

**CITY OF FORT LAUDERDALE
SUSTAINABILITY ADVISORY BOARD
100 N ANDREWS AVE, 1ST FLOOR COMMISSION CHAMBERS
FORT LAUDERDALE, FLORIDA 33301
June 28, 2021 - 6:00 PM**

Cumulative Attendance					
1/2021 through 6/2021					
	Members	Appt by	Attendance	Present	Absent
1	Elizabeth Adler, Chair	M	P	5	1
2	Muge Nurgun, Vice Chair	II	A	3	3
3	John Bonavita-Goldman	II	P	4	2
4	Kelly Charles	IV	P	6	0
5	Patxi Pastor	I	A	2	2
6	Owen Cylke	C	P	5	1
7	Whitney Dutton	IV	P	5	1
8	Carolann Mazza	III	A	5	1
9	Douglas Meade	I	A	5	1
10	Carol Tamburry	III	P	6	0
11	Vacant Position	M			

Staff Present

Public Works Department

Stephanie Wilk, Sustainability Specialist, Staff Liaison

Glen Hadwen, Sustainability Manager

Dr. Nancy Gassman, Assistant Public Works Director - Sustainability

Guests Present

Eric Vandernoot, Florida Atlantic University and the International Dark-Sky Association South Florida Chapter

Call to Order/Roll Call

The meeting was called to order by Ms. Adler at 6:12 p.m. The roll was called, and a quorum was not present.

Approval of the Meeting Minutes

Because a quorum was not present, the Board was unable to vote to approve the May 24, 2021 SAB meeting minutes.

Staff Liaison Report

Ms. Wilk shared that Mr. Bonavita-Goldman has been approved by the City Clerk's office to participate virtually due to an extenuating circumstance. If there were a quorum, the Board would vote to allow Mr. Bonavita-Goldman to participate as a voting member.

Ms. Wilk shared that the SAB's Bahia Mar Communication is going to Commission on the July 6, 2021 City Commission Conference meeting. She suggested that one of the Board members attend the City Commission Conference meeting to represent the Board. Mr. Hadwen added that Dr. Gassman has looked at sea level rise data for the site. Dr. Gassman gave a short presentation on sea level rise projections and what the Bahia Mar property will potentially look like in the next 50 years. In sum, Dr. Gassman explained that sea level rise scenarios may be useful in understanding what the City will be able to do with this particular property at the end of this lease.

The slides are attached.

Ms. Wilk informed the Board that the Commission Chambers are not available for the August SAB meeting and that it will have to be held in the 8th floor conference room at City Hall.

Mr. Hadwen provided an update on the ULDR 47-21 Landscape and Tree Preservation Ordinance revisions. He reminded the Board that the revisions were presented to the Planning and Zoning Board (PZB) on March 30th. The PZB asked that staff spend more time consulting with stakeholders, specifically the landscape architects and arborists who had expressed concerns at the meeting. Following the PZB meeting, the City hired a landscape architect consultant who has facilitated a couple of meetings over the last few months. Additionally, the consultants worked on building a consensus between the stakeholder group and City staff. The last meeting was in early June. Mr. Hadwen added that City staff and stakeholders were able to reach a consensus. The consultant updated the ordinance language and returned it to staff for review. The plan is to return to the Planning and Zoning Board in July or August. Mr. Hadwen said he will bring more updates to the July SAB meeting.

Mr. Bonavita-Goldman asked if Mr. Hadwen could summarize some of the changes. Mr. Hadwen replied that there are about thirty different issues that they addressed. The most significant changes included the following:

- Definition of specimen tree
- Allowable uses of the Tree Trust Fund such as:
 - Excluded use of funds for tree inventory of public spaces,
 - Allowed to develop an urban forestry master plan; and
 - Excluded using the funds for non-emergency mitigation tree planting
- Tree spacing specifications were added

Mr. Hadwen said that the City has been looking for more money for renewable energy and energy efficiency projects. They hired a consultant to conduct an audit of the City's electricity bills with Florida Power and Light (FPL). They are specifically looking at billing accuracy. He added that one recommendation from the consultant is changing certain FPL accounts to a time of use rate to save money. Thus far, twenty accounts have been converted to the time of use rate and they are projected to save the City about \$12,000 per year. Secondly, they are looking into streetlights. The City is responsible for 4,000 streetlights and 10,000 streetlights belong to FPL but the City pays for them. FPL can bill the City for light poles when the City is the sole user of the pole. However, if a pole has additional users, such as cable companies or telephone companies, FPL may not bill the City for that pole. The consultant found approximately 800 poles that fall under this scenario and the City is billed between five and seven dollars per month for each pole. Mr. Hadwen added that as per state law, FPL is required to make billing corrections retroactively up to five years. The consultant has cumulatively identified almost \$200,000 in savings from streetlight bill corrections so far and have submitted their findings to FPL for review. The hope is that this money will go to the Parks and Recreation Department for solar installation projects.

Presentations

Light Pollution (Eric Vandernoot – International Dark Sky Association)

Mr. Vandernoot explained that we are a diurnal species, meaning that human eyes function best in the daytime.

He provided an overview of the following:

- Why we use outdoor lighting
- Benefits of outdoor lighting
- Best practice goals for outdoor lighting
- Disadvantages of glare light sources
- Pollution caused by artificial light
- Impacts of bad outdoor lighting practices
- Health impacts caused by artificial light for humans, plants, and animals
- The relationship between bright lighting and crime

The presentation is attached.

New Business

None.

Old Business

Climate Change and Insurance Rates Webinar

Mr. Hadwen explained that staff had a phone call with Mr. Cylke to discuss the webinar. They discussed who the target audience was. Staff suggested creating two different Communications. The first

Communication would ask the Commission to allow a professional present to them at a future City Workshop on this topic. The presentation to the Commission would be about fifteen minutes and it would need to be a single individual who can provide a high-level overview of the banking, real estate, and insurance aspect in that time frame. Mr. Cylke suggested that the Board take the next month to look for a speaker that would be appropriate for this presentation.

The second Communication is for the Board to meet with a few key stakeholders and gauge their interest. Additionally, obtain their feedback on the topic and then formally host a webinar using information gathered from those meetings. Mr. Hadwen reminded the Board that they cannot approve these communications in this meeting due to the lack of quorum, but they are able to edit them. Mr. Cylke added that we need to distinguish that with this scenario, it would include multiple panelists.

Proposed Communications

City Contracts to Include Green Language

Mr. Hadwen advised that the Board develop a few priorities a year for procurement to focus on. Ms. Adler added that originally the intention was to bring this topic to the Commission's attention and to ask the Commission to direct staff to put contracts into different buckets. Ms. Adler suggested to put this Communication aside for now until they are able to add more specific directives and goals. The Board agreed to remove this from the agenda for now and will revisit some time in the future.

Comments

None.

Items for Next Meeting

Presentation:

- Water Quality Testing Updates

New Business:

None.

Old Business:

None

Proposed Communications:

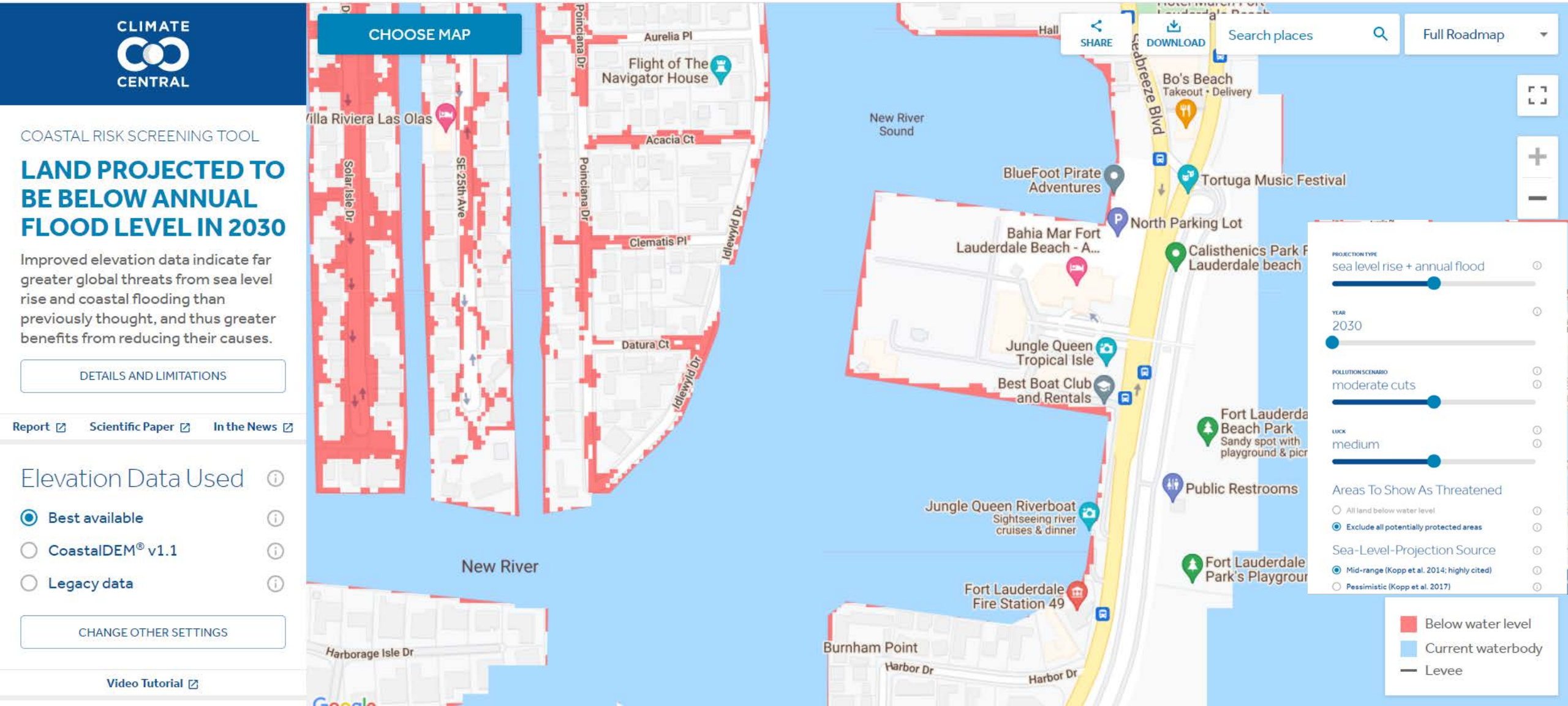
- Climate Change and Insurance Rates Webinar

Adjournment

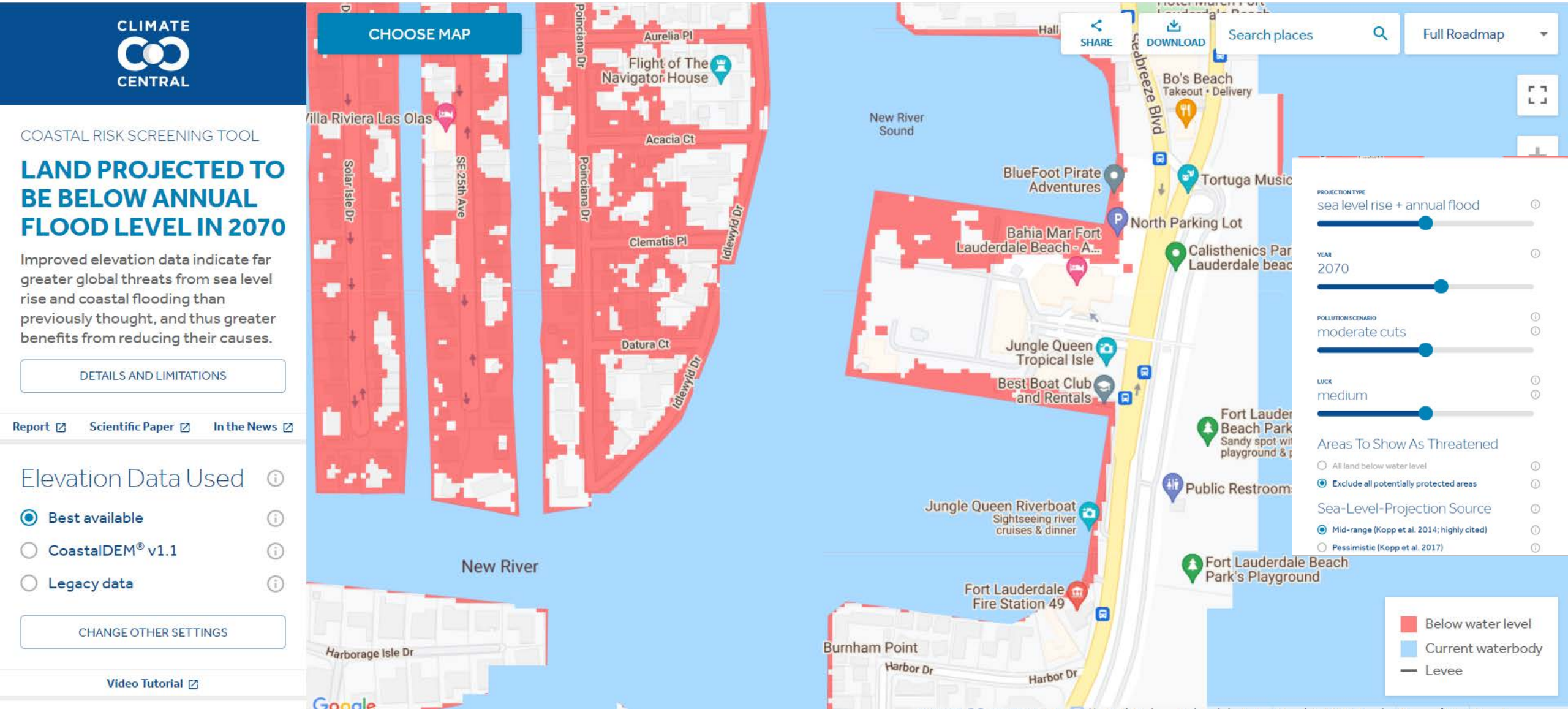
The meeting adjourned at 7:47 p.m.

Bahia Mar and Sea Level Rise over time

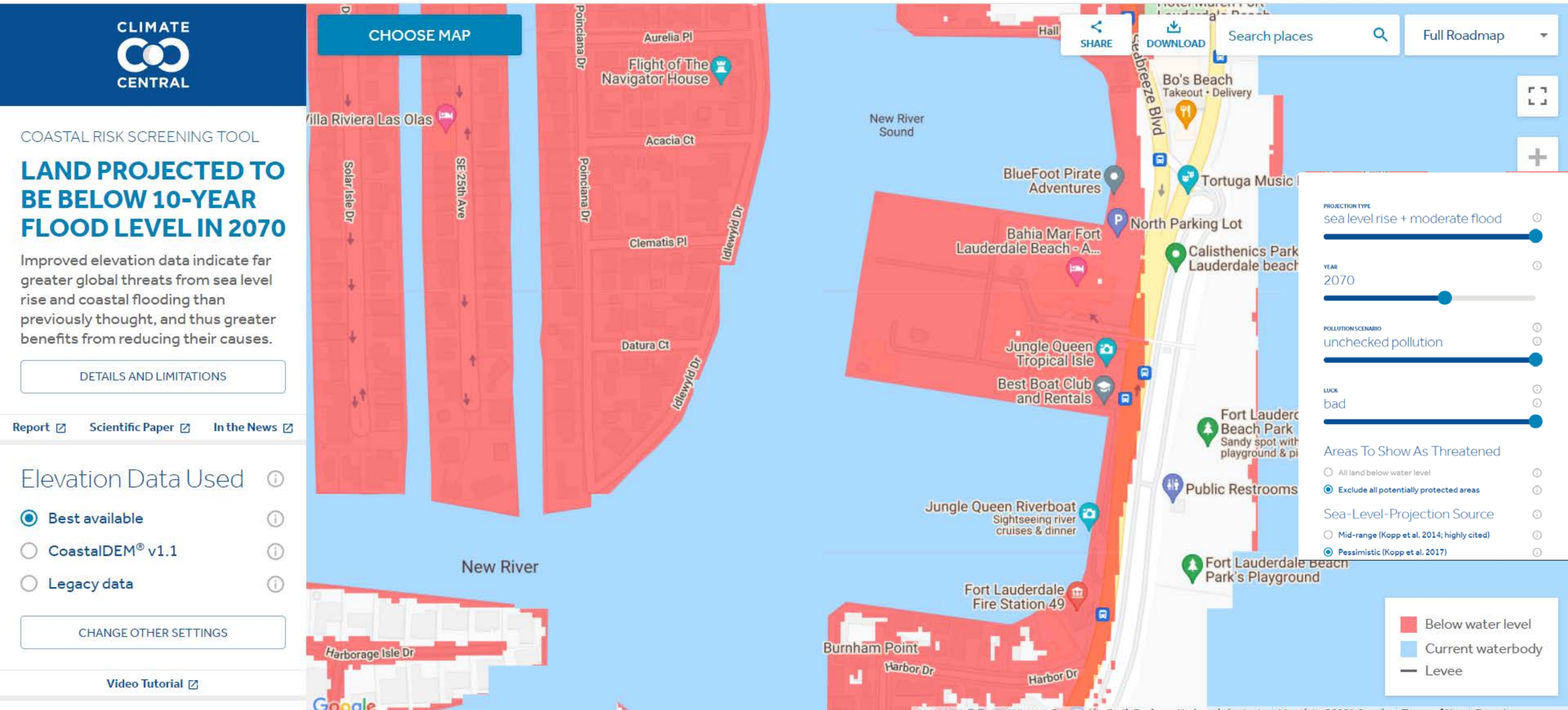
Potential Sea Level Rise and Annual Flood Impacts to Bahia Mar by 2030



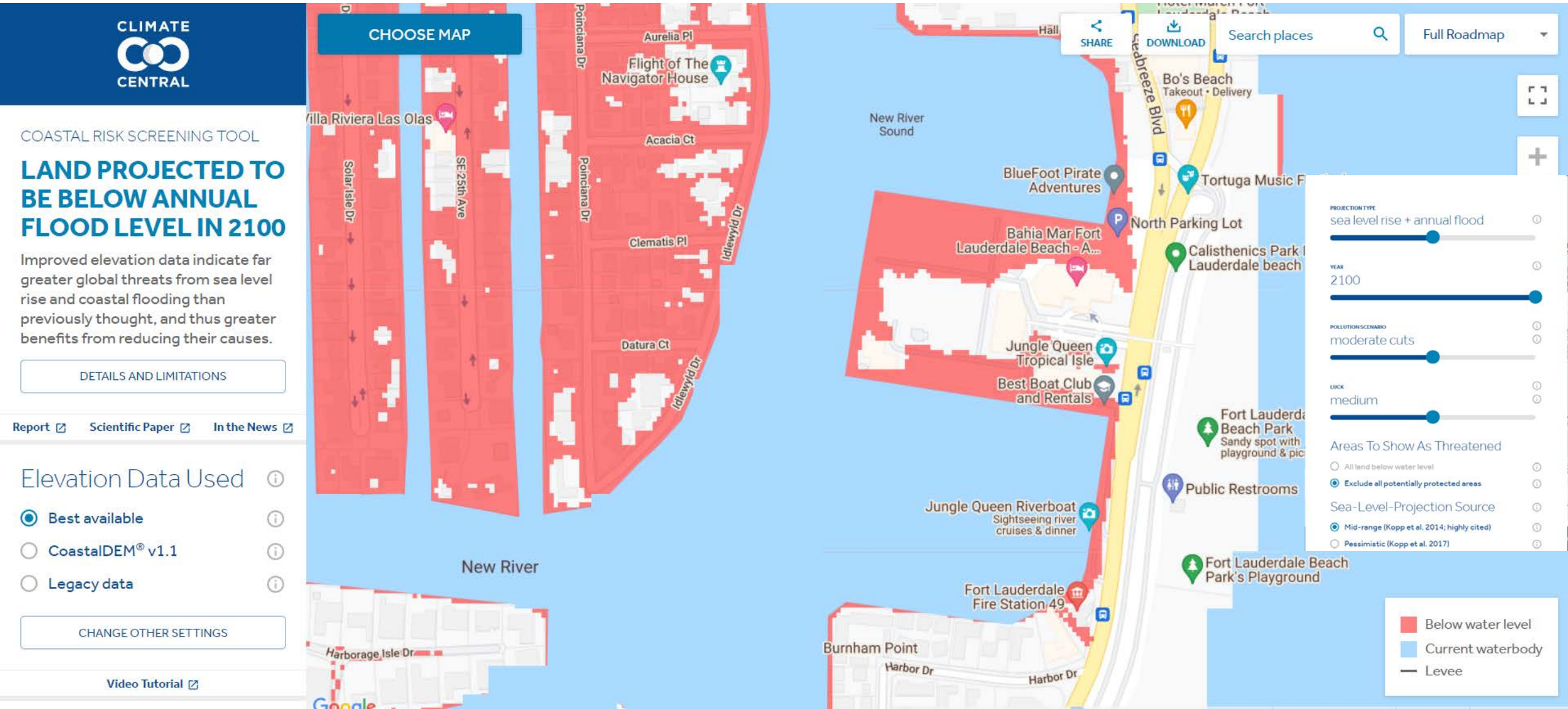
2070, Mid range SLR projection, moderate cuts in greenhouse gas emissions, SLR plus annual flood



2070, High range SLR projection, unchecked greenhouse gas emissions, slr + moderate flood



Potential Sea Level Rise and Annual Flood Impacts to Bahia Mar by 2100





The International Dark-Sky Association South Florida Chapter

preserving and educating the importance of majestic and naturally dark night skies

Help us Light the Night Right!

www.idasouthflorida.org



Image Credit: Aaron Umpierre Aug 9th, 2013
Big Cyprus National Preserve

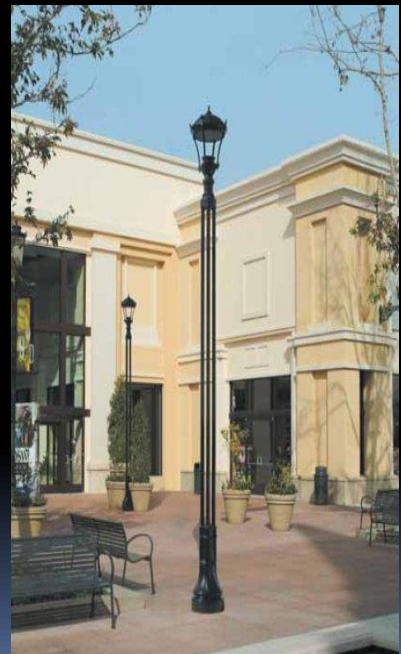
1

Why Do We Use Outdoor Lighting?

We are a diurnal species, which means that our eyes function best in the daytime.

Outdoor lighting provides visibility for nighttime activities.

But, to make better judgments on lighting, it helps to understand how our eyes function.



2

2

Benefits of Outdoor Lighting

Lights give us feelings of safety & security.

They strengthen the themes & goals of a community, while highlighting its amenities.

They communicate a positive visual image of the community & visual order.

Done correctly, we see good outdoor lighting as an attractive asset for the community.



3

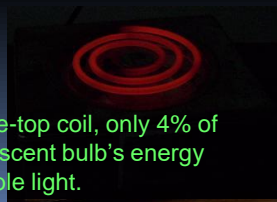
3

Good Outdoor Lighting Goals:

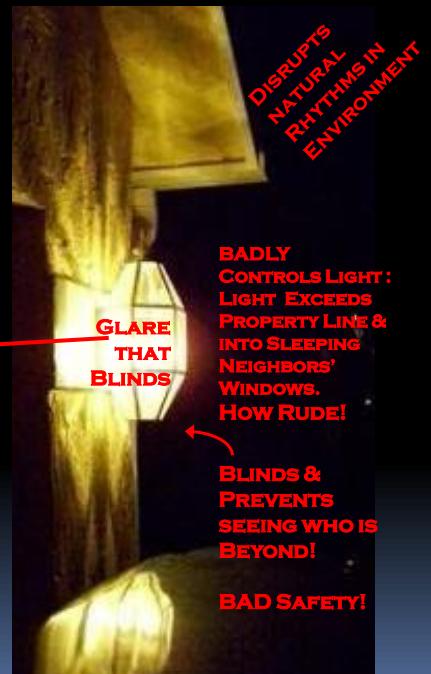
- Minimize energy consumption
- Minimize impact on the environment
- Minimize light trespass
- Minimize glare
- Provide security
- Optimize visibility at night for what we want lit

Instead, this “glassy-brassy” luminaire:

**WASTES ENERGY:
PRODUCED BY FOSSIL
FUELS & OFTEN DONE
BY INCANDESCENT
BULBS, THE MOST
ENERGY INEFFICIENT
METHOD**



Like a stove-top coil, only 4% of an incandescent bulb's energy makes visible light.



4

4

A Blight of Bright Light at Night!

It is very easy to install lights, especially poorly controlled lights.

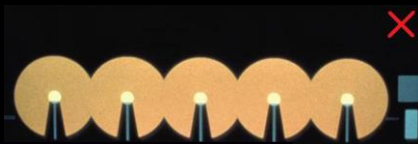
It is very easy to create more reasons for lights.



The challenge is to educate and to motivate people on effective & efficient lighting principles, and to correct errors especially after installation.

The problems bad lighting causes are numerous. Here's what makes them bad:

"Glare Bombs"

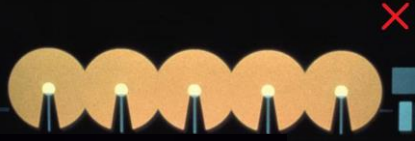



A "Washington" style or "Acorn" light.

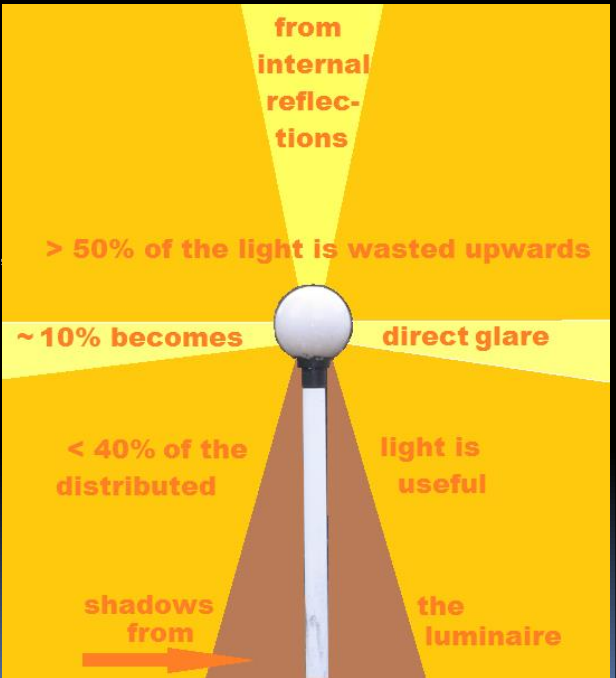


A cheap glare bomb near eye level.

“Glare Bombs”

A “Washington style or “Acorn” light.



7

Lighting Terminology

Glare – excessive light emitted from a source that directly enters the eye is harshly discomfoting, a visual nuisance or a hazard.

Strong glare often has a radiant and prismatic aura around the source as you look at it.

It over-saturates our eye’s rod cells & disables our night vision.

As a means of self-protection, our eyes naturally adapt to the brightest objects in view by constricting the pupils.

Our pupils range from ~ 7mm to 1 mm in diameter, so, at their smallest, our pupils try to block 98% potential incoming light.

The combined disabled night vision and constricted pupils greatly impedes one from seeing faint objects around you, either from those in the sky or what’s right in front of you . . .

8

Glare Light Enhances Shadows



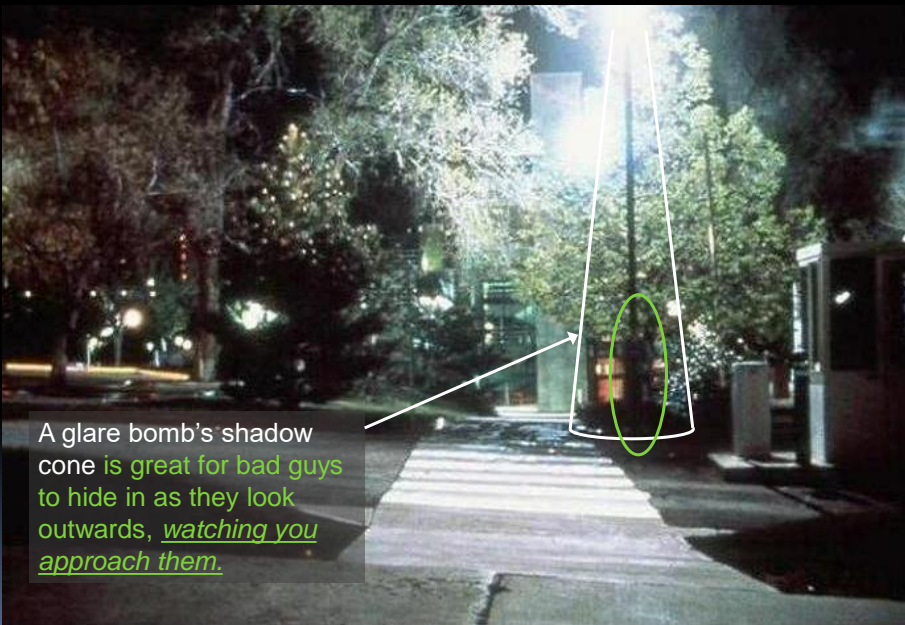
While the student can be seen, what does the light actually light up?

Note that she wore a white shirt & shoes!

9

9

Glare and Shadows can Hide Risks



A glare bomb's shadow cone is great for bad guys to hide in as they look outwards, watching you approach them.

The student has moved closer to the camera!

But can you see her?

She is in the glare bomb's shadow cone, blocking the light from the window beyond her.

10

10

Direct Glare Light Sources Are Used by “Bad Guys” to Hide



George Fleenor, Bradenton, FL

IDA

Shielded Lights Reduces Contrast & Shows What's Hidden



George Fleenor, Bradenton, FL

IDA

Terms

Disabling Glare - severe glare that impairs visibility and creates an immediate hazard.

The important factor is to realize *where lights are directed and how they will affect people there.*



This must be measured in the dark, when the lights affects people's night adapted eyes.

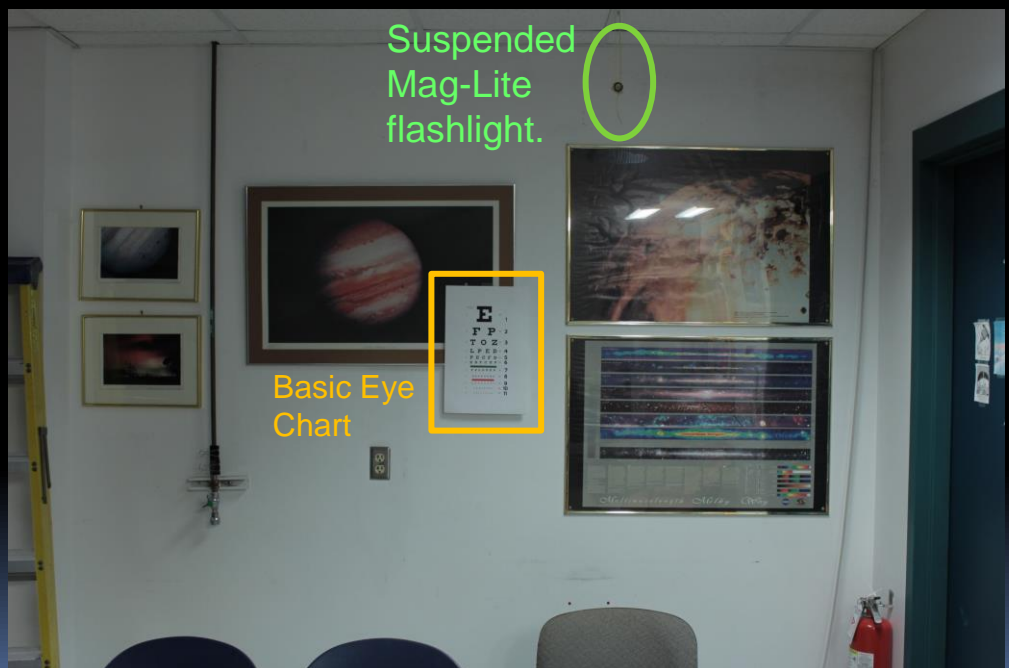
Its especially dangerous for the elderly, whose eyes are not only slower to recover from highly contrasting light sources but may also have *various degrees of cataracts that impedes their ability to see.*

Here is a demonstration of this very problem ...

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Eyechart Demo

The south wall in FAU's Observatory in Boca Raton.



14

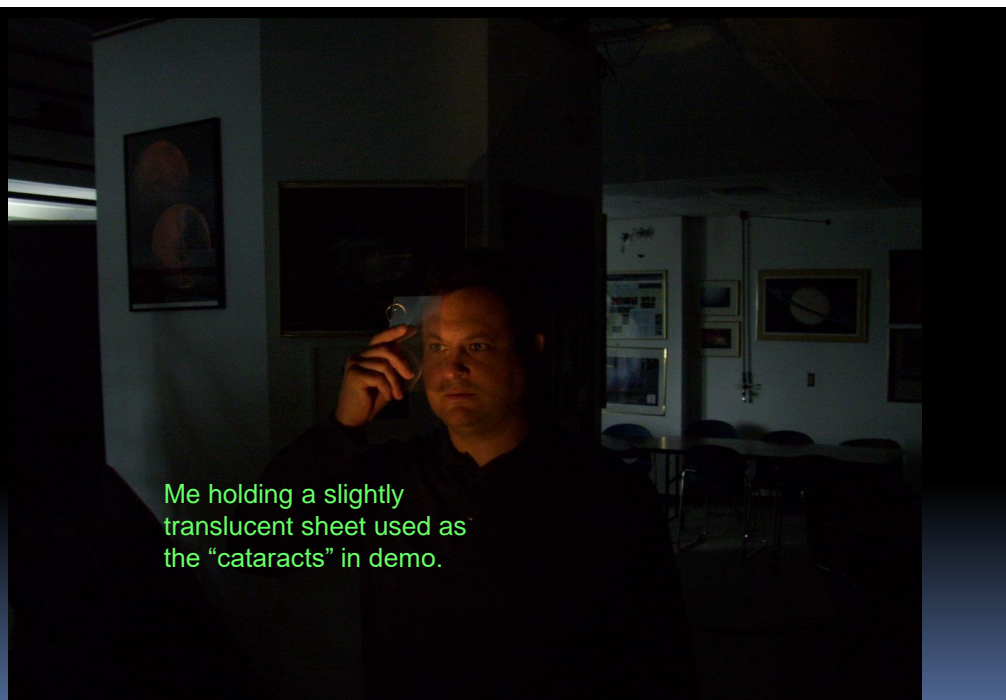
14

Eyechart
+ Glare
Demo



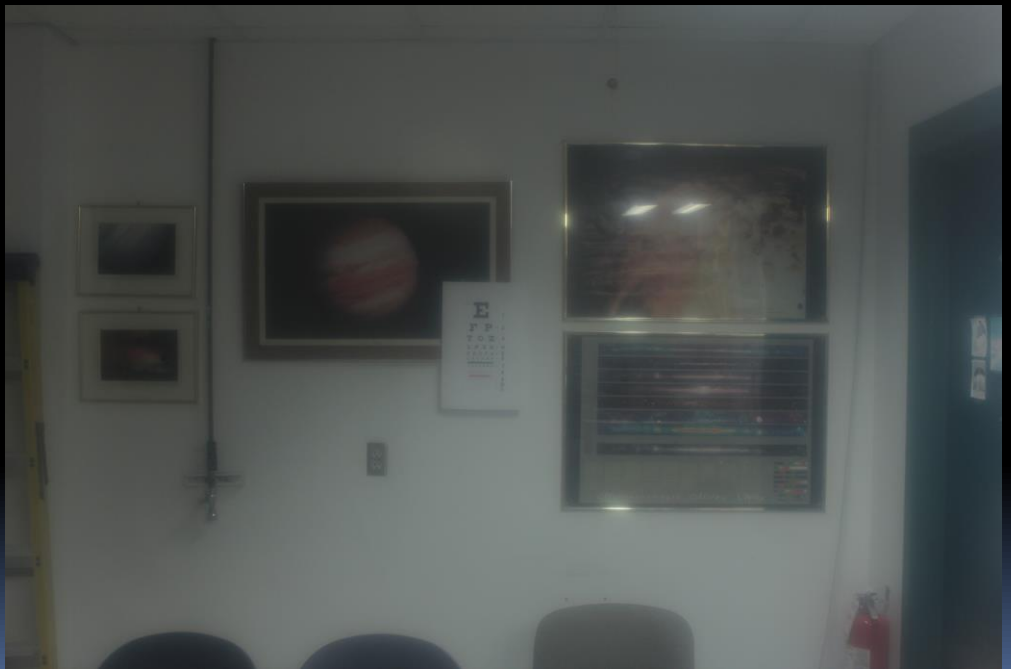
Mag-Lite
on.

“Cataracts”
Demo



Me holding a slightly
translucent sheet used as
the “cataracts” in demo.

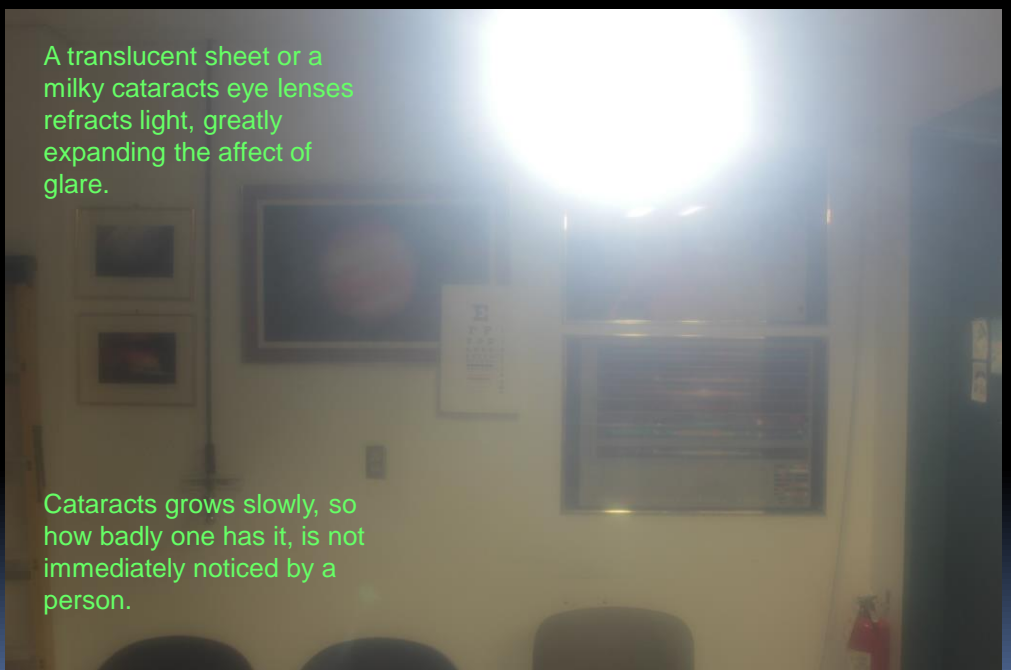
Eyechart +
“Cataracts”
Demo



17

17

Eyechart +
Cataracts
+ Glare
Demo



A translucent sheet or a milky cataracts eye lenses refracts light, greatly expanding the affect of glare.

Cataracts grows slowly, so how badly one has it, is not immediatly noticed by a person.

18

18

Eyechart + Cataracts + Glare Demo

Cataracts & disabling glare can greatly imperil a person.

Disabling glare must be corrected for public safety!

19

19

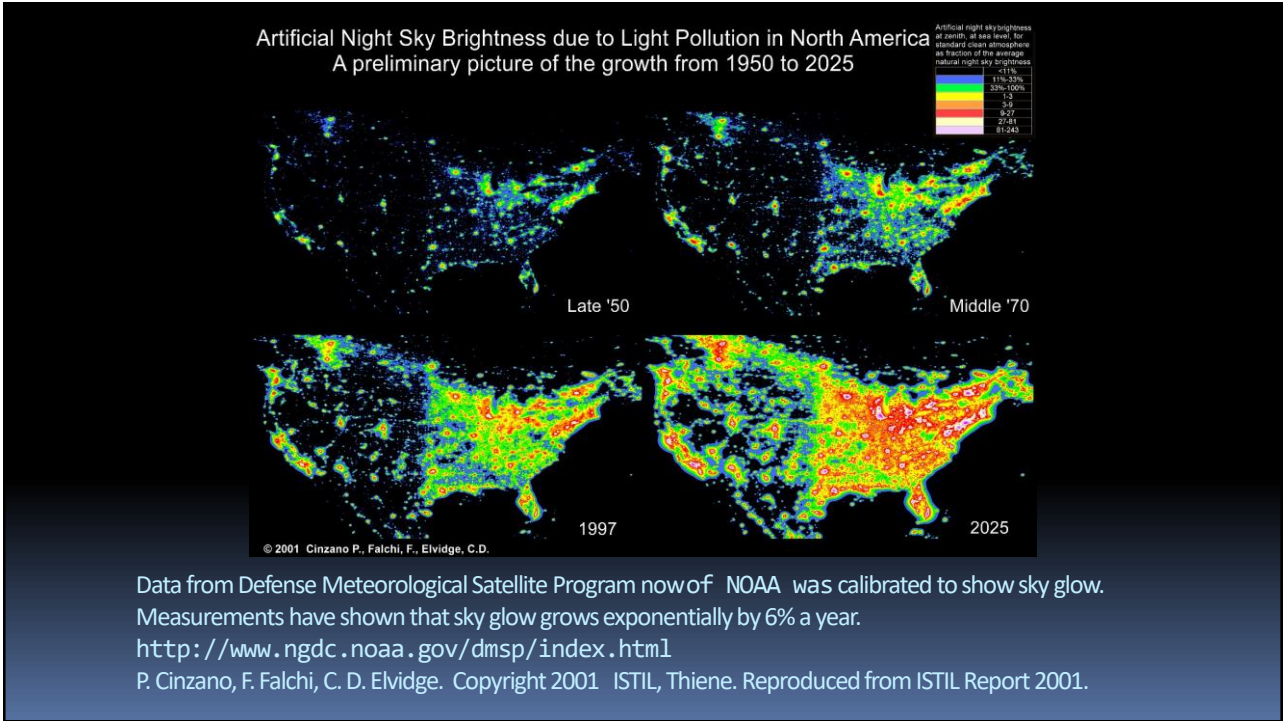
We Live in a Blight of Bright Light!

Aug. 10, 2013: The Expedition 36 crew on the International Space Station Image Credit: NASA

Satellites measure that South Florida's emits 2x the light of Tampa and Orlando combined!

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21

ShenNeng Natural Gas & Coal Spill into Great Barrier Reef

Massey Energy 330 million gallon coal ash spill into Appalachian waterways

Artificial Light Is A Pollutant Made By Pollution

Deep Horizon Oil Platform

NASA satellite image of oil spill from sunken oil rig in the Gulf of Mexico, April 29th, 2010.

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Impacts of Bad Outdoor Lighting Practices

Environmental Impact:

Negative impacts occur on nocturnal animals, insects, migratory birds & plants.

In general, light either:

- acts as a debilitatingly powerful *attractant* that directly harms the animal or prevents it from carrying out its normal behaviors, (example: a light at night either kills moths on its heated surface or mesmerizingly entraps them as it overwhelms their senses, both effects in prevents them from mating and reproducing, which they only have a week or two to do)
- interferes with the TIMING of an animal's natural biological activities or
- exposes animals that try to hide from predators.

Half of all animal life begins its daily activities at sundown!
(* 30% vertebrates, 60% invertebrates)*

23

23

Artificial Lights Affect Plants

Plants need light for photosynthesis AND photoperiodism, which affects dormancy, shoot growth, and flowering. Since the '40s, we've known that it *is the duration of uninterrupted darkness during a 24 hour cycle* that governs developmental processes in angiosperms (flowering) plants, such as trees. Photoperiodism can also influence leaf shape; surface hairiness (pubescence); pigment formation; autumn drop time; and root development, as well as onset and breaking of bud dormancy.

Relatively high light intensity of $1000 \mu\text{E}/\text{m}^2/\text{sec}$ is adequate for photosynthesis in most trees.

However, *photoperiod responses may be induced with as little as 0.06 to $3 \mu\text{E}/\text{m}^2/\text{sec}$, which is only a fraction of what they need for energy.*

Source Examples	Lumination Flow
Indoor light for reading	$4.6 \mu\text{E}/\text{m}^2/\text{sec}$
Light from Full Moon	$\sim 0.004 \mu\text{E}/\text{m}^2/\text{sec}$
100 watt Incandescent bulb	$5 \mu\text{E}/\text{m}^2/\text{sec}$ at 5 feet away.



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Light source	Wavelengths	Potential effect emitted on trees
Fluorescent	High blue, low red	Low
Incandescent	High red and infrared	High
Mercury vapor	Violet to blue	Low
Metal halide	Green to orange	Low
High pressure sodium	High in red to infrared	High

How Lights Affect Plants



Red & infrared spectral colors manipulate plant's photoperiodism.

This is the exact opposite of what affects animals, such as sea turtles, mice, insects, and people!

Darkness greater than 12 hours can trigger a reproductive response in photoperiodic plants.

A light interruption of 30 minutes at 20 foot candles can prevent the same response. We CAN control or *harm* a plant's development!

Growers use guides to control lights with blackout clothes to manipulate the "flowering time of poinsettias".

SDP 13 hr c.p.	LDP 15 hr c.p.		Different manipulations of the Night	
flowers	no flowers	winter	10 hour day	14 hour night
no flowers	flowers	winter	10 hour day	6 hr ☾ 8 hour night
no flowers	flowers	winter	10 hour day	8 hour night 6 hr ☾
no flowers	flowers	winter	10 hour day	6 hour night 2 hr ☾ 6 hour night
no flowers	flowers	summer	16 hour day	8 hour night
flowers	no flowers	summer	10 hour day	6 hr black 8 hour night

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Artificial Lights at Night Hurts Life

Half of all animal life begins its daily activities at sundown.

Insects, the basis for nature's food pyramid for proteins and many of the animal products that we eat, have suffered incredibly.

Gerald Eisenbeis calculated that the total insect mortality would range between 60 to 130 billion deaths per summer season for just the country of Germany alone in 2000!

Authors	Year	Publishing Info.	Count of Insects Caught	Number of Traps	Catch Span Times
Robinson & Robinson	1950	<i>Entomologist's Gazette</i> 1:3-20	over 50 thousand moths	1	the one night of August 20-21, 1949
Worth & Miller	1979	<i>J. of the Lepidopterists' Society</i> 33:261-264	50 thousand moths	1	May 2nd to Sept 12, 1978
Eisenbeis & Hassel	2000	<i>Natur und Landschaft</i> 75(4):145-156	6205 moths	19	May 29th to Sept. 29, 1997

Ecological Consequences of Artificial Night Lighting, Catherine Rich & Travis Longcore (eds), 2006, Island Press, pages 281-304.

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In our quests for greater efficiency, remember that other factors are important too, like a light's spectral distribution and its biologically activating effects.



Image Credit: Bryan Bodie
Yellow bug-friendly lights are still needed!

Thousands of mayflies carpeted the ground around a security light in a single night at Millecoquins Point in Naubinway on the Upper Peninsula of Michigan.

To the mayflies, it represents a huge loss of reproductive potential for the species. And a loss of food for species that depend on them, like fish for us.

Image courtesy of Phil DeVries, Univ. of New Orleans.

<http://fs.uno.edu/pdevries/>

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Artificial Lights at Night Hurt Sea Turtles

While lights directly on the beach have been reduced, *lights from the interior land* can impact sea turtle hatchlings. Dr. Rusenko took this image at Spanish River Park in Boca Raton. →

Dr. Kirt Rusenko Gumbo Limbo N.C.



2010/5/13



2011/09/19 20:02

988 174
 8 280° 84° 13.454"
 81826 21° 58.882"

Lights measurably affected sea turtle hatchlings at Gumbo Limbo Nature Center from a source 2.25 miles inland.

Dr. Kirt Rusenko Gumbo Limbo N.C.

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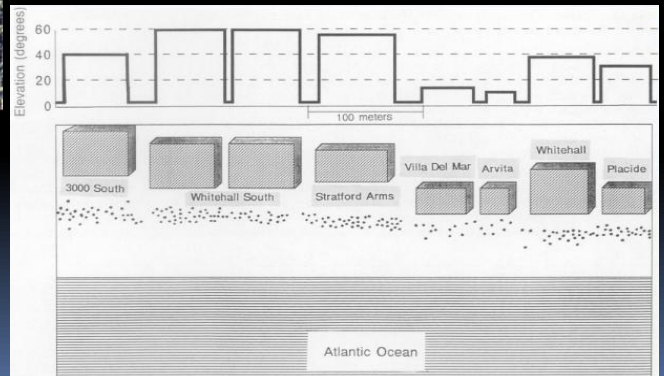


Overcast cloudy conditions disorient loggerhead
 ← (*Caretta caretta*) hatchlings, as shown by these
 meandering tracks in Melbourne Bch, FL.

Blair Witherington
 FL Marine Research Inst.

Sea turtles un-naturally concentrate their nests
 near tall, beach front buildings in Boca Raton
 & increase infection risks. The buildings shade
 the beaches from lights of the interior land.

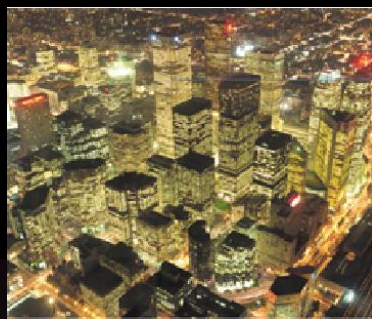
Dr. Michael Salmon FAU



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Artificial Lights at Night Decimate Birds

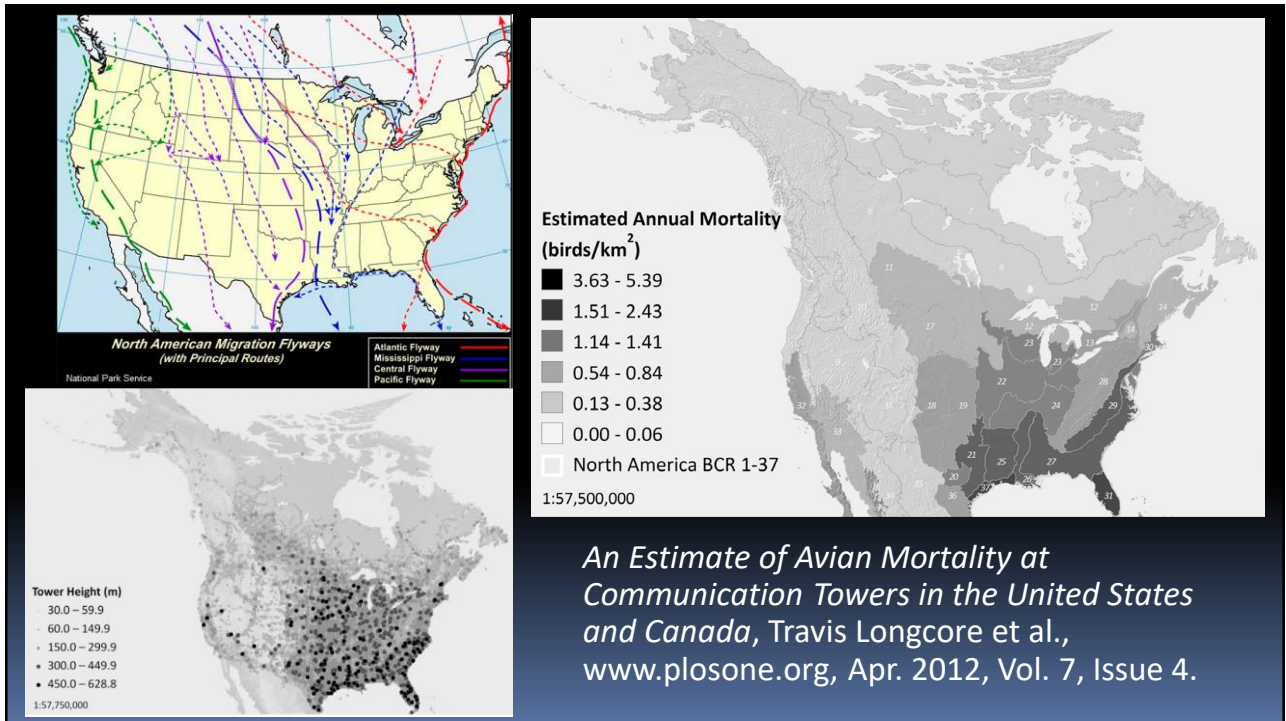
Artificial lights can attract birds to foodless cities, entrap birds in up-pointing search light columns until they fall dead from exhaustion, cause them to fly into lit windows, or attract birds to lit towers causing fatal strikes into their unlit wires.



900
 million
 birds die
 each year
 from
 light!

<http://www.flap.org/lights.php>

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People need nights to be dark, too!

Just like plants, our bodies' biological clocks, our own circadian system, depends on dark nights to function.

In front of the rods and cones are the retinal ganglion cells, ~2% of which are intrinsically photosensitive to blue light. It is our 5th light sensitive cell type!

BLUE light, such as the daytime sky, is our "zeitgeber" (or external "time-giver"), that entrains our circadian system & allows to function per season.

Action Spectrum for Melatonin Regulation in Humans: Evidence for a Novel Circadian Photoreceptor Source, George Brainard, et al. *The Journal of Neuroscience*, August 15th, 2001, Vol. 21, Issue 16, pgs 6405-6412.

3 cones cells for color, rods are for night vision

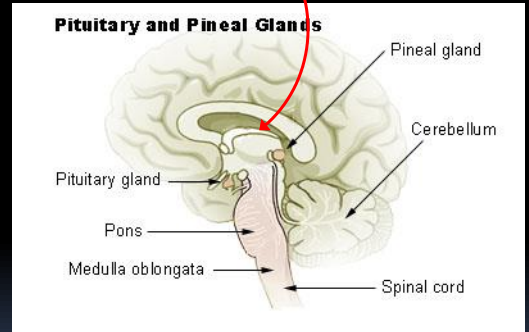
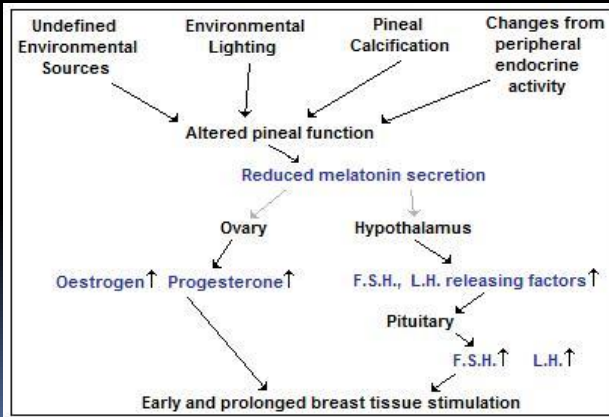
32

Our ganglion cells react to the quantity of light by altering the size of our pupils to control how much light comes into our eyes and protect our vision.



They also send signals back to the Suprachiasmatic nuclei (SCN) in our hippocampus, which in turn sends signals to inhibit our pineal gland from releasing its melatonin.

When its dark, the pineal gland does not get the SCN's signal, it releases melatonin, a hormone that provides a variety of benefits to us we need.

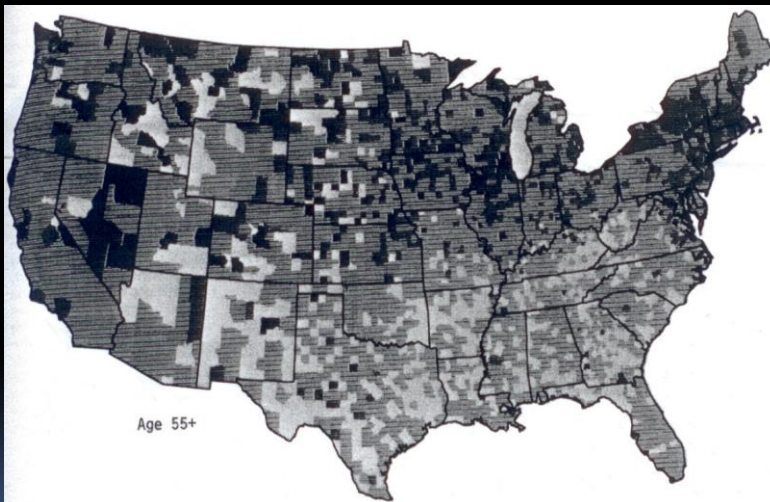


Role of pineal gland in aetiology and treatment of breast cancer.

Source: Lancet, Oct 14th, 1978, Vol. 2, pages 814-816. Michael Cohen, Marc Lippman and Bruce Chabner

33

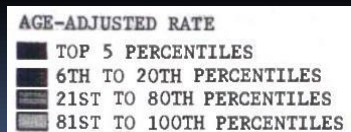
Epidemiological Mappings of Cancer



Blot, W., Fraumeni, J., & Stone, B., *Geographic Patterns of Breast Cancer in the U.S.*, J. of the Nat. Cancer Inst., 1977, Vol. 59, p1407-1411.

Breast Cancer rates are greater in technologically bright areas.

No epidemiological evidence has been found linking breast cancer to diet or ethnicity.



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Inverse association between breast cancer incidence and degree of visual impairment in Finland

Researchers created definitions of “degrees of visual impairment” and found 10,935 women in the Finnish Registry that could be so sorted.

Then, they cross-referenced the women with the Finnish Cancer Registry data between the years of 1983-1996.

The women’s years in the Cancer Registry were counted (“Observed”) & were compared to the number of breast cancers & other types of cancer cases in each group.

They were then compared to the numbers of their Expected incidents of cancer.

They found *breast cancer rates decreased as the visual impairment increased* in the women.

Four other studies in different countries found similar results.

Degree of Visual Impairment	Numbers	Person-years	Observed Breast Cancers	Cancer Incidence	Expected Breast Cancers	SIR
Moderate low vision	6 440	32 213	81	0.2395%	77.14	1.05
Severe low vision	1 896	9 403	21	0.2326%	21.88	0.96
Profound low vision	1 538	8 104	15	0.2343%	18.99	0.79
Near-total blindness	856	4 848	6	0.1875%	9.09	0.66
Total Blindness	205	1 627	1	0.1308%	2.13	0.47
Total	10 935	56 195	124	0.2299%	129.17	0.96

British Journal of Cancer, 1990, Vol. 80, No. 9, p1459-1460.

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Melatonin-Depleted Blood from Premenopausal Women Exposed to Light at Night Stimulates Growth of Human Breast Cancer Xenografts in Nude Rats

The scientists put MCF7 cells into mice to generate human breast cancer tumors. These tumors were then grafted into rats.

The scientists then injected the rats with blood taken from women:

- during the day,
- in the earliest hours of the morning (as in 1 am to 3 am),
- or after being exposed to about 5 minutes of light at night (such as going to the bathroom).

Blood drawn from women after exposure to light, whether it was full daytime or just from a short period of lights on at night failed to slow down the tumor’s growth.

The blood that was taken during darkness & injected into the grafts slowed the growth of the cancers by 80 percent!

Cancer Research, Dec. 1st 2005, Vol. 65, No. 23, p11174-11184.

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Light at Night Co-distributes with Incident Breast but not Lung Cancer in the Female Population of Israel.

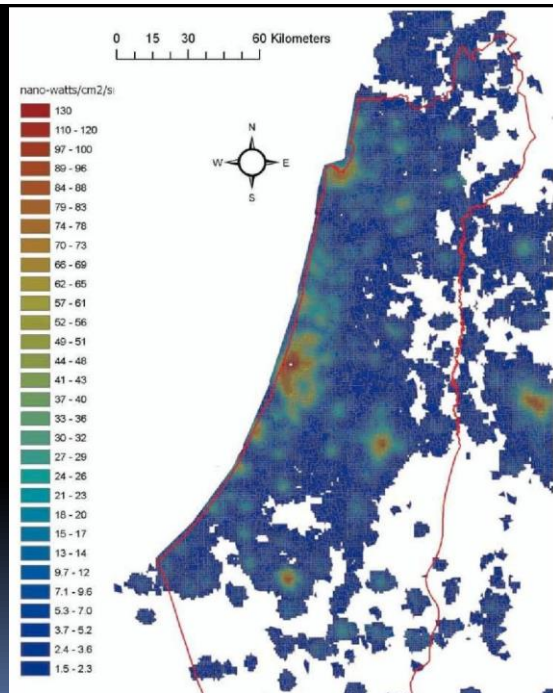
Nighttime satellite images estimated LAN levels in 147 communities in Israel.

Multiple regression analysis was performed to investigate the association between LAN and breast cancer incidence rates.

To test of the specificity of their method, they looked at lung cancer incidence rates in women across localities under the prediction of a connection with breast cancer but not lung cancer.

They adjusted for variables on a population level, such as ethnic makeup, birth rate, population density, and local income level.

Chronobiology International: The Journal of Biological & Medical Rhythm Research; 2008, Vol. 25, Issue 1, p 65-81.



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Light at Night Co-distributes with Incident Breast but not Lung Cancer in the Female Population of Israel.

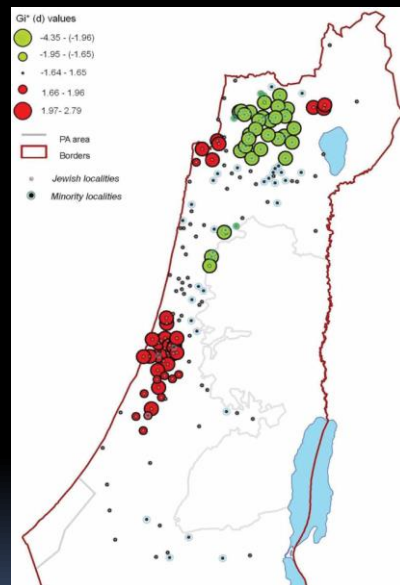
They found a strong positive association between LAN intensity and breast cancer rate was revealed ($p < 0.05$), and this association strengthened ($p < 0.01$) when only statistically significant factors were filtered out by stepwise regression analysis.

Concurrently, no association was found between LAN intensity and lung cancer rate.

These results provide coherence of the previously reported case-control and cohort studies with the co-distribution of LAN and breast cancer on a population basis.

The analysis yielded an estimated **73% higher breast cancer incidence in the highest LAN exposed communities compared to the lowest LAN exposed communities.**

Chronobiology International: The Journal of Biological & Medical Rhythm Research; 2008, Vol. 25, Issue 1, p 65-81.



Red circles – high cancer rate locality clusters.
Green - low rates.

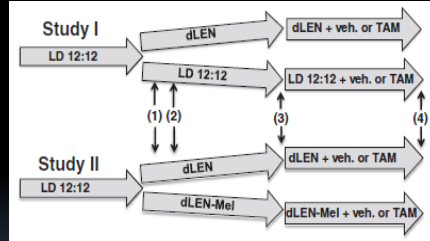
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Circadian and Melatonin Disruption by Exposure to Light at Night Drives Intrinsic Resistance to Tamoxifen Therapy in Breast Cancer

Robert T. Dauchy^{1,4}, Shulin Xiang^{1,3,4}, Lulu Mao^{1,3,4}, Samantha Brimer², Melissa A. Wren^{1,4,5}, Lin Yuan^{1,4}, Muralidharan Anbalagan^{1,4}, Adam Hauch^{2,4}, Tripp Frasch¹, Brian G. Rowan^{1,3,4}, David E. Blask^{1,3,4}, and Steven M. Hill^{1,3,4}

Abstract

Resistance to endocrine therapy is a major impediment to successful treatment of breast cancer. Preclinical and clinical evidence links resistance to antiestrogen drugs in breast cancer cells with the overexpression and/or activation of various pro-oncogenic tyrosine kinases. Disruption of circadian rhythms by night shift work or disturbed sleep-wake cycles may lead to an increased risk of breast cancer and other diseases. Moreover, light exposure at night (LEN) suppresses the nocturnal production of melatonin that inhibits breast cancer growth. In this study, we used a rat model of estrogen receptor (ERα⁺) MCF-7 tumor xenografts to demonstrate how altering light/dark cycles with dim LEN (dLEN) speed the development of breast tumors, increasing their metabolism and growth and conferring an intrinsic resistance to tamoxifen therapy. These characteristics were not observed in animals in which the circadian melatonin rhythm was not disrupted, or in animals subjected to dLEN if they received nocturnal melatonin replacement. Strikingly, our results also showed that melatonin acted both as a tumor metabolic inhibitor and a circadian-regulated kinase inhibitor to reestablish the sensitivity of breast tumors to tamoxifen and tumor regression. Together, our findings show how dLEN-mediated disturbances in nocturnal melatonin production can render tumors insensitive to tamoxifen. *Cancer Res* 74(15); 4099-110. ©2014 AACR.



Cancer Research, August 1st 2014, Vol. 74, Issue 15.
doi:10.1158/0008-5472.CAN-13-3156.

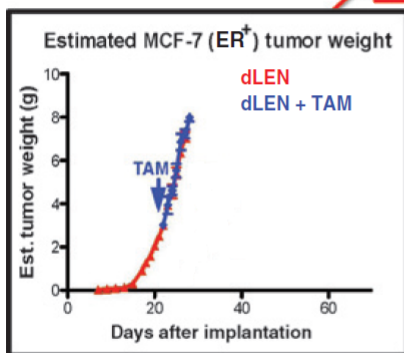
<http://cancerres.aacrjournals.org/content/74/15/4099>

Lab rats split into 2 groups:
one group had full light days & dim Light Exposed Nights,
the other had 12 hrs light / 12 hrs dark cycles.

Dauchy, et al.

A

Study I



Obvious tumor growth.

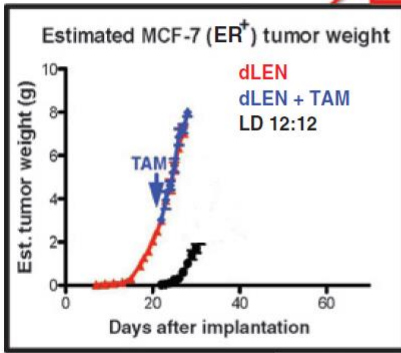
dLEN – “dim Light Exposed Nights”

dLEN

Day 28

Dauchy, et al.

A Study I



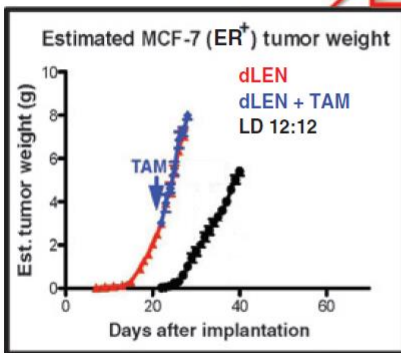
Tumors not yet noticeable.

Day 28

LD 12:12 – “12 hrs light, 12 hrs dark”

Dauchy, et al.

A Study I

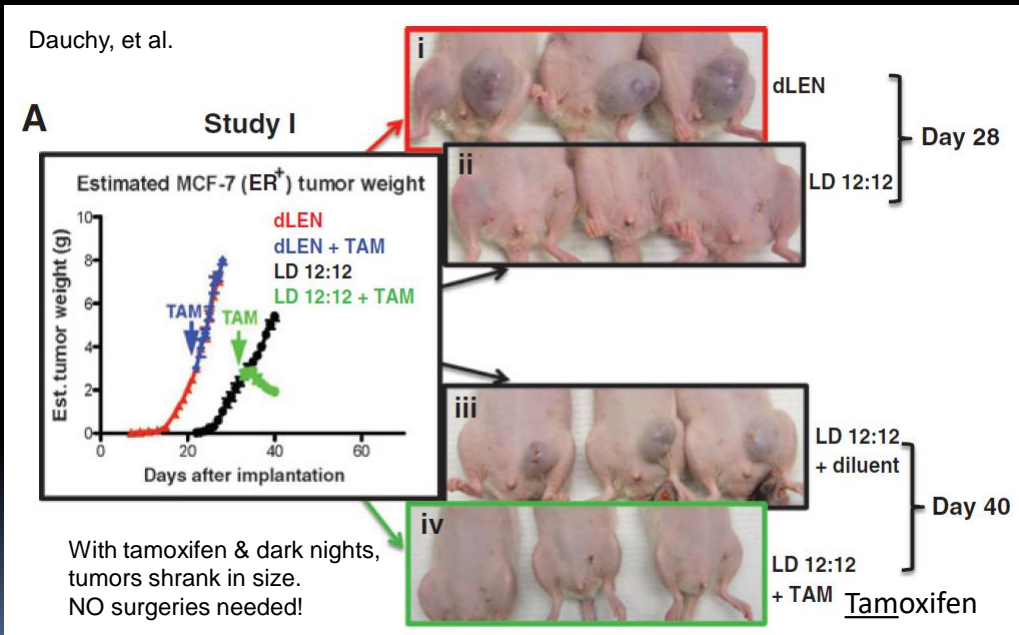


Tumors now noticeable.



Day 28

Day 40



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Classification Residence Burglaries:	2004 ¹	2005 ³	2006 ^{2,3}	2007 ⁵	2008 ⁵	2009 ⁵	2010 ⁵	2011 ⁶	2012 ⁷	2013
Total:	1,409,253	1,417,440	1,453,870	1,486,405	1,567,682	1,599,047	1,602,056	1,628,656	1,571,635	1,425,732
Night	28.78%	28.42%	28.47%	28.52%	27.96%	27.89%	27.81%	27.16%	27.34%	27.69%
Day	47.28%	47.24%	48.78%	49.95%	51.52%	51.26%	51.51%	52.76%	53.00%	52.97%
Unknown	23.94%	24.34%	22.75%	21.53%	20.52%	20.85%	20.69%	20.08%	19.66%	19.34%

Lights Do Not Guarantee Safety

If "more light means more security", then "daytime", our brightest of times, must be the period of GREATEST security & the LEAST amount of crime. But FBI's national data records daytime burglaries is greater than nighttime, thus light does not protect!

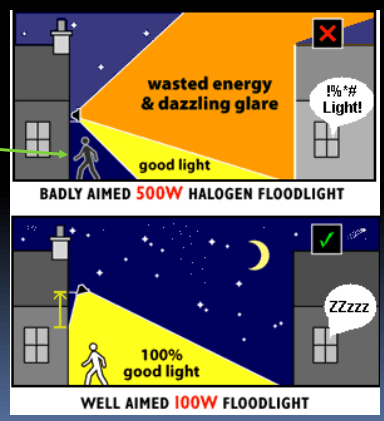
¹ The 2008 UCR report: http://www.fbi.gov/ucr/cius2008/data/table_07.html , had 2004's numbers.
² The FBI readjusted the numbers up by 0.58%, 0.37%, and 0.28%, respectively, for these years from the prior's years UCR.
³ The revised 2005 - 2009 numbers can be accessed at http://www2.fbi.gov/ucr/cius2009/data/table_07.html .
⁴ The 2010 numbers can be accessed in Table 23 at <http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2010/crime-in-the-u.s.-2010/download-printable-files>.
⁵ The 2011 numbers can be accessed in Table 7 at <http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2011/crime-in-the-u.s.-2011/tables/table-7>.

FBI Burglary Crime Statistics for 2013, The Federal Bureau of Investigations, U.S. Dept. of Justice. Wash. D.C.

Poorly executed security lights create glare & deep shadows that reduce visibility & aid criminals.

Bright lighting gives *illusions* of security. It can induce people to take risks that are not justified by the overall situation.

Remember, criminals need light too!



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More Security Lighting Reduces Crime is a Myth

The “Chicago Alley Lighting Project” (CALP)

In 1998, the city of Chicago tried to reduce crime by increasing lighting levels on the streets and alleys.

The Research and Analysis Unit of their Illinois Criminal Justice Information Authority jumped at the change to do an experiment.

They defined two different neighborhood areas, with very similar characteristics in demographics, socio-economic status & crime levels to be an experimental & a control area in their investigation of the CALP effects.

The intent of the program was to *increase feelings of safety and decrease crime in the alleys.*

<http://www.icjia.state.il.us/public/pdf/ResearchReports/Chicago%20Alley%20Lighting%20Project.pdf>

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More Security Lighting Reduces Crime is a Myth

In multiple steps, the city of Chicago:

- “upgraded & improved” the city’s 175,000 streetlights, which illuminate the arterial & residential streets.
- repaired & upgraded the lighting in & around viaducts and in Chicago Transit Authority stations.
- boosted lighting levels in alleys across the city.

The plan increased the alley lighting from 90 Watt bulbs to 250 Watt bulbs. A 2.78 multiplier
→ or only “1 magnitude”!

<http://www.icjia.state.il.us/public/pdf/ResearchReports/Chicago%20Alley%20Lighting%20Project.pdf>

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More Security Lighting Reduces Crime is a Myth

They did think that that alley lighting would not deter all types of crime, some types may be more susceptible to the unique characteristics of an alley.

The Ill. Crim. Just. Info. Auth.'s RAU examined :

- Violent crimes (homicide, criminal sexual assault, robbery, assault)
- Property crimes (burglary, theft, motor vehicle theft, arson)
- Non-Index crimes (prostitution, damage and trespass to property and vehicles, gambling, and drug/liquor/weapons violations).

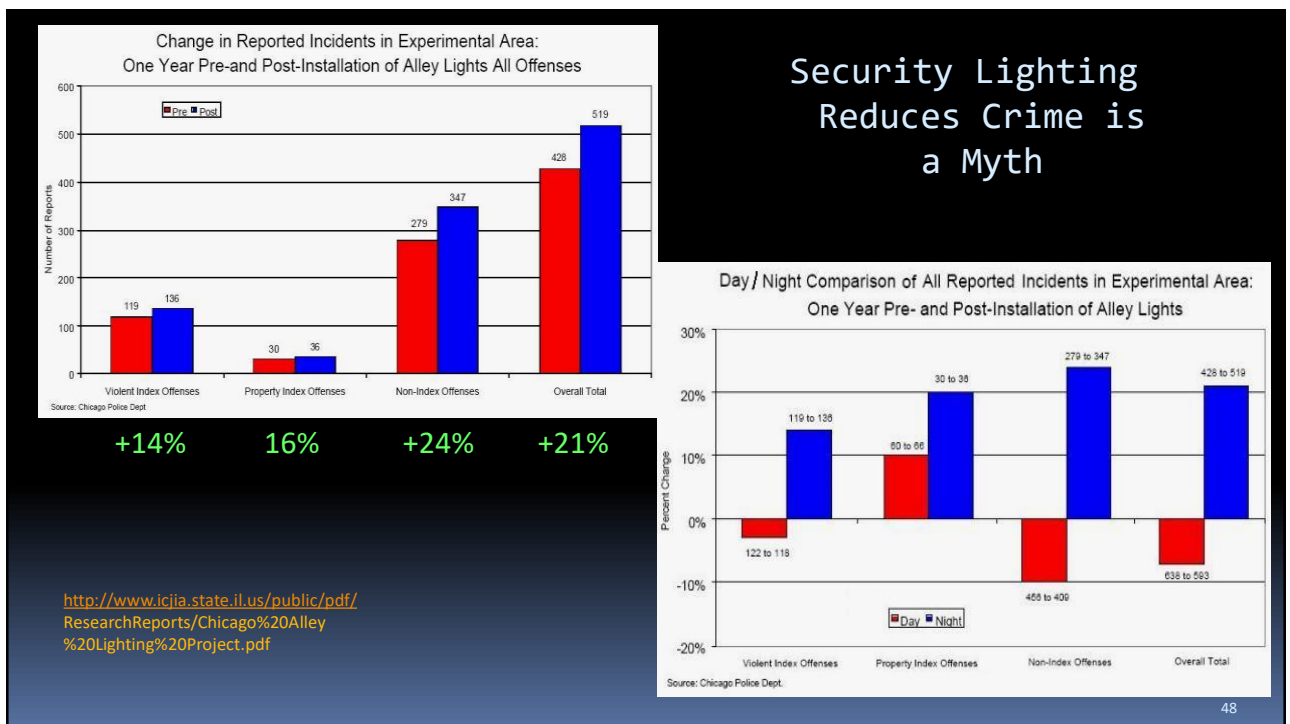
Previous research suggested that these non-index crimes would show most of the change when additional lighting is installed, due to their nature.

The Results:

<http://www.icjia.state.il.us/public/pdf/ResearchReports/Chicago%20Alley%20Lighting%20Project.pdf>

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More Security Lighting Reduces Crime is a Myth

Both experimental & control areas saw increases in reported incidents at night & decreases in reported incidents during the day.

A breakdown of non-Index offenses found that substance abuse violations :

	Experimental Area:	Control Area:
Evening Crime:	increased from 77 to 123 (60%).	increased from 30 to 52 (73%).
Daytime Crime:	decreased from 187 to 152 (-19%).	decreased from 69 to 33 (-52%).
Net total:	a 4% increase (264 to 275).	a 14% decrease (99 to 85).

<http://www.icjia.state.il.us/public/pdf/ResearchReports/Chicago%20Alley%20Lighting%20Project.pdf>

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More Security Lighting Reduces Crime is a Myth

So, whether or not the increased lighting levels:

showed more crime occurring (so more could be reported to police), or just *attracted criminals so that they could see what they were doing & what was going on around them,*

the clearest statement that one could make from these findings is that the **increased lighting did NOT deter crime.**

Not only was there NO suppression on criminal activity, but the activity level *seemed to increase* as a result of increased alley lighting, as reported by the Chicago Police Department.

They may act at night because the rest of the populace, at home asleep, is not looking. Once again, criminals need light, too. Example: substance abusers need to be able to see their veins in order to “shoot up”.

<http://www.icjia.state.il.us/public/pdf/ResearchReports/Chicago%20Alley%20Lighting%20Project.pdf>

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Cultural Impact:

This loss of the naturally dark, star-filled sky is a consequence akin to a loss of our forested landscapes or other natural wonders.

Comet Pan-STARRS (C/2011) L4 taken on FAU's campus Wed. Mar. 13th, 2013, 8:17 pm EDT.



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Canary Wharf, London, England

← Is this picture from Earth or Saturn's moon Titan?? →

Nighttime Sky Glow is Un-Natural

With sky-glow, we see only 1 – 10 kilometers up.

We become a much larger percentage of the limited universe that we see. This may inflate feelings of a false & even arrogant, pompous importance.

Without sky-glow, clear dark nights shows us wondrous, awe-inspiring, views of the "infinite" universe.

Naturally, we tend to feel how small we really are and yet connected to the vast cosmos at the same time!

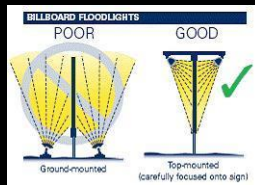
It can be a very humbling view that inspires the imagination, curiosity & self-reflection.



Image Credit: Aaron Umpierre Big Cypress National Preserve Aug 9th, 2013

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What to do?



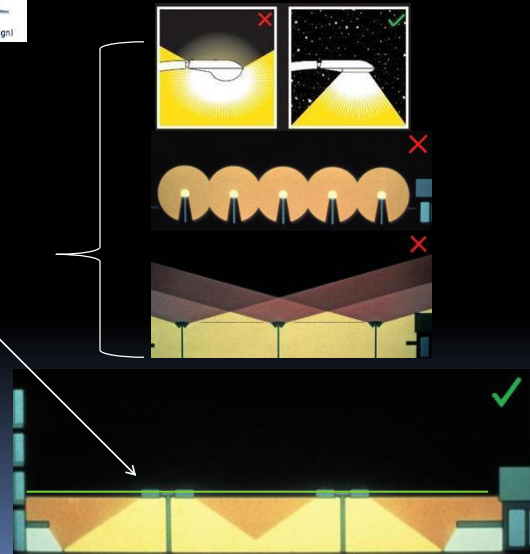
Use *Intelligent light controls*, e.g. motion sensors, timers, programmable controllers

Late night turn-off of all lighting except as needed for safety/security, turn off lights at 11 pm!

Goal: “no light should be emitted above a source’s horizontal plane.”

Use *fully shielded & focused light fixtures* to minimize glare and prevent wasted up-light, start with your own homes!

Eliminate/correct bad, older lights – do not accept any “grandfathered-in” lights.



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Considerations for Home

Make sure your bedroom is dark so that you can NOT see your hand in front of your face when you go to sleep.

Get light blocking curtains for your windows and turn off the lights.

Do not leave the television on when you or your family sleeps. Not only will these affect your sleep, but they will certainly affect your electric bill.

If you use an alarm clock, use one with a **RED light source** on it, such as one that uses **red LED digits**.

Shift workers: If you have a second or third shift job that requires you to sleep during the daytime, its so important for you to ensure that your bedroom is dark. Your very own job is a "risk factor for cancer". Ensuring your sleep time is as dark as possible, is the only way you can ameliorate the effect.

If you must use a computer screen at night, install software that reddens its colors like f.lux at <http://justgetflux.com/>



“Night Lights” at Wal-Mart

Red/pink bulbs types will protect your night vision & melatonin levels at night!

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