite its modern construal as a realm of lurking danger, criminality, ignorance, and backwardness, darkness is now being more substantively re-enchanted. Perhaps as they have become less central to human experience, the loss of the night has prompted a reconsideration of the virtues of darkness, and this, in turn, has encouraged the ongoing, proliferating designation of dark sky places as realms in which multiple experiences of gloom may emerge. For many, the night is too bright, too indistinguishable from diurnal apprehensions, because it has been extensively over-illuminated, as we now discuss.



### **The loss of the night: darkness and over-illumination**

The binary ways in which the relative values of dark and light are mapped onto geographical understandings of space after nightfall remains a major barrier to advancing the re-evaluation of dark skies. The persistent modern urge to flood nocturnal space with light inheres in the expansion of illumination, which has transformed the atmospheres of places at night, giving rise to new forms of labour and enabling social activities to wrap around the clock. Consequently, a prevailing tendency regards urban electric lighting as integral to their vibrancy and character, while in contrast, normative perceptions of rural places is that they will be satisfyingly dark the further they are away from urban areas. These dual notions of pristine “natural” darkness in rural areas and the bright lights of urban spaces are powerful in shaping how we apprehend whether places at night should be illuminated or not. Yet this thinking is reductive. While protecting dark reserves is important, tackling light pollution concerns all forms of landscape such is its pervasive growth. These difficulties in understanding are exacerbated by evaluating the value of dark skies (Henderson, 2010; Gallaway, 2015) beyond these long-held beliefs about light and dark space (Gallan and Gibson, 2011). Yet the articulation of such notions is geographically variable.

In her chapter for this book, Yee-Man Lam explores the diverse meanings of dark skies across contemporary cultural and geographical contexts. Drawing upon the results from putting the phrase “dark sky” into an internet search engine, she finds that since 2008, the most common links are to popular cultural forms, such as songs, novels, films, and commodities, and to dark sky settings and events. By contrast, an internet search across the same period for solely Chinese references to “dark sky” disclosed no findings at all, although there were plenty of links to “starry sky” and “night sky”, the later exclusively focused on pop songs that include the phrase in their titles or lyrics, while “starry skies” brings up a broader range of popular cultural productions. Lam draws out two conclusions from her research. First, that the links to “dark sky” in non-Chinese contexts are deceptive in that what is really sought are the stars that illuminate the dark sky, not darkness itself. This may represent the dominance of astronomers as initiating advocacy for the assignation of dark sky places, but as the chapters in this book demonstrate, dark skies and darkness are being increasingly valued for the many other potentialities they promise. Second, in exploring the Chinese dearth of links, the search is narrowed to Hong Kong, where intense nocturnal illumination eliminates any possibility of dark skies, and culturally speaking, light remains integral to Hong Kong’s entrepreneurial identity, with darkness associated with crime and poverty. The discussion critically reveals that the positive values increasingly associated with dark skies have not gained saliency in many parts of the world. Lam’s example thus further demonstrates how negative associations about darkness persist, as Kumar and Shaw (2019) show in disclosing how illumination remains a signifier of modernity in rural India.

The advantages of illumination have been crucial to the development of towns and cities after dark, and we should not seek to refute how light brings order and

regulation, safety, ease of movement, accessibility, and way marking to formerly dark spaces. Yet its unfettered, global growth across maritime and land-based realms has heralded the advent of a serious, malign ecological, health, and aesthetic effects. In seeking to extend awareness of the spread of light pollution, in 2001, a team of astronomers have created the first atlas of light pollution (Cinzano, Falchi and Elvidge, 2001). More recently, new technologies that have produced depictions of the Earth at night, such as NASA's composite satellite imagery, although according to Pritchard (2017) this has reinforced binary ideas of light and dark, including normative ideas about where both conditions are located.

Light pollution is, however, increasingly being recognised as a global challenge (Davies and Smyth, 2018), the cascading effects of which remain unknown. Historically, problematic concerns about of light pollution have been connected to urban areas (Meier *et al.*, 2014) that contained the greatest concentrations of outdoor artificial illumination. However, artificial light's impact now extends far out into rural (Falchi *et al.*, 2016) and maritime areas (Smyth *et al.*, 2021) that might be far from urban places. This has already led to an "extinction of experience" (Pyle, 1978; Soga and Gaston, 2016) in many places, in which people are unable to access and thereby appreciate dark skies. This loss has major implications, not least because it further complicates the challenge to retain awareness of the value of dark skies and our relationships with them, alongside the benefits for other species and the planet.

The impacts of light pollution have been further problematised by the recent rollout of LED lighting across the globe that has introduced initially unforeseen and unintended consequences. For example, although the economic and technological efficiency of LED lighting technologies have driven their implementation, the cost benefits have masked how energy usage for outdoor lighting and artificial night-time brightness both continue to increase (Kyba, Hänel and Hölker, 2014). In addition, this contemporary transition is generally shifting the colour of night as tonalities of the light source toward increasingly blue-white and directional light than previously experienced which has greater impacts on ecosystems, as Jones and Lockett explore in their chapter for this book (also see Pawson and Bader, 2014).

Yet as Taylor Stone emphasises in his chapter, a quest to restore historical experiences of dark skies through a purist approach is unrealistic. What is required is the rebalancing of the relationship between light and dark in diverse situational contexts; what Stone refers to as repairing the relationship between urban inhabitants and darkness by incorporating lighting designs that are attuned to a wildness that does not exclude humans. While some campaigners call for standardised measurements and placements in efforts to regulate the damage caused by light, others argue for more cautious policies. A modest approach is recommended by Jones and Lockett, who identify the complexities of each situational context and the diverse theories that contest levels of harm perpetrated by excessive illumination on humans and non-humans. In their chapter in this book, Tim Edensor and Dan Oakley present further ways for challenging normative views concerning light and dark through their examination of festive illuminations in dark sky places. They demonstrate how creative, sustainable, and place-specific interventions can

unlock more progressive approaches to engaging with gloom and place. Edensor and Oakley identify the need for more influential guidance and explore how inventive, yet less intrusive illumination might enhance the qualities of places after dark in urban and rural settings.

However, as more evidence is revealed about its harmful effects, the presence of light pollution is not simply a matter for cultural perceptions and social behaviours. There is a growing body of evidence concerning the problems light pollution is producing for human health (Chepesiuk, 2009; Falchi *et al.*, 2011). Exposure to LED lighting, increasingly common in both indoor and outdoor environments, has been linked to chronic sleep and circadian disruptions. Altering natural cycles of light and dark directly affects the rhythms of our bodies and minds with serious health consequences including cancer, cardiovascular disease, diabetes, and obesity (Rijo-Ferreira and Takahashi, 2019). Artificial light can make our species less healthy and, in some cases, cause very serious reactions (Levin, 2019). As we now discuss, this damage extends to destructive impacts upon non-humans and the ecological spaces they occupy.

### *Effects of over-illumination on non-humans*

Before the advent of humans on Earth, dark skies were used for navigation by other species, culminating in the evolution of distinct diurnal, nocturnal, crepuscular, and cathemeral creatures and the biogeographies in which they live. Dark skies remain crucial for navigation by other species, including night-migrating birds, seals, dung beetles and certain species of moths (Foster *et al.*, 2018). Yet this wayfinding is only one aspect of how other animals relate to dark skies. Most mammal species are nocturnal, but many are diurnal, active during the day; crepuscular, mostly active around twilight; or cathemeral, active during hours of both daylight and darkness. These various strategies for regulating activity over a 24-hour cycle are related to evolutionary adaptations to light or semidarkness.

The nocturnal activity of non-humans seethes through the night, with certain realms becoming extraordinarily animated after darkness falls. Dixe Wills (2015) describes the swirling din and movement he experiences during a nocturnal visit to the Isle of Skomer in Wales. Here, having spent hours hunting at sea, hundreds of thousands of Manx shearwaters return to their burrows to feed their chicks, choosing the darkest conditions in which to land so as to thwart the threats posed by the squawking, predatory seagulls that await their arrival. As Lees (2022, p. 14) relates, in the sea, “the shift to twilight triggers squid to rise, jellyfish to descend, pink mamo to become paler and more mottled as they sink, and luminescent plankton to flash”. Botanically, too, photoreceptors in leaves and petals flood flowers with perfumes to attract pollinators while territorial animals lay down scents. These examples provide a small indication of the sheer complexity of non-human responses to light and dark, integral to genomes that have evolved over millions of years. Such flourishing is under great threat from over-illumination.

Living in cities and towns can have many benefits but there are also negative consequences. Urban pollution, for example, manifests in distinct forms and across

different mediums, notably through air, noise, and waste. These represent significant challenges for urban life and can have serious impacts on human health and the wider environment. However, until recently, the problems caused by light pollution have garnered little relatively attention and are only starting to enter the public imagination as a serious problem (Drake, 2019). The introduction of artificial illumination and its subsequent development across urban spaces and its extension and colonisation of rural landscapes has become so ubiquitous that many rarely think to question its presence and deployment in the environments we inhabit.

Its effects are not merely limited to humans. Darkness is integral to biodiversity and its disappearance is having far-reaching consequences for other species (Sánchez-Bayo and Wyckhuys, 2019; Gaston, Visser and Hölker, 2015). This means that places where dark skies are protected are becoming more and more important to planetary health. Nocturnal rhythms and behaviours of flora and fauna are disturbed by artificial light as the sensory capacities of nonhuman creatures to breed, feed, prey, and migrate are impacted (Haim, Scantlebury and Zubidat, 2019). There have been high-profile cases of the many migrating birds who, disorientated by electric lights, become victims of “fatal light attraction” and crash into buildings and other engineered structures (Van Doren *et al.*, 2017). Furthermore, the encroachment of artificial light at night into dark places also disrupts the rhythms of insects (such as moths, fireflies, and beetles), bats, salamanders, and migrating sea turtles (Rich and Longcore, 2006). Coastal and maritime lighting is also responsible for suppressing the colonisation of certain species yet promoting harmful others that foul harbours and coastlines to flourish, precipitating ecological collapse (Davies *et al.*, 2015) and thus promoting demands for the designation of *marine* dark sky parks.

Clearly, light pollution can create critical, if not downright disastrous effects in disturbing the lives and ecosystems of the planet. In their chapter for this book, Thérèse Jones and Marty Lockett provide a more substantive account of these extremely diverse effects on a host of non-humans, before considering how we might mitigate these problems through a better balance between human desires for nocturnal brightness and its impacts on other species. Kimberly Dill’s chapter focuses on how woodland environments, crucial for sustaining biodiversity, carbon sequestration, and oxygen production, are being enormously harmed by excessive illumination, which affects their non-human inhabitants in numerous ways. She provides a compelling argument for the restoration of natural darkness to biodiverse, forested ecosystems, citing the impact that light pollution has upon such places, compromising their ability to sequester carbon and thereby indirectly contributing to global climate change. In addition, Dill reminds us that immersion in dark, biodiverse forests has been, and remains pertinent to, transformative experiences for humans which the loss of darkness profoundly diminishes. In their chapter in this book, Rupert Griffiths, Nick Dunn, and Élisabeth de Bézenac further bridge between the human and non-human experiences of dark places. They discuss how use of unattended sensor methods, photography, and walking can be used to create thick descriptions of places after dark. By apprehending darkness in different ways, the descriptions move between systematic environmental observation,

imaginative interpretation, and environmental and bodily rhythms and sensation. Through this, Griffiths, Dunn, and de Bézenac give expression to different nuances and values of darkness, then reflect on how such knowledge of the lived experience of humans and non-humans might inform design strategies that construe the urban environment as a more-than-human ecology.

To reiterate our earlier discussion, a reduction in the dynamic non-human agencies that swarm under dark skies are contributing to the human experiential extinction (Soga and Gaston, 2016) of the night. We illustrate this by referring to Chris Yates's (2012) account of nocturnal walking through the rural south England, in which he charts the gradual loss of the sights, sounds, and movements of many of the non-humans he formerly encountered but are now seldom witnessed. His elegiac account of the depletion of moths, birds (owls, skylarks, nightjars, nightingales), mammals, and insects from the nocturnal countryside that he regularly encountered a few short decades ago draws attention to the vicious impacts of the chemicals routinely sprayed on crops and fields, the removal of hedgerows, and the effects of over-illumination that produce this quieter, less lively night-time landscape.

Before this loss, such experiences were able to promote a renewed appreciation for the sheer otherness of the non-humans with whom we share the planet. In contextualising our specifically human capacities for sensing and moving under dark skies—discussed later—it is salient to consider the myriad, often unimaginable and uncanny ways in which non-humans deploy their sensory aptitudes after nightfall. Bats locate prey through echolocation, snakes through their sensitive tongues, sharks swim through dark seas via electrolocation, badgers and dogs are primarily guided through dark space by their extraordinary ability to apprehend the world through smell, and moles sense their utterly dark environs by detecting vibrations.

### **The rise of the dark sky movement**

It is through an urgent desire to preserve a relationship with dark space, with the starry skies it promises, the creatures who emerge, the aesthetic experiences it encourages and the communal encounters it fosters that the dark sky movement has gained in popularity. Such positive experiences, along with growing awareness of the damage caused by over-illumination are contributing to the expansion of designated dark skies and spaces across the world.

In summarising the virtues of the dark night sky, Terrel Gallaway (2015, p. 280) identifies how it has been a “source of aesthetic, scientific and spiritual inspiration . . . a natural resource, a scenic asset and part of humanity's cultural heritage”, as well as signifying more ecologically sustainable environments (Sutton and Elvidge, 2015). Such values inform the rise of the dark sky movement, a worldwide campaign whose overarching goal is to decrease light pollution to preserve the natural night sky. Although the primary aim was to enable access to starry skies, subsequent research has proven that there are other significant advantages to reducing light pollution in the environment, improving the health, wellbeing, and safety of humans and non-humans, and cutting down on energy usage. As chapters in this book demonstrate,

the movement has also drawn subsequently ecologists and environmental campaigners, artists, tourists, nightwalkers, and literary champions into its orbit.

Since the discovery and growing awareness of light pollution (Riegel, 1973), professional and amateur astronomers began to work together towards protecting the night sky. The first city light pollution ordinance was conducted in 1958, in the town of Flagstaff, Arizona, home to the Lowell Observatory (Flagstaff Dark Skies Coalition, 2014). As the discovery site for Pluto and dark matter in the universe, the observatory has historical and scientific importance. Flagstaff also housed the Northern Arizona University Astronomic Research Observatory, which drew attention to how light pollution posed a serious threat to future discovery and research. Its supporters, together with advocates for astronomy, recognised the significance of protecting the site from the city's growing light pollution. In response, the ordinance was passed to limit the effects. As the city expanded, the regulations were revised accordingly. Initially prohibiting the use of commercial searchlights, stricter lighting codes were implemented in the 1970s that also banned billboard lighting. Dozens of cities have since followed Flagstaff's example and continue to deter the growth of light pollution.

The first recognised authority on light pollution, the International Dark-Sky Association (International Dark-Sky Association, n.d.), was founded in 1988 by David Crawford, a professional astronomer, and Tim Hunter, a physician and amateur astronomer. A not-for-profit organisation, the International Dark-Sky Association (IDA) has taken the lead on research into the negative impacts of artificial light on human health, wildlife, and climate change. In 2001, the IDA launched the International Dark Sky Places programme (International Dark Sky Places, n.d.) to encourage communities, parks, and protected areas around the world to preserve and protect dark sites through responsible lighting policies and public education. The programme offers five certification categories:

- International dark sky sanctuaries  
Sanctuaries are the most remote, and often the darkest, places in the world whose conservation state is most fragile.
- International dark sky parks  
Parks are publicly or privately owned spaces protected for natural conservation that implement good outdoor lighting and provide dark sky programmes for visitors.
- International dark sky reserves  
Reserves consist of a dark "core" zone surrounded by a populated periphery where policy controls are enacted to protect the darkness of the core.
- Urban night sky places  
Such places are sites near or surrounded by large urban environs whose planning and design actively promote an authentic night-time experience in the midst of significant artificial light at night.
- International dark sky communities  
Communities are legally organised cities and towns that adopt high quality outdoor lighting ordinances and undertake efforts to educate residents about the importance of dark skies.

By January 2023 there were 201 certified dark sky places in the world. These include 115 parks, 38 communities, 20 reserves, 16 sanctuaries, 6 urban night sky places, and 6 dark-sky-friendly developments of distinction. Thus, there are different kinds of designated dark sky places and the crusade for more, including urban areas, continues. For example, Moffat in Dumfries and Galloway, Scotland, was awarded the title of Europe's first dark sky town in 2016, having adopted special street lighting to keep light pollution to a minimum in order to preserve the starry skies. In 2023, to ensure a coherent global identity across its extensive network, the IDA renamed itself DarkSky (2023).

A wider list of dark sky places, including those without official protection, is maintained by the Dark Skies Advisory Group (n.d.) of the International Union for Conservation of Nature. Different countries also have their own initiatives and networks for dark skies. In the UK, for example, the Dark Sky Discovery (n.d.) partnership is a scheme that recognises over 150 areas as dark sky discovery sites, where good quality views of the night sky persist. These are divided into two categories: Milky Way-class and Orion-class sites. Milky Way class means the galaxy must be visible to the naked eye, while Orion class requires that all seven stars in the Orion constellation can be seen unaided. Beyond the international network of DarkSky, there are a number of national efforts such as Commission for Dark Skies (UK) and projects such as Stars4All (EU) that seek to increase public engagement with the issues and advocate for appropriate ways to address the problems caused by light pollution.

The designation of urban dark sky places constitutes an important shift in focus that addresses some of the negative discourses that have construed a division between the rural and the urban, wherein the urban stands as modern in contradistinction to rurality as a threatened historical realm (Dunnett, 2015). In his chapter, Dwayne Avery shows how 19th-century ideas about the moral values of Romanticism, frontier nostalgia and the sublime are inflected with anti-urban and anti-modernist sentiments that continue to inform the contemporary advertising strategies of dark sky tourist marketing. He exemplifies these representations through the retro posters produced by artist Tyler Nordgren that champion the after dark experience of US national parks. This does the dark sky movement a disservice, Avery argues, by construing dark skies as ancient, unchanging, and immune from the polluting tendencies of humans, and yet, as he contends, stars, moon, and planets are now supplemented by numerous satellites that have irrevocably transformed the appearance of the night sky over the past few decades. This needs to be recognised, he maintains, so that astronomical romanticism is historically contextualised by contemporary changes and more mundane encounters with darkness can be recognised as potent.

These urban dark sky places also underline the geographical and environmental diversity of dark sky places, a theme we return to in our concluding chapter. This geographical variety is mirrored by the very different ways of engaging with dark skies that are emerging, as astronomers are joined by botanists, ornithologists, hunters, artists of various inclinations, sound recordists, photographers, tourists, those seeking the therapeutic benefits of darkness, local people, hikers, light designers,

storytellers, and writers. The different subjectivities and focus they mobilise testify to different modes of engagement, ways of looking and sensing, scrutinising different objects and experiencing different emotions. In her chapter, such divergencies are brought out by Nona Schulte-Römer from a specifically gendered perspective in an in-depth discussion with four women concerned with dark skies, but from different angles of approach. Occasionally disputatious, these gendered passions and perspectives are themselves revealed to be diverse, sidestepping any essentialist conceits, yet nonetheless, they pose a challenge to the authoritative views of male experts, and especially around the dilemmas of excessive illumination on the grounds of safety. In his chapter, Kerem Asfuroglu draws upon his professional experience of collaborating with dark skies communities to illustrate how the design of lighting schemes can be informed by place-based aesthetic and material qualities that are sympathetic to environmental imperatives and social agents rather than in conflict with them. Using three projects, he explains how the design of more varied, sustainable, and aesthetically attractive nocturnal environments can be evolved through the promotion of the dark sky movement's goals. Asfuroglu's work illustrates how practices can be innovatively applied to rethink and reconfigure the relationship between light and dark.

### **Sensing dark sky places**

While there have been manifold symbolic associations with dark skies, crepuscular settings are not only the focus of cultural meanings but are realms of sensation and affect. While pervasive contemporaneous feelings for those unhabituated to the dark remain shaped by fear and supernatural associations with what cannot be seen, dark sky environments offer a wealth of sensory and affective opportunities for experiencing the world at variance to daytime perception and feeling.

The continuing negative associations of sensations experienced under dark skies belies the notion that our sensory apparatus provides unmediated access to the reality of the world, as we detect sights, sounds, textures, and smells that exist beyond ourselves. However, as Constant Classen (1993, p. 9) points out, “[W]e not only think about our senses, we think through them”. Thus, distinctive cultures of looking ensure that sensing with light and dark invariably “involves movement, intention, memory, and imagination” (Macpherson, 2009, p. 1049). We direct attention towards particular objects, interpret the sensory information they provide, and are likely to experience values, fears, likes, and dislikes in accordance with prevailing cultural norms.

Yet despite the ways in which cultural sensory conventions have informed the design and regulation of nocturnal environments, and perhaps because of these ordering processes, the drive for experience in unfamiliar, sometimes overwhelming sensory realms remains powerful. As bodies become accustomed to familiar sensations and smooth progress in predictable spaces, more stimulating engagements with the material world are increasingly sought (Boddy, 1992; Edensor and Millington, 2018). A venture into dark sky places constitutes one such retreat into a space in which unfamiliar sensory experiences may be sought. While a host of



recent commercial encounters with darkness are typified by safely regulated environments, which may nonetheless offer potent sensory experiences, a walk through a dark sky park constitutes a less predictable, more variegated, and multi-scalar sensory encounter with darkness and its multiplicities.

To become immersed in a dark sky setting is to move towards an experience of space depicted by Tim Ingold (2011, p. 119) in which the land is not “an interface” separating earth and sky but is a “vaguely defined zone of admixture and intermingling”. This is both apprehended visually and through an array of non-visual sensations. This is amply demonstrated in this book by Louise Beer’s account of her artistic responses to the night sky, producing ideas and works informed by her New Zealand childhood in which she became habituated to dark skies. Her images are inspired by her enduring and deep connections to the stars, moon, solar system, and universe and the sense of deep historical time that situate the brief, numberless human and non-human lives that have lived and will live on Earth and the astronomical and earthly events that have shaped the landscapes in which they live. This is accompanied by a lingering melancholy for the countless life forms that are rapidly being extinguished in the Anthropocene.

In terms of vision, dominant cultural meanings about landscape remain anchored in romantic notions that posit a detachment between observer and that which is beheld, rendering landscape passive, subject to the onlooker’s romantic gaze. At night, the gaze can certainly be arrested by the spectacle of the starry or moonlit firmament above, but the visual paring down of the land, its monochromatic appearance, provides a dramatic contrast to the variegated colours and complex forms, gradients and distances that characterise its daytime appearance. In a different way to the daylight, the tone, light, darkness, colour, and cloud cover of the “sky in formation” (Ingold, 2011) continuously shifts.

Alphonso Lingis (1998) identifies how changing *levels* of light, characterised by depth of field and brightness, continuously play across the spaces within which we see things and with which we continuously adjust, and this also applies to depths and densities of darkness. This distribution of light and dark across space is shaped by seasonal and weather patterns, diurnal temporalities and longitudinal and latitudinal positions, on the presence of cloud and atmospheric particles. Also, Diane Young describes how colours “animate things in a variety of ways, evoking space, emitting brilliance, endowing things with an aura of energy or light” (2006, p. 173) according to season, time of day, and the light’s intensity. Yet at night, human visual perception devolves into a primarily monochromatic experience, characterised by a medley of shades of grey and black, although natural and artificial light can bestow patches of colour on nocturnal landscapes that dramatically stand out from this muted backdrop.

Gloom thus stimulates different ways of looking at landscape and the things in it that stand out. Our perceptual experience of night is also conditioned by the affordances of place, the way moonlight shines on distinctive surfaces or reflects on water, thick shadowy masses of trees and bushes, and silhouetted forms standing out against the sky (Edensor, 2013; Dunn, 2016). Clouds may be tintured with an orange glow radiated by the lights cast by nearby settlements. Moreover, while the

daytime landscape is constituted by a succession of scenes that fade into the distance or come near, and the eye continuously shifts between them, in dark landscapes, vision usually attends to black masses that block light. This is articulated in John Daniel's (2008, p. 23) contention that daylight vision "catches on the surface of things, gets snagged and tugged about by their multiplicity" whereas, he continues, when looking at trees in a forest at night, the sensation is of their "commonality . . . not the names I knew them by but their essential namelessness".

In addition, landscapes seethe with vitality as non-human agencies ceaselessly change them in myriad obvious and unnoticed ways. Landscapes are never pre-formed but are "always in process . . . always in movement, always in making", vitally immanent and emergent (Bender, 2001, p. 3; Benedicktsen and Lund, 2010; Edensor, 2022). Geological, biological, creaturely, chemical, and physical forces combine to transform landscape according to different temporalities. While certain vital elements such as flying creatures, shifting clouds and stars, trees bending in the wind, and looming landforms are visually apprehended at night, the dynamic nocturnal landscape is often more powerfully experienced through emergent smells, sounds and textures. As vision becomes less critical, Tallmadge (2008, p. 140) contends that we become attuned to the landscape through other senses, as the body "relaxes, opens, breathes, extends its attention outward into the world the way a plant feels its way into the soil with roots or into the air with leaves".

In her chapter, Ellen Jeffrey discloses the visual transformation of Finnish woodland into a glowing realm by winter snowfall, and how the landscape is further altered by the sound of her footsteps crunching through snow. In the dark landscape, sound becomes especially accentuated, with the scuttling sounds of small creatures, cascading water, and the wind amongst leaves. Smell too becomes more foregrounded as the scent of pine trees, earth, and fungi permeate the air. Indeed, the qualities of the air, its freshness, moistness, and temperature, command attention.

In recent years, creative non-fiction, especially through the rise of new nature writing, has explored intense, prolonged experiences with landscapes at night, often capturing the potent sensations that arise (Gaw, 2020; Francis, 2019). The sensory experience of rural darkness is beautifully captured in the account by Chris Yates (2012, p. 20) of his nocturnal walks through a hilly area of Southern England. Attuned to the subtle shifts in temperature, flows of air and the scents it carries, he observes how "the evening smells as if the pores of the earth had opened to filter the underground river through all the acres of herb-rich grass around me. After the thin, desiccated atmosphere of the previous week, the humidity seems almost tropical". On a different occasion he remarks how

as the air calms at the end of a summer's day it begins to generate a subtle and complex interweaving of currents: cool air pouring down from the hill-tops, warm air rising up the valley sides, a localized weather system of minor katabatic [downslope] and anabatic [upslope] winds.

(*Ibid.*, p. 28)

Yates has also become attentive to the sounds of the dark landscape, as he describes in his account of a wood at midnight, which

had the same stored up warmth and hushed boxed-in quiet as an old high raft-ered barn—quiet but not soundless. The interior of any summer wood after dark is nearly always gently clicking, rustling, pattering and squeaking . . . sometimes there are unlocatable rufflings as birds fluster their wings in sleep, and if the previous day has been hot there might be the occasional quite sharp crack or creak of cooling dead wood. Even the tiniest mouse-tremble is accentuated in the enclosed, resonant space, which makes a patrolling badger sound like a trundling bear.

(*Ibid.*, p. 70)

During her numerous travels through rural nocturnal Aotearoa, Annette Lees (2022, p. 61) has similarly become highly attuned to the visual elements that grasp her attention, referring to how “landscapes are nuanced with gradations of shadows grey and black—the faint lustre of starlight . . . flakes of moonlight, a flash of bioluminescence, a shimmer of a candle, a spit of firelight, a torch’s wobble”. She also describes the acoustic identity of places, more evident at night in the absence of visual distractions. For instance, she discerns her location through the sound of rain “as it variously falls on grass, metal, water, rock, sand or leaves” (*ibid.*, p. 65) and depicts how sounds subtly change each hour from 5:00 p.m. to 4:00 a.m. across the night as bird calls rise and fall and the ancient chorus of the cicada spreads across the land. Yet as she disturbingly points out, extensive ecological devastation has undoubtedly reduced the diverse array of non-human sounds, a historic soundscape that can no longer be imagined, and she seeks to identify the more than 50 missing elements that once added to Aotearoa’s cacophonous dawn chorus. Such absent sounds include those emitted from the many millions of seabirds that flew in gigantic masses through coastal areas, now only a remnant of these colossal numbers, and the ghosts of the long extinct flightless birds, some giants, that roamed the night.

The sensory experience of darkness, as in all apprehension of landscape, unfolds according to the angle of perception. A journey that includes a walk to the top of an escarpment offers a view backwards to the landscape that has been traversed and a look forward to that which lies ahead. Other views may be typified by a gaze into the middle distance or scrutiny of an unidentifiable object. Yet also critical is how sensations are conditioned by the modes through which we move in dark space, whether as drivers or passengers, walking, running, cycling, sailing, diving, fishing, surfing, or skiing.

Walking in darkness teaches feet to differentiate between textures underfoot, and the body has to anticipate how to walk from moment to moment, with no visual information that prepares the body for a steep ascent or descent (Edensor, 2013). Dancing in the dark is different. In this book, Ellen Jeffrey devises a choreographic practice in a wood at the southern edge of England’s Lake District. She is especially drawn to an area in which yew trees create a swathe of canopy that darkens

the space and restricts the growth of an understory. The characteristics of the wood ceaselessly shift during the year and through dancing, her body responds to these changes, coming to know this ground kinaesthetically as she moves and is moved by the undulations and materialities of the arboreal environment. As she dances through this dynamic wooded landscape, her imagination seeks to grasp the forms that separate, blur, and merge during the different phases of the night.

Hayden Lorimer (Edensor and Lorimer, 2015, p. 9) details how running at night offers sensory experiences that diverge from running in the daylight. He explains how movements are contingent as “feelings of vulnerability are palpable, borne of not knowing with any real confidence what lies beneath or just ahead. Long strides shorten and stiffen to smaller steps . . . freer movements are pitched off balance by the ever-present worry of putting a foot wrong” as “feelings of fluency deteriorate into a clutter of physical uncertainty”. Rather differently, the cyclist is guided along roads and through dark landscapes via the narrow beam of the lamp that cuts an illuminated tunnel through the gloom, highlighting the road surface, trees, and hedges (Cook and Edensor, 2014). In the absence of expansive vistas and multiple scenes, a more intense awareness of the body, its capacities and energies emerge through the changing rhythms of pedalling and physical exertion. Indeed, nocturnal cycling is becoming increasingly popular, as exemplified by the 112-mile Dunwich Run that starts in Hackney, London, and travels through Epping Forest to the Suffolk coastal village of Dunwich (Wills, 2015).

A more insulated experience of travel in the dark is depicted by Sandy Isenstadt (2011, p. 229), who also draws attention to illumination in motion, contending that the early motorist’s experience of positioning themselves “at the vertex of a cone of light and propel it across a darkened landscape must count as one of the most startling visual experiences of the twentieth century”. At a more rapid rate than cycling, Isenstadt (*ibid.*, p. 218) discusses how car headlights illuminated roadside objects, which “bloomed gradually into nocturnal form, then sharpened for an instant and, just as swiftly were gone”. Comparably, on a coach tour that set off to unsuccessfully witness Iceland’s aurora borealis, Katrin Lund (2020) discusses how she visually apprehended a host of often unidentifiable forms across the passing nocturnal landscape, while also more intensely experiencing the tactile sensations of mechanised movement through darkness.

The experience of mechanical mobile technological mobilities are also sensorially divergent for passengers on night trains, as evoked by David Bissell (2009, pp. 52–53), who draws attention to “the otherworldly flashes, glows, sparks and orbs that punctuate the dark of night” and “the magical green lights of trackside signals” as the train speeds through nocturnal environments. In a different register, Maria Borovnik (2017) explores how seafarers sensorially experience an ever-shifting environment as their ships move through nocturnal seas, scanning the horizon for landmarks and nautical lights, while developing a sonic attunement to oceanic and mechanical sounds and a tactile sense of the motion engendered by the roiling ocean.

These sensory apprehensions of dark sky settings are accompanied by emotional and affective experiences that potentially solicit creative impulses, imaginative

flight, therapeutic possibilities, meditative states and convivial dispositions. Psychologists Anna Steidle and Lioba Werth (2013, p. 76) contend that darkness “elicits a feeling of freedom, self-determination and reduced inhibition . . . and promotes a risky, explorative, and less vigilant task processing style” that fosters creativity. Rob Shaw (2015) explores how darkness offers conditions for meditation and intimacy in the absence of the visible, and Annette Lees (2022, p. 12) concurs, affirming that we are “more primed to experience intimacy, to be softened and receptive to awe and emotion”.

Such affective potentialities and multi-sensory attunements were formerly integral to a nocturnal world with little light, a way of living with pervasive darkness that also prompted the acquisition of sensorially informed ways of moving through the night competently. The way ahead could be discerned according to knowledge of the patterns disclosed by stars, and the multiple phases of the moon, the “changing colours and contours in its shape-shifting light” that according to James Attlee (2011, p. 5), are “too subtle for our modern eye to appreciate”. Roger Ekirch (2005) also details how parents devised walking exercises to accustom their children to moving through dark space, seeking to develop their aptitude for wayfaring through place via touch, sound, and smell. A range of dark sky experiences are being devised that provide an alternative to daylight sensory experiences, perhaps offering more substantive opportunities for becoming reacquainted with the potent experiences of dark spaces, reattuned to their different sensory pleasures.

## **Innovations in artistic and tourist engagements at dark sky places**

### *Artistic and creative engagements with dark sky places*

The spectacular artificial lighting technologies of the urban night and its relationship with urban darkness has influenced numerous cultural and artistic representations of the nocturnal city in cinema, literature, painting, photography, theatre, and television (Dunn and Edensor, 2020; Sharpe, 2008). This has been recently supplemented by the huge rise in urban light festivals, in which new technological, aesthetic, and conceptual approaches have vastly expanded the range of creative responses to nocturnal urban space, once more re-enchanting the night (Edensor, 2017). These artistic urban innovations have increasingly been complemented by diverse cultural events that have been staged in total or partial darkness. Extraordinary deployments of darkness in ways that solicit changing apprehensions of space, sensory perception, and interactivity have been devised by James Turrell (Sumartojo, 2020) and Tino Seghal (Edensor, 2015), theatrical potential has been elicited by plays that have been staged in the dark (Welton, 2020), and music concerts have also been held to intensify listening in the absence of visual distraction. Darkness has also been inventively exploited in grand immersive cultural experiences staged outside. Notable here are Scottish arts group, NVA, who organised the 2005 event *The Storr: Unfolding Landscape*, which ran across a spectacular mountainside on the Isle of Skye (Morris, 2011), as well as *Speed of Light* in 2012,

in which and runners and walkers combined to mark their presence with modest illumination across Edinburgh's volcanic park, Arthur's Seat.

As chapters in this book demonstrate, artistic and creative endeavours are being developed that encourage people to conceive, sense, and affectively engage with dark sky settings in new ways. Some of these projects retain a focus on the visual, others are concerned with attuning visitors to the sonic, aromatic, and tactile sensations that unlit dark places conjure, while some seek to explore cosmic feelings, technological possibilities, and collaborative and interactive initiatives.

Louise Beer's art emerges out of a very personal experience that combines potent memories of the dark skies of her New Zealand childhood, the grief she has suffered following the death of her father and an acute melancholic sense of Earth's diminishing biodiversity. Beer's awareness that everything that constitutes the Earth and the life it contains is derived from the universe adds piquancy to this vision and distinguishes the planet from the potentially lifeless, vast expanse of the solar system in which it spins. She draws out the unique liveliness of the Earth and the human-generated crises that threaten it by adopting various visual strategies. In an audio-video installation, she portrays the spinning Earth over 40 days—an Earth that also produced her father and all our ancestors—as a reassuring vital cycle of change, life, and death that provides constant stability at a time of personal loss. The personal meshes with the cosmic. Another work consists of a manipulated sound piece of nocturnal and dawn birdsong that intensified into a crescendo of grief at the possibility of extinction. In capturing a vision of Earth as an alien planet she created a series of images of white mountains in Tuscany, Italy, that blended photographs sunsets and sunrise, moonlit scenes and night skies that invite the viewer to contemplate the long and slow formation of Earth, far before there were ever eyes to see it. Beer ends her essay with eloquent quotations from astronomers who echo her sentiments about the cosmic preciousness of Earth, invoking the shared, similar responses of scientists and artists.

In exploring the dark sky settings of the Scottish England border, the chapter by Helen McGhie and Natalie Marr provides a compelling insight into the artistic process. The two artist-researchers reflexively identify the evolution of their ideas and the site-specific projects they have undertaken in two dark sky parks through a dialogue. Their often experimental works emerge from engagement with the dark sky sites and through workshops with the people who work in, live in, and care for them: McGhie at Kielder Observatory in north-east England and Marr at Galloway Dark Sky Forest Park in south-west Scotland. Critically, both honour the communities at the sites by registering the values and practices they espouse during different participative exercises. Both seek to foster the emergence of new imaginative, emotional, and sensory experiences. McGhie focuses on offering alternative photographic approaches to the conventional astronomical images produced at dark sky places. She has contingently composed portraits of staff, images of the textures of the ground, photographs converted into sonic forms, and open-air photographic exhibitions staged amongst the trees. Marr has created sound recordings of the nocturnal sounds of the forest, images produced through pinhole photography, and sketches stimulated by her regular encounters with dark skies and sites.

Ysanne Holt's chapter explores how dark skies provide an opportunity for thinking across and beyond the constraints of borders and boundaries and envisioning new forms of connectedness and being together. She focuses on artists who have moved away from the visual and away from structures that may be conceived as having been "imposed" on sites, towards more dematerialised or immaterial art forms and temporary experiences and interactions. Such works sidestep the creation of enduring forms in favour of immanent, unrepeatably, and fleeting experiences. Holt explores the curation of a sensory walk in the dark that offered unexpected experiences of tastes, sounds, and textures and that also made connections with other times and places. She also focuses upon the organising of participative events that explore the potentialities of the situated, sonic experience of off-grid, dark sky landscapes to stoke environmental consciousness and a sense of place. Such work seeks to forge new connections between people through collective participation in using alternative forms of digital technology that lie outside mainstream networks.

### *Dark sky tourism*

Darkness has long been economically deployed to entice visitors to a wealth of attractions. As Alice Barnaby (2020) details, as modern illumination spread, during the first half of the 19th century, the Hermit's Grotto, Submarine Caves, and Dark Walk in the Vauxhall Pleasure Gardens, London, produced a recreational space in which visitors could experience depths of light and darkness. These enticements have been superseded by ghost trains and thrill rides that have also relied on the potential of darkness to enhance experience. Once more, this underlines how experience of darkness provides a corrective for ocularcentrism, confirming that "tourists encounter the world multisensually and multidimensionally" (Scarles, 2009, p. 467), through tactility, sound, smell, and taste.

In recent decades, the expansion of tourism as an economic imperative and cultural practice has incorporated an increasingly diverse range of attractions, activities and destinations across the world (Urry, 1990). This extension reaches into the night, with the nocturnalisation of tourism evident in the growing popularity of visits to museums in the dark, graveyard tours, ghost walks, and bat walks (Eldridge and Smith, 2019). Celestial tourism is also growing (Weaver, 2011). Tours to the Arctic Circle are growing in popularity as visitors travel to experience the "Land of the Midnight Sun" (Birkeland, 1999), while other tourists venture to Iceland, northern Scandinavia, and Canada to experience the aurora borealis (Lund, 2020). Chapters in this book reveal this development of a range of tourist experiences in dark sky places, and while many tourists are motivated by astronomical spectacles, other diverse pleasures are being adopted to attract visitors.

Importantly, MacMillan *et al.*'s chapter in this book foregrounds two essential dimensions in developing tourism in dark sky places. First, they emphasise the importance of the advocacy and participation of the local community in campaigning for dark sky designation and subsequently, in devising and participating in key events designed for both residents and tourists. Second, they show that while astrotourism may continue to attract most visitors to Mayo Dark Sky Park, a medley of

storytelling and literary festivals, nature walks, the staging of historical events, and the aesthetic pleasures of innovative lighting schemes offer alternative delights for both tourists and locals. In her chapter, Neha Khetrupal takes a different perspective in advocating how dark skies are inextricably entangled with ancient celestial myths that are materialised in the sculptural and material designs of significant heritage sites, such as at the central Indian temple complex of Khajuraho (also see Khetrupal and Bhatia, 2022).

## Conclusion

In this introduction we have sought to provide a substantive context for the chapters that follow by highlighting the histories of dark skies, multiple meanings of darkness, the loss of darkness due to over-illumination, the rise of the dark sky movement, and how creative engagements with dark sky places offer new insights for reconnecting with dark skies. We conceive of this book as contributing to a conversation that is multi-dimensional, multi-disciplinary, and continually emerging. We contend that the chapters in this volume reveal the sheer diversity of debates, experiences, historical contexts, and geographical settings associated with dark skies. We further explore the implications of the issues they raise in the concluding chapter.

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