

WHY IT CANNOT WORK



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1. The real treat.

Nobody knows exactly how many billion tons of plastic garbage are floating in a layer 100 feet deep from the surface in the ocean vortexes that the currents and winds have created. Nobody has ever taken an aerial picture of one of those “garbage islands” simply because they are more a sort of “soup” than a thick layer whose density varies from 100Kg to 1Kg/Km². (fig 1) Since a crushed plastic bottle weights around 25gr, the density range is 4000-40/Km². The maximum being 1 bottle every 250m²

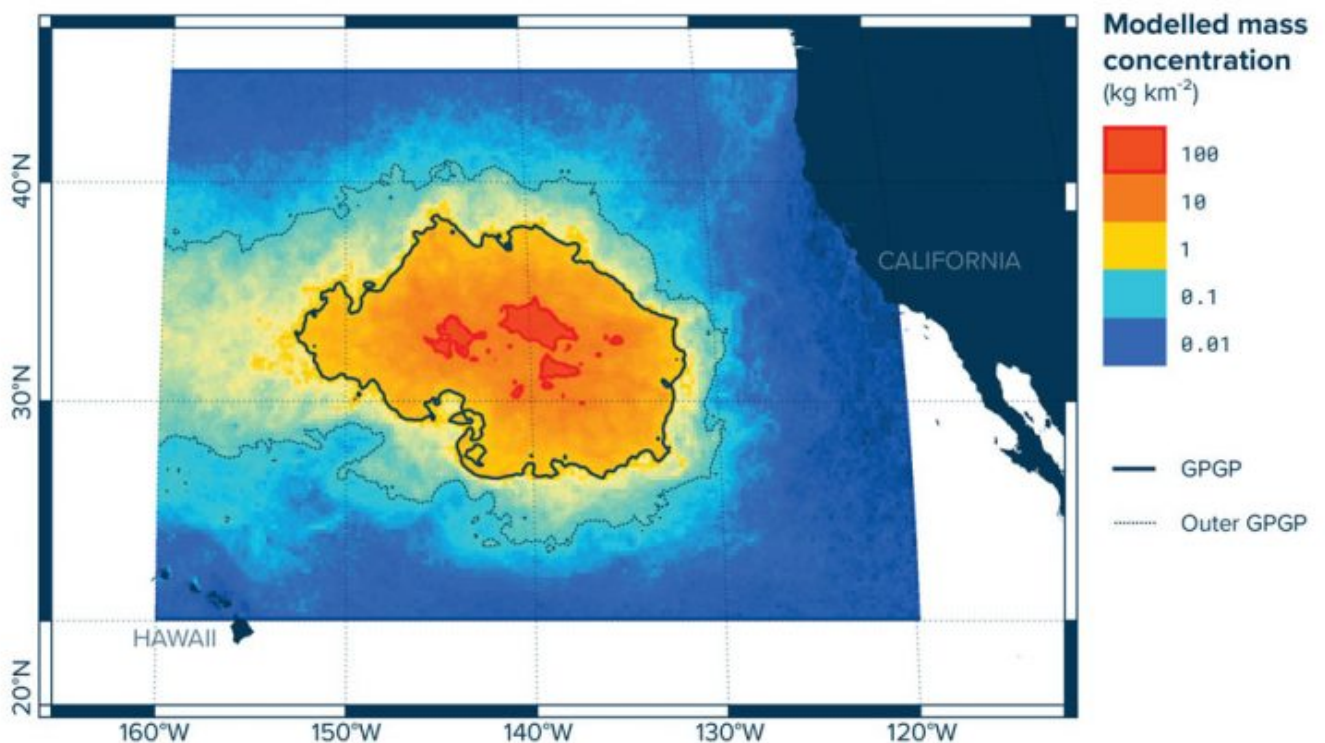


Fig 1

There are 5 of those giant vortexes (Fig 2) but we will focus on the most known of them all, i.e. the North Pacific convergence zone. Moreover, we will be considering only the macro plastic garbage pollution since it is simply unthinkable to recover with mechanical means, in the open seas, micro and nano plastics. These, when not eaten by plankton and the sea-living fauna, will eventually drop to the bottom and pollute it for centuries. The mass of the macro plastic garbage is less than 40% of

the whole garbage soup. This will be eventually photo-degraded, become chunks of micro-plastic and follow the said destiny.

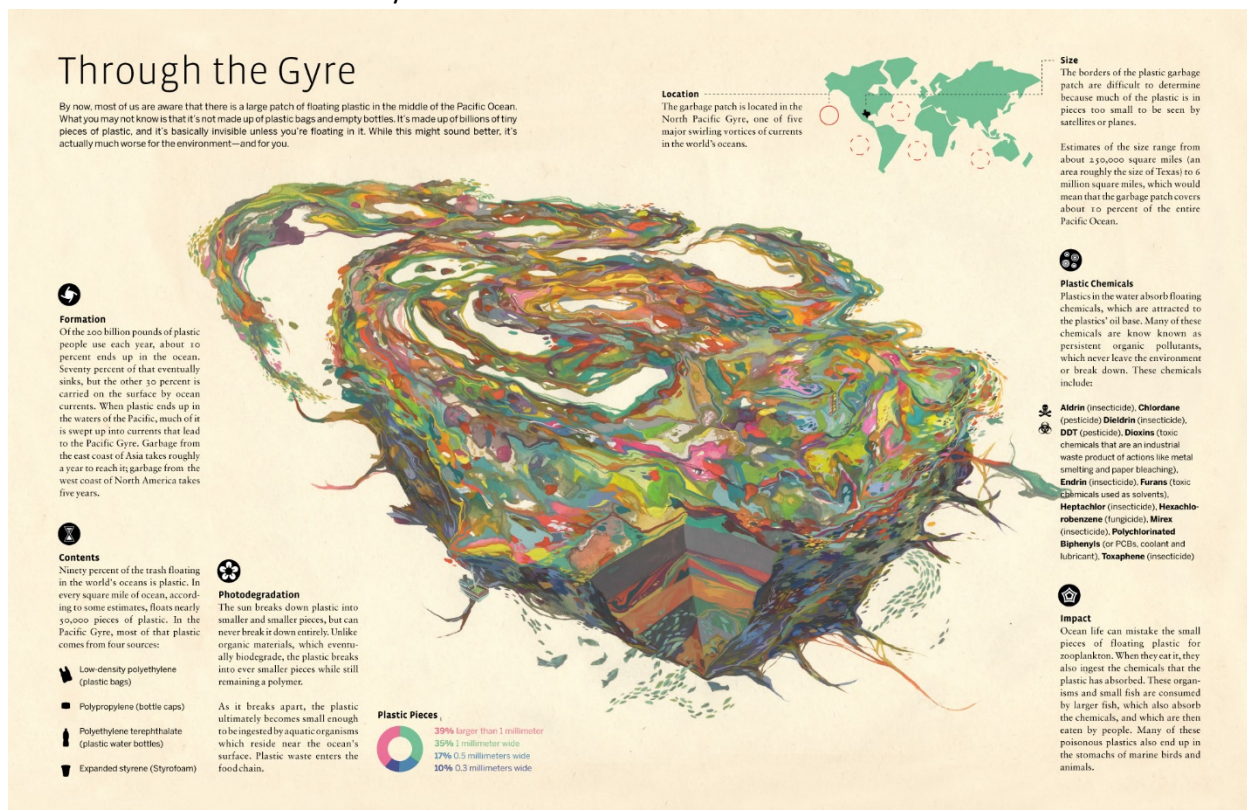


Fig 2

It takes more than one year to a floating chunk of plastic to go from the east cost of Asia to the rim of the North Pacific Vortex and almost five years if coming from the US West Coast (Fig 3)

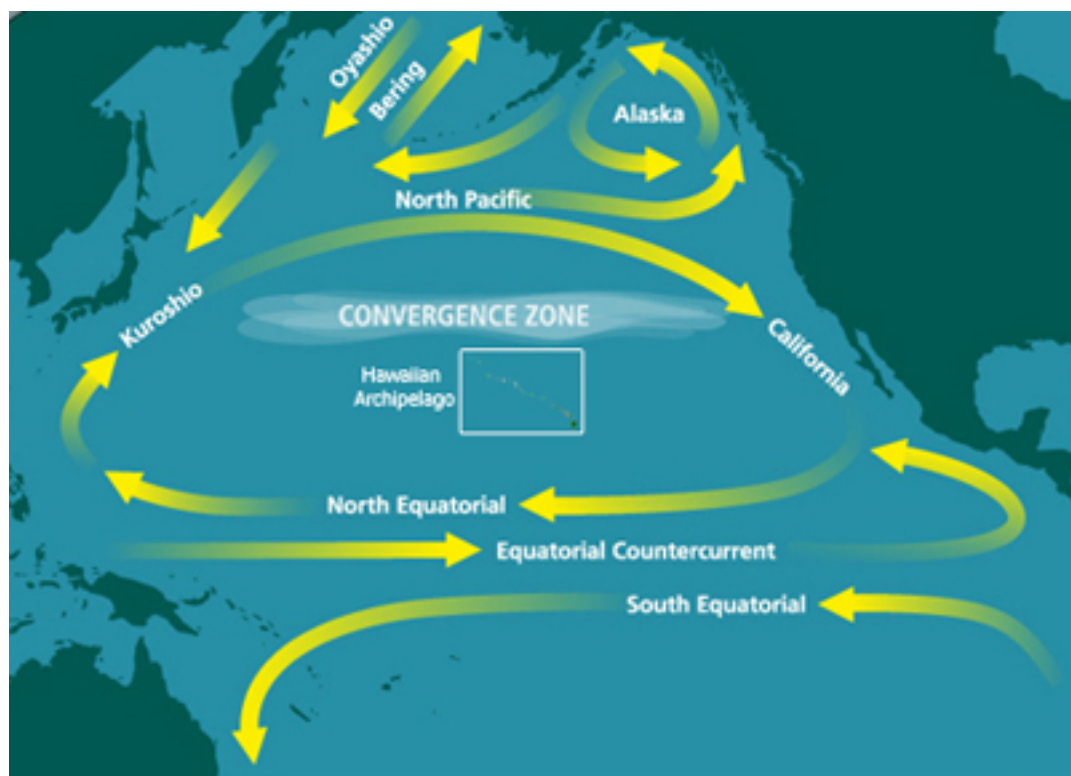


Fig 3

2. The Operation Zone dimensions

As it can be seen from Fig. 1, the highest density of plastic garbage area (no less than $2\text{Kg}/\text{Nm}^2$) extends roughly 25° in longitude and 12° in latitude in a rectangle of $1275\text{Nm} \times 720\text{Nm}$, around 918.000 Nm^2 . Theoretically, even if extremely expensive and difficult, it is an area that can be swept and turned into a (floating only) plastic free Zone.

3. Oceanography and Meteorology/considerations on passive or drifting gears/barriers.

Please see <https://www.aoml.noaa.gov/phod/docs/jgrc20210.pdf> for Pacific Ocean currents and http://www.stormsurfing.com/cgi/display_alt.cgi?a=npac_slp for winds (other than trade winds) direction and force. In a nutshell: while the currents in the examined area are rather constant and not very fast ranging $0,1 - 1\text{ KTS}$ describing a clockwise elliptical pattern, (Fig 4)

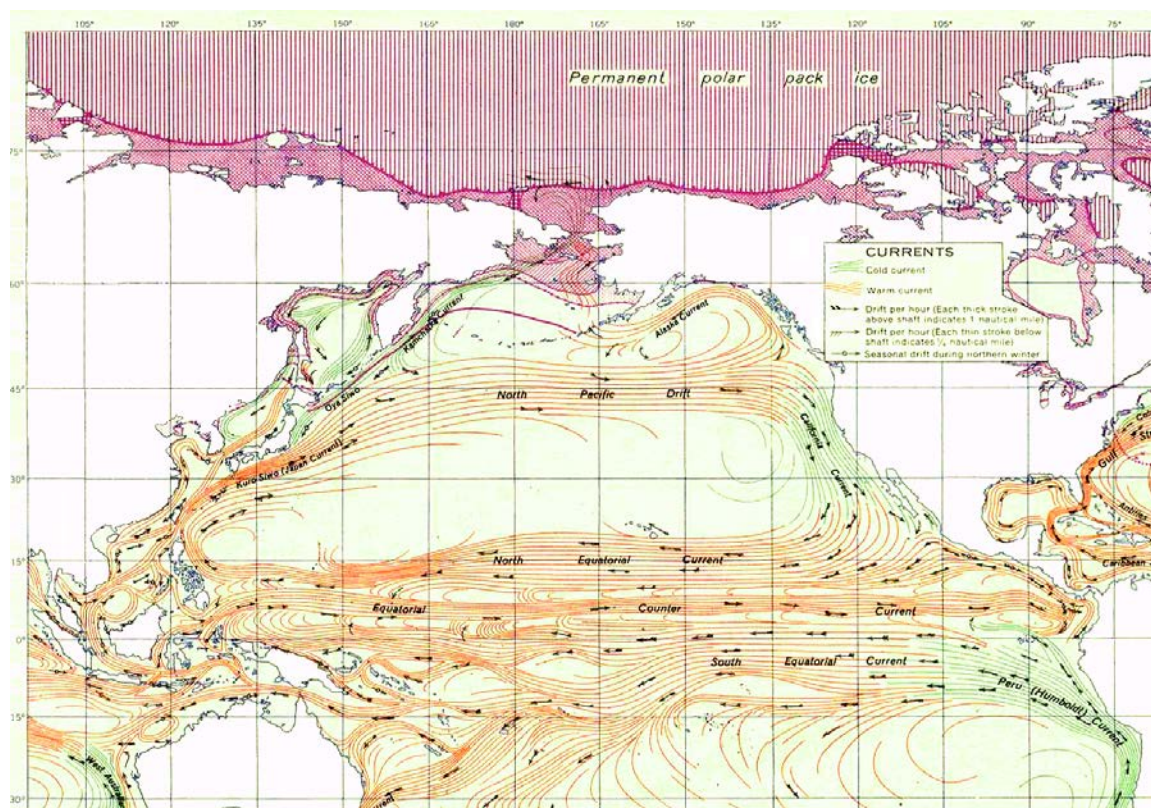


Fig 4

the wind changes in speed and direction as the weather (fronts) move eastward. (Fig 5) The wave height and period depend on the wind duration, intensity and the fetch. In the Pacific Ocean 18 m high waves have been observed.

Approaching those conditions <https://www.dezeen.com/2019/01/07/ocean-cleanup-suspended-pacific-plastic/> any drifting barrier, left in place to catch plastic garbage would have difficulties not to turn into a drifting, useless and navigation-dangerous wreck.

<https://www.dezeen.com/2019/05/23/the-ocean-cleanup-failure-great-pacific-garbage-patch-plastic/> In spite of the said problems they keep stating “The Ocean Cleanup aims eventually to remove 90 per cent of plastic waste from the world's oceans using giant U-shaped floating rigs. The non-profit organization has raised \$30 million in funding.”

During normal operations a drifting barrier also if “moored” at a sea anchor would keep drifting in the current but would be necessarily oriented downwind in respect of the sea-anchor. But nobody

can guarantee that, swirling the wind, it does not collide with the downwind anchor thus spilling the caught plastic garbage.

In heavy seas conditions (over sea force 3-4), it would be rather difficult also for small 20 mt Trawlers, trailing the plastic garbage nets, to continue normal operation.

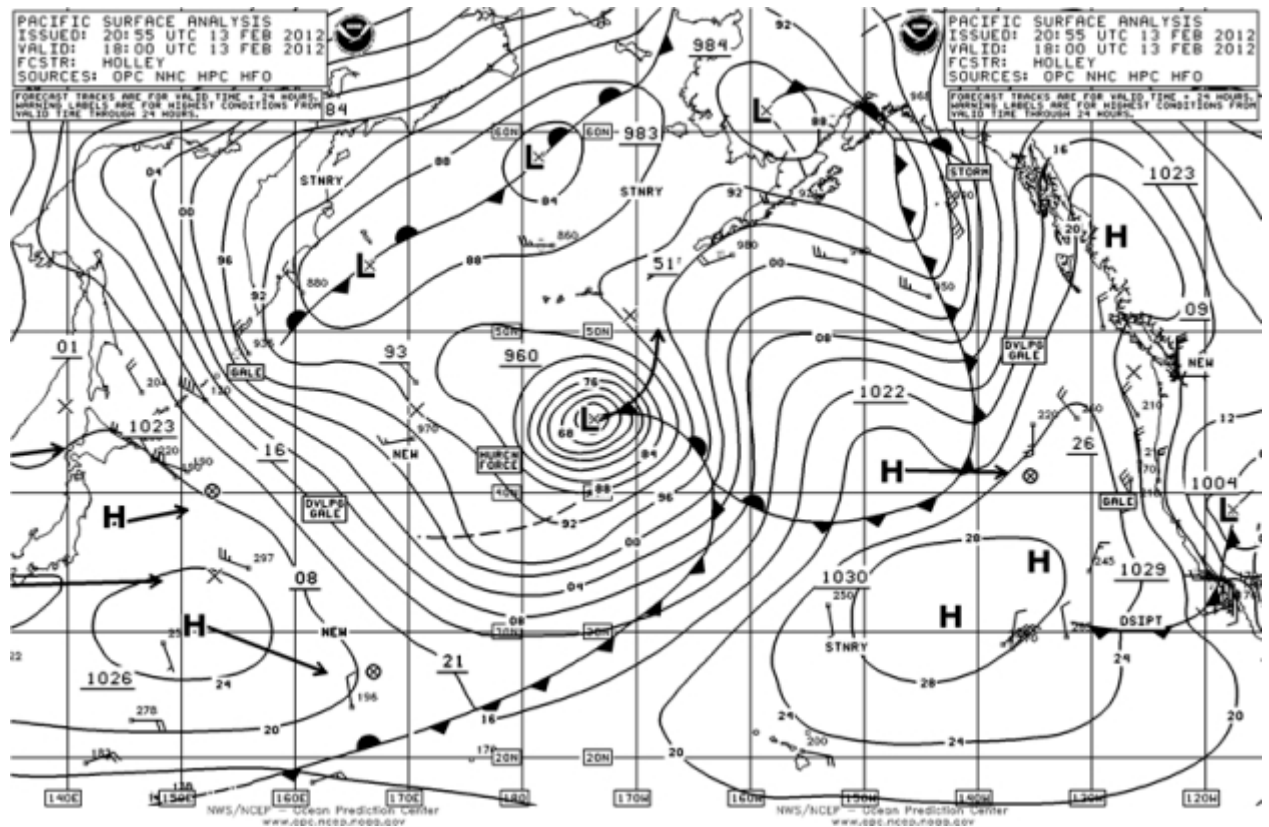


Fig. 5

4. Sweeping procedures

In no wind conditions a drifting barrier would catch no garbage since it floats at the same speed of the floating plastic. It has to be moored somehow to something. A sea anchor could be the answer, but if the wind get stronger the two barrier heads would close thus reducing accordingly the effectiveness of the system. This is the reason why IYFR will never support OCEAN CLEANUP nor those Organizations, Rotarian or not Rotarian sponsoring the said “non-profit” organization.

This being clear, IYFR thought to examine a more conventional system to sweep Oceans. We imagined to employ used and transformed Navy LPDs Units (Landing Platform/Dock) each one carrying a flotilla of 12 Trawlers. Since 5 couples of Trawlers sweeping on a front of ½ Mile at a speed of 4Kts, working in 3 shift per 24 hours/day, can clean an area of 48Nm², to “clean” the North Pacific vortex area it will take some 19.125 days, something more than 52 years. Using a combined TASK FORCE composed by 10 TASK GROUP sailing 365 days/year, H24 could (absolutely theoretically) it could be done in almost 5 years. But used and transformed Naval Vessels would not even last one year at the said rhythm. It would be much wiser to have sufficiently recent Ships to do the job; but even in those conditions, taking into the due consideration the maintenance periods, the normal crew change every six months at sea and the sea state... the said 5 years might easily become 8-10.

5. Naval Units and crews requirement. Logistics

Each TG could be composed by a new/transformed LPD Unit each embarking 12 Trawlers and some 600 Sailors, and a logistic ship (complement 300) to transform the recovered plastic into reusable oil (to refuel the LPD and the Trawlers) and to weekly replenish with fresh food the operating LPD

6. Cost effectiveness of the LPD solution.

Each TG, even if working H 24 in an average part of the vortex ($20\text{Kg}/\text{Nm}^2$) could recover no more than 1 Ton of plastic garbage per day. **150 USD/Kg**. It is not even the case to pose the question “it is worth-while?”

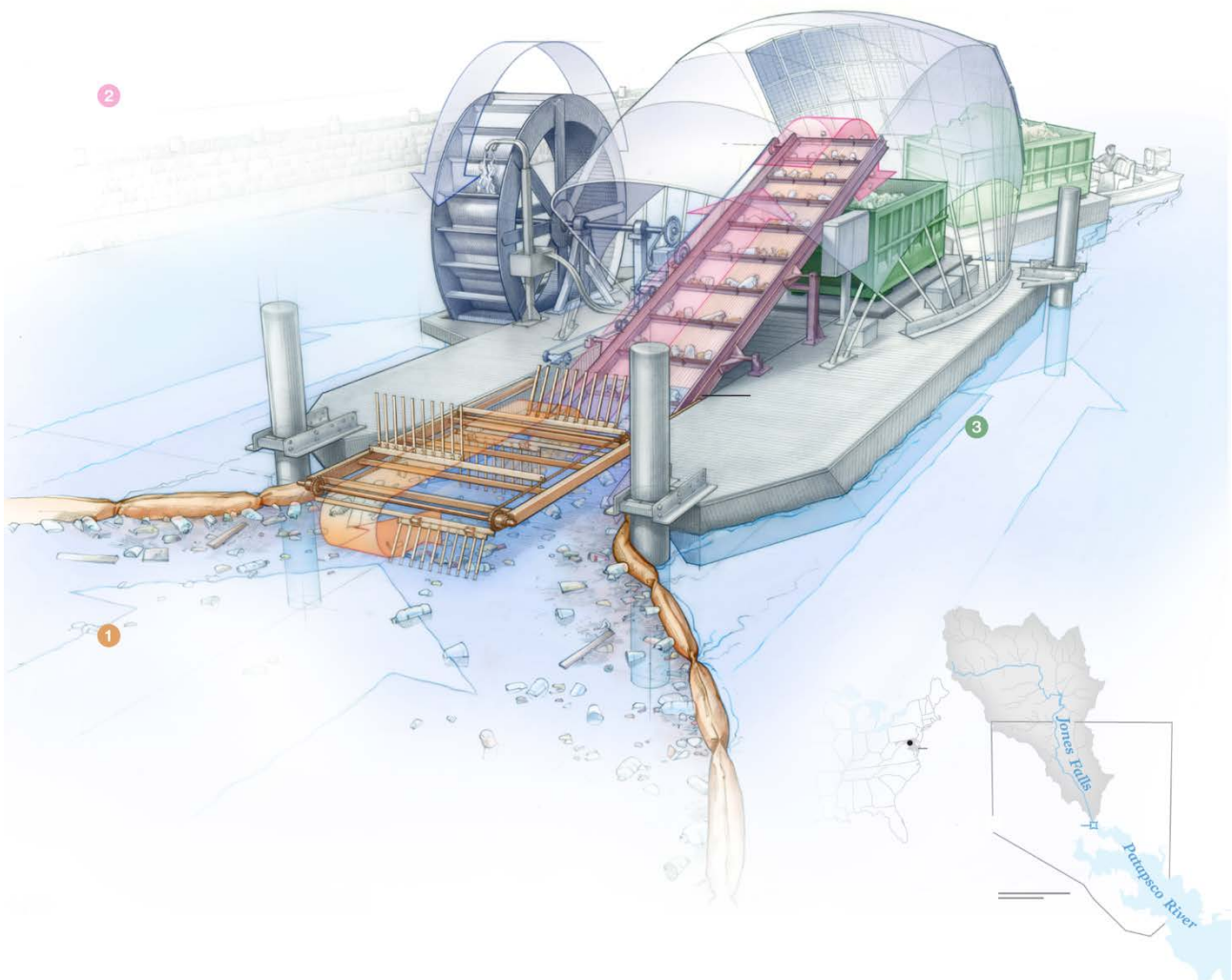
7. Conclusions

Even if we, forgetting about the cost/effectiveness, would give a positive answer to the rhetoric question of previous point 6., we should also consider that an average of 7 years is necessary to declare: MISSION ACCOMPLISHED.

HOW MANY MILLION TONS OF PLASTIC GARBAGE WOULD HAVE ENTERED THE OCEANS IN THE MEANWHILE?

WOULD IT NOT BE BETTER TO CLOSE THE TAP INSTEAD OF STOPPING THE OVERFLOW WITH A DROPPER?

OTHER SOLUTIONS/SITES & PERSONAL COMMENTS



a. <https://www.oceanphoenixproject.com/> pure madness

b. <https://oceancleanx.com/ocean-cleanx-solution/>

<https://oceanxgroup.org/index.php/expertise/> utopic way to lose time and money on a rather useless device.

c. <https://lnx.castalia.it/en/servizi/1999-2008-river-tiber-rome-floating-solid-refuse-pollution-environment-ministryrome-municipality/> has sense and has proved to be effective

d. <https://theoceancleanup.com/rivers/> same family of the ocean barriers. Same destiny. Cost for 1 device is 700.000 Euro.

e. <https://www.seadefencesolutions.com/> honest and affordable solution. Being tested in a most polluted river in Thailand

f. <https://www.youtube.com/watch?v=stZcW-b8lT0> I would see this perfect device that is apt for (very and calm) confined waters to go out skimming oceans in sea force2

g. <https://www.youtube.com/watch?v=stZcW-b8lT0> these people believe that the oceans dimensions are the same of a medium-large swimming pool. Costs 3.500 Euro. i.e. 5€/Kg of plastic f it works per 3 years. See... point a.

Rapallo, 04 21 2020



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IYFR Past International Commodore

IYFR Operation Plastic Free Waters Coordinator