

Further, Faster | Fringe Festival at COP26

# A drop in the Ocean

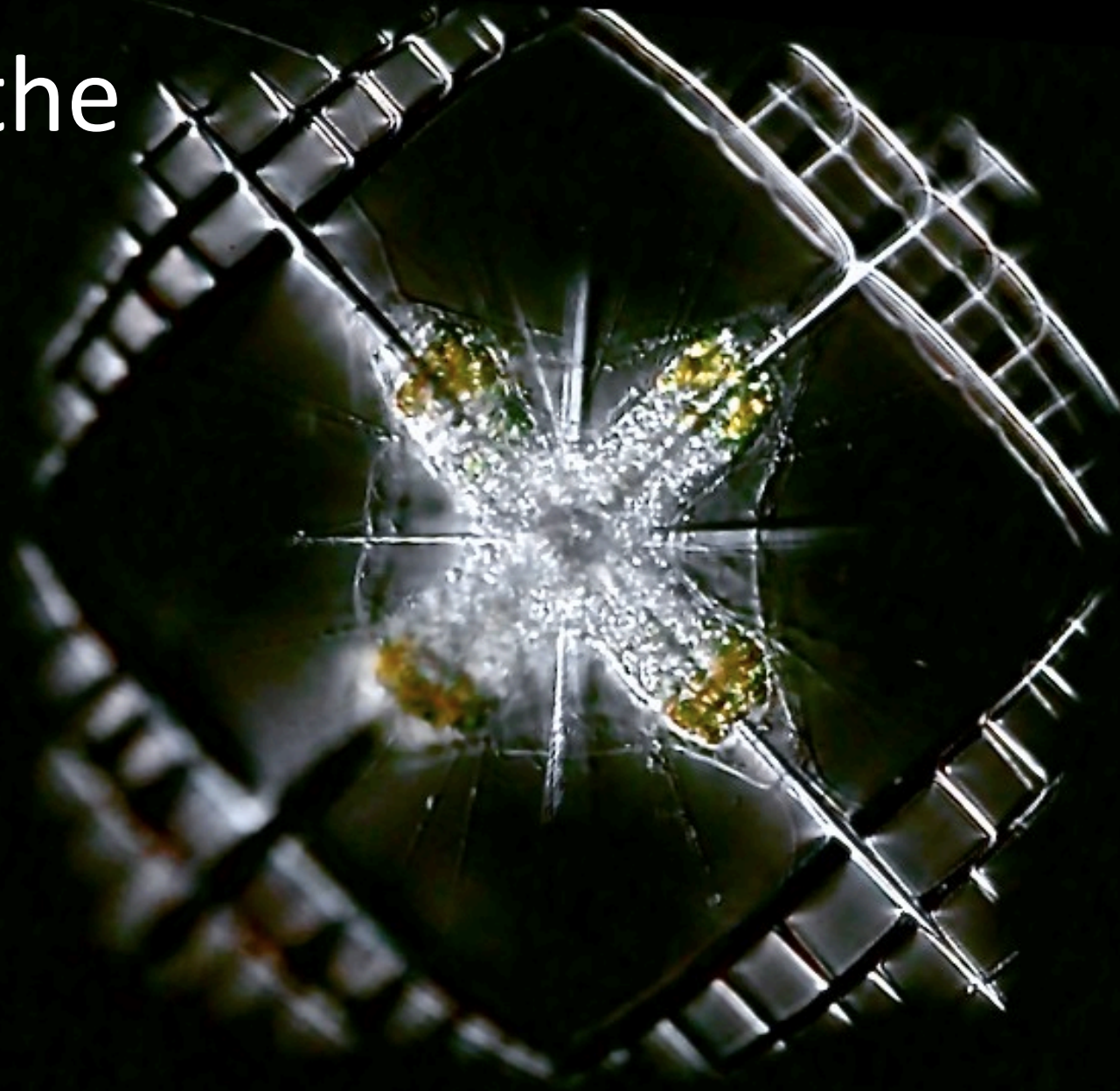
Howard Dryden  
GOES

**Sustainability. We mean it.**

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For professional investors only

# A drop in the Ocean



# GOES

GLOBAL OCEANIC ENVIRONMENTAL SURVEY

[www.GoesProject.com](http://www.GoesProject.com)

Roslin Innovation Centre  
The University of Edinburgh  
Easter Bush Campus  
Midlothian EH25 9RG



Take a two deep breaths



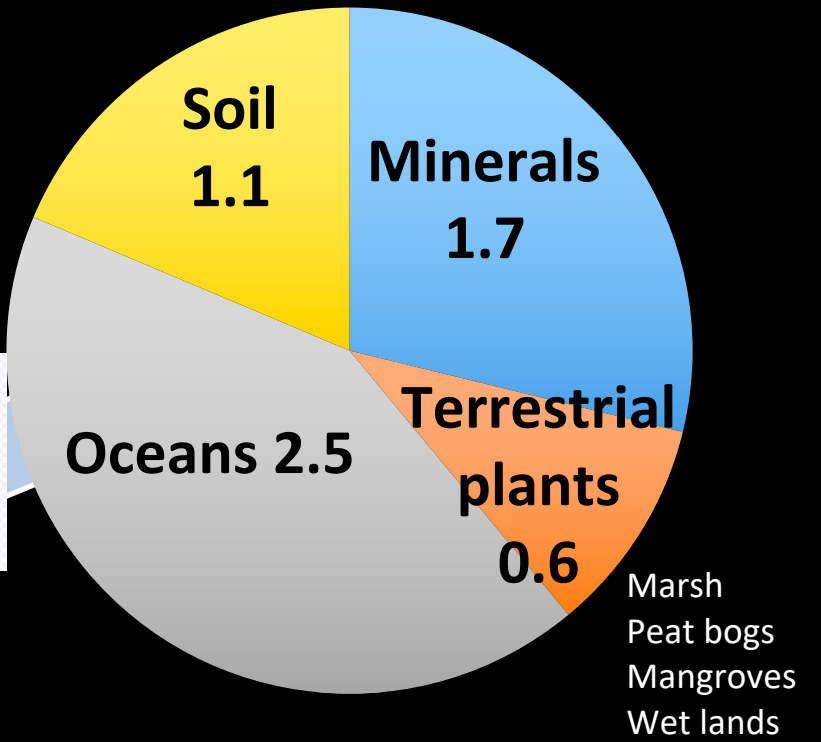
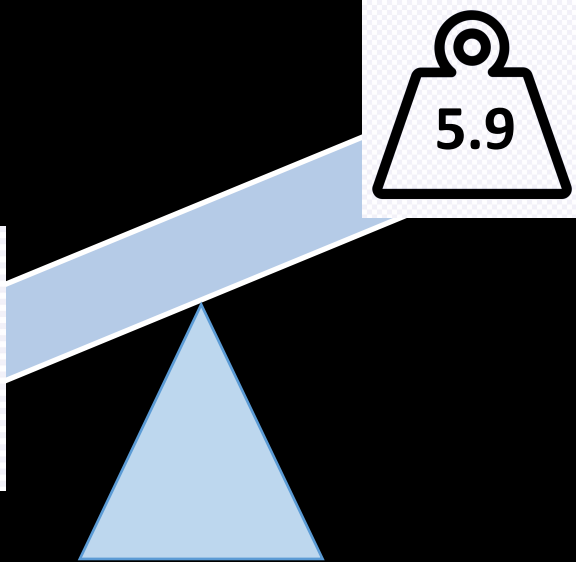
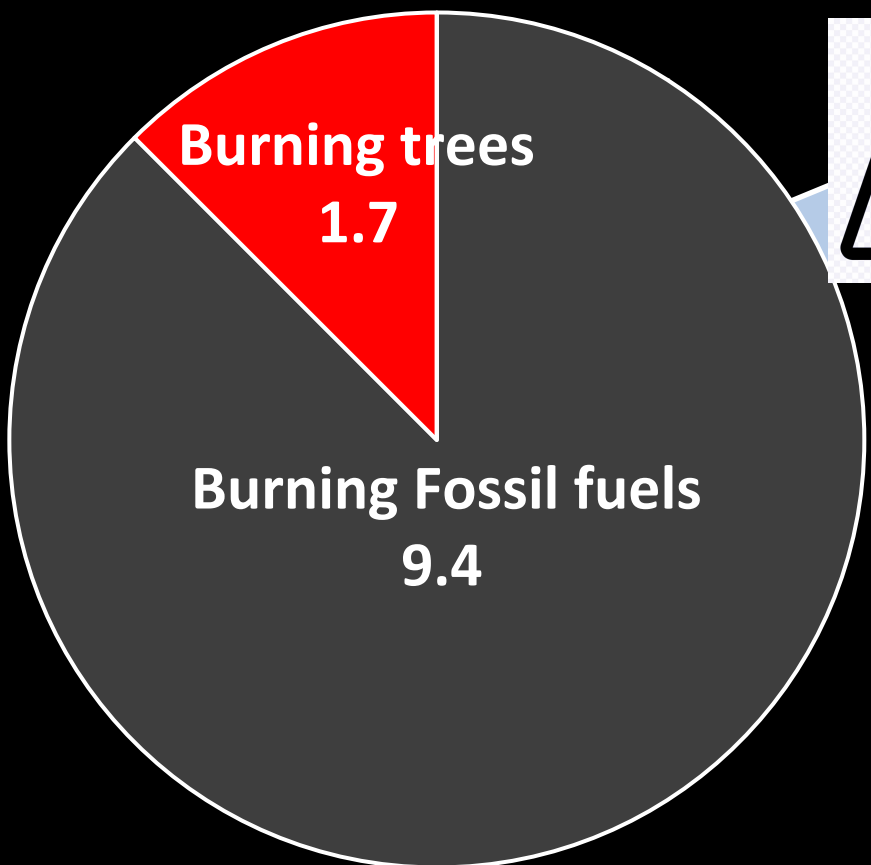
Climate change is an equation;  
What goes into the atmosphere = carbon removed by plants

We have neglected the oceans and more than  
80% of marine life will be dead  
As we approach the ocean acidification end point  
of pH7.95 in just 25 years

We need to reduce carbon emissions but  
Net Zero is **not enough**



+ 5.2 Giga tonnes CO<sub>2</sub> as C released into atmosphere every year



# Prochlorococcus, cyanobacteria

- Discovered in 1985
- Produces 20% of our oxygen
- micro-plastic are toxic to the bacteria



# Diatom

Made from silica

Produce 45 Giga tonnes every year, double every few hours  
Terrestrial plants take 60 years to double in mass.

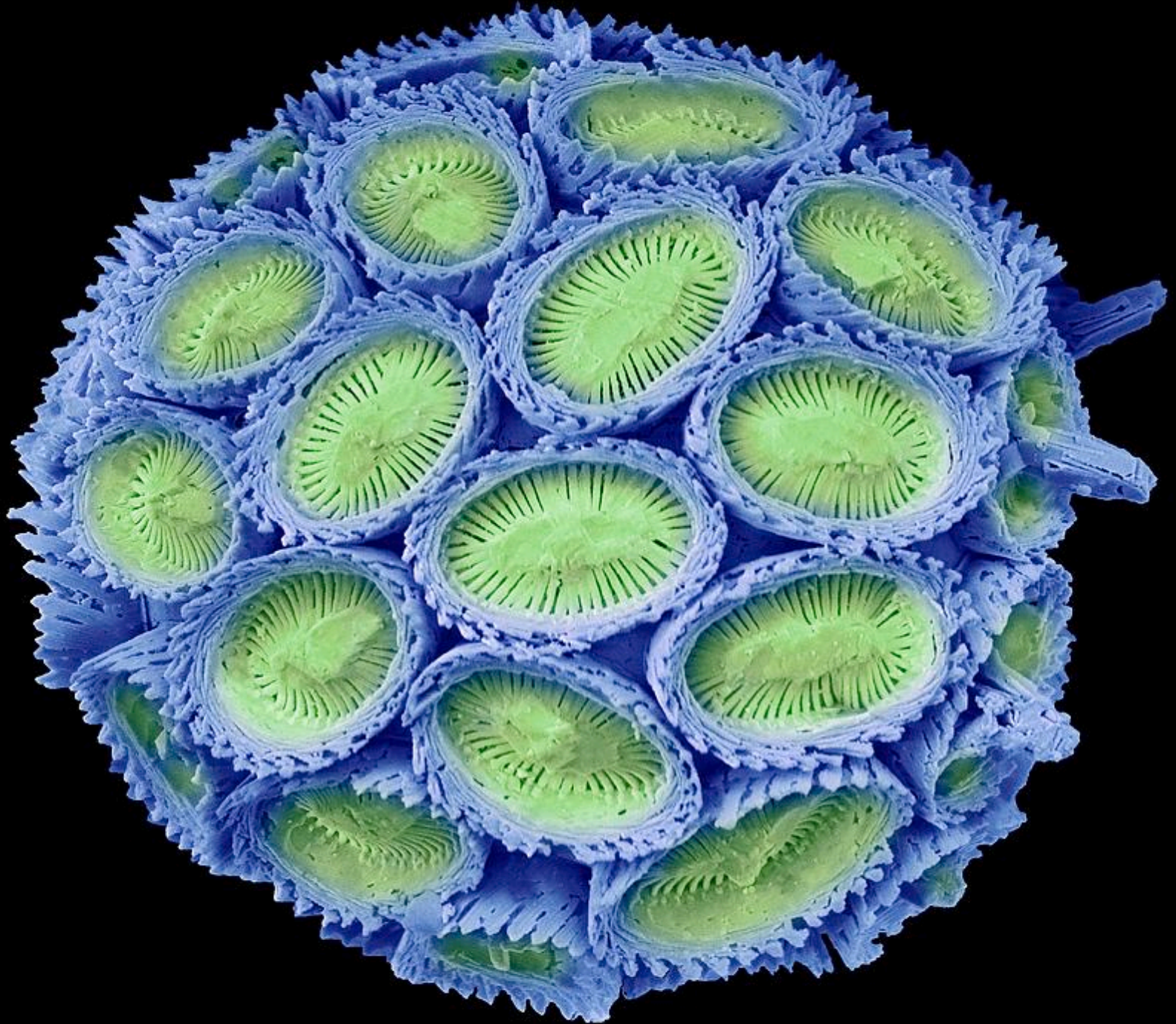




# Coccolithophore

They give seawater its  
odour

Made from carbonate,  
they form limestone to  
lockout carbon



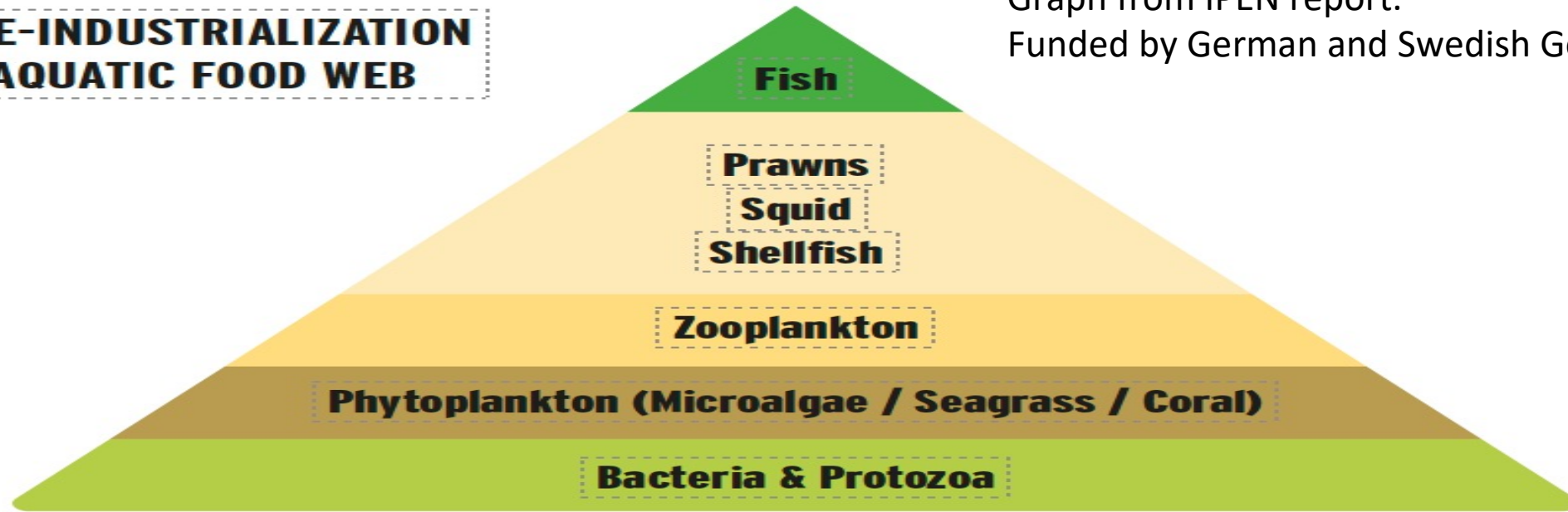


# Copepod



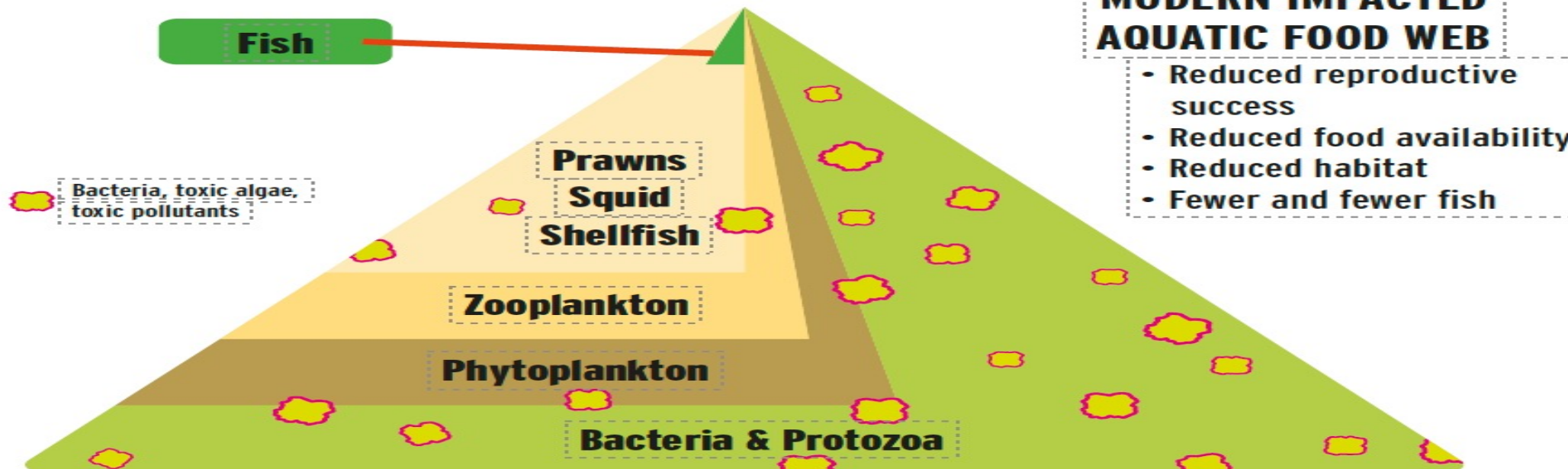
They have a collective mass of 5 Giga tonnes. equivalent to 17 million 747 Jets. They poop 30 times the mass of carbon from fossil fuels, 6% reaches the Abyss and is not recycled, this equates to 2.5 to 3 Giga tonnes of carbon sequestered

## PRE-INDUSTRIALIZATION AQUATIC FOOD WEB



Graph from IPEN report.

Funded by German and Swedish Government





All life on earth depends upon Plankton in the oceans.

They remove most of our CO<sub>2</sub> and produce more than 90% of our oxygen

We are killing marine life with pollution, with toxic for-ever chemicals and plastic. We are killing the life support system of the planet



Textile wastewater and micro-plastics  
10% of worlds waste water and energy is with textiles

Pharmaceuticals

Petrochemicals



80% of the world has no municipal wastewater treatment  
90% of municipal wastewater in Europe have no tertiary treatment to remove plastic and toxic chemicals





Dubai







Lisbon



Istanbul

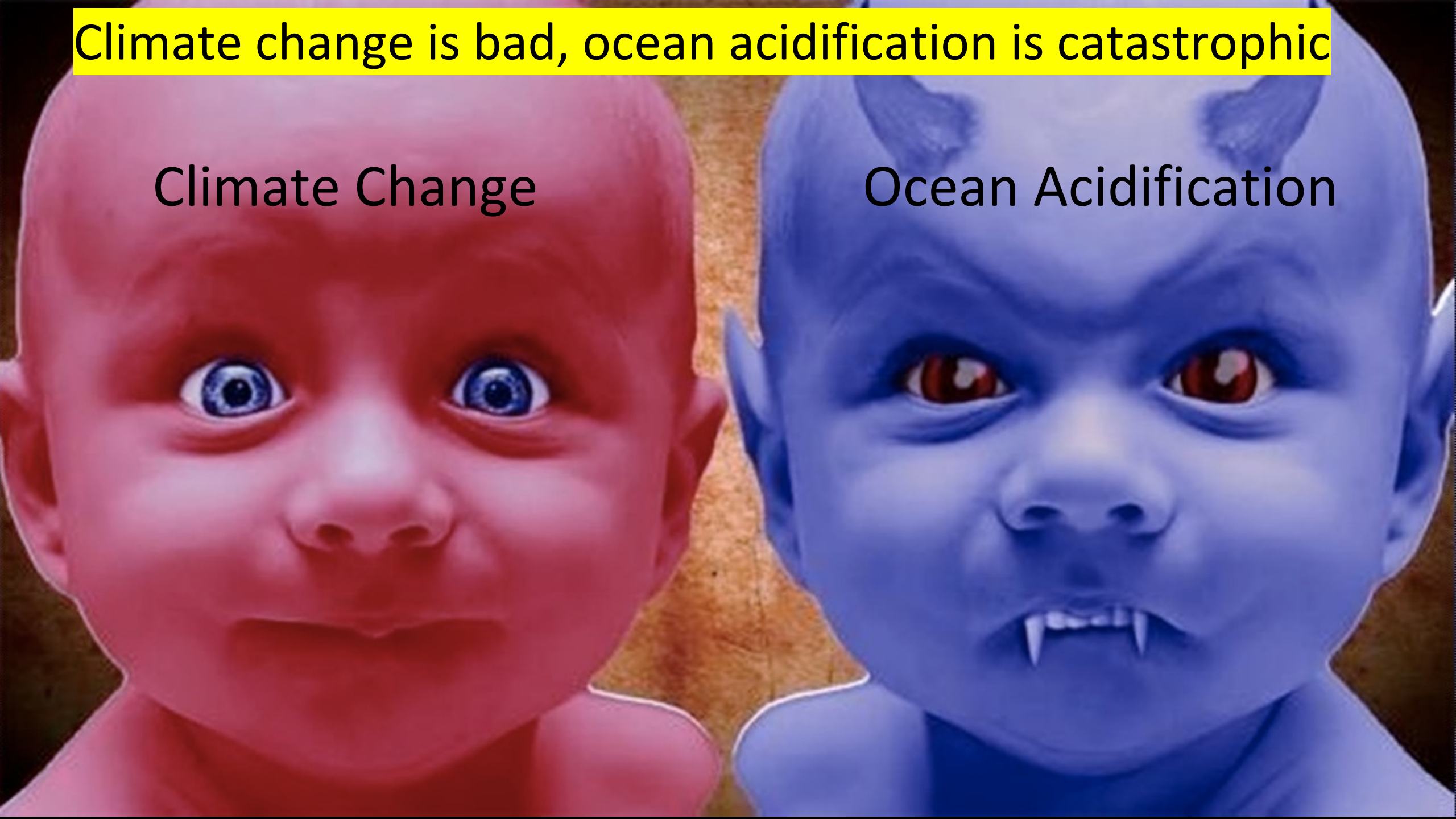




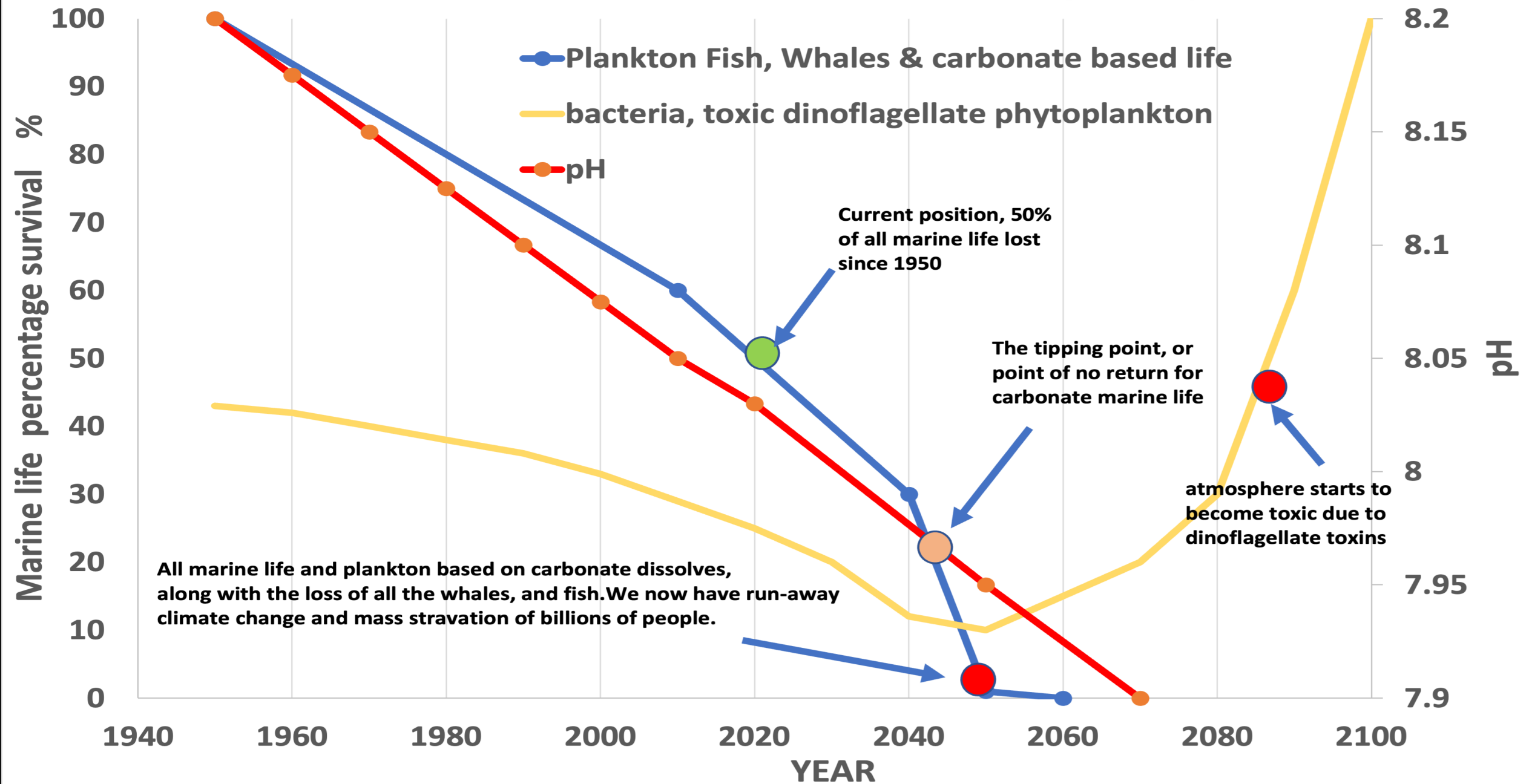
Climate change is bad, ocean acidification is catastrophic

Climate Change

Ocean Acidification



# Carbonate based marine life survival against pH







# Toxic for ever chemicals

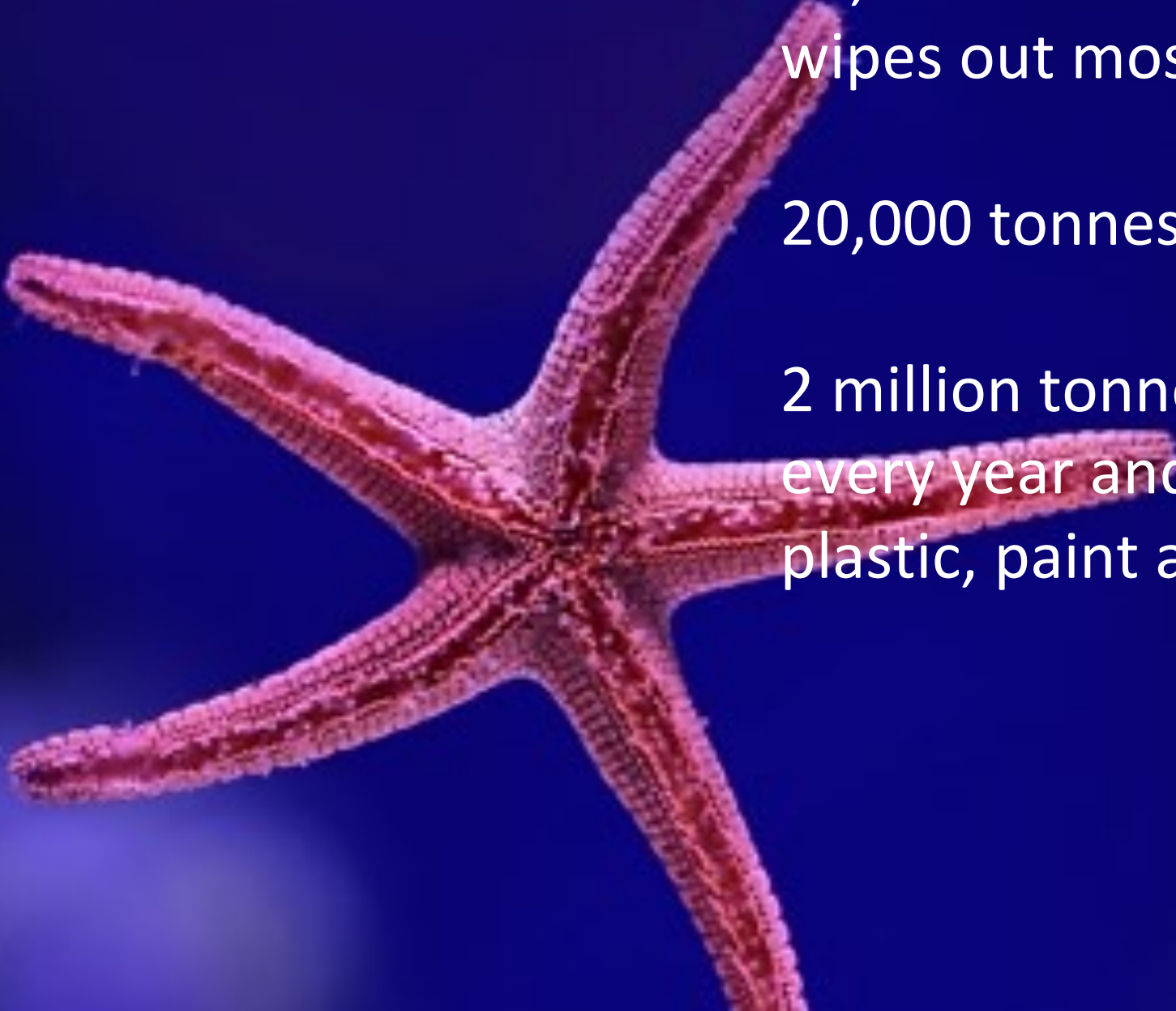
The toxic **chemical revolution** starting  
in the 1940's with chemicals such as  
DDT, PCB'S, PBDE, PFOS

Oops!..... it may not be climate change that is  
killing the coral

Oxybenzone, a common active  
ingredient in sun-block and  
cosmetics is toxic at  
62 parts per trillion





A red starfish with five arms is positioned on the left side of the image, set against a dark blue background. The starfish's arms are spread out, and its central disk is visible. The texture of the starfish appears slightly rough or bumpy.

70,000 tonnes of oxybenzone  
wipes out most marine life.

20,000 tonnes used in just cosmetics

2 million tonnes are manufactured  
every year and used in  
plastic, paint and adhesives

# Plastic is important, but It is what you don't see that is really dangerous




There is 21 million tonnes of micro plastic 35 to 300um in the Atlantic Ocean, 7 x particles for every litre of water



Every fish, shrimp and living organism in the oceans contain priority chemicals and.....1 in 15 contain micro-plastic



Microplastics adsorb many of the chemicals and concentrate them x 1,000's. This is why the plankton are dying at a rate of 1% year

A person with long, reddish-brown hair in a thick braid is seen from behind, looking out at a vast, blue ocean with white-capped waves. The person is wearing a dark blue sleeveless top. The scene is captured in a cinematic style with soft lighting.

THERE IS  
**HOPE**



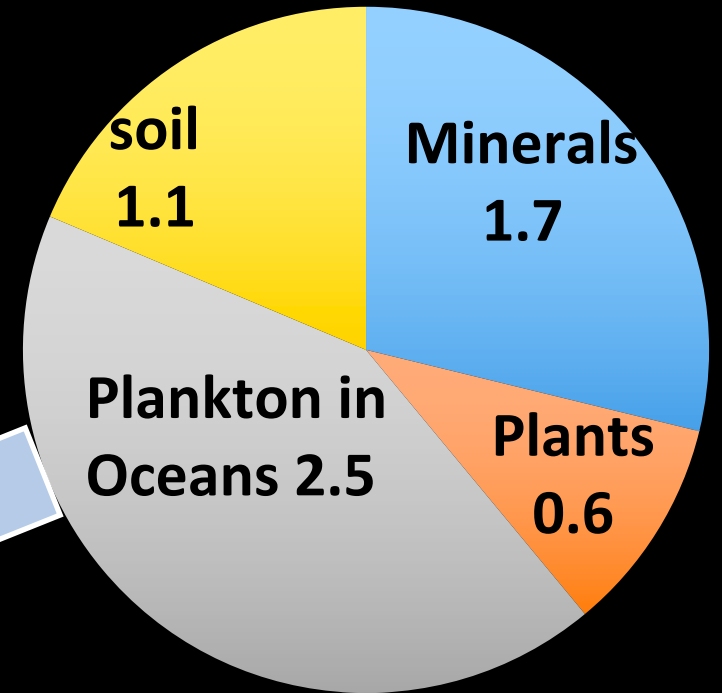
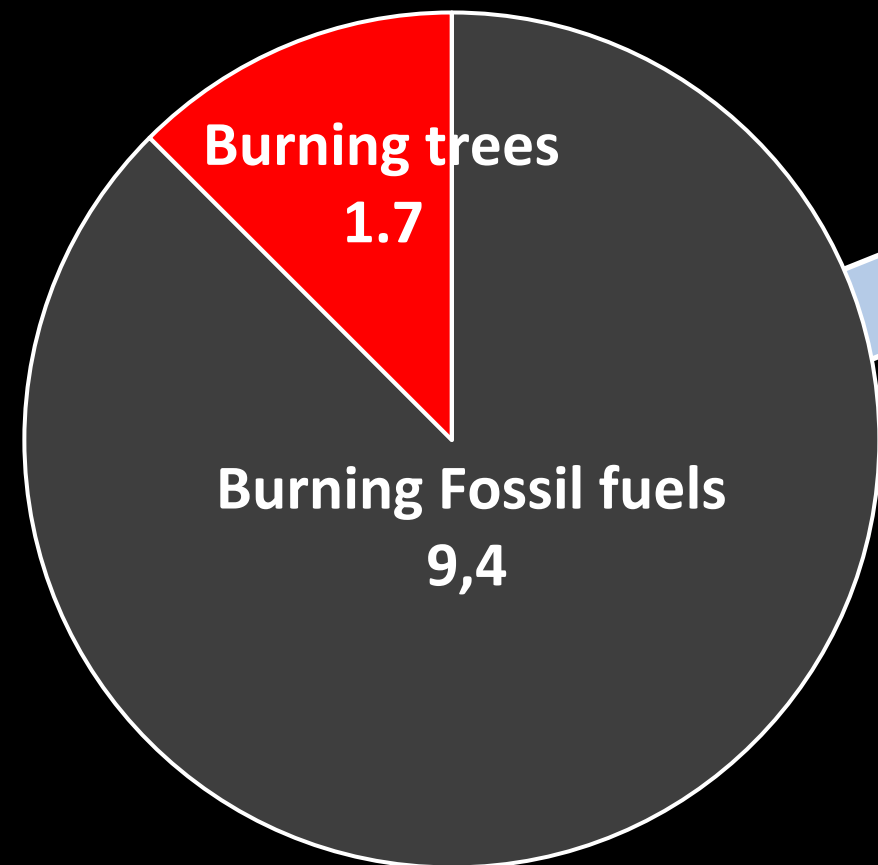
If we had not wiped out more than 50% of marine life from over-fishing and pollution we would not be experiencing climate change

If we prevent toxic chemicals and plastic  
from entering the oceans  
marine life will recover

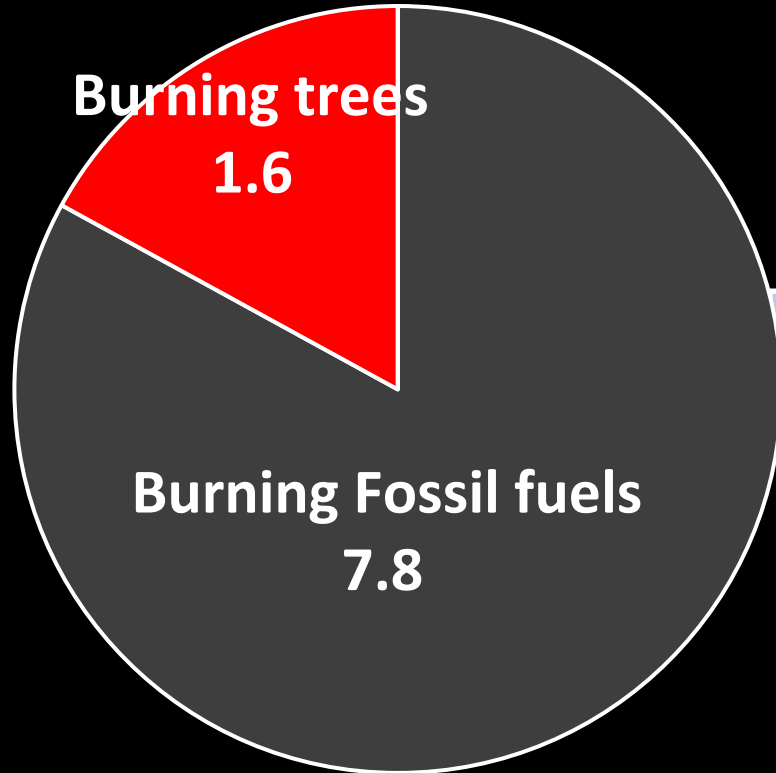
Marine biomass doubles every 3 days  
Terrestrial biomass takes 60 years



5.2 Giga tonnes C into atmosphere

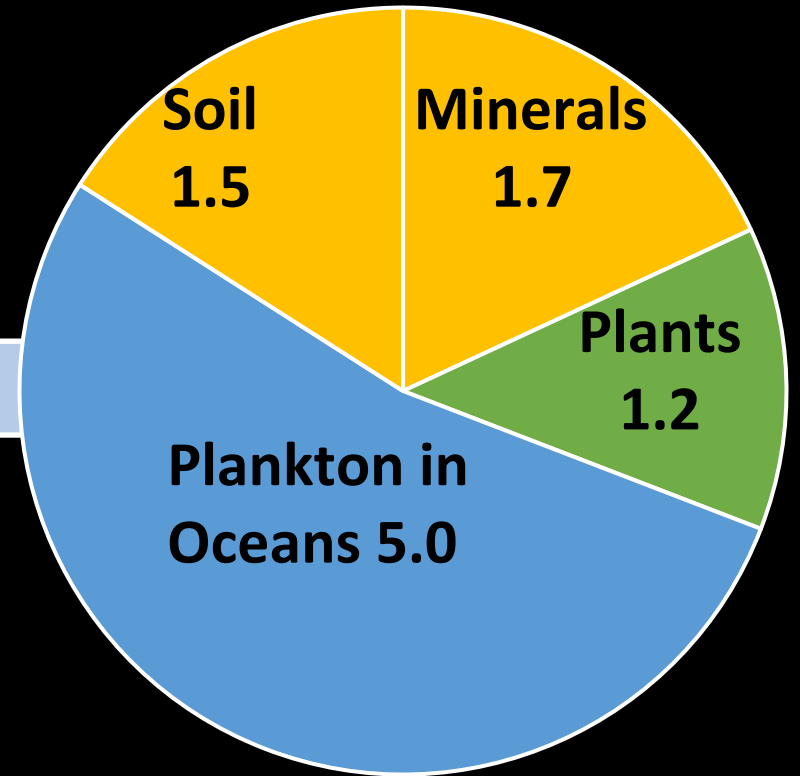


# Carbon Neutral



9.4 Giga tonnes /year CO<sub>2</sub>  
from burning fossil fuels and trees

<= Equilibrium =>



9.4 Giga tonnes /year CO<sub>2</sub>  
Removed by Nature



But....

we need to take action now!

no more that 10 years to stop pollution  
in 25 years, we lose marine life in the Oceans

# ACTION points

- Treatment of Municipal and Industrial wastewater
- Eliminate microplastic, such as car tyre particles
- Regenerative agriculture, no herbicides / pesticides
- Green pharmaceuticals and cosmetics
- Green chemistry / product development for textiles



# A new Beginning

s/v copepod  
citizen science project  
with 100 blue water  
yachts measuring  
plankton and plastic  
concentrations in the  
world's oceans



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