MANAGING LIGHT POLLUTION
FOR COASTAL MARINE COMMUNITIES

Executive Summary

Coastal marine communities are becoming disproportionally effected by excessive light pollution as urbanization continues to concentrate and expand along coastlines. Whats dangerous about an increasing amount of artificial light making its way into the marine realm is that it is beginning to signifcantly disrupt the marine ecosystems diverse array of processes that rely on cues from natural light. Scientist agree that the negative effects of light pollution are severely under-estimated and this will have major implications for our future marine health and accordingly the coastal peoples who rely on these ecosystem for their livelihoods or well being

Policy Opportunity

Here we provide action based plans and incentives that coastal cities can adopt in order to reduce the impact that light pollution is having on their adjacent marine ecosystems, and to promote further research in the growing field of light pollution

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HOW CAN LIGHT CAUSES

Disorientation
artificial lights mimic or overpower cues of natural light that marine organisms rely on [1]

Masking
artificial light masks day and night cycles and with it certain biological rhythms that coincide with this change [2]

Ecosystem Composition Changes
artificial light shifts communities away from nocturnal species to those species who do better in lit environments [3]

Example : Clownfish eggs will not hatch when exposed to a low level LED light as this disrupts the eggs light cycle [2]

ARTIFICIAL CITYGLOW CAN EXPOSE UP TO 70-76% OF THE 3D SPACE ON THE SURROUNDING SEAFLOOR[4]

What Is Causing an Excessive Amount of Light Pollution To Enter the Marine Realm?

Worldwide switch to LED lights in cities : LED lights are well suited for penetrating past surface water and deep into the water column [4]

Poor lighting arrangements : Unnecessary lighting is contributing to increased light pollution in the marine ecosystem [5]

Indirect Lighting : non-directional lighting allow for the spilling over of light into the marine realm [6]

The green and blue wave lengths emitted in LEDS are best at penetrating deep into the water column and are easily detected my marine organisms

RECOMMENDED ACTIONS

Although all cities depend on artificial light to function, there are many ways in which the shear amount of light can be reduced with little effort, cost or at the expense of human safety.

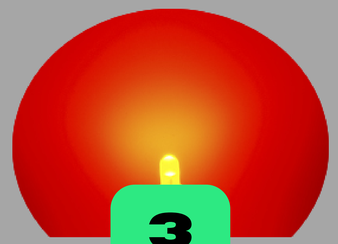
1

The use of limited angle, shielding, and motion sensor lights can prevent high intensity light from penetrating directly into the ocean and reduce the ecosystem overall exposure time to light [7]

Photo of un-sheilded (left) versus shielded light (right)

2

Remove excess lighting and reconstruct the lighting grid in a more efficient way. It is estimated that 30 per cent of the exterior lighting in Australia is wasted each year as a result of poor lighting design. This equates to spending 3 billion per year to make the sky glow [8]. While a cost effective measure on its own it will also reduce a substantial amount of unnecessary light pollution entering into the ocean



3

switch from LED lights that emit blue and green wavelengths towards ones that emit more red wavelengths, as red attenuates in water and is not as easily detected by marine organisms [9]

To ensure success incentives or implementation aided through legal and regulatory tools should be used in order to trigger change

4

Fund and develop marine light pollution studies to determine its effects at the local scale level

5

Enroll your city/municipality in the dark skies initiative

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