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Clean up the ocean and rivers from plastic in 1 year to 100%

Proposal for ocean and sea waste collection and recycling technology

Subject of proposal

It is known that the Pacific Ocean and other areas of the World Ocean have accumulated millions of tons of mainly plastic waste ("**Eastern Garbage Patch**" a.k.a. "**Eastern garbage continent**", "**Pacific Trash Vortex**", or "**Pacific garbage collector**" etc).

- **the proposal** is given on how to clean the ocean from this plastic, and in addition;
- **how to stop the flow of this garbage** from now on, cleaning up the flow of the great rivers.

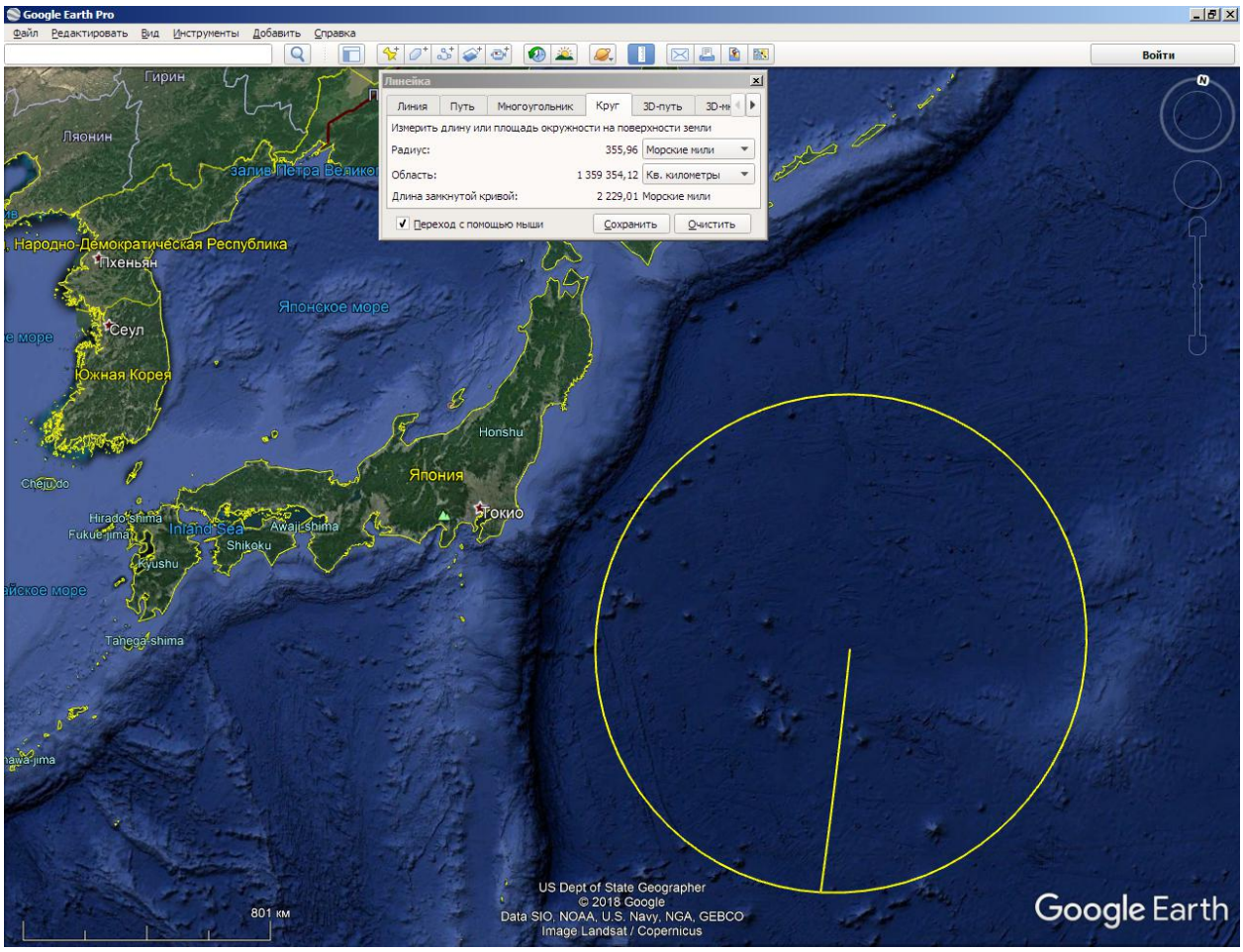

Fig.1. Big Pacific garbage spot - western island off the coast of Japan

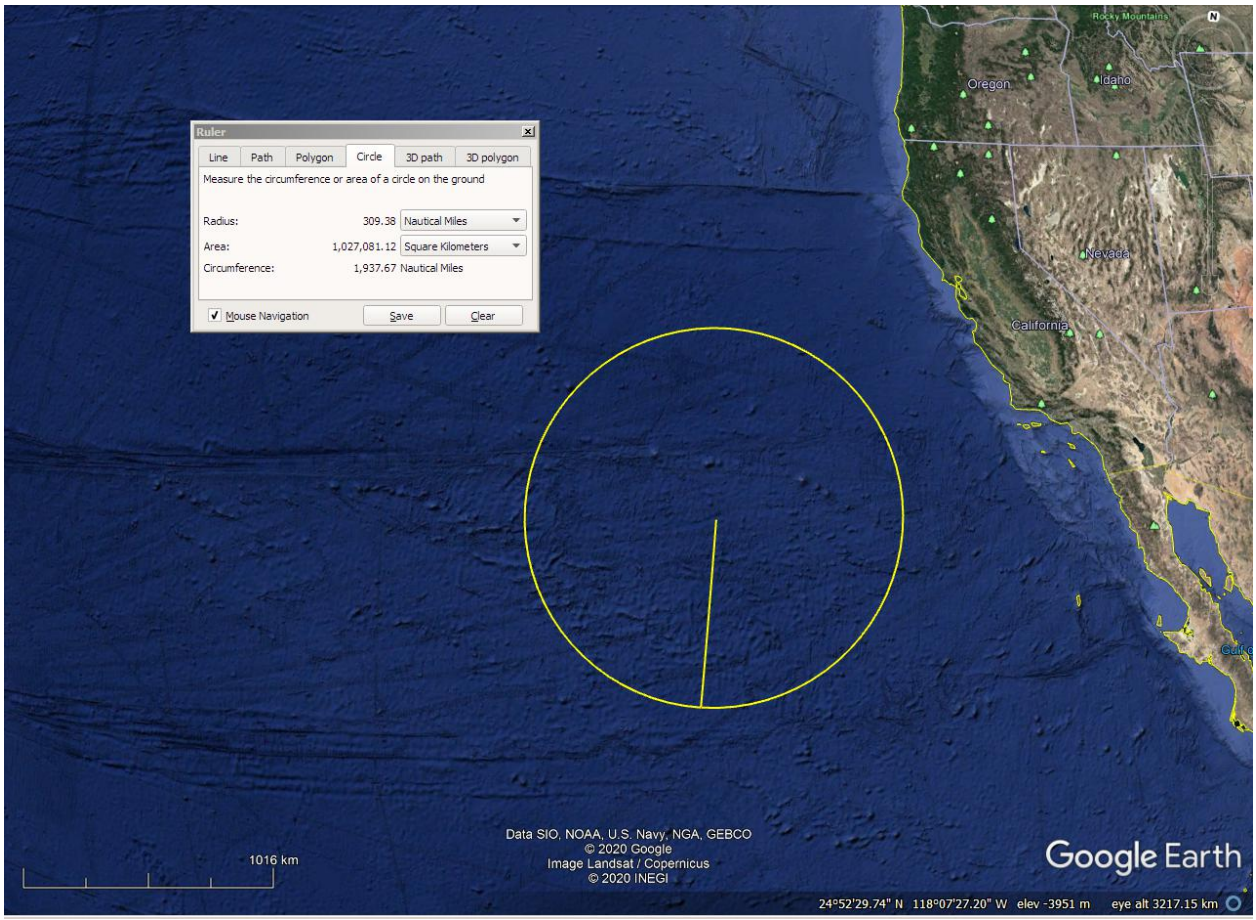

Fig. 2. Central region of the eastern spot off the U.S. coast, - radius 300 m, area - 1.3 million sq.km.

State of the matter:

Like other zones of the world ocean with a high content of garbage, the "Great Pacific Garbage Slick" was formed by ocean currents gradually concentrating in one area the garbage thrown into the ocean.

The garbage spot occupies a large, relatively stable area in the North Pacific Ocean, limited by the North Pacific Current System (an area often called "horse latitude" or latitude of the dead band). The system whirlpool collects garbage from the whole North Pacific Ocean, including the coastal waters of North America and Japan. The waste is picked up by surface currents and gradually moves to the center of the whirlpool, which does not release garbage beyond its limits.

The exact size of the area is unknown. Approximate estimates of the area vary from 700 thousand to **15 million km²** or more (from 0.41% to 8.1% **of the total area of the Pacific Ocean**). Probably, there are more than **100 million tons of waste** in this area.

Fig. 3. Big Pacific garbage spot in the places with the highest concentration.

Fig. 4. View of the Big Garbage Spot from Space (eastern island)

Attempts to solve:

In 2008, Richard Owen, a construction contractor and submarine instructor, organized the "Environmental Cleanup Coalition" (ECC) to address pollution issues in the North Pacific. The ECC is calling for a fleet of ships to clear the waters and open a Gyre Island recycling lab.

In 2009, an ocean scientist Dr. Markus Eriksen and his wife Anna Cummins formed the "Five Gyres Institute". The Institute studies the problems of world ocean pollution, the already discovered garbage stains, and is also looking for new ones.

There are several other publications that threaten to collect 41% of garbage in 10 years and similar arbitrary statements, in particular, that make you think that garbage will stop coming as soon as they start collecting it.

Garbage in other oceans:

In 2010, a significant garbage spot was found in the central part of the Indian Ocean, but to date its characteristics have not been determined. Most likely, constant trade winds blowing in the Indian Ocean, blow this garbage into the southern Atlantic, a stream south of the Cape of Good Hope. The issue requires a separate study, and the solution may be in the southern tip of Africa.

concept of the technology | solution

It is proposed to collect almost all garbage in the areas of its main congregation in the World Ocean, without stretching the case for decades, without being distracted by fruitless reasoning and not limited to the incomprehensible 41 percent, as mentioned above.

This unit looks especially touching next to 40%, which proves that in reality neither 40%, nor 20%, nor even 10% of this garbage can be collected according to the ideas of these publications.

Our idea of technology is based on several key principles and components, which, when combined together, will give an effect unattainable by any other means.

1. The density of waste distribution in the World Ocean, if we take its mass, according to a cautious estimate, is 10 million tons, and the main area - 10 million square kilometers, will be 1t/sq.km, or only 1 g / sq.m. For example, the region in Fig.1. with the area of 1.3 million sq. km contains only 1.3 million tons of plastic under this assumption. This density estimation seems realistic and there is very little probability of density above 10 g/sq.m. However, as well as the density of 0.1 g/sq.m, it is likely that the density is also severely underestimated.

   So, let's take for the initial data the garbage density of 1t/sq.km, and its distribution by height, now unknown to the authors, let's take uniform at the depths from 0 to 100m. This assumption has a right to exist, because if the garbage is found on the surface, it

means that it is even deeper. And if the depth below which the garbage is not found, we can always reduce the limit depth of 100 meters to 50 meters or 25 meters in the future.

Total score

1.3 mil sq. km, 1.3 mil. tons of garbage, volume of ocean water treated - 130 bil. sq.m

2. The technology provides for the collection of plastic by drift nets of a special form, **known to the authors**, throughout the garbage stain in its boundaries by trawling special devices. including those containing the fence of trawls from the ingress of fish and other ocean inhabitants in a way **known to the authors**.

   Many long special drifters of long length are used, up to ten kilometers each, depending on the density of debris in the area of trawling, special shape at a depth of cutting off the trawling, for example, 100 meters.

   Towing resistance of such a network with length of 10000 m and height of 100 m, area of 1 million square meters, with a speed of 0.1 m/s, safe for the inhabitants of the sea, will be 500 tons of force, and towing capacity - 500 kW.

   Let us estimate what one such network will allow to do. Let's assume that the network operates in the mode of garbage collection at the front of 10 kilometers and a height of 100m, moving at a speed of 0.1 m/s. Then in an hour it will pass 360 meters, clearing an area of 3.6 sq.km.

   With a garbage density of 1 t/sq.km, the network will collect **3.6 t of garbage per hour**.

3. How many hours of operation of one such network will it take to clean completely the Big Garbage Spot of **1.3 million sq.km**? One single such network will collect all garbage in 40 years of round-the-clock operation, and **40 networks - in a year**. The figures are, of course, **estimates**.

4. So, to clear **1.3 million square kilometers** of the ocean of debris and collect **1.3 million tons of plastic**, you need to run simultaneously **40 networks of 10 kilometers long** and 100 meters high at a speed of 0.1 m/sec. Garbage is collected at a floating base based on a large tanker with a deadweight of 250000 to one million tons, the more - the better. Moreover, today such tankers are not in great demand and are available at a very low price.

Fig. 5 VLCC tanker

Drifter nets are produced from the board of the floating base in the sea as a continuous front on the windward border of the garbage spot - on a part of it or all along perpendicular to the wind line.

After the release of all networks float-base tanker released on the wind from the networks of a group of autonomous tugboats known to the authors of the design, which are automatically distributed by algorithms known to the authors, distributed along the top edge of the network, power and other characteristics of tugboats, as well as the scheme of their arrangement known to the authors, and after attaching to the network begin its towing in the leeward direction, where at the design point meanwhile falls into drift tanker. Let's assume that the autonomy of towing vessels will be 10 hours, that is, the whole group of 40 networks with a total length of 400 km in 10 hours will pass 3.6 km, collecting garbage from an area of about 1440 sq.km - It will collect **1440 tons of plastic**.
Of course, the simultaneous finish of a 400-kilometer network line is not rational!

5. And it should be evenly distributed, say, 150 tons per hour for 10 hours of work. This is also part of the mentioned grouping algorithm.

6. The tugboats are automatically operated small vessels of 20 to 50 m length with electric drive on batteries with capacity from 500 to 50 kWh, and their screw drives should provide a stop from 10 to 50 mT respectively. These are not very large installations, given the low speed, with screw diameters from 1 to 3 m. Batteries are charged on board the tanker floating base or on its side from the power installation of the floating base. The grouping of tugboats is controlled by the above mentioned "algorithms".

7. After the process of garbage collection by one network of the float-base comes to one end of the filled network, tugboats release it and go for charging, and full of garbage network known to the authors way with cranes and slips rises aboard the float-base, known to the authors way prepared and processed into finished products.

8. In the process of processing, some products are used to produce new sets of networks. Networks are disposable, cast or other design known to the authors, taking into account the disposable nature of their application.

   Then plastic in the reactors is thermally transformed into combustible gas as fuel for on-board power plants, partially - liquid fuel, which is stored in the tanks of floating tankers.

9. **Is such an event economically efficient?**

Let's say we will get 500,000 tons of boiler or marine fuel at the price of $400 per ton as a result of cleaning one million tons of garbage from the surface of the World Ocean. **This is $200 millions** at least.

The case is not profitable enough, of course, if no one gives a cent for the fact that the World Ocean will be cleared of garbage.
But if you get at least $200 for cleaning a ton of garbage and attract several other economic benefits known to the authors - **the total effect can be billions of dollars**, and the political - dozens and hundreds of billions of dollars.

How to assess the global political and **political-economic impac**t of this operation without exaggerating the global scale?

10. The ocean is the habitat of billions of tons of phytoplankton, producing at least 50% of the oxygen that enters the Earth's atmosphere.
    Ask yourself the easiest question - is it worth the question whether you will breathe today or not, 1 dollar a day?

    The alternative is very simple - either you pay a dollar and breathe or you do not pay a dollar and you do not get oxygen, because the phytoplankton ate the garbage stain in the ocean. If you agree to give a dollar a day and $365 a year for your breath, and all the people of the Earth agree - then 7 billion for $365 will give **$2.5 trillion dollars in a year** at least.

    And for those 20 years, which accumulated this garbage in the ocean **$50 trillion dollars** in total.

11. This figure is most likely underestimated if not twice, then one and a half times. Because the ocean is not only phytoplankton, but also the fauna - the food of people, estimate for yourself how much more fish will give the ocean, cleared of garbage.

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Method and system of garbage collection from the flow of large rivers

It is known that garbage is carried to the Pacific Ocean (as well as to other areas of the World Ocean) by the great rivers of the Earth - primarily the rivers, on whose shores hundreds of millions and billions of people live. And it is useless to clean the ocean from plastic, if not to stop the new garbage from the ground, which is carried out by the "great rivers".

This rivers are :

- **Ganges**, with a basin of more than 1 million square kilometers, flows into the Bay of Bengal Indian Ocean,
- **Indus**, with a basin of about 1 million square kilometers, flows into the Arabian Sea of the Indian Ocean,
- **Yangtze**, with a pool of about 6 million square kilometers, flows into the South China Sea of the Pacific Ocean,
- **Zhujiang**, with a pool of about 0.5 million square kilometers, flows into the South China Sea of the Pacific,
- **Huang He**, with a pool of about 0.8 million square kilometers, flows into the Yellow Sea of the Pacific Ocean,
- **Mekong**, with a pool of about 0.8 million square kilometers, flows into the South China Sea of the Pacific Ocean,
- **Yukon**, with a pool of about 0.8 million sq.km, flows into the Bering Sea of the Pacific Ocean,
- **Amur**, with a basin of about 1.8 million square kilometers, flows into the Sea of Okhotsk of the Pacific Ocean,
- **Colorado**, with a pool of about 0.7 million square kilometers, flows into the Gulf of California Pacific Ocean,
- **Chao Phraya**, Thailand, with a basin of about 0.3 million square kilometers, falls into the South China Sea;

and a number of other rivers, which are undoubtedly suppliers of "raw materials" for education "**Big Garbage Pyat of Silent Ocean**".

State of the matter:

Like other zones of the world ocean with a high content of garbage, the "**Big Pacific Garbage Slick**" is formed by ocean currents gradually concentrating in one area the garbage thrown into the ocean. And most likely it is garbage runoff of the mentioned rivers.

Idea:
is extremely simple. As trash is carried by the rivers, we cover the riverbed with a network that extends from one bank to the other or to the middle of the riverbed, or less, and for particularly wide rivers - overlapping with steel seams on limited sections across the river.

1. Garbage from the river water flow shall be collected in the following order:
   - the ship sets up the net fixed at one end to the barrel or the other anchor at its second end, and the net gradually collects garbage in the water flow, signaling its filling with a sensor and control system. In order not to limit the navigation, you can put the net on half the width of the fairway in a chessboard order, with some overlap, and even on 2-3 nets in parallel that one at the other shore.

   - the ship sets up the network, fixed at one end, on the barrel or the other anchor at its second end, and the network gradually collects garbage in the water flow, signaling its filling with the sensor and control system. In order not to limit the navigation, you can

put the net on half the width of the fairway in a chessboard order, with some overlap, and even on 2-3 nets in parallel that one at the other shore.

2. After filling the network, the installer takes over the anchored end of the network and tows it to the second end, forming a trash-filled trawl, which it then tows to the ship or shore complex to process this debris in a way known to the authors. And while one net is not in place, the others perform its functions.

... Given the above, we can responsibly state that solving the ocean pollution problem is technically and commercially feasible and possible.

And the **solution to this problem** depends on follow factors:

1. Spreading the idea among the inhabitants of the Earth that the problem really affects the lives of the peoples of the Earth and it can be solved, as well as who opposes it.

2. Financial groups must understand that the problem must be solved with concrete actions rather than chitchat and excuses, and the allocation of hundreds of billions of dollars to allegedly solve the problem in order to launder this money does not bring the solution closer.

3. Of course, we understand the desire of financial groups to "launder" the "dirty money" earned during the war, murder of people and genocide of nations during the World War 2, which in fact continues without interruption until today, and especially some financial structures are actively engaged in it, so for example, one of the largest financial groups popularizes itself as a benevolent to "Mother Earth" - in fact, makes only moves to correct its image.

The problem really has a solution, but the solution is possible only with the direct participation of those responsible for business corporations and the very existence of states. Therefore, the clerks reading this text do not need to distort or paraphrase it - it is easier to get it to their bosses as it is.

In the future, we will publish who we specifically made this offer personally and who refused to participate in the salvation of the earth - the names of your heroes you should know!