

Does COVID-19 Have Environmental Impacts on Aquatic Ecosystems?

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Figure 1. Visual representation of the process a single use PPE can take leading it to aquatic ecosystems. (Fadare & Okoffo, 2020)

BACKGROUND

- Microplastics have been a concern in The Great Lakes as pollution from single use plastics have continued to increase.
- Single use PPE (Personal Protective Equipment) is an emerging new source of microplastic fibers (Fadare & Okoffo, 2020).

HYPOTHESIS

Due to the pandemic an increase in the necessity for single use plastic PPE (masks) has caused a significant increase in microplastic pollution in the Great Lakes.

MOTIVATION

As a society we have tried to find a silver lining to the global pandemic. The lack of travel due to COVID-19 limited the air pollution and helped the pandemic gain a reputation of being beneficial to the environment. (Berman & Ebisu, 2020).

We propose to evaluate COVID-19’s relationship to increased microplastic to expose the harsh environmental impacts of this pandemic.

STUDY DESIGN

To understand whether the amount of micro plastics that are found in Lake Erie and Lake Michigan have increased, we found an experiment that collected data in years past. (Lenaker., Corsi, & Mason, 2020) We will mirror the three step extraction and sourcing from the same locations from the previous experiment. We will extract sediment samples from each lake, strained them out and observe the amount of micro-plastics under a microscope in a petri dish to determine the amount of plastic per kilogram or (p kg^{-1}). (Lenaker., Corsi, & Mason, 2020).

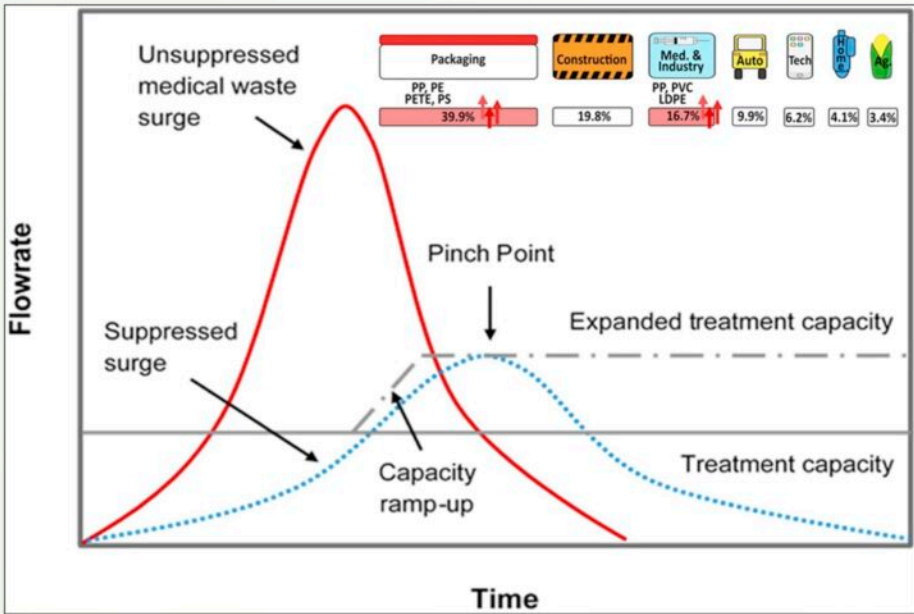


Figure 2. Supply and Demand chain for medical waste during Covid-19. (Benson, 2021)

PREDICTIONS

Using data we collected on the amount of microplastics found in the Lakes in the past (Lenaker., Corsi, & Mason, 2020) and the market size of the PPE industry (Zhang,2021) we were able to predict that there would be a significant increase in microplastics p kg^{-1} post pandemic in both Lake Erie and Lake Michigan due to the increase of mask production.

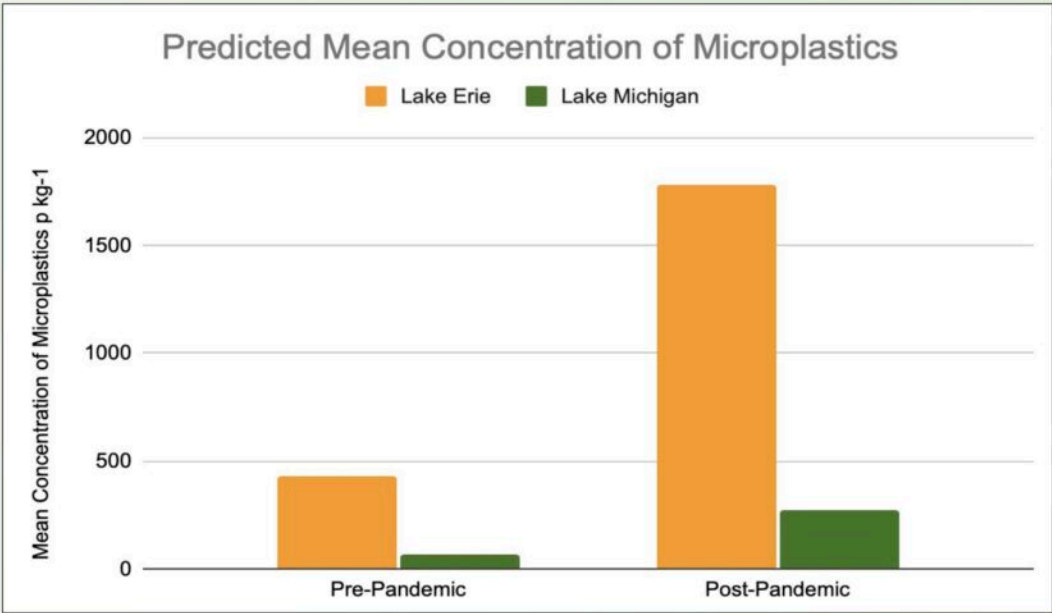


Figure 3. Our predictions about how single use PPE used during the pandemic will influence the amount of microplastics within the Great Lakes.

INTENDED ANALYSIS

We identified PPE as a categorical independent variable and microplastics as a continuous dependent variable. Since Lake Michigan and Lake Erie offer a broad temporal scale, we will use an observational study. After samples are collected, conducting a T-test will allows us to infer if there is a significant relationship between PPE production and microplastic pollution in aquatic environments.

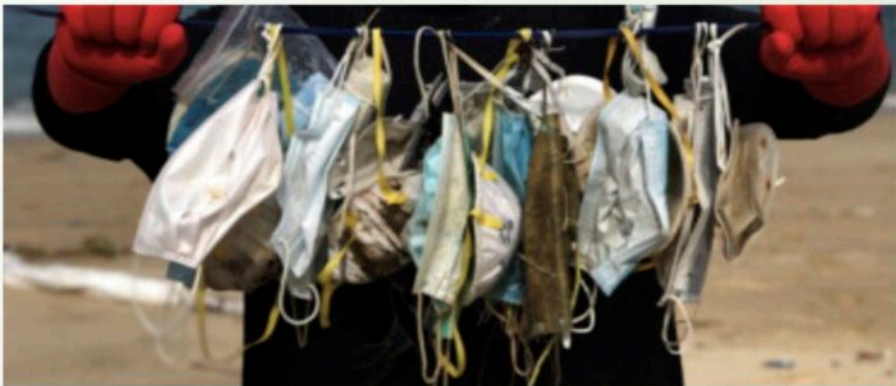


Figure 4. Masks have been making their way into the Lakes and their fibers are a source of microplastic

EXPECTED BENEFITS

Wearing masks is one of best ways people can protect themselves from COVID-19 (CDC, 2021). Given that they have become so popular it is extremely important to understand the potential impacts masks can have on our ecosystems, specifically aquatic. Our study will bring light to the harsh effects of using single use plastics and possibly encourage people to wear reusable/ washable masks.

Literature Cited: Zhang, Elissa J, Aitchison, Lucy P, Phillips, Nicole, Shaban, Ramon Z, & Kam, Andrew W. (2021). Protecting the environment from plastic PPE. *BMJ*, 372, N109; [Protecting the Env. from PPE](#) - Benson, Nsikak U, Bassey, David E, & Palanisami, Thavamani. (2021). COVID pollution: Impact of COVID-19 pandemic on global plastic waste footprint. *Heliyon*, 7(2), E06343; [Covid Pollution Footprint](#) - Aragaw, Tadele Assefa. (2020). Surgical face masks as a potential source for microplastic pollution in the COVID-19 scenario. *Marine Pollution Bulletin*, 159, 111517; [Surgical Face masks as a potential microplastic pollution](#) - Fadare, Oluniyi O, & Okoffo, Elvis D. (2020). Covid-19 face masks: A potential source of microplastic fibers in the environment. *The Science of the Total Environment*, 737, 140279; [Face masks: a source of microplastics](#) - Berman, J. D., & Ebisu, K. (2020). Changes in US air pollution during the COVID-19 pandemic. *Science of the Total Environment*, 739, 139864; [Changes in U.S. Air Pollution during Covid](#) - Lenaker P., Corsi S., & Mason S. (2020) Spatial Distribution of Microplastics in Surficial Benthic Sediment of Lake Michigan and Lake Erie. *Environmental Science & Technology*, 55, 1, 373-384; [Spatial Distribution of microplastics in Great Lakes](#).