

Slippery Ships activity sheet

39 Ways to Save the Planet

Ships

This is a resource linked to the BBC Radio 4 programme 39 Ways to Save the Planet. Listen to the episode [Slippery Ships](#) and complete the tasks below.

What is the problem?

If you put any object into ocean water, it is going to get fouled with 'a conditioning layer' consisting of diatoms and bacteria. In the shipping industry this leads to oysters, sponges, marine invertebrates, and barnacles attaching themselves to the hull of ships (shown in Figure 1 below). This describes how a bacterial layer leads to 'macro fouling' of larger organisms, known as biofouling.



Figure 1 Biofouling © Beth Macdonald

Biofouling

If this build-up is allowed to occur on the hull of a ship, it can lead to anything from a 12 to 55% energy efficiency loss over the duration of a ship's journey. This can create millions of pounds in extra costs on a single maritime journey due to increases in the amount of fuel and an approximately 20% loss in forward speed. This extra fuel releases extra greenhouse gas emissions and is a multibillion-dollar problem for major shipping companies such as APM-Mærsk, the Mediterranean Shipping Company and COSCO Shipping Lines.

Around half of all ships are affected by biofouling, resulting in around 10% of shipping emissions.

If left unchecked, biofouling can get to up to 30cm on the hull of ships. It is a longstanding problem for ships. To combat it, divers descend to scrap it off 'in-water', and toxic coatings are applied to the hull of the ships during dry-docking to reduce adhesion.

- Shock of the Global: Post-War Britain and Globalisation
www.blog.geographydirections.com/2013/11/26/shock-of-the-global-post-war-britain-and-globalisation/
- How China's Belt and Road Initiative is changing cities – and threatening communities
www.blog.geographydirections.com/2021/02/03/how-chinas-belt-and-road-initiative-is-changing-cities-and-threatening-communities/

Suggested questions for Slippery Ships

- a. What percentage is lost in forward speed with a 12 to 55% loss in efficiency?
- b. When biofouling builds up, at what point does the Jotun marine robot become ineffective?
- c. How many ships will be involved in the sea trial of the Jotun marine robot this year?
- d. Why are the challenges (of climate change adaptation) 'immense' in the shipping industry?
- e. How much of total human GHG emissions is the shipping industry responsible for?

Answers to Acceleration section questions

3. 9 out of 10 of the world's busiest ports are in the Far East: Port of Busan (South Korea), Port of Hong Kong, Port of Shanghai (largest and busiest in the world), Port of Qingdao, Port of Singapore, Port of Shenzhen, Port of Ningbo-Zhoushan, Port of Tianjin and the Port of Guangzhou colloquially known as the 'Silk Road on the Sea'. This dominance is due to huge Chinese state investment in seaports and shows the country remains 'the workshop of the world' with a high number of ships in the western Pacific, Indian and Atlantic Oceans.
4. Well known choke points: the Suez Canal, the Panama Canal, Cape of Good Hope, Strait of Hormuz, the Strait of Malacca, the Strait of Gibraltar, the Turkish Straits, and Bab El-Mandeb which connects the Red Sea to the Gulf of Aden.
5. Biofouling removal will speed up the movement of ships thereby allowing faster transport and, in theory, less congestion and better routing.

An RGS-IBG expert

Go to [What our experts say](#) to hear further analysis Society Fellow Professor Bharathram Ganapathisubramani from the University of Southampton.

