

# Did the COVID-19 Lockdown Impact Water Quality in New York Harbor?

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Waterways such as the Hudson River play an integral role in agriculture, health, transportation, recreation, energy, and sustaining biodiversity. Although water pollution in New York Harbor has been extensively studied, the reduction of millions of commuters during the COVID-19 lockdown presents an unprecedented opportunity to study human impact on water quality. We used remote sensing data to assess how the COVID-19 lockdown impacted water quality in New York Harbor, particularly in areas near Combined Sewer Outfalls (CSOs). This technique has previously been used to measure water quality in the Hudson River. We used ACOLITE to process Landsat-8 and Sentinel-2 images from 2015-2020. The algorithms “t\_nechad”, “spm\_nechad”, and “kdpar\_qaasw” were used to measure turbidity, and “chl\_oc2”, “chl\_oc3”, “chl\_re\_moses3b”, “chl\_re\_moses740”, and “chl\_re\_mishra” to measure chlorophyll concentration. After uploading processed images into SeaDAS, we extracted values from pixels corresponding to Department of Environmental Protection (DEP) field sites. By comparing pixel values with DEP data we determined that the chlorophyll algorithms did not produce accurate readings of chlorophyll concentration in New York Harbor. We focused on analyzing turbidity at five DEP sites, four of which were located around wastewater treatment plants, to assess any CSO-induced changes in water quality. The frequency of usable satellite data from 2020 was severely limited by cloudiness, so we combined Landsat-8 and Sentinel-2 turbidity measurements ( $R = 0.8685$ ) to form time series for each site. Although turbidity strongly fluctuated throughout all years, preliminary analysis shows that water was less turbid during the lockdown around the North River CSO, but there was no significant change in turbidity around other CSOs.