



National
Qualifications
2025

X826/76/11

**Environmental Science
Paper 1 — Supplementary source booklet**

WEDNESDAY, 28 MAY

9:00 AM – 9:45 AM

Supplementary sources of information

Source A shows images of (a) *Sargassum* and (b) *Sargassum* washing up on a Caribbean beach.

Source B shows estimated mean global values for some marine primary producers.

Source C is a sketch map showing the major ocean gyres.

Source D is a sketch map showing the South Atlantic Gyre and site of the planned aquafarm.

Source E is a summary diagram of the planned carbon capture process using *Sargassum*.

Source F describes the escape of *Sargassum* from the North Atlantic Gyre.

Source G lists innovative uses of *Sargassum*.



Source A Images of (a) *Sargassum* and (b) *Sargassum* washing up on a Caribbean beach

(a)



(b)



Source B Estimated mean global values for some marine primary producers

	Mangrove	Salt marsh	Seagrasses	<i>Sargassum</i>
Mean annual carbon sequestration (PgC)	5.90	8.03	6.39	7.50
Geographic extent (10^4 km ²)	14.50	21.10	39.15	227.89
Surface biomass (Gg km ⁻²)	321.80	71.00	0.38	82.58

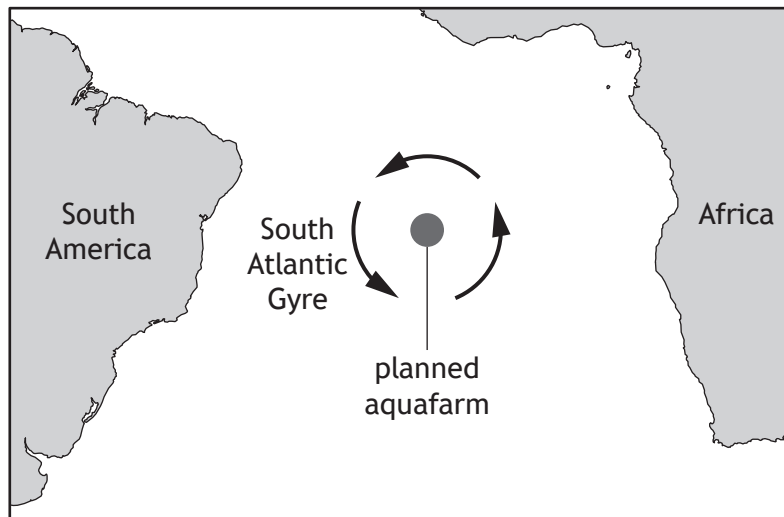
1 Pg = 10^{12} kg

1 Gg = 10^6 kg

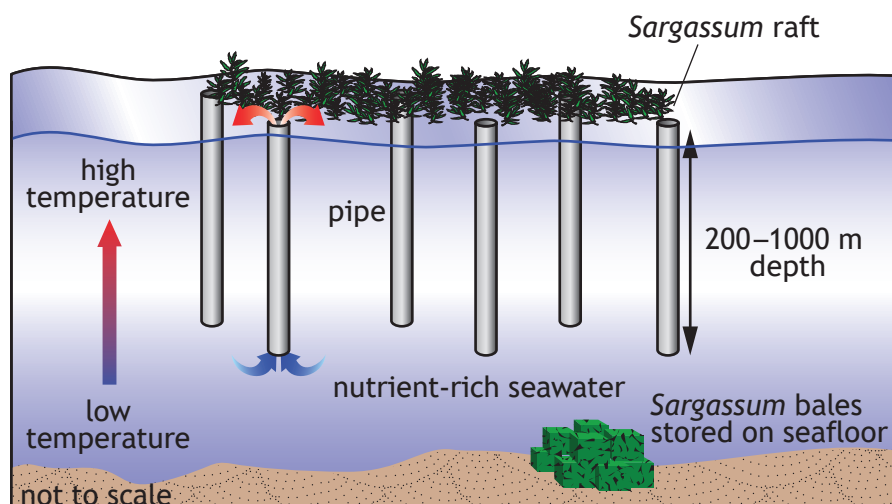
Source C A sketch map showing the major ocean gyres



Source D A sketch map showing the South Atlantic Gyre and site of the planned aquafarm



Source E A summary diagram of the planned carbon capture process using *Sargassum*



Source F The escape of *Sargassum* from the North Atlantic Gyre

The Great Atlantic Sargassum Belt is a naturally occurring *Sargassum* raft located in the North Atlantic Gyre. Productivity has increased dramatically since 2011, thought to be due to climate change. Some believe that nutrients reaching coastal waters from human activities are also responsible. By 2023, the belt was estimated to be 8047 km in length and to weigh more than 24 million tonnes.

Productivity in the North Atlantic Ocean typically starts to increase at the beginning of spring due to a rise in sea temperature, peaking in June–July. In 2023, *Sargassum* appeared in the Caribbean Sea and Gulf of Mexico earlier than in previous years, and experts are forecasting a similar trend in future as climate change progresses.

Productivity within the North Atlantic Gyre is now so high that the gyre is unable to contain the *Sargassum*. It is estimated that over 1 million tonnes of *Sargassum* washed up on beaches in Mexico in 2019 alone. In addition to its visual impact, the decomposing algae gives off a strong smell of rotten eggs and attracts flies. Decomposing algae also alters the temperature and pH of the coastal waters, leading to declines in local biodiversity. These impacts badly affected Mexico's tourist industry, which was worth \$23 billion in 2019.

Physical removal of *Sargassum* from beaches and subsequent waste treatment is prohibitively expensive, and countries affected are instead considering how it could be turned into a resource rather than waste.

Source G Innovative uses of *Sargassum*

- A thickening agent and emulsifier in food and pharmaceutical products
- Animal feed
- Extraction of anti-fungal and medicinal compounds
- In cosmetics and skincare products
- A mulch and fertiliser
- A substrate for growing mushrooms
- Biofuels and bioplastics
- A corrosion inhibitor for oil and gas pipelines
- Processed into bricks for construction

[END OF SUPPLEMENTARY SOURCE BOOKLET]

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Source A (b) Multiverse/shutterstock.com