

"In June 2017, a giant iceberg the size of Delaware broke off the Larsen C Ice Shelf in West Antarctica, creating an 80 mile long crack in the ice. How do relatively small shifts, rifts and changes lead to a long lasting effect on our planet's climate?"

Many know that global warming causes a plethora of notorious problems, but not many are aware of the fact that over the last century, averaged over all land and ocean surfaces, the temperature has only increased by approximately 0.74°C,¹ probably a much smaller temperature fluctuation than what most people experience over a mere hour. A small, seemingly negligible increase of 0.74 °C may not seem like it could lead to much harm, however, the EGU (European Geosciences Union) published a study in April 2016 that investigated the impact of a 0.50°C temperature increase by the end of the century, and the results were alarming. An average increase from 1.50 °C to 2.00 °C – increase by a third of the initial temperature, could cascade to heat waves lasting around a third longer, rainstorms being a third more intense, warming ocean temperatures and the destruction of ecosystems.² The direct consequences of a small rise in temperature only start the downward spiral; further complications are what can lead to serious long-term damages to the climate of our planet. As Barack Obama summarizes: 'There is one issue that will define the contours of this century more dramatically than any other, and that is the urgent threat of a changing climate.'

This is how a small temperature rise of less than 1.00 °C can cause ecological and climatic catastrophes. Coral bleaching, a result of the warming ocean brought by rising temperature, has reached an unprecedented height in recent years. A temperature increase of 1.00°C for as short as four weeks can trigger mass coral bleaching events.³ Bleaching occurs when zooxanthellae, a type of photosynthetic alga that the corals depend on for nutrients, leaves the tissues of the corals, leaving them vulnerable to diseases and with elevated mortality rates.⁴ It has been confirmed that 29% of shallow water corals on Great Barrier Reef in Australia died during one the worst coral bleaching events in 2016,⁵ triggered by a small rise in sea temperatures, bringing detrimental effects on the ecosystem that shelters 25% of all marine species.⁶ Projections based on the current level of declination say that tropical coral reefs could be virtually wiped out by 2100⁷, a more grave matter than what most people would assume.

The potential consequences of the destruction of the coral reef ecosystem include a decrease in biodiversity and an increase in ocean acidity – both a cause and a consequence of ecosystem destruction.⁸ While a rise in the dissolved CO₂ level leads to ocean acidification - another contributing factor to the increased mortality of corals, the declining population of photosynthetic organisms, such as zooxanthellae, adds to the problem – less CO₂ is absorbed in

¹ <https://globalclimate.ucr.edu/resources.html>

² <https://climate.nasa.gov/news/2458/why-a-half-degree-temperature-rise-is-a-big-deal/>

³ <http://www.gbrmpa.gov.au/managing-the-reef/threats-to-the-reef/climate-change/what-does-this-mean-for-species/corals/what-is-coral-bleaching>

⁴ http://www.teachoceancscience.net/teaching_resources/education_modules/coral_reefs_and_climate_change/how_does_climate_change_affect_coral_reefs/

⁵ <http://blogs.ei.columbia.edu/2011/06/13/losing-our-coral-reefs/>

⁶ <http://www.habitat.noaa.gov/ourwork/corals.html>

⁷ <http://globalreefproject.com/threats.php>

⁸ http://www.teachoceancscience.net/teaching_resources/education_modules/coral_reefs_and_climate_change/how_does_climate_change_affect_coral_reefs/

photosynthesis and more remains dissolved in the ocean, resulting in a vicious cycle of ocean acidification and the loss of what could potentially be one of the most promising, sustainable sources of biomass and oils. Evolved over billions of years to produce and store energy as oil more efficiently than any other known natural or engineered processes, algae could be a sustainable alternative to fossil fuels. Its wide-ranging advantages include having a high yield of 2,000 to 5,000 gallons of bio-fuels per acre per year, while their rapid growth rates (doubling in number every few hours) allow for daily harvest⁹ - oil extraction from microalgal biomass could essentially solve the problem of climate change from its very roots. Who would have anticipated the irony in that the indirect consequence of the rising sea temperature could mean the elimination of the solution to the problem itself?

While some of these problems are largely solvable at their primary stages, if people carry on dismissing them as 'small problems' and fail to act upon them, these 'small problems' can easily escalate to bigger, irreversible changes to our planet. There are many, including politicians and scientists who, out of scepticism, fear of financial pressure or a general reluctance to act, spend their time questioning and debating about the indisputable effects of global warming instead of finding a solution. The media, funded by fossil fuel and other related industries, is constantly blinding the public with the illusion that global warming is nothing more than a minor concern. The inundation of misinformation misleads the public and complicates the implementation of solutions that can effectively combat these problems.

These small problems do not become bigger, climate-changing problems on their own, they do because we allow them to; we wilfully neglect their true implications and allow them to grow out of control. It is our responsibility to navigate through these deceptive messages and only trust empirical scientific evidence, such as the fact that the oceans have become 30% more acidic since the beginning of the industrial revolution.¹⁰ In order to change, it is our responsibility to acknowledge the role that us humans, down to the individual level, have played in precipitating some of the biggest changes to our planet today. To accept is to understand, and to understand is to overcome.

Small problems can be dealt progressively with small steps on an individual level; small changes within individuals can help to reverse some of the effects of climate changes. For example, if everyone in America recycled just one-tenth of their newspapers, 25 million trees would be saved per year¹¹, absorbing an extra 530,000 tonnes of CO₂.¹² On a larger, industrial level, companies should try to limit and be truthful about their Carbon Footprint by investing in renewable, sustainable resources as a start. Secondly, companies should avoid excess packaging which has greatly contributed to the ten million tonnes of packaging waste produced in the UK. With a large percentage of these waste products being non - biodegradable, they can eventually end up being landfills, which were the largest anthropogenic emitters of the greenhouse gas in

⁹ <http://allaboutalgae.com/benefits/>

¹⁰ <https://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F>

¹¹ <https://www.byui.edu/university-operations/facilities-management/recycling-and-sustainability/recycling-statistics>

¹² <https://projects.ncsu.edu/project/treesofstrength/treefact.htm>

the UK in 2006.¹³ As consumers, we should band together and boycott excessively-packaged products and choose more environmental alternatives. The small change that can improve the planet lies in every one of us. As Christine Lagarde says about reducing man-made environmental damage, 'it's a collective endeavour, it's collective accountability and it may not be too late.'

Word Count: 1043

¹³ <http://thepaperlifecycle.org/end-of-life/in-depth/the-landfill-and-climate-change/>

References:

1. <http://allaboutalgae.com/benefits/>
2. <http://blogs.ei.columbia.edu/2011/06/13/losing-our-coral-reefs/>
3. <https://climate.nasa.gov/news/2458/why-a-half-degree-temperature-rise-is-a-big-deal/>
4. <https://globalclimate.ucr.edu/resources.html>
5. <http://globalreefproject.com/threats.php>
6. <https://projects.ncsu.edu/project/treesofstrength/treefact.htm>
7. <http://thepaperlifecycle.org/end-of-life/in-depth/the-landfill-and-climate-change/>
8. <https://www.byui.edu/university-operations/facilities-management/recycling-and-sustainability/recycling-statistics>
9. <http://www.gbrmpa.gov.au/managing-the-reef/threats-to-the-reef/climate-change/what-does-this-mean-for-species/corals/what-is-coral-bleaching>
10. <http://www.habitat.noaa.gov/ourwork/corals.html>
11. <https://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F>
12. http://www.teachoceanscience.net/teaching_resources/education_modules/coral_reefs_and_climate_change/how_does_climate_change_affect_coral_reefs/