**Academic English (PEN0065)**

**Trimester 1, 2023/2024 (T2310)**

**Reading Project (30%)**

Instructions: Read the text and answer the questions that follow.

## How Do We Clean Up All That Ocean Plastic?

1 According to the World Economic Forum, there are currently 75 to 199 million tonnes of plastic polluting our oceans. This is a result of humans recycling only nine per cent of plastic waste and dumping 10 million tonnes of it into the seas each year. If we remain in this path, as plastic production continues to increase, the annual flow of plastic into the ocean could triple by 2040. Marine plastic pollution may cost the world economy trillions of dollars every year as it adversely affects fisheries, coastlines, tourism, marine life, and the food we eat.

2 Some ocean plastic ends up in one of five major gyres, systems of ocean currents that corral marine garbage into their vortexes. The Great Pacific Garbage Patch, the largest gyre, located between Hawaii and California, covers 1.6 million square kilometres, an area twice as big as Texas. It is estimated that it contains 1.8 trillion pieces of plastic, weighing almost 90,000 tonnes. Many of the identifiable floating items in the gyre are macroplastics such as cigarette butts, plastic bags, food containers, laundry baskets, plastic bottles, medical waste, and fishing gear.

3 Even though most large plastic pieces are spread out across the vastness of the oceans and the rest may be too small to collect, there are a number of organisations attempting to clean up the oceans. The most high-profile effort to clean up ocean plastic is being conducted by Ocean Cleanup, a Dutch non-profit organisation that aims to get rid of 90 per cent of floating plastic pollution in the ocean. Its first collection system proved ineffective when plastic garbage was able to escape its barriers and a part broke off due to the winds and waves. Its more successful current iteration has removed 220,000 pounds of plastic from the Great Pacific Garbage Patch.

4 Ocean Cleanup's system consists of a large floating net-like barrier three meters deep that forms a large U shape which is slowly towed by two ships. The natural flow caused by the movement directs plastic garbage to the central retention zone. Once a week, the two vessels come together to close the barriers, pick up the retention zone, and empty the plastic out onto one of their decks. There, it is segregated into different recycling streams, packaged, and sent to recycling facilities onshore.

5 While Ocean Cleanup has received a lot of attention for its efforts, some marine biologists believe its methods could in reality do more harm than good. They point out that the fossil fuel-powered ships towing the barriers emit 660 tonnes of carbon dioxide per month of cleanup. Besides, Ocean Cleanup's system could harm a little understood ecosystem called neuston, comprising insects, worms, snails, nudibranchs, crabs, sea anemones and more that float on the ocean surface much like the plastic, before scientists have even had sufficient time to study it. Several ocean plastic experts are also worried that Ocean Cleanup's system will harm marine life and could kill creatures even if they are returned to the ocean. (continued…)

Ocean Cleanup counters the critic's argument by asserting that fish can escape its system. In addition, there are breathing ports for mammals, birds, or turtles that get caught in the retention zone, underwater cameras to ensure that marine life does not get entangled, and a remote-controlled trigger release which opens one end of the retention zone if a creature is trapped. Protected species observers are always onboard to monitor and document all animals.

6 Nevertheless, critics insists that lower tech strategies like beach cleanups are more effective because they prevent plastics from reaching the ocean in the first place. It turns out that more of the recently produced plastic stays near shorelines. One study found that, for the first five years after entering the ocean from land, 77 per cent of plastic remained on beaches or floated in coastal waters. According to Utrecht University oceanographer Erik van Sebille, most plastic in the ocean remains within 100 miles of the shore between the coastline and ocean, washing back and forth and scraping on the sand, a process that eventually breaks it down into microplastics. This means that beach cleanups may be one of the most effective ways of dealing with ocean plastics and microplastics.

7 Marine animals eat microplastics, which means they also ingest the toxic chemicals that were added to make the original plastic product flexible, colourful, waterproof, or flame resistant. Microplastics can also absorb other toxic chemicals and carry harmful bacteria. They have been shown to harm marine life by disrupting reproductive systems, stunting growth, and causing tissue inflammation and liver damage. Because microplastics have been found in all marine life, even in the guts of tiny crustaceans in the ocean's deepest trenches, they are part of the food chain and are also consumed by humans. Microplastics have already been found in human blood, and in the placentas of unborn babies, but so far there have been no large definitive studies on how microplastics harm human health.

8 Beizhan Yan is an associate research professor at Columbia Climate School's Lamont-Doherty Earth Observatory, where he specialises in plastic pollution. Yan is studying the sources and environmental fate of microplastics in New York City waterways. Cleaning up microplastics while also protecting ecosystems will not be easy. Yan said, "Those tiny microplastics coexist with many other minerals and fine particles, like silt, clay, plant debris, and black carbon, all sorts of other particles, whether natural or anthropogenic. They have a similar size and density, so it is difficult to efficiently separate microplastics from other particles. In terms of concentration or mass, the microplastics are probably less than 0.1 percent of the total mass of these particles." He believes that in the future, researchers may develop technology to separate the elements out efficiently, but today it does not exist.

9 However, there are, ongoing efforts to deal with microplastics. NASA's Cyclone Global Navigation Satellite System can help track microplastics as they move by analysing where the ocean surface is smoother and thus likely to have more microplastics. This enables organisations attempting to clean up microplastics to identify the areas of greatest density. Numerous experiments are being conducted to capture microplastics. Wasser 3.0, a German company, uses a special non-toxic compound which, when circulated in a vortex, pulls microplastics into popcorn-like clumps that can then be collected. The technique could be used in sewage treatment plants or industrial processes. It is already being used in a paper processing plant and a wastewater treatment plant in Landau-Mörlheim where it has removed 600 pounds of microplastics. Some scientists discovered enzymes that can break down polyester. Researchers from Hong Kong Polytechnic University devised a sticky biofilm from

a bacterium that can incorporate microplastics. At the University of Adelaide, scientists created spring-shaped carbon nanotube magnets that grab microplastics and break them down into harmless water-soluble pieces. Besides, a chemistry student in the Netherlands invented a device where microplastics attach themselves to a magnetic liquid; the contents can then be removed with a magnet, leaving only water behind.

10 The most economically efficient approach to combatting plastic pollution involves effectively controlling its sources and mitigating its environmental impact. For example, sewage is one of the primary sources of microplastics, though microplastics originate from the products people use. Studies show that most of the microplastics in sewage effluent are microfibers that come from laundry, washing machines and driers. Yan's study of New York City waters found that more than 90 per cent of the microplastics which are greater than 0.2 millimetres were microfibers shed from clothing, transported by the wastewater of washing machines. With more and more people dressing in clothes made from synthetics that shed microfibers, it is unlikely that the fashion business will stop using these materials, so microfibers must somehow be prevented from getting into the sewage system to begin with.

11 While cleanup technologies have a role to play in cleaning up ocean plastic, no single solution can effectively reduce ocean plastic. What is required is fundamental and systemic change that includes the banning of single-use plastics in favour of products designed to be recycled or repaired, and more recycling infrastructure. A Pew research centre report has identified the measures which, if implemented, could cut annual dumping of plastic into the ocean by 80 per cent in 20 years. These include reducing plastic consumption, substituting plastic with compostable materials, designing products and packaging with recycling in mind, increasing recycling, and reducing the export of waste.

*Adapted from* Cho, R. (2022, October 13). *How do we clean up all that ocean plastic?* https://news.climate.columbia.edu/2022/10/13/how-do-we-clean-up-all-that-ocean-plastic/

**Instructions: Based on the text, answer all the questions below.**

| | | |
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| 1. | Why is the ocean severely polluted with plastic? | (1 mark) |
| 2. | Explain why Ocean Cleanup's first collection was less successful? | (1 mark) |
| 3. | Why do "…marine biologists believe its method could in reality do more harm than good." *(line 31 -32)*? | (3 marks) |
| 4. | State three counter arguments that Ocean Cleanup has stated to defend their cleaning effort. | (4 marks) |
| 5. | What is the main idea of paragraph 6? | (1 mark) |
| 6. | i. State the author's purpose in paragraph 7. (1 mark)<br>ii. Provide support from the text for your answer. (2 marks) | (3 marks) |

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| 7. | State if these statements are **True or False**. Justify your answer.<br><br>a. A number of organisations are cleaning up the large plastic pieces spread out across the vast oceans and leave out those too small to collect.<br><br>b. NASA has developed a satellite system that can separate microplastics from other particles.<br><br>c. Fashion business may continue to pollute the waters with microfibers because of the high demand for synthetics clothes. | (3 marks) |
| 8. | State if these statements are **facts or opinions**. Justify your answers.<br><br>a. Some ocean plastic ends up in one of five major gyres, systems of ocean currents that corral marine garbage into their vortexes. *(line 8-9)*<br><br>b. The natural flow caused by the movement directs plastic garbage to the central retention zone. *(line 25-27)*<br><br>c. Cleaning up microplastics while also protecting ecosystems will not be easy. *(line 69-70)*<br><br>d. What is required is fundamental and systemic change that includes the banning of single-use plastics in favour of products designed to be recycled or repaired, and more recycling infrastructure. *(line 108-111)* | (4 marks) |
| 9. | **Provide a word** for the reading passage for each definition below.<br><br>a. in a way that is bad or harmful (*paragraph 1)*<br><br>b. set apart or kept separated from something *(paragraph 4)*<br><br>c. making something less harmful, unpleasant, or bad *(paragraph 10)*<br><br>d. to put a plan or system into operation *(paragraph 11)* | (4 marks) |
| 10. | i. State the author's intended audience. (1 mark)<br>ii. Provide support from the text for your answer. (2 marks) | (3 marks) |
| 11. | i. What is the author's tone in paragraph 9? (1 mark)<br>ii. Provide supports from the text for your answer. (2 marks) | (3 marks) |

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