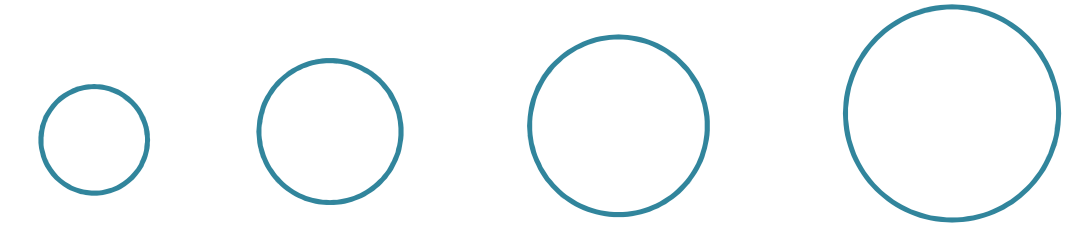
Plastic pollution in the ocean, its sources and its impact: An overview

Visualization by Sonali Johari

Plastic pollution is currently one of the biggest environmental concerns. Ever since the introduction of plastic in the late 1950s, there has been a boom in its production. However, safe disposal of plastic and its recycling has not been implemented, leading to pollution both on land and water.

We know that plastic is not biodegradable and can take more than hundreds or even thousands of years to break down. My project aims at exposing how greatly we have polluted the world's oceans, to the point that it cannot be reverted. There are 4 basic kinds of plastics in our oceans,



0.335 - 0.999 mm (CD1)

1.0 - 4.75 mm (CD2)

4.75 – 200 mm (CD3)

> 200 mm (CD4)

It is very important to understand where most of the pollution originates, what kind, the density of pollution and how it affects the environment.

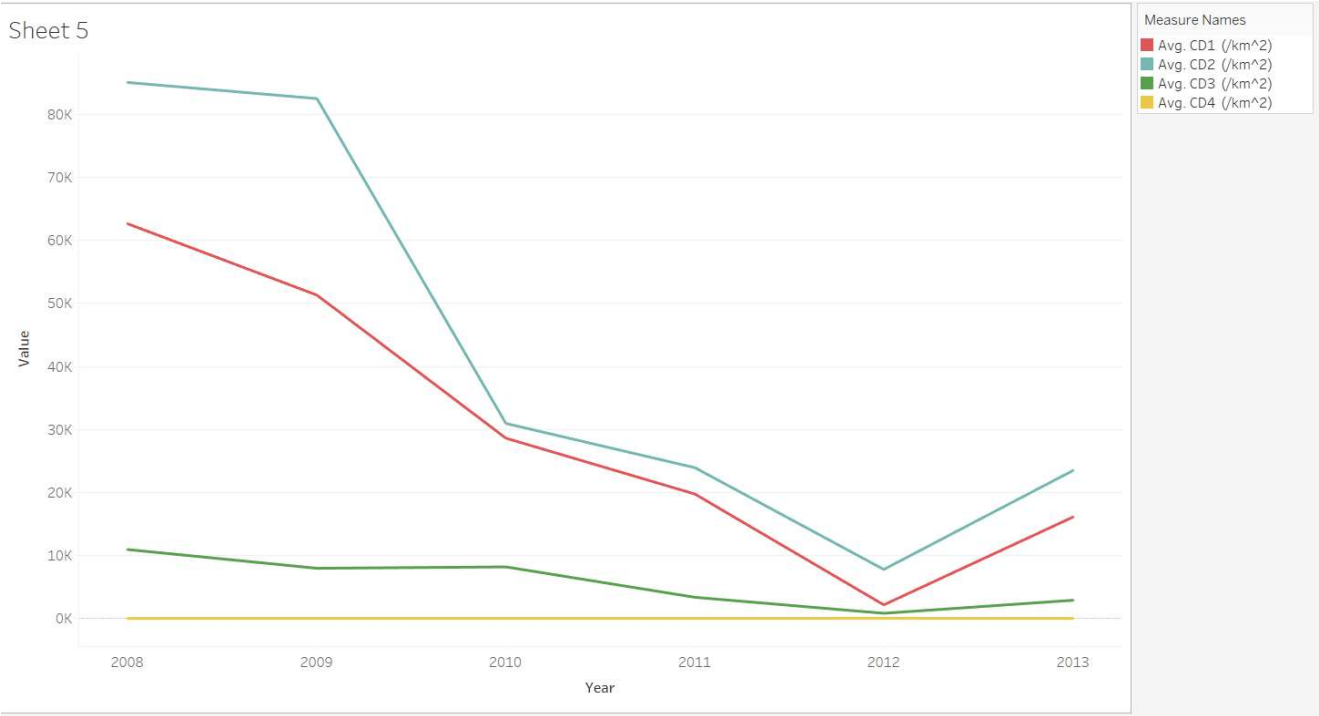


Figure 1

What we can analyse from the above line graph (Figure 1) is that the density of ocean pollution was at an all time high, which steadily decreased from 2007 to 2012, which is an all-time low. This can be due to 2 reasons – A large scale oceanic clean-up, or an ineffective data logging. As we notice a rise in the trends after 2012, we can assume it is the latter.

Another factor that we can notice is that the biggest pollutant seems to be CD2, followed by CD1. The amount of CD3 and CD4 is not as alarmingly high as CD1 and CD2, but most certainly as concerning.

By plotting these values on a world map, we can have a better look at the sources of these pollutants, and which countries seem to be disposing most of their wastes into the ocean.

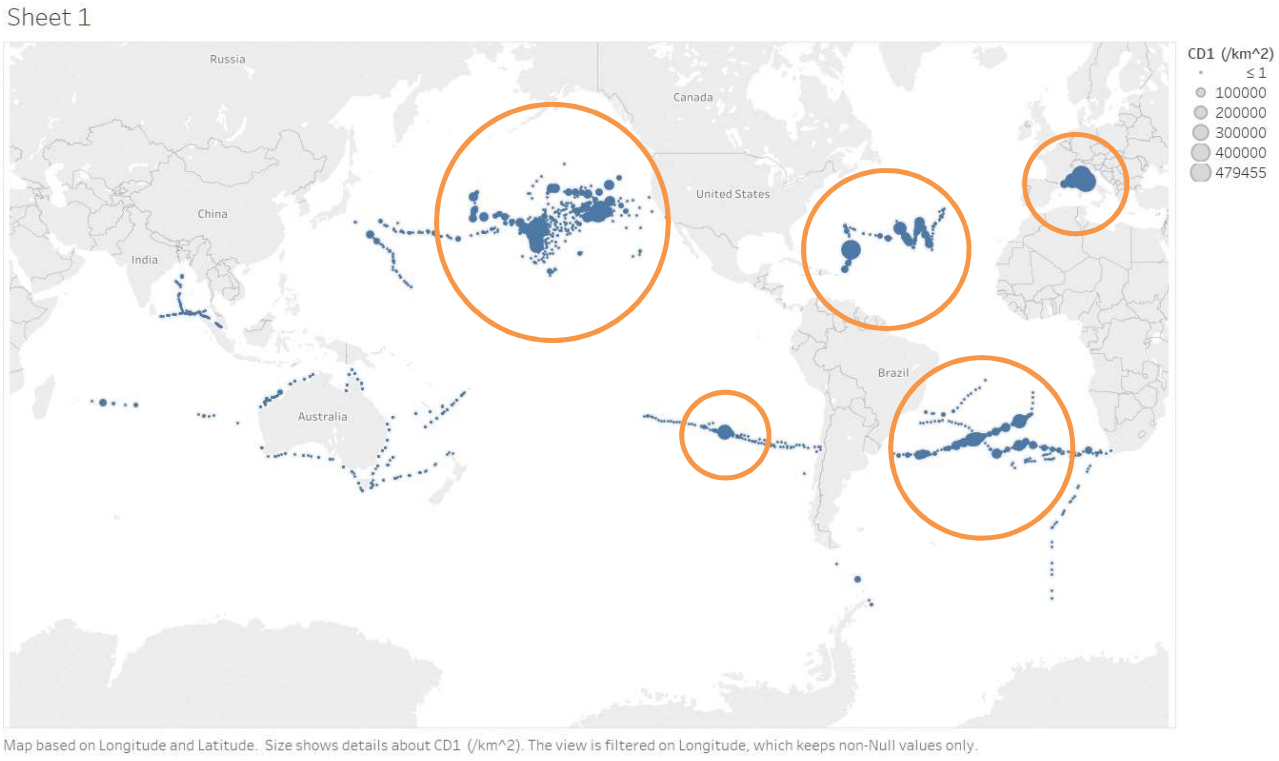
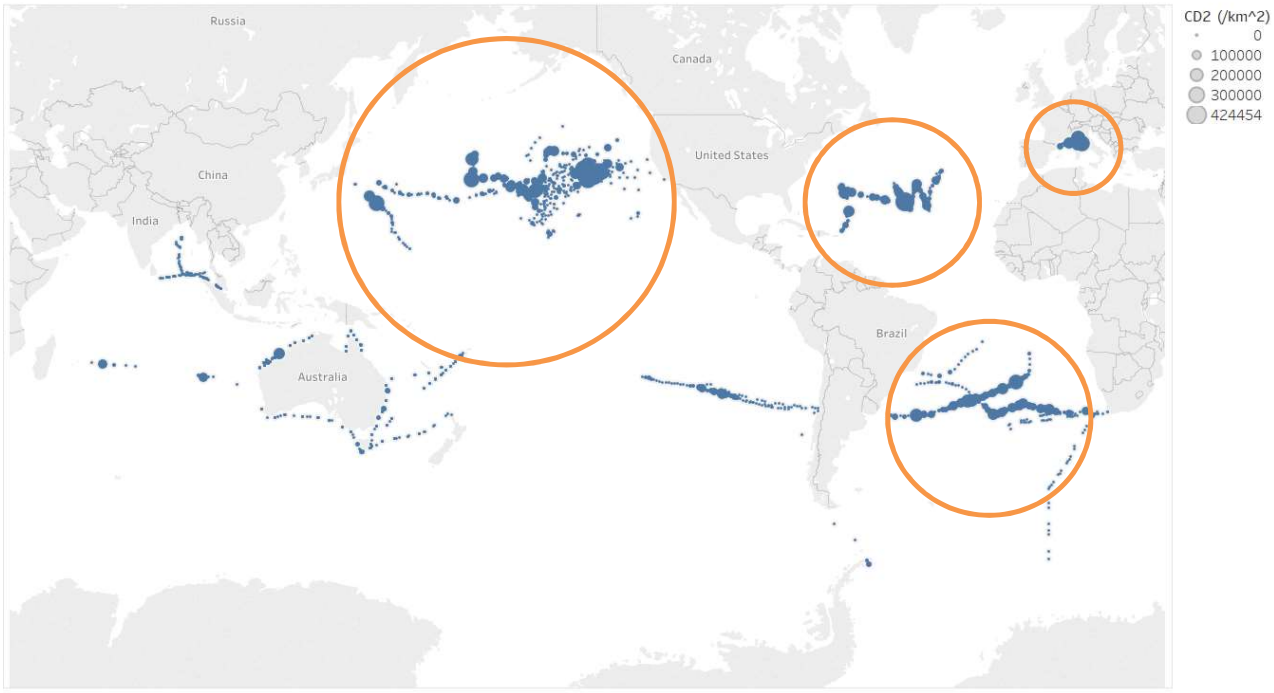


Figure 2

The above chart (Figure 2) depicts the 5 most polluted oceanic waters with respect to the CD1 pollutant.

Most of the pollutants seem to be sources at the following regions: US, South America and Europe. Some pollutants can be seen around Australia and India, but it is not that dense.

Sheet 2

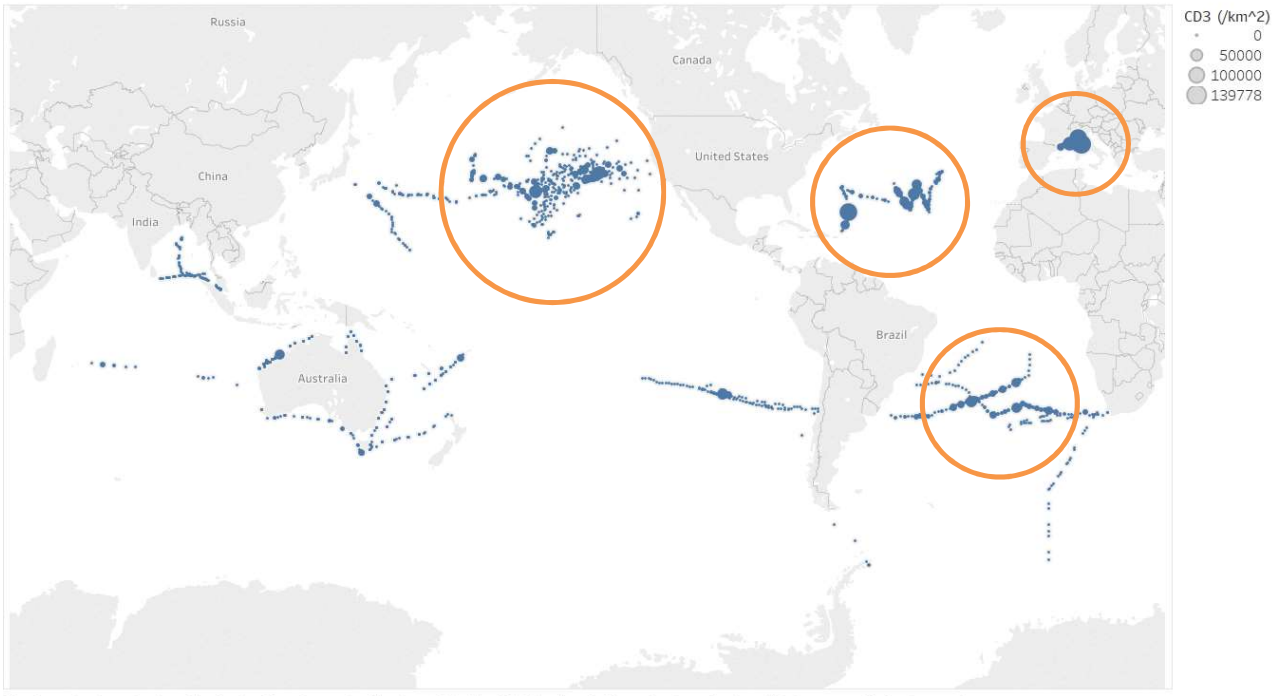


Map based on Longitude and Latitude. Size shows details about CD2 (/km^2).

Figure 3

The CD2 pollution in the Pacific Ocean is very alarming. Spanning from Japan to the West Coast of USA, this is the biggest patch of ocean pollution observed yet. There seems to yet again a patch on the East Coast, a big concentration near Europe and also to the right of South America. There are some pollutants visible on the west of Australia and in the Bay of Bengal, but not as dense as compared to these other regions.

Sheet 3



Map based on Longitude and Latitude. Size shows details about CD3 (/km^2). The view is filtered on Longitude, which keeps non-Null values only.

Figure 4

Not as dense as CD1 or CD2, there definitely is some CD3 pollutants in the oceans, again mainly in the areas observed in figures 2 and 3.

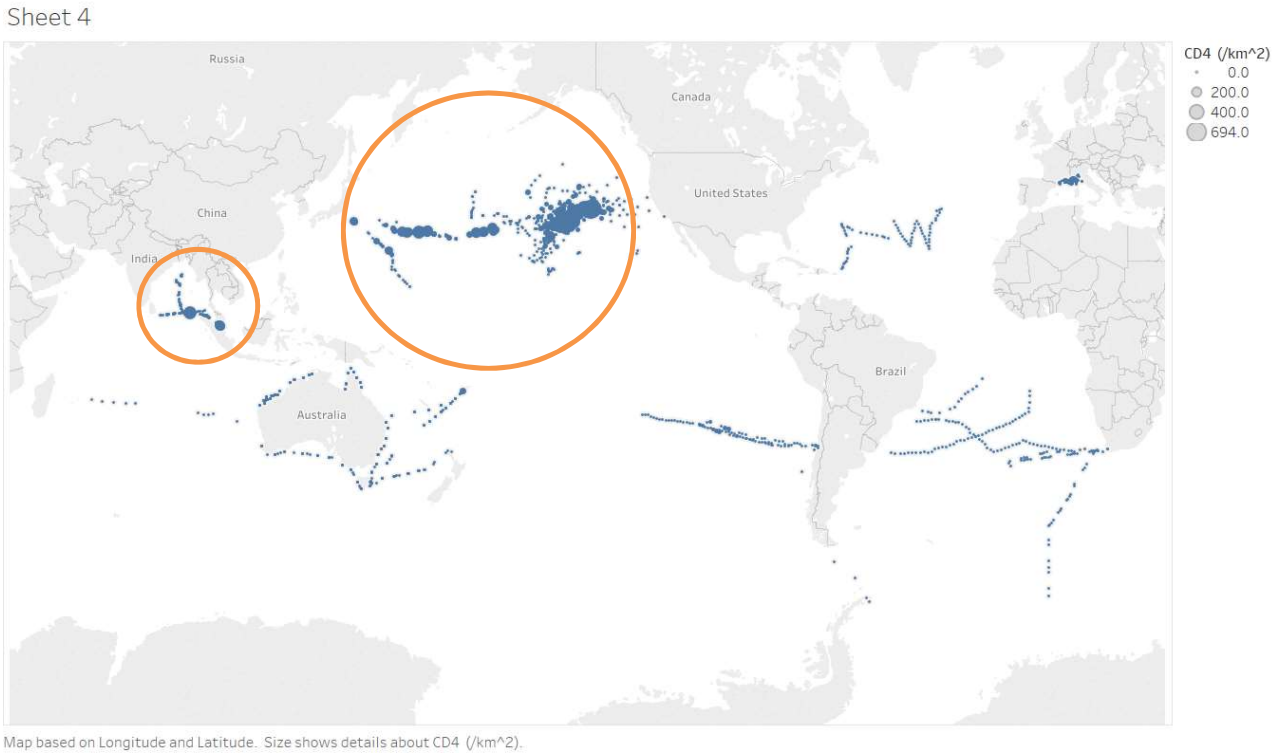


Figure 5

We can finally notice some improvement in ocean pollution with respect to CD4, but here we can observe that a new area, i.e. the Bay of Bengal seems to be dense enough to be highlighted on the map. We can infer that although the pollutants CD1 to CD3 are not that prominent, the countries around the Bay of Bengal, especially India and East Asian countries seem to be the source of this dangerous pollutant.

So, to summarize, we can say that:

Trash accumulates in 5 ocean garbage patches, the largest one being the Great Pacific Garbage Patch, located between Hawaii and California.

If left to circulate, the plastic will impact our ecosystems, health and economies. Solving it requires a combination of closing the source and cleaning up what has already accumulated in the ocean.

Source: https://figshare.com/articles/Plastic_Marine_Pollution_Global_Dataset/1015289

References:

1) https://www.sciencedaily.com/releases/2012/04/120425192843.htm
2) https://www.theoceancleanup.com/