SLS Group 9
Technology - The Solution to Our Problems?

Case 1 – The Ocean Cleanup Project

The Problem - Plastic Pollution
Plastic has begun to saturate our environment. Because of the durability volume of plastic in our society, global plastic has built up over time. Since 1907, more than 6.3 million metric tons of plastic has become waste (Geyer, Jambeck & Law, 2017, Ellen Mcarthur Foundation, 2016). Every year, about 8 million tons ends up in our oceans, and by 2050, ocean plastic is projected to outweigh ocean fish (Hardesty & Wilcox, 2015). Perhaps more worrisome, microplastics. Bits of plastic less than 5 millimeters, there are an estimated 51 trillion microplastics floating in the ocean (Wilcox, Seville & Hardesty, 2015). These travel up the food chain, and measurable amounts of microplastics and plastic chemicals are being found in humans.

The Ocean Cleanup Project
Ocean Cleanup is developing technological solution that will clean the world's oceans. The technology is a floating system made of a 600-meter-long, 3-meter-deep floater that collects plastic as it drifts. The system is energy neutral, utilizing currents, wind and waves to transport around. Fit with cameras, solar powered lights, anti-collision systems, sensors, and satellite antennas, the system is prepared for anything – even storms. Constant communication systems allow us to know where the system is at all times. The plastics collected by these systems will be used to create many of the durable, plastic made products we use today. If implemented at full scale, the systems are estimated to clean 50% of ocean plastic every 5 years.

Discussion Questions:

- **People and Privilege** - After the technology is deployed, is this a problem we shouldn't worry too much about anymore?
- **Technology** - What flaws or problems are you able to see with this technology?
- **Global Justice** - Is this THE solution to ocean plastic waste?
- **Status Quo and Change -** What other solutions might be able to contribute to solving ocean plastic waste?
- **Power** - Do the people that own this technology "own" this solution?

Literature

Case 1
References and Related Articles

Ellen Macarthur Foundation. (2016). *The New Plastics Economy: Rethinking the Future of Plastics*. https://www.ellenmacarthurfoundation.org/publications/the-new-plastics-economy-rethinking-the-future-of-plastics.

Geyer, R., Jambeck, J., Law, K. (2017). *Production, Use, and Fate of All Plastics Ever Made.* Science Advances. http://advances.sciencemag.org/content/advances/3/7/e1700782.full.pdf.

Hardesty, B. D., Wilcox, C. (2015). *Eight Million Tons of Plastic Are Going Into the Ocean Each Year*. The Conversation. https://theconversation.com/eight-million-tonnes-of-plastic-are-going-into-the-ocean-each-year-37521.

Nelms, S. E., Galloway, T. S., Godley, B. J., Jarvis, D. S., Lindeque, P. K. (2018). *Investigating Microplastic Trophic Transfer in Marine Top Predators.* Elsevier Environmental Pollution.

Wilcox, C., Sebille, E., Hardesty, B., (2015). *Threat of Plastic Pollution to Seabirds is Global, Pervasive and Increasing*. Proceedings of the National Academy of Sciences of the USA. http://www.pnas.org/content/early/2015/08/27/1502108112.

Ocean Cleanup Project: https://www.theoceancleanup.com/technology/

Desalination for the city of Algiers:
How seawater desalination plant eases water scarcity

Desalination plant for Algiers (BACKGROUND)

Due to an increasing number of the population has moved to cities in Algeria, and most of the population (> 60 %) lives in urban regions, water scarcity becomes an increasing challenge. In the capital of Algeria, Algiers, water scarcity caused by the increasing demand, drought or lacking distribution system, water rationing becomes more frequent. Due to limited surface and groundwater sources, Algiers invested to build Africa's first largest seawater desalination plant with the sea as unlimited water source. The Hamma Sea Water Desalination plant was North Africa's first large-scale reverse osmosis desalination plant and was funded by a joint venture of public (30%) and private (70%) investment (Mooij, 2007). The plant was finished in 2008 and supplies approximately 200,000 m^3/day, which covers 25% of Algiers freshwater needs.

Moving forward: (PROBLEM DEVELOPMENT)

Over the years, Algeria has build numerous additional seawater desalination plants (the number by the end of 2019 can be estimated to 200 plants). Despite the growing number of desalination plants to ease water scarcity, numerous urban areas are struggling to provide its citizens with water and approximately 80 % of urban residents only have access to quality water once per day or fewer. Therefore, the need for better access to quality water remains. Furthermore, a reverse osmosis desalination plant of the size of the Hamma Desalination plant requires energy of about 1 000 000 kWh/day of energy, which could supply 80 000 four-person homes with electricity. Critical voices also note that there has been insufficient action of the government concerning the reuse of treated water.

In this context we ask: (DISCUSSION QUESTIONS)

- Who benefits the most from this desalination installation and why? (PEOPLE AND PRIVILEGE)
- Could technology improvements help desalination spreading in other areas subject to water scarcity? (TECHNOLOGY)
- In which extend does the use of energy intensive method to supply water for a small and local area affect the rest of the world? (GLOBAL JUSTICE)
- How can Algeria maintain its government fixed water price considering rising the rising prices for fossile fuels for electricity and is there a sustainable way for the government to improve the water supply? (STATUS QUO OR CHANGE)
- What kind of complications could arise from private investments concerning a traditionally public and vital resource?(POWER)

Literature

Case 2

References *(not mendatory to read)*
Mooij, C. (2007) 'Hamma Water Desalination Plant: Planning and funding', Desalination, 203(1-3), pp. 107–118.

Recommended Literature
Paper: Drouiche *et al.* (2011) 'Reasons for the Fast Growing Seawater Desalination Capacity in Algeria'

Hamma seawater desalination plant receives OPIC impact award
https://www.wateronline.com/doc/hamma-seawater-opic-impact-award-for-critical-infrastructure-0001

Desalination in Africa https://theconversation.com/desalination-africa-should-rather-manage-its-water-resources-better-82948

Optional (if there is interest)

http://news.rice.edu/2017/06/19/freshwater-from-salt-water-using-only-solar-energy-2/

Technical review and evaluation of the economics of water desalination: Current and future challenges for better water supply sustainability (2013)