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Editorial

COVID 19 and its' impact on the world's oceans!

There is no doubt that 2020 will be identified as 'the year of the pandemic', caused by a virus that initially did not seem to be much different from the other flu type outbreaks of past years. A few weeks later, a world-wide pandemic developed that resulted in many health care systems overwhelmed and human deaths in the hundreds of thousands. Efforts to contain the spread resulted in border closures, severe travel restrictions (including air and sea travel) and industry scale-backs including the commercial fishery), to the detriment of economies everywhere. We all experienced this and felt its' impacts, but did the COVID19 pandemic have any impact on the planet?

Travel and industry have been linked to increased greenhouse gases and other toxins introduced into our environment, so reductions should result in less pollution. Indeed, reports began to emerge from China that smog normally seen around large cities was clearing (2). Scientists identified a 25% reduction in carbon emissions from China during that period (Figure 1) and daily global emissions in May fell by 17% (2). In India, anecdotal comments were that people who lived 150 km from the Himalayas, could finally see them for the first time in decades, as smog levels were drastically reduced during their outbreak. In Venice, during their pandemic time, the water clarity of the canals was dramatically improved as result of diminished boat traffic that used to stir up the sediment. The decline in commercial fishery activities worldwide meant that stocks were not depleted as usual. Some suggested the herring biomass in European waters may actually have doubled due to the pandemic reductions in the fishery in that region (2).

The 'pandemic induced' reductions in ocean traffic had other benefits that included significant reduction in anthropogenic underwater noise levels (3). For example, scientists used underwater sound monitors and noted an almost 50% reduction in the noise levels (~ 4dB) during the height of the pandemic in the west coast of Vancouver island and Georgia Strait (3). Marine mammals rely on their underwater senses, specifically hearing, for communication, migration, hunting and other activities. The negative impacts of anthropogenic underwater noise on these are well documented, so any reductions should be beneficial for them. This is particularly true for species such as the North Atlantic Right whale, known to be very sensitive to underwater noise (8). Interestingly, during the cessation of marine traffic during 911, stress hormones were significantly reduced in this species (4). This was attributed to dramatic decrease in ocean traffic that resulted in significant reductions in recorded underwater noise (4). As similar reductions in both ocean traffic and anthropogenic noise levels occurred with the pandemic, it would seem reasonable to assume similar benefits for them in this

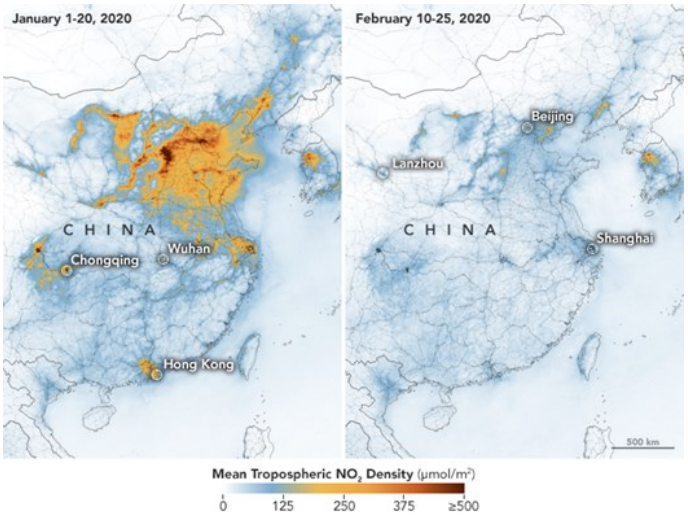

Figure 1: Note *reduction in pollution density from January to February, courtesy of NASA and European Space Agency (ESA) pollution monitoring satellite - https:// earthobservatory.nasa.gov/images/146362/airborne-nitrogen-dioxide-plummets-over-china, Public Domain, https:// commons.wikimedia.org/w/index.php?curid=88063985*

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situation. In addition, this benefit may apply to more than just marine mammals. Research published in 2017 identified zooplankton as negatively affected by high intensity underwater noise (7). Specifically, the use of marine seismic survey air guns, which emit a low frequency high intensity sound burst to explore for petroleum resources, were tested. It decreased zooplankton abundance, caused a 2-3 fold increase in dead adult and larvae over the 1.2 km zone examined, and larval krill in this area were also killed (7). Clearly the impact of anthropogenic noise in the oceans extends throughout the food chain. Since zooplankton and krill are key food sources for various species, from fish to whales, the potential benefits of reduced noise in our oceans during the pandemic is not just directly on marine mammals but on their food sources as well.

The above described consequences of the pandemic present a very positive global impact, but were there any negative effects? The enormous increase in need for use of disposable personal protective equipment (PPE), much of which contain plastic, must be examined. Even before the pandemic, plastics were a serious environmental contaminant, lasting at least 450 years once introduced into the environment. It is known that yearly global plastics production is over 300 million tons and 8 million of that ends up in the oceans each year (9). Now, in addition to that staggering figure, the pandemic caused a massive increase in the use of plastics, referred to as 'pandemic plastics'. Items like masks (contain polypropylene and other plastic compounds), gloves (latex, rubber), other PPE and health care related products, subsequently ended up in land fill and even the oceans (2). This was documented early in the pandemic in waters around uninhabited islands near Hong Kong and in the Mediterranean Sea, off coast of France. Masks were found floating like jellyfish in their waters and waterlogged latex gloves littered the seabed (Figure 2) (5). This worrysome finding has lasting impacts, not only for the duration this will reside in the oceans, but the terrible additional harm to sea life. For example, the loops on the masks could ensnare, while both masks and gloves float in the water column resembling prey and both could be ingested by sea turtles or sunfish, with dire consequences. Even as these items are degraded they turn into microplastics, which are plastics less than 5 mm in size, roughly size of a sesame seed (6). These are ingested by fish and other prey species, potentially cause digestive system obstruction, malnutrition and other issues if they leach toxic substances. Then as further degradation occurs, smaller sized plastics, called nanoplastics (1-100 nm), can even enter the vascular system, lodging in tissues and organs. The smaller the particle the greater its' ability to absorb toxins and even microorganisms (8). In 2014 it was reported that there was between 15-51 trillion

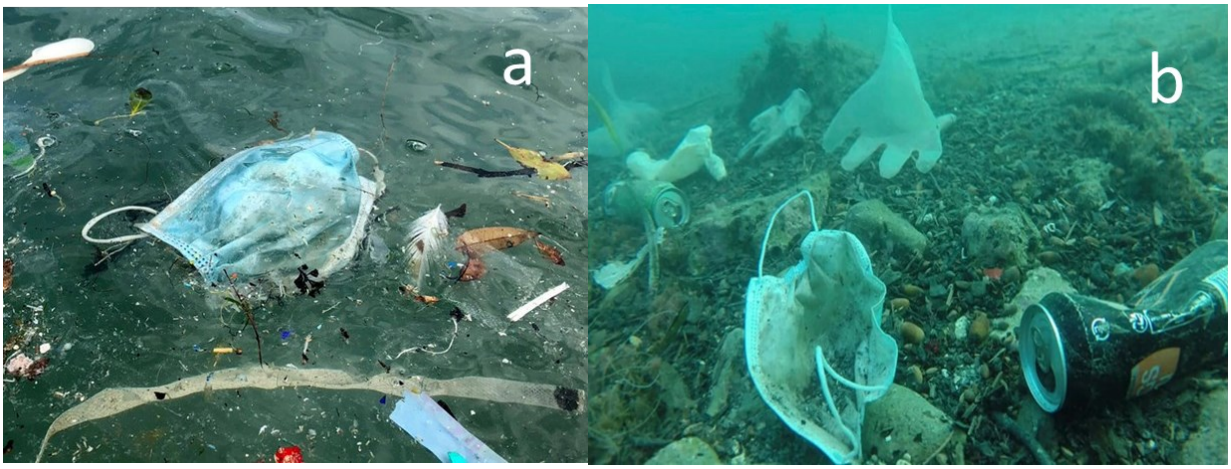

Figure 2: (a) Photo courtesy of OceansAsia of debris floating to shore in Hong Kong; (b) Photo courtesy of Operation Mer Propre of debris in Mediterranean Sea near Antibes in the French reviera. April/May 2020

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pieces of microplastic in our oceans, or 93,000 to 236,000 metric tons (1). Now we have the added burden of 'COVID plastics' exacerbating this situation.

So, in balance, the environmental impacts of the COVID19 pandemic have yet to fully reveal themselves. Will the positive effects of reduced ocean activities by humans be rapidly erased or even overshot as a 'return to new normal' occurs and commerce is ramped up to make up for lost time? The long lasting characteristics of the various forms of plastics means we will be impacted for many generations to come. Only if we control the use and disposal of these items from the start, not allow it to enter the environment, can we possibly avoid this tragedy. However, everyone's efforts seem focused on managing the outbreak, without any consideration for the added pollution burden to the planet, the ocean environment and the species within. Sadly, yet again there are never 'lessons learned'. As humans, we continue to focus on short term gain, not considering the long term effects. The mindset of 'let it be the next generation's problem' needs to be changed. If not, we will eventually arrive at the scenario where there may not be a next generation and then we question WHY, but by then it will be too late.

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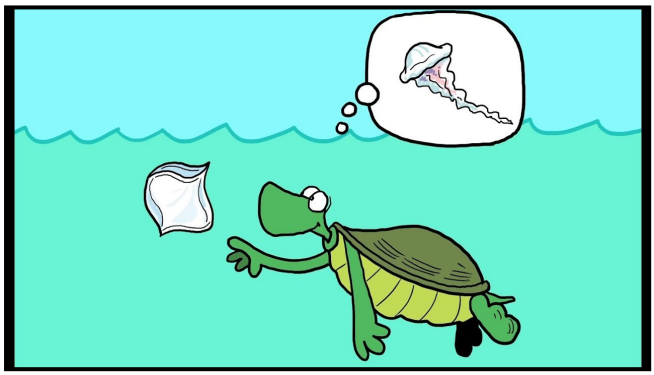

Figure 3: Cartoon from Jim Toomey; accessed July 2020
https://www.youtube.com/watch?v=fGQOkERpUhU