
Demons in the Light

Light Waste – An Overview



The Film Narration



City of Edmonton – downtown area

LIGHT WASTE - AN OVERVIEW - The Film

Background

For millennia our ancestors anxiously watched the sun slowly sink in the west. Another night would soon bring with it not only the warmth of the fire and companionship but the terrors of darkness.

Soon, it would be time to stoke up the communal fire and huddle in closely, their backs to the curtains of night. There would be time to look over one's shoulders and gaze with fear into the blackness beyond the circle of light.

But, there was also time to peer into the flames, and to daydream, to see them rise in the darkness casting their glowing embers high into the black sky overhead. One could follow the embers ever upward and reverently peer into the great unknown.

Here you could gaze upon the beauty of the gods, heroes, villains, objects and beasts fashioned by the timeless, twinkling stars, ever wheeling to the beat of nature's rhythm.

Occasionally, the welcome silver moon would be seen dashing through waves of clouds, washing the earth below with her cool, blue light while keeping the terrors away.

This story repeated itself day after day, millennia after millennia.

The effects, surely and insidiously, seeped ever deeper into the human subconscious mind, leaving future generations with a deep-rooted fear of the dark. However, over time, humans invented ways to add light to our nights.

With the discovery of electricity came the electric light bulb, a much more brilliant glow easily controlled and used wherever electricity was available.

As towns and cities were electrified the light bulb flourished. Soon, one electric light on the corner was not enough and municipalities installed light poles up and down the streets.

Suddenly, the world experienced a lighting explosion like never before and, like a cancer, electric lights spread throughout the civilized world.

Everyone was entranced by the spell and promises of this new light source.

Today, unconsciously and comfortably, we live our lives in a perpetual day-like cocoon of light, either natural or artificial.

We have forsaken the night environment, its beauty, its mystery and its direct relationship to our health and welfare, who we are, where we came from and where we are going.

We have chosen to live bathed in the constant flood of light. It drenches our homes, towns, cities and surrounding environment every night. Through fear, we have turned our backs on those very night-time experiences and environments which helped to create our psyche, our cultures and enrich our lives.

We have chosen to become Creatures of the Light

Insidiously, new terrors now stalk our homes and communities and all is not what it seems.

Research indicates that we currently live with many serious, negative, long term effects caused directly by the very artificial lights that promised delivery from our fears.

Unknowingly, we are paying a very high

price for our use and abuse of light, not only in a financial sense but with severe costs to our health and well-being.

We have also identified many serious, negative effects on other living organisms, our environment, dwindling precious resources and threats to the very future of the planet.

Without concern and forethought, we have released the Demons in the Light..

The Problem

Most people think this view of the earth from space is a beautiful sight.

At night, the twinkling lights from towns and cities sparkle like diamonds in the darkness as our planet whirls endlessly through space.

However, when one considers the many negative effects of untold billions of lights in uncountable communities creating this spectacle, one may have a change of mind.

We are witnessing megawatts upon megawatts of wasted energy literally flowing outward into the universe.

Some of the light comes directly from street lights and community sources while the rest comes from reflections off a wide variety of surfaces.

Around the world, with every dusk, light waste and light pollution begins, and continues on into the next dawn.

Like a cancer, waste light spreads its tentacles over the earth, ever expanding, ever brightening, ever more costly and ever increasing in its waste of precious disappearing resources.

From space, satellites using photography can easily detect this waste light, its tentacles grasping ever outward from every town and city center and engulfing the surrounding countryside with impunity.

More sensitive satellites can detect the extent of polluting light emanating from each community and enveloping the environment for tens or hundreds of kilometers in every direction.

This data can be presented as light pollution maps, vividly illustrating the large and rapidly spreading domain of artificial light and the diminishing areas of unaffected territories.

Only recently have we begun to realize this as a tremendous waste problem that now exists throughout the world.

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First world countries are of the greatest concern, wasting billions of dollars each year to support waste light and light pollution. It is estimated that the United States alone spends between four to ten Billion dollars a year on waste light and light pollution creation.

However, virtually nothing is spent on waste light and light pollution control and elimination either in education or purchase of new, waste reducing lighting systems.

Ubiquitous, badly designed, power-hungry, obsolete streetlights are the worst offenders most of which are still being installed in many communities.

It has been estimated that for every single watt actually used, 100 watts of energy have been lost in its production and transmission!

And yet, for most streetlights, only a small fraction of that one watt is actually converted into visible light.

Then, most of the light actually produced, well over 80% of the energy, is wasted as the light is spread in every direction beyond the streets and sidewalks, the intended targets.

Ignoring energy waste, effectiveness and efficiency, streetlights and yardlights spray light in all directions, including directly into the sky and space. Other facets are well worth considering.

Most municipalities are seriously over-lit, wasting incredible amounts of electricity, light and money in the process.

This is based on the erroneous assumption that the more light the better! As well, much of the light and energy used is wasted by lights left on when not needed, or lights with malfunctioning sensors that do not turn off as required.

In most communities, streetlights remain on all night, an incredibly tremendous waste since few people are on the streets during late night and early morning hours.

This means a continuing waste of approximately 7 hours per day if lights were to be turned off from 11 p.m. at night to 6 a.m. in the morning.

Most councils are unaware of the problem, its ramifications and its many serious, negative side effects for human health, safety and security as well as effects on flora, fauna and the environment.

Very few communities and their councils have as yet begun to contemplate solutions to the problems associated with waste light and light pollution.

Fewer communities have as yet adopted automatic, computerized or sensor control of streetlights, reducing the time the lights are on while saving energy and maintenance costs. Fewer yet have developed policies and procedures which carefully control waste light and energy use within the community.

Extremely few municipalities have seen fit to educate their citizens about the large number of negative effects of waste light, its causes and remediation.

However, spiraling energy costs are now common throughout the world and taxpayers are growing increasingly concerned about ever-increasing taxes to support municipal budgets. As earth's resources quickly dwindle and energy prices soar, it has become increasingly evident that the serious problems of waste light and light pollution must soon be addressed.

The problem is exceedingly large, multifaceted, very expensive and very real.

There was a time when electrical energy was inexpensive and little thought given to the resources required to produce light.

Times have changed.

New, available technologies now offer the possibility of dramatically reducing energy use while tightly controlling the effects of every light in our communities.

Councils and citizens must be made aware of the many dangers posed by waste light and how these demons affect almost every

facet of life not only within the community but its vast surrounding light dome. The time is now at hand to seriously consider and change our outdoor lighting practices.

Now, let us look at what scientific research has discovered about the negative effects of Demons in the Light.

Light Waste

As each day on earth comes to an end, somewhere a part of the planet is slowly plunging into night. The setting sun lingers in the western sky as the fingers of night grip the fabric of darkness. Slowly, it pulls a dark shroud over the hushed landscape below. It is a magical time of day, one to which many people look forward. It implies a break from work and the worries of the day.

It implies a time of rest, repose, reflection and anticipation of the peace, quiet and a sky of stars which will soon follow. For the people of earth this scene was all too familiar for untold thousands of years.

However, today's nightfall is, for most people, a far cry from the simple pleasures enjoyed by our ancestors as each day met its end.

Our day no longer stops with the setting sun and, in most modern societies, people are preparing for work, leisure, or entertainment. Night becomes merely another artificial day, flooded with thousands of lights that turn cities into light-wasting, garish, nightmares.

All of this has been created through the push of power companies, the demands of people, and age-old myths about things that live in the blackness of night.

Recent scientific research has brought to light some of the various ways in which artificial night lights cost us dearly, something to which we were oblivious until now.

1. Energy Costs

Most home-owners are aware that they are paying for the municipality's electric power bill for the lighting system in the community. Also, most taxpayers are not happy about the amount they have to pay to support the system.

Unfortunately, very few taxpayers are aware that almost all the energy flowing into the streetlights is wasted as heat. Well over 90 percent of the energy flowing in, flows out into the night sky as wasted heat and only a tiny percentage of the remaining energy is converted to visible light. However, the great amount of energy wasted in converting electricity into light is only one way in which waste is created.

As well, most luminaires, including modern LED types, then waste most of the light produced through bad design. This permits the light to cover everything in the area, not only the streets and sidewalks, which was the original intent.

To waste light from any luminaire is almost sacrilegious as energy costs are already high and steadily climbing year by year. One estimate of money lost by waste light in the United States alone for a year is upwards of ten billion dollars or more! Unfortunately, this is money that municipalities could be spending on other useful projects.

It is no wonder that many, especially large communities, have quickly adopted LED lighting which can reduce energy consumption by half or more, depending on the way in which the luminaires are designed and configured. Indeed, in the case of Los Angeles, enough money was saved from the first LED installation to allow a re-installation of LED's of lower colour temperature.

There are several important questions related to this area:

1., Why are many municipalities continuing to operate obsolete street lighting systems when more modern LED lights can save them half or more of the lighting budget?

Note that LED technology has changed so rapidly that one may not know what to order. However, the LED scene is now showing signs of reaching a stabilized state.

2., Why are so many areas of the city, over-lit, wasting more energy and light than is necessary?

3., Why are community streetlights on all night?

Most homeowners know it is good fiscal practice to shut off the lights when one is going to bed. No sleeping person is using the light so there is no point in having them burning. Note that new LED luminaires may be controlled by computers and sensors to save use and money.

2. Financial Costs

Lighting a community is a major project. One must first consider the infrastructure that must be put in place in order to support street lighting. This includes the wires that run from pole to pole, the poles on which the luminaire rests and the luminaire itself. Costs must also include the labour that goes into running the wires and installing the luminaires.

Although most communities attempt to be as cost-conscious as possible, costs keep rising through inflation and the increasing costs of labour and materials.

There are several important questions related to this area:

1., How much does the street lighting system in your community currently cost taxpayers per year?

2., How have street lighting costs changed in the past ten years and what are the projections for the next ten?

3., What steps is the municipality taking to reduce the costs and waste of street lighting in the community?

3. Costs to the Community

Megawatts of energy flow through each metropolis banishing darkness and seriously affecting the inhabitants, human, animal and plant in so many negative ways, ways in which we are only now beginning to identify and understand.

Interestingly, most people do not see light as a form of waste when it is not being used properly. We turn lights off in order to reduce the waste of electricity but not as a way of reducing the waste of light. We have been so brainwashed that we only think of light as a benign energy that we must have at night.

b. Health

Scientific research has concluded there are serious problems with artificial light and waste light at night.

Indeed, if waste light were to be seen as toxic (which it is), like smoke from a waste dump, it would be on every municipality's priority list for attention. Unfortunately, the lack of education in this area has meant that waste light at night means business as usual and almost nothing is being done in this area.

Connections have been drawn between night light, especially blue, and the reduction of melatonin in the body, a process that can only occur in the dark during sleep. Linked to melatonin reduction are major, serious health issues such as breast and prostate cancers, Alzheimer's disease, circadian rhythm modification, sleep-deprivation syndrome, etc.

Blue light at night has a tendency to wake the body up instead of encouraging sleep. It has also been shown that blue light at night is very significant in reducing the effectiveness of some drugs used for treating cancer.

No doubt continuing research will provide us with more negative issues caused by waste light at night.

In the area of health, one can easily see vast amounts of unacceptable waste directly related to the abuse of light.

For each province and state, the costs of medical care, for those suffering from and dying of the above causes runs into untold millions each year. The waste starts from the loss of loved ones, all people a resource to their family, friends, jobs and the community.

The waste continues when we investigate the tremendous amounts of money, people, health facilities, drugs, counseling, etc. that accompanies each case as it wends its way through the health system often to be only futile.

Some questions to consider:

1., What are your province's or state's costs to identify and treat those suffering from the previously listed maladies for each year?

2., How have these health costs changed over the past ten years? How are these costs expected to change over the next ten?

3., What are the provincial or state authorities doing about educating the public, in terms of light waste, trespass, pollution and its negative effects on human health?

c. Culture

Much of our culture depends on the past and the myths that have come down to us through the ages. It is important to realise that much of this culture, over the years, has become associated with the gods, goddesses, animals, etc. imprinted in the stars as constellations.

Most of the major constellations have their own stories, many with valuable lessons for the attentive.

The stars, the stories, the campfire and the warmth are all part of our culture.

Some of us even get to sit around a campfire and tell our stories as we gaze up at the myriad of stars slowly whirling overhead much as our ancestors used to.

However we do not tell the same stories and, if we are lucky enough to see the stars, do not incorporate them into our storytelling as most of our forefathers have.

With this veil of light pollution we are indeed ignorant of the night sky and its allure due to the loss of the stars.

What has happened is that, with the loss of night in our communities, few people know the stories anymore and fewer still are passing these on to our children.

An important part of our culture has become a garish wasteland as we sit below the ever present sky-covering glow of our electric lights.

d. Education and Research

Areas related to astronomy (the scientific study of celestial objects), and scientific research will be affected in negative ways if the sky is polluted through waste light, which interferes with observations and photography. This will affect schools, colleges and universities, along with students and professional scientists alike.

They may make attempts to defeat light pollution through the choice of specialized filters, but this may add additional costs and difficulties in completing acceptable observations. In most cases, even travelling outside the community may still cause problems, as the community's light dome extends well beyond the community limits.

It is unfortunate that having waste-light polluted skies will probably have a great impact on the young student or novice alike, as they try to undertake the study of celestial objects. Most of the stars, and other interesting objects are simply missing.

They will find it very difficult to get their bearings or locate objects of interest, a situation which is most frustrating and not conducive to future involvement.

e. Quality of Life

Although quality of life is usually defined as a personal preference, most of us would probably agree that a part of it is a measure of how happy we are with the environments in which we live.

It is interesting to note that over the past century or more, people have become more aware of their environments and in becoming aware, they have realized that much of the natural environment in communities has changed into something that is no longer desirable. Once this awareness has dawned, people have often taken action to have the environment returned to its previous state or one close to it.

Citizens have complained, and received changes to laws and bylaws, which have helped to restore clean air, clean water, and clean lands, all of which had become areas of waste and unacceptable to the quality of

life people desired. Waste light has also been detrimental to a great natural resource for the quality of life, the night sky.

No longer are the communities' skies filled with stars at night, but left with the scarcity of a few bright stars, the sun, the moon, and some planets. This situation is no longer accepted or desired.

No longer does the night sky serve as an inspiration for all who see it, but a stinging reminder of what we have lost and what might have been.

Due to the many serious, negative effects of waste light, we now realize that clean night skies are important to ourselves and to the flora and fauna with which we live. This waste light situation is no longer acceptable, or desirable, and laws and bylaws are being changed to correct this loss and this cost to society.

f. Flora

Everyone is taught that plants need light. However, few of us ever get to know the whole story. Plants are very particular about the quantity and quality of light they receive. Under natural conditions, they will work during the day and rest at night, taking into account the light they are receiving.

Knowing more about how night light affects plants, horticulturalists and other plant growers may vary the quantity and type of light. This forces them to do a variety of things that plants would normally only do only under certain natural conditions.

In a community with lots of waste light, plants do not always follow their natural cycles and this can have great detrimental effects to their health and welfare. They may not grow well, be unhealthy, nor flower, nor produce fruit properly. In this case, light is wasted on the plants and the costs may be seen in the number of plants that die or live poorly and have to be replaced throughout a community.

g. Fauna

When one views the graphs of waste light on a map, one of the most noticeable characteristics is how waste light not only covers the community but spreads out across the surrounding landscape. This means that any effects of waste light also affects the fauna in the surrounding region and any animals migrating through that area.

Like human beings, animals have regular circadian rhythms to which they respond. Waste light in and around a community disturbs this cycle and can add stress to the animal and its lifestyle, eventually, and possibly fatally, to the point where the animal has to modify its behaviour in order to survive, if it can.

Light at night can also be a source of trouble for the animal's health and welfare and, sometimes, the effects can be so severe that changes to the chemical makeup of the body can cause physical changes to the body itself. With light, this is particularly true for amphibians.

All animals are part of the community food web. If animals are affected, the food web also suffers. With light on their side, predators find it easier to locate prey at night. Prey animals may then decline in number from

increased predation and, if the predation rate is too high, this can cause the predator numbers to first increase, then crash with the fewer numbers of prey available.

Birds are also of particular note as they migrate. Artificial lights at night interfere with their migratory routes as the birds are enticed off course by the bright lights of cities below. Birds are also attracted and disoriented by the waste light from tall buildings. Many thousands die each year as they crash into tall structures and litter the streets below.

Research indicates that exterior lighting, such as street or road lighting, actually changes the ecology of an area. Insects such as moths are attracted to the lights and circle until they fall from exhaustion. They are then eaten by predators which have gathered to the feast. These predators, in turn, attract other predators higher on the food web and so on. Thus, the natural patterns and ecology of the region is negatively impacted.

Farm animals are also seen to suffer from the effects of artificial waste light at night. An experiment has suggested that they, like humans, do suffer from yard lights left on all night. They eventually exhibit many symptoms similar to that of humans suffering from sleep deprivation. Their personalities change and they are no longer as cooperative and responsive as they were before yard lights were installed. Leaving yard lights on at night may also increase the death rate of farm animals from local predators.

The cost to animals is large and varied. With the advent of waste light, an imbalance is created in nature which upsets the health and welfare of animals.

Fortunately, many of these negative effects can easily be resolved with community education and the use of automatic controls on exterior lighting and street lighting.

h. The Night Environment

The night environment is a wonderful world unto itself, a world filled with new sights, new sounds, with nocturnal animals, and the glitter of the night sky unpolluted and pristine. Unfortunately, it is also a world where most humans do not want to go, based on fear of the unknown.

Modifying this world through waste light creates artificial situations and changes in the night environment, many of which are not for the good of man or beast. Waste light distorts it and the ways in which animals and plants interact with each other.

Our fear of the night environment stems from many natural fears born over eons of time. It appears to be a fear closely woven into the very fabric of our beings, a fear so close that it affects our very breathing, and ability to think properly. Supported over time by long-standing myths, and reinforced by our very parents, media and their stories, we are indeed alone with our fears in the dark.

In this respect, we have long lost our affiliation with the night and this has cost us dearly.

Instead, we have substituted a tsunami of light to wash away our fears and provide us with a false feeling of safety and security.

i. Climate Change

With climate change and its many negative effects continually on the news, it is important that humanity attempt to do all it can to reduce the amount of wasted energy it is creating, and, at the same time, reduce the amount of carbon dioxide and other greenhouse gases being spewed into the atmosphere.

Much of these gases come from power plants that are using coal or other carbon fuels to provide energy.

When addressing light waste, one must, of course, consider the causes and effects that this waste has on climate change.

Consequently, this is creating many very destructive weather patterns. Any weather station today carries troubling news of a variety of disasters occurring everywhere on the planet.

It has been noted that climate change is not making equitable changes all over the world, but that northern regions are warming much faster than regions closer to the equator.

In some places, like western Canada, the winters may be getting warmer while summers become cooler.

As well, it appears that springs are coming earlier and falls are lasting longer.

We appear to have far fewer gentle rains but far more vicious storms, which literally dump rain on the land increasing the amount of run-off and damage.

This may also lead to increased flooding, a phenomenon which had rarely been experienced before in many locations.

River ice is now more likely to melt, and rivers begin to flow, at earlier dates, changing the ecology of the river and those who depend on it.

This also means that ice and snows are melting sooner, causing much more heat to be absorbed by the earth, and thus raising the local temperatures more and faster.

Climate change is extremely costly, with the bills for these storms reaching billions of dollars each year for countries most affected!

Not only does it cause changes in the lives of all living things, but damages great areas of the earth and communities through heat waves, hurricanes, tornadoes, vicious storms, flooding, dust storms, fire storms, etc.

We are now feeling the results of years of wasteful use of carbon-based fuels, and our future appears bleak and uncertain. Our wasteful use of energy, and light, must be curtailed as much as possible, as quickly as possible.

END

Additional Information Screens on the film:

The Light-Efficient Community Prime Principle:

Light only what needs to be lit only when it needs to be lit with the most efficient light source of appropriate intensity and colour without creating direct light trespass on neighbouring properties and the night sky.

Keep your light to yourself!

Please Note;
Refer to the LEC web site to learn about Light-Efficient Communities and solutions to the light waste problem. Additional resources are available from the following web sites.

www.Light-EfficientCommunities.Com

(Note the dash -)

Please access this web site for additional resources, videos and solution along with a "quick course" on light waste, trespass, glare and light pollution. Also, please search YouTube.com for "light-efficient communities" relevant videos.

Research on Light and Health Effects:

For research on the effects of artificial light at night, search the Web using keywords. Also, a great source of relevant research is the listing in the American Medical Association's policies, also found on the LEC Web Site under "All Documents Download."

Title repeat "Demons in the Light"

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More Information:

Light-EfficientCommunities.com

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Credits:

Rod E. Mc Connell

- research
- writing
- music: "Alberta Safari," "You"
- graphics design and creation
- photography
- astro-photography
- videography
- audio/video editing
- narration/editing
- pre-and post production

NASA

- Night Earth from Space - ISS
- Edmonton at Night from Space photo -
from ISS
- Jupiter, Saturn & deep space photos

SPECIAL THANKS TO:

Credit: P. Cinzano, F. Falchi (University of Padova), C. D. Elvidge (NOAA National Geophysical Data Center, Boulder). Copyright Royal Astronomical Society.

BGMusic 11b - music:

- "Safe Harbour"
- (Chill")

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- "Safe Harbour"
- (Chill")

Jingle Punks - music:

- "The Story Unfolds"
- "On the Bach"
- Cataclysmic Open Core"

BGMusic 30 - music:

- "Echoes and Fragments"

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Videography/Photography:

- Video for this film was shot in 4K on Panasonic 4K camcorder. Stills were shot on Panasonic Lumix cameras.

- This film was edited on an HP Pavilion desktop computer using Corel "Video Studio Ultimate 2018" software.

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Web Site:

Visit:

www.Light-EfficientCommunities.com

The web site contains a short course in light waste, trespass and pollution as well as resources such as printed materials, PowerPoint presentation, government policies, posters, advocate materials, videos, etc.

For access to other modules in this series:

- Go to YouTube.com
- Search for Light-Efficient Communities
- Choose from the list of modules and presentations available. Download and copy at will for educational use.

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