

Sublime Seagrass

39 Ways to Save the Planet

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

We often confuse seagrass with seaweed. Seagrass is a flowering marine plant (angiosperm), that live in brackish (slightly salty) water or marine environments. Seagrasses are primary producers that photosynthesise and pollinate underwater.

Seagrasses are at the beginning of the food chain. They are essentially terrestrial plants that have migrated and adapted to live in the marine environment. An example of one such adaptation is that seagrass has evolved to rely on sea currents to transport their pollen. Around the world there are 72 seagrass species in 5 families. Figure 3 shows how a single species, *Zostera marina* (eelgrass), is found across the coastal areas of the northern hemisphere.

Why are seagrasses important in marine ecosystems?

Two important functions are performed by seagrass: carbon sequestration ('sucking in' carbon from the world's oceans) and the accumulation of sediment.



Seagrass © The Metro [Seagrass is a 'wonder plant' beneath the waves – the UK is saving it | Metro News](#)

The ocean is a carbon 'sink' and is described as a 'nature-based' solution to climate change. However, because they have absorbed around one-third of the carbon dioxide emitted since the Industrial Revolution, they are now suffering from ocean warming and acidification. Seagrass are nicknamed the 'plants of the sea' and have an amazing capacity to store carbon storage. To date, they have been greatly under-valued in the fight against climate change. Listen to Ph.D. Postdoctoral Research Fellow Barnabas Daru from Harvard University from 12:30 [about the ability of seagrass to sequester carbon](#) and the cascading effect of this marine flowering plant. There are many different



species of seagrass around the world with some thought to be thirty-five times more efficient at sequestering carbon dioxide than tropical rainforests.

1. *Zostera marina* is found along 18 coastlines in the northern hemisphere. Using the blank world map and the text boxes listed below, highlight where *Zostera marina* is found. The answer can be found in Figure 3 at the end of this resource.



Figure 1

Japan	The US	The Gulf of California
Iceland	Canada	Europe
The south of Greenland	The UK	Morocco
Algeria	Tunisia	Libya
Ukraine	North Korea	Scandinavia
Russia, Sea of Japan	China, Yellow Sea	Aleutian Islands

The image below is a blank diagram of the photosynthetic activity of seagrass.

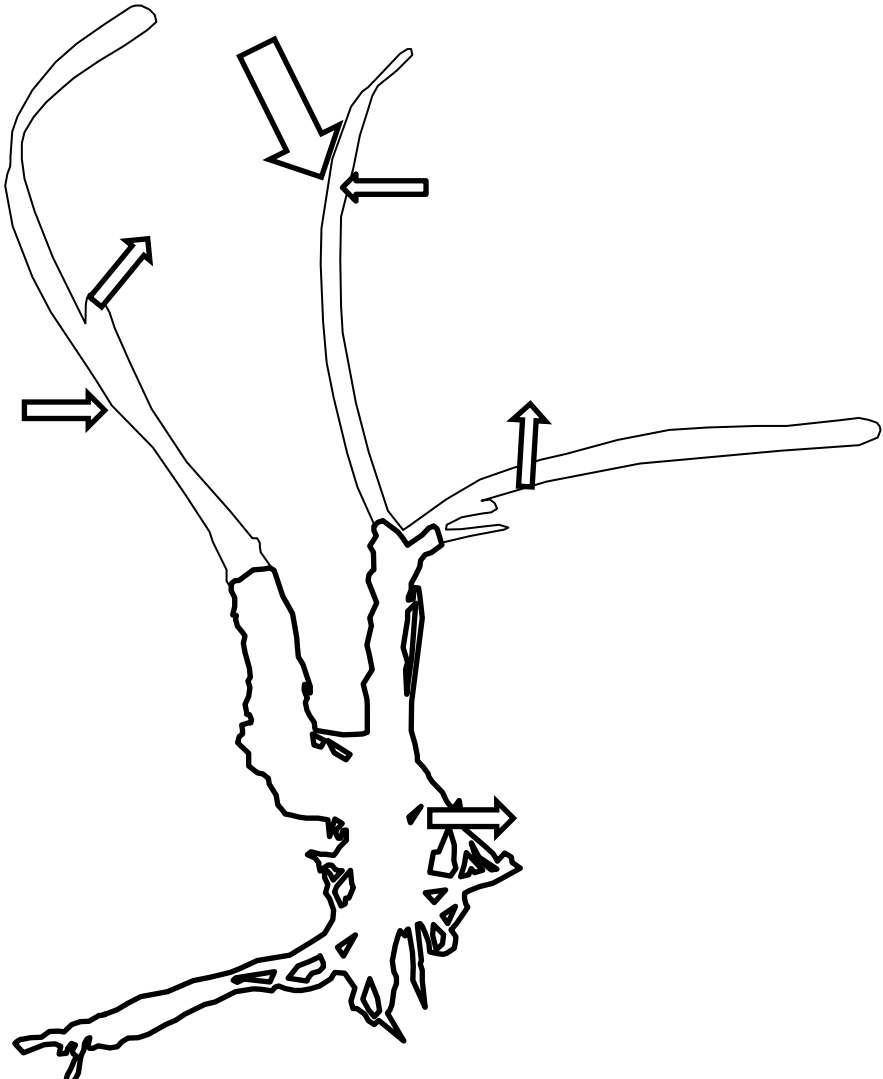


Figure 2

DOC Dissolved Organic Carbon, this is excluded from the leaves and root system of seagrass.

PAR Photosynthetically Active Radiation is otherwise known as solar radiation.

CO₂ Carbon Dioxide.

N₂ Nitrogen.

O₂ Oxygen.

- 2. Can you correctly add the labels: DOC, PAR, CO₂, N₂ and O₂ to the 6 arrows on Figure 2? Some of the labels are repeated twice. The answer can be found in Figure 4 at the end of this resource.

The accumulation of sediment is equally important. Sediment accumulates by seagrass leaves trapping sediment and pollutants, which helps to purify water. Leaves break off seagrass throughout the season, with many sinking to the ocean floor; this is due to an 'incredibly high' leaf turnover rate which is responsible for further sediment accumulation around the plant. Additionally, these leaves do not rot in the same way as tropical rainforest litter, as they release less CO₂. Seagrass also has a particle-trapping mechanism which traps any organic matter, such as excreta, further locking away more carbon.

Seagrasses cover roughly 600,000km² of the Earth, an area equivalent to the size of Madagascar. 7% is lost per year with an ever-increasing risk to marine life that rely on seagrass. There is widespread concern about the rate at which we are losing our seagrass meadows, which in the past have not been adequately protected in designated Marine Protected Areas. This is due to environmentalists and the public focusing on the conservation of marine animals rather than the marine plant life. Seagrass has been lost around the UK for many hundreds of years. According to [research carried out by Kings College London](#) 92% of UK seagrass has died in the last century.

To combat this decline in UK waters, a Swansea university research team have been replanting around the Llŷn Peninsula, requiring only low-tech planting.

Wales

The Llŷn Peninsula is the largest seagrass meadow in Wales because of a major milestone reseeded project led by Sky Ocean Rescue, the WWF, and Swansea University. The aim of the project is to restore 20,000 m² of the marine plant in west Wales.

2,000 volunteers, aged between 3 and 90 years old, helped scientists from Swansea University prepare hessian bags containing 1 million seedlings. These bags were dropped and then planted at a depth of 1 metre just off the Llŷn Peninsula during 2020. It is predicted that once fully grown the seagrass could support 160,000 fish and 200 million invertebrates.

Our coastlines have changed and there are now vast gaps in seagrass around the UK coast. However Dr Richard Lilley from Project Seagrass is keen to use this as a call to action. It is hoped that places around the River Humber, the Stour, the Orwell and the Forth — all legacy industrial areas — will also be restored.

Around the world it is estimated that there are 16 to 27 million hectares of seagrass, with around 6 million hectares which need immediate protecting. When grouped with other marine 'blue carbon' examples such as the importance of saltmarshes, mangroves, and mudflats this brings the total impact up to 0.1 to 0.2% of global greenhouse gas emissions.

Answers

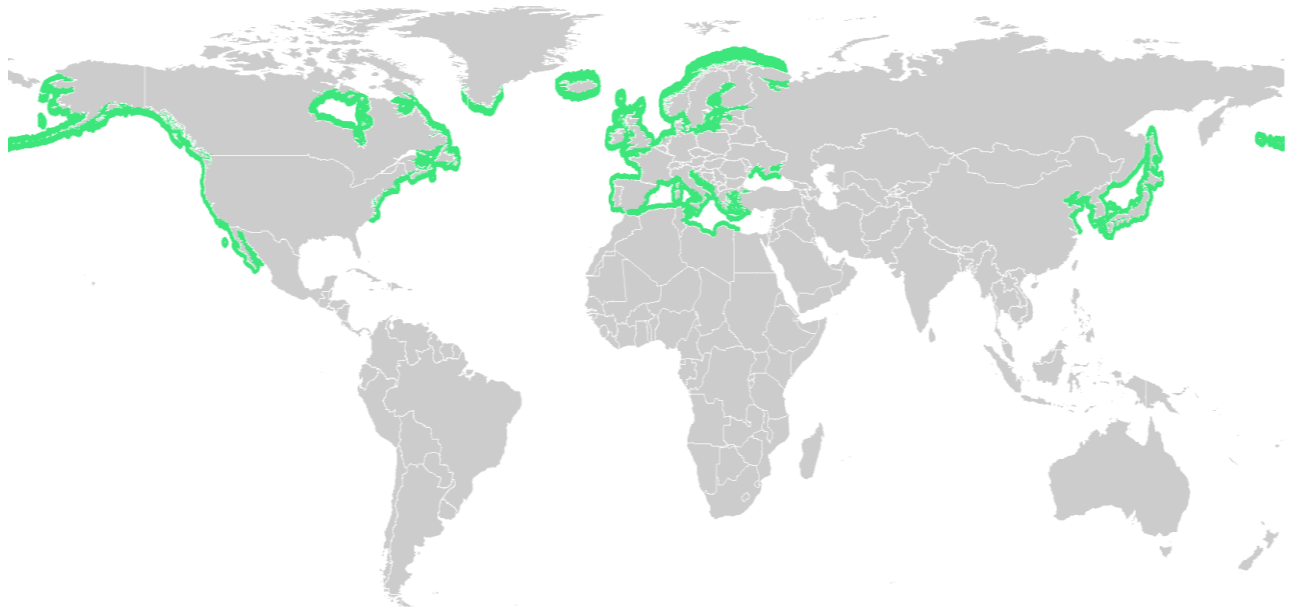


Figure 3 The global distribution of *Zostera marina* © ICUN

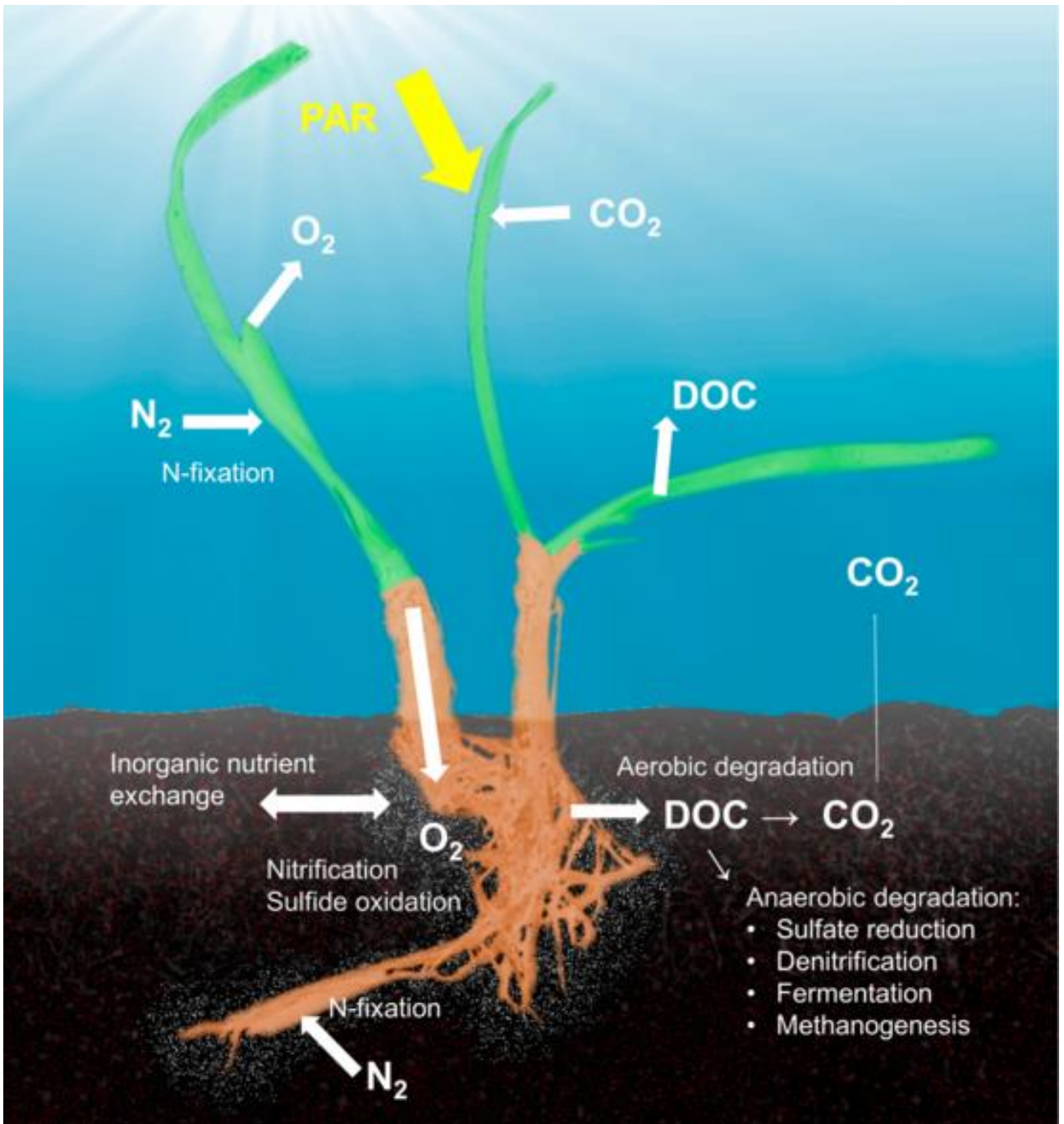


Figure 4 Seagrass © Kelly Ugarelli, Seemanti Chakrabarti, Peeter Laas and Ulrich Stingl MDPI

Further reading

- Chesapeake Bay [Conservation Efforts Boost Seagrass Meadows and Their Value to Nature and People | The Pew Charitable Trusts \(pewtrusts.org\)](https://www.pewtrusts.org/en/research-and-analysis/articles-essays/2017/04/conservation-efforts-boost-seagrass-meadows-and-their-value-to-nature-and-people)
- Restoring seagrasses can bring coastal bays back to life [Restoring seagrasses can bring coastal bays back to life \(theconversation.com\)](https://www.theconversation.com/restoring-seagrasses-can-bring-coastal-bays-back-to-life/2017/04)
- Watch a grey seal in Porthdinllaen seagrass, Llŷn Peninsula [Curious grey seal in Porthdinllaen's seagrass - YouTube](https://www.youtube.com/watch?v=...)

- Eelgrass really a flower that stores more carbon than tropical forests [Eel grass really a flower that stores more carbon than tropical forests, genome reveals | Northwest Coast Energy News \(nwcoastenergynews.com\)](#)

Suggested questions for Sublime Seagrass

- a. Since the Industrial Revolution how much carbon dioxide has the ocean absorbed?
- b. How many species live in a completely marine environment in the UK?
- c. Why can't the seagrass scientists from Swansea University 'just throw the seeds over the boat'?
- d. Aside from carbon sequestration, what are the other benefits of seagrass restoration?

An RGS-IBG expert

Go to [What our expert says](#) to hear further analysis from Professor Vincent Gauci on Sublime Seagrass in *39 Ways to Save the Planet*.

