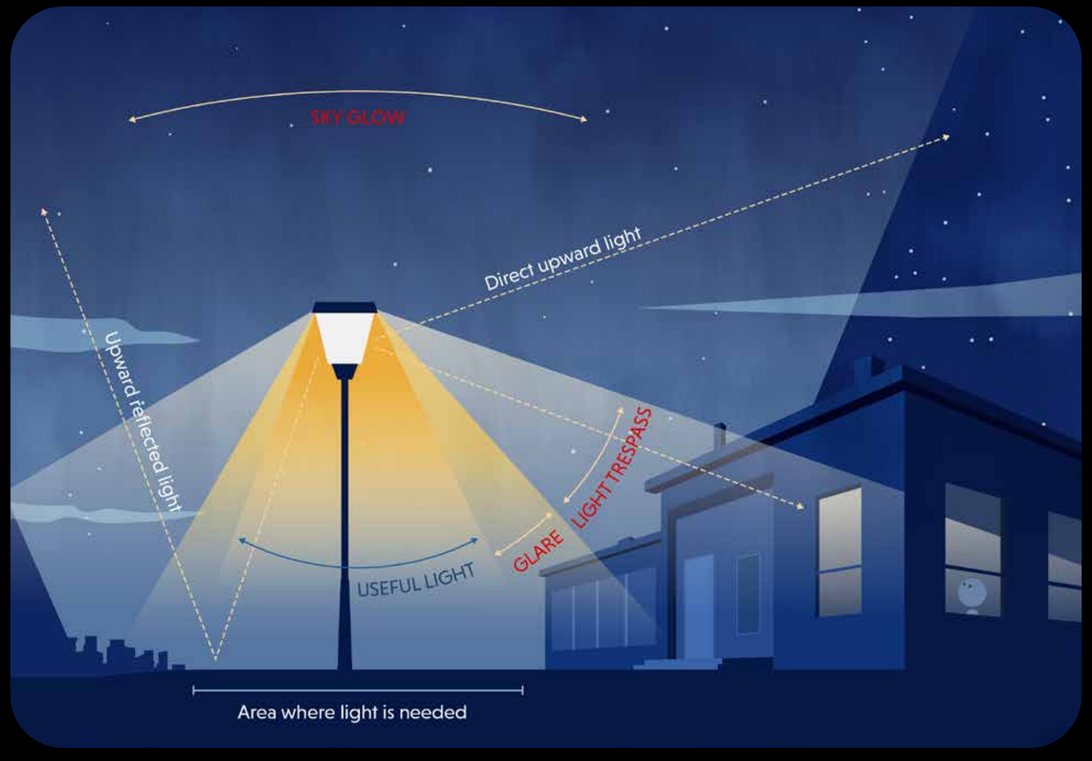
Darkness

Darkness can intimidate, but also awaken imagination and offer meaningful safe spaces. Darkness is needed so animals, plants and people can live and function according to own natural rhythm. Darkness also needs protection.

Darkness regulates life

Life on Earth has always been based on the alternation of day and night. The length and variation of light and dark periods regulates life, feeding, rest and reproduction of living organisms. Humans have throughout history, depended on the dark sky and positions of celestial bodies for navigation and agriculture. Numerous scientific theories, crucial insights in understanding our earth's system, and deepest mysteries of the universe have all been possible through observations of the dark sky.
The greatest threat to natural darkness is man-made light pollution, that is increasing across the globe at a rate of about 10% annually. For example, 90% of residents of Europe and 67% of residents of Finland no longer experience natural darkness. We need light to function in the dark, but unnecessary and excessive light is harmful.



What is light pollution?

Light pollution is man-made artificial lighting that disturbs people, the environment and animals. Light pollution is generated, for example, from street lights, facade lighting of buildings, advertising columns and lights from sports fields and roads.

Lights that are too bright, poorly directed or on at the wrong time cause various impacts and effects. **Glare light** dazzles the eyes and trespass light can penetrate through the windows of residential buildings. Upward-facing luminaires or excessive lighting reflecting upward creates **sky glow** that lightens the sky, obscuring stars and other celestial phenomena even tens of kilometres from the source of light pollution. Bright lights directed towards the sky and lit after dark have even confused migratory birds into losing their way.

Curbing light pollution is simple:

Orient lights correctly, preferably pointing downwards, and take glare effect into account.

Illuminate only those places where light is really needed, such as walkways.

Use yellow and orange (less than 2700 Kelvin) light sources of suitable intensity combined with a timer or motion sensor whenever possible.

Most importantly: turn off the lights when not in use! After all, you never leave the tap water running when you leave the room.

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Life in the dark

Light pollution, unnecessary and excessive artificial lighting, affects almost all living organisms on this planet by disrupting their natural circadian rhythms.

The northern bat - *Eptesicus nilssonii*

At night, around the street lamps, you can see the northern bat predating on insects attracted by the artificial light. The northern bat is one of Finland's most common and widespread bat species. It does not usually move in forests under branches, it thrives in spacious areas in yards or along roadsides. Like other bat species, the northern bat plays an important role in our ecosystem as a pollinator and predator of pests.

During light nights of the Finnish summer, the northern bats are lured from open field margins to darker areas such as forests, where low light provides them protection from both predators and prey. Increase in light pollution, especially in rural areas, can negatively impact on the life of the northern bat; the lure towards artificial light can increase bat mortality resulting from increased collisions and predation, while light polluted spaces can similarly lead to habitat loss and reduced bat populations.

Silver birch - *Petula bendula*

Imagine yourself as a birch tree on the side of a city street. Artificial light from street lamps, cars and buildings flooding you from all sides. Even though it's late autumn, the light shines on you like on a bright summer day. Should you go rest for the winter or stay awake?

Like animals, plants need rest to rhythm their lives. Flowering or bud break usually occurs in spring, when it is warm and sunny. The amount of light also affects when to start growth. In November's rains or spring cold, bright lights can confuse. As the days begin to get shorter, deciduous trees stop producing the green pigment, chlorophyll. They take the nutrients in the leaves back to their roots and drop their leaves. In spring, an increase in light affects leaf break. But artificial light flickering around can cause deciduous trees to keep their leaves green for too long or grow buds too early. If this happens year after year, the tree can begin to weaken.

Latticed heath - *Chiasmia clathrata*

The Latticed heath is a fairly common butterfly that flutters in Koli's meadows, recognisable by its checkered appearance. Unlike many other moths, it can often be seen during the day. What it has in common with other moths is that it is an avid pollinator. Therefore, the sun also plays an important role in the life of moths.

The Latticed heath has been used to study how light pollution disturbs nature and insects. According to a study carried out in northern and central Europe, the glow radiating from brightly lit urban areas affects also the life and development of butterflies far away in rural areas. The Latticed heath overwinters as pupae, and the larvae uses the shortening of the day in autumn as a sign of cocooning. However, light pollution can lead caterpillars to misinterpret the season and develop into butterflies too early, just before winter sets in, causing them to die and not have time to reproduce. Light pollution in cities may be one of the reasons for the decline in insect populations. Reducing light pollution in and around cities is important to protect insect pollinators.

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Stories of the night sky

What do you see while gazing at the stars and moon? Can you spot a big and little bear in the sky, a hare on the moon, or feel the fire fox fur flare up the sky, as it glides over the dark sky?

”Where the Beast was given birth
the honey-paw was turned round
in the moon, in the sun’s cleft
upon the Great Bear’s shoulders
where the air’s lasses live, where
nature’s daughters are.”

Kalevala, poem 46. Translated by Keith Bosley

The Big Dipper

The Big Dipper, termed Otava in Finnish, is part of a bigger constellation Ursa Major. The constellation has varying narratives even across the northern cultures.

In Finland, Otava is associated with a birth story of Finland’s national animal, the bear. To ancient Finns, the bear was feared, but also sacred and revered animal. On the one hand, the bear threatened grazing cattle, but on the other hand was also a source of food as a prey animal. The bear was believed to have been born in the sky, “on the shoulders of the Otava”, from where, as a cub bear, it was gently lowered to the earth to trample on the ground. In ancient times the bear hunting would culminate in a feast to honor the bear, ending with the bear’s skull being placed high in a pine tree as a symbolic return of the bear to its birthplace, the stars.

Moon

You’ve probably heard of the man in the moon, but did you know that depending on the culture, you can also see a hare, a man carrying branches or a female side profile on the moon’s surface? The face of a man and other figures seen on the Moon consist of dark lunar seas and lighter highlands. In ancient times, astronomers believed that the seas on the Moon were truly vast expanses of water. Today we know that the “seas” are impact basins filled with ancient lava and other lunar material.

In the territory of East Asia, the story of the moon hare is told. The Jade Emperor sought for himself a helper in animals to make the elixir of life, but only the hare showed sufficient selflessness and kindness. The Jade Emperor carried the hare to the moon and taught him to prepare the elixir of life, and in this activity the hare can still be seen on the moon today: toiling by the mortar. In gratitude of the hare’s services, the Jade Emperor gave him a glowing fur resembling precious jade, and thus the hare became the Jade hare. The virtues of the hare are commemorated during the Mid-Autumn Festival, also called the Moon Festival, celebrated in East Asian countries.

Northern Lights, the Fox fires

Northern lights (Aurora borealis) are created by the solar wind hitting the Earth’s magnetic field. People travel to see this phenomena even from long distances. Even though northern lights occur fairly evenly throughout the year, they are best seen in darker times of the year. In Finnish language the northern lights are called “Revontulet” that translates to Fox fires. How does the fire fox relate to this northern phenomenon?

There is an old Finnish belief that the northern lights were caused by shiny fire foxes running across the northern sky. In folklore, the fire fox is a mythical animal whose fur struck sparks and which every hunter dreams of catching, for the catcher of the fire fox would become rich and famous. Running through the Lapland skies, the fire foxes were believed to have caused the phenomenon of light to blaze across the sky.

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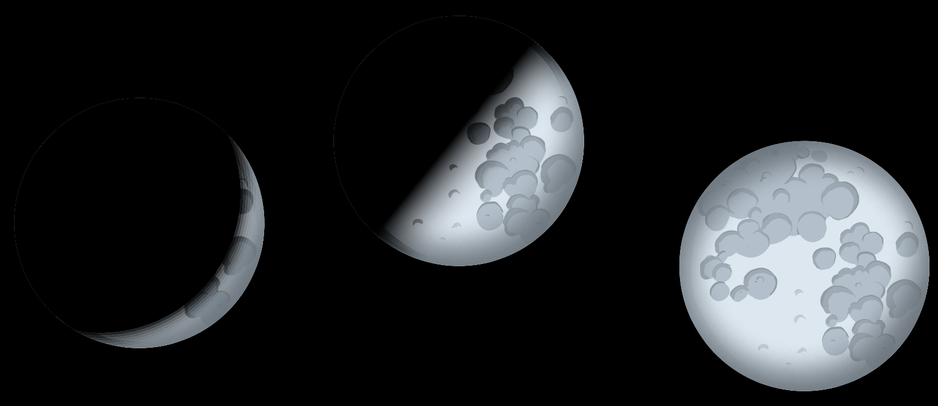
Adventure in the dark

You can hike, play and spend time in the dark, just like in the light. When you equip yourself properly and take your surroundings into account, you can enjoy darkness in peace.

How to prepare for a trip in the dark

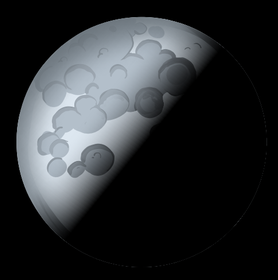
- Before the outing, check the weather forecast and dress in layers to keep warm, as nights can get chilly. Take along a warm drink for example.
- The human eye takes about 20 minutes to adjust to the dark. The best color of flashlight light for wandering in the dark is red, as red light does not disturb one’s night vision.
- Although moving in the dark may seem exciting, it is worth exercising in nature at night and talking calmly. Many wild animals also function in the night, we don’t want to disturb them.
- Binoculars and telescopes bring celestial objects closer. With ordinary binoculars you can gaze at the surface of the Moon and spot more stars, for example!
- The best place to observe the stars is away from light pollution. Outside cities, on the edge of fields or by shores of lakes, there is often minimal or no glare reflected in the sky, or disturbing light.



Try spotting these celestial phenomena:

Moon
The Moon always revolve around the Earth with the same side facing towards us, why we on earth observe different phases of it as it moves. The Moon doesn’t emit its own light, it reflects it off the Sun why we can see its various shapes.

- New Moon: The Moon is completely dark because the sun is illuminating the opposite side of the Moon which is facing away from earth.
- Crescent: most of the Moon is dark, but a cresent shape of the Moon’s edge illuminated by the Sun can be seen.
- Half-moon: half of the surface of the Moon visible to Earth is illuminated by the Sun.
- Full moon: The moon fully illuminated as its dark side is facing away from Earth.



Aurora borealis
Even though Northern Lights are common in Northern parts of Finland, they can also be seen further south. The best time to observe them is in the evening, most often after 10 pm.
TIP: The Northern Lights can sometimes be better seen in a photo than with the naked eye. Take a photo of the night sky when the space weather service shows a high probability of the Northern Lights and you might be surprised by what you see!

Constellations
Explore star maps or starry sky apps before going out. Select a few patterns that you wish to spot. The constellations that stand out best in the northern sky are the Big Dipper and the Great Bear. The constellations of the Little Bear, crowned by Orion, and Cassiopeia and the North Star can also be spotted. If it’s dark enough at your observation point, you can also distinguish the opposite edge of our home galaxy, the Milky Way, as a stellar cluster passing through the sky.

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