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**What is pelagic sargassum?**

**What can we do with it?**








# Objectives



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The main learning **outcome** is to develop understanding on different aspects of pelagic sargassum, including:

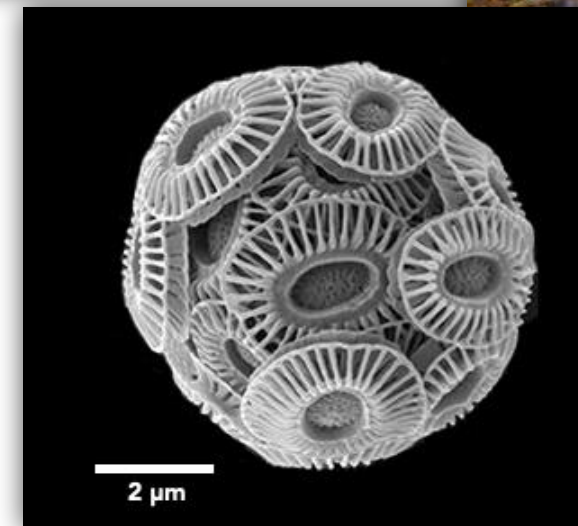
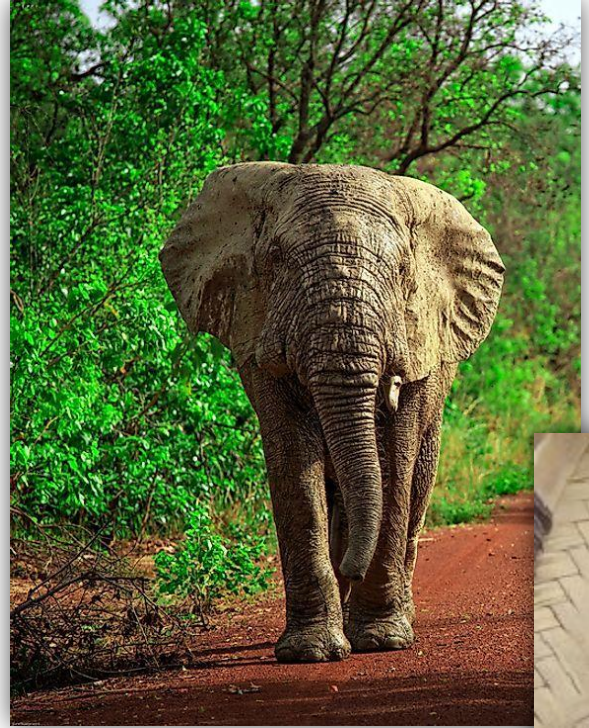
-  What is sargassum as a biological organism, and how different it is from other organisms such as land plants?
-  Where does pelagic sargassum come from?
-  Why pelagic sargassum forms an important ecosystem when floating at the surface of the oceans?
-  What are the negative impacts of pelagic sargassum biomass when stranding on the beaches?
-  What are the potential applications of the pelagic sargassum biomass to benefit affected communities and beyond?



# Animals, plants, fungi, bacteria, and algae

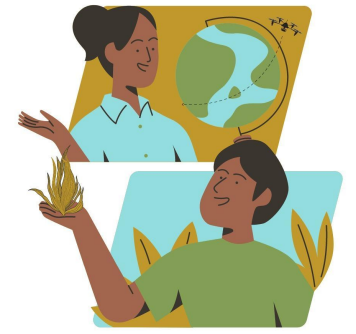


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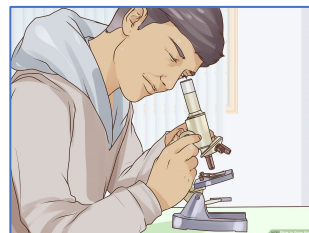


# Microalgae and macroalgae



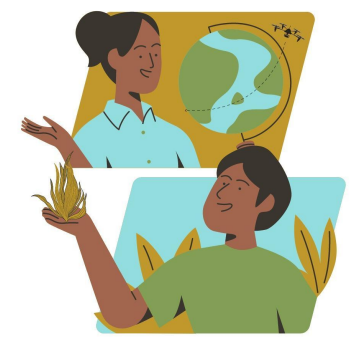
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- Algae and plants have some common features:
  - Eukaryotic organisms (cells with several organelles and nucleus)
  - Photosynthetic autotrophs (produce their own food through photosynthesis)
- Algae can be very small (microscopic - microalgae), or very big (macroscopic - macroalgae)
- We commonly refer to macroalgae as seaweeds
- Seaweeds are quite different from land plants (e.g. no roots), but sometimes they look like land plants
- The smallest seaweeds are just a few millimetres in size, but some of them can go up to 50 meters!

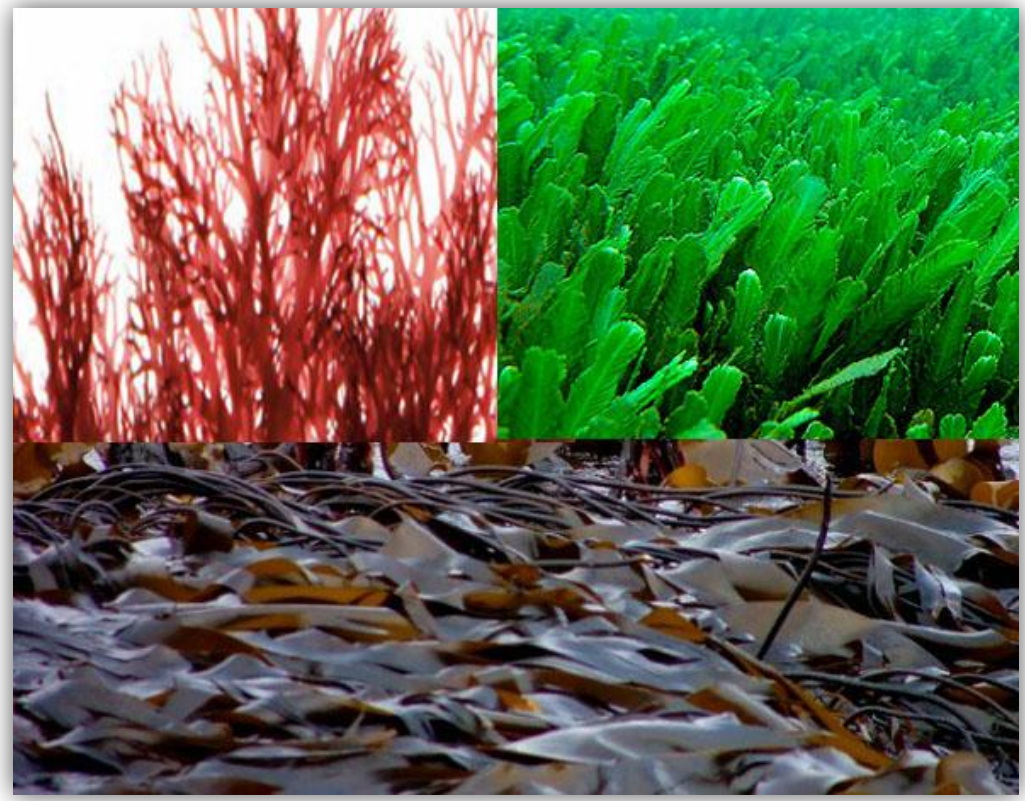




**Seaweeds can be green, red, or brown**



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**Types of seaweeds**



## Seaweeds can be green, red, or brown



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- Macroalgae are classified into three major groups: brown algae (*Phaeophyta*), green algae (*Chlorophyta*), and red algae (*Rhodophyta*),
- this depends on their composition of pigments.
- Brown algae are the largest algae.
- Sargassum is one type of brown algae. →
- The three types of algae can all live together, in the same place!



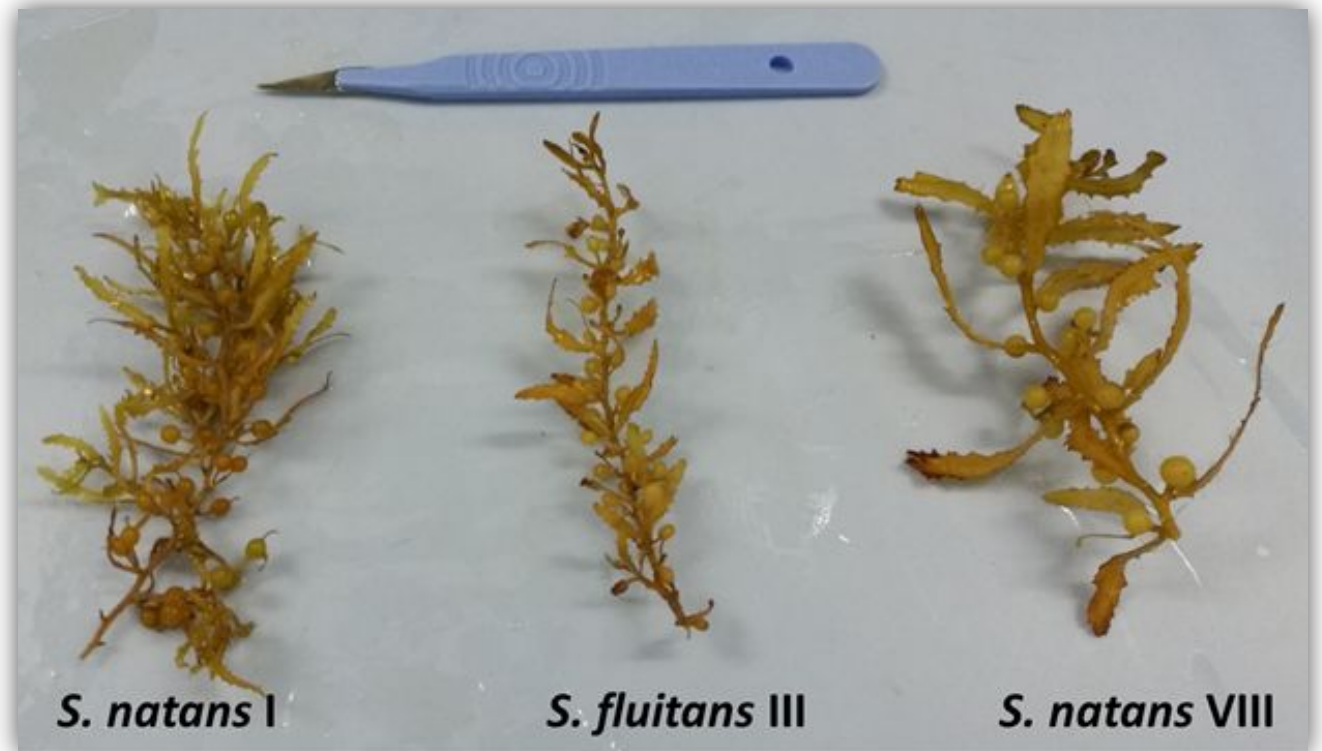


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## Benthic (attached) and pelagic (floating) sargassum



*S. muticum*



*S. natans I*

*S. fluitans III*

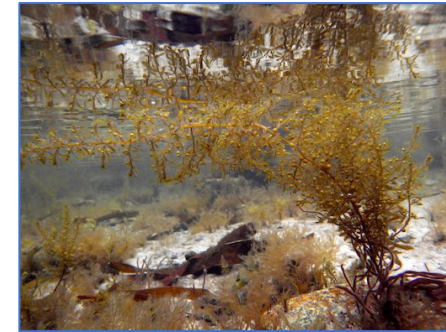
*S. natans VIII*



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## Benthic (attached) and pelagic (floating) sargassum

- Benthic = attached to the seabed or to other solid substrate
- Pelagic = free-floating



- Some benthic sargassum can be detached by strong winds and currents, and will start floating and migrating (e.g. *S. horneri* in China)
- The pelagic sargassum find stranding in Ghana are only pelagic, they spend all their life floating without being attached to any substrate during their life cycle

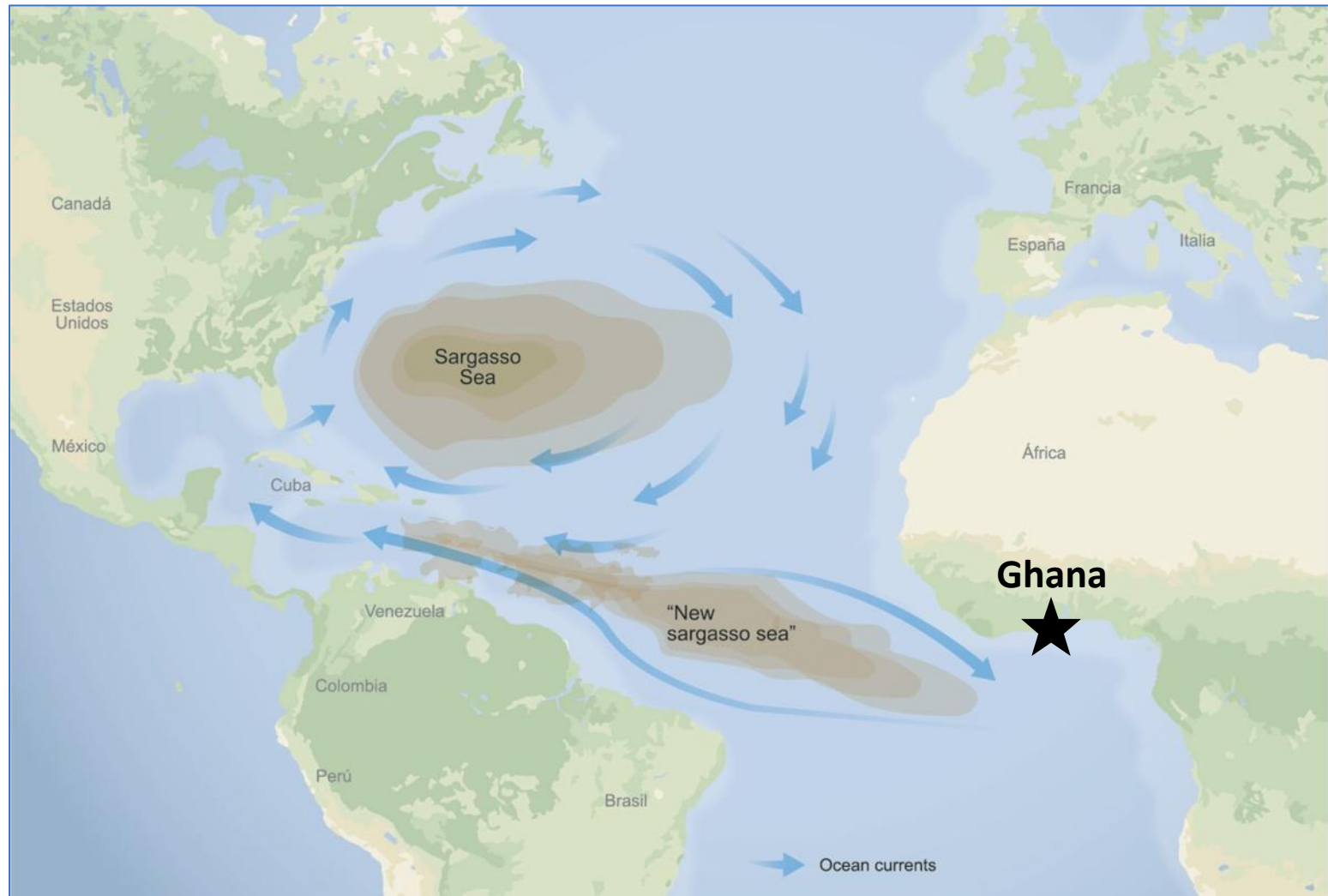




# Where pelagic sargassum is coming from?



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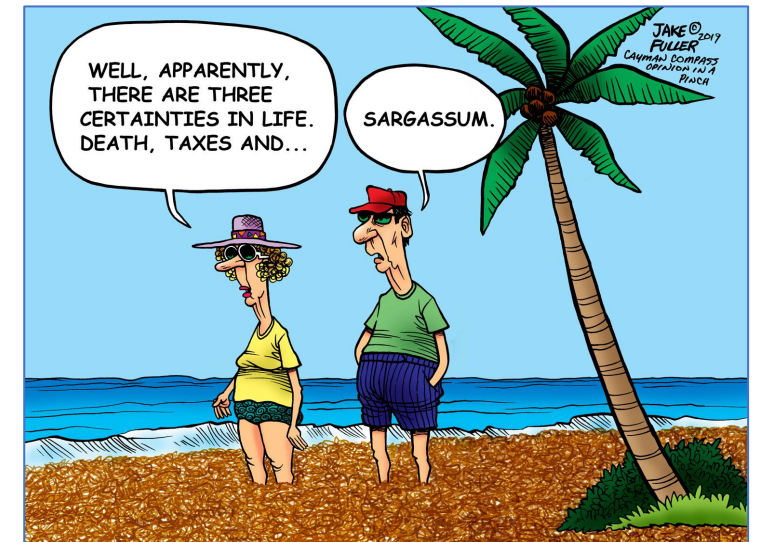


## Where pelagic sargassum is coming from?



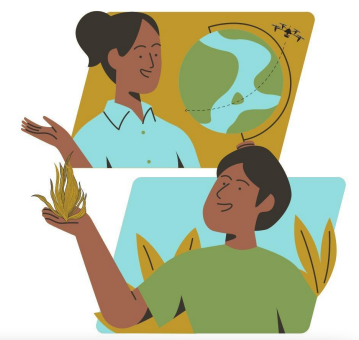
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- Sargassum comes from the Sargasso Sea, it was blown south by unusual ocean currents and winds events in 2010
- Since 2011, huge amounts of sargassum have appeared across the Atlantic ocean and badly affected coastal countries from Central America to West Africa, including Ghana
- Scientists predict sargassum in West Africa is here to stay





# Why pelagic sargassum is important when floating in the middle of the ocean?





# Why pelagic sargassum is important when floating in the middle of the ocean?



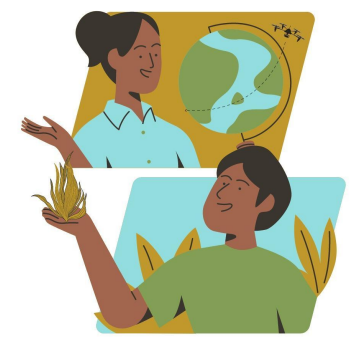
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- Specific ecosystem
- Amazon forest of the sea
- Acting as nursery for baby sea turtles
- Providing food sources for sea birds

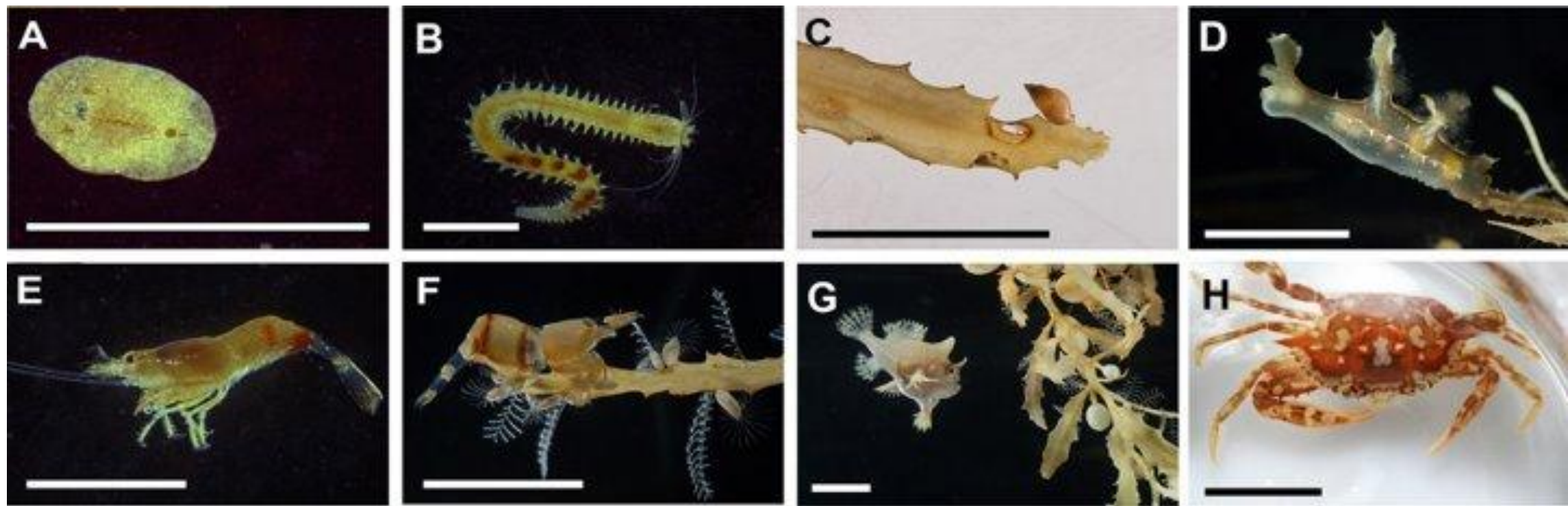




# Why pelagic sargassum is important when floating in the middle of the ocean?



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## Why pelagic sargassum is important when floating in the middle of the ocean?



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- Providing home and food to many invertebrate species (small flatworms, crabs, snails, shrimps)
- Absorbing and retaining CO<sub>2</sub> and other compounds important for their growth





# Why pelagic sargassum has negative impacts when stranding on the beaches



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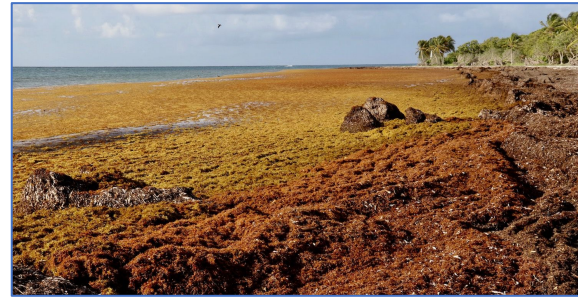


# Why pelagic sargassum has negative impacts when stranding on the beaches



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- Piles up on shore
- Blocks access to the sea: fisheries and tourism
- Becomes entangled in fishing nets
- Creates bad smells
- Causes itchy skin and waste when it rots
- Damages appliances







# Why pelagic sargassum has negative impacts when stranding on the beaches



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# Why pelagic sargassum has negative impacts when stranding on the beaches



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- Sargassum biomass can contain arsenic, which can be a threat to public health because it is poisonous to people
- We need to be careful with applications containing sargassum, especially if they are planned for growing crops, animal feed, and human consumption
- This is because sargassum can contain high levels of arsenic and of other compounds that can be detrimental to plant and animal health





# What pelagic sargassum can be used for – Building blocks



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## What pelagic sargassum can be used for – Building blocks



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- *Sargablock* is a construction material made from sargassum seaweed developed in Mexico
- A machine designed to make adobe bricks has been adjusted to process a mix of 40% sargassum and 60% other organic materials for the Sargablock
- The machine can produce 1,000 blocks a day, and after four hours of baking in the sun, the block are dried and ready to be used
- A sargassum house could last 120 years

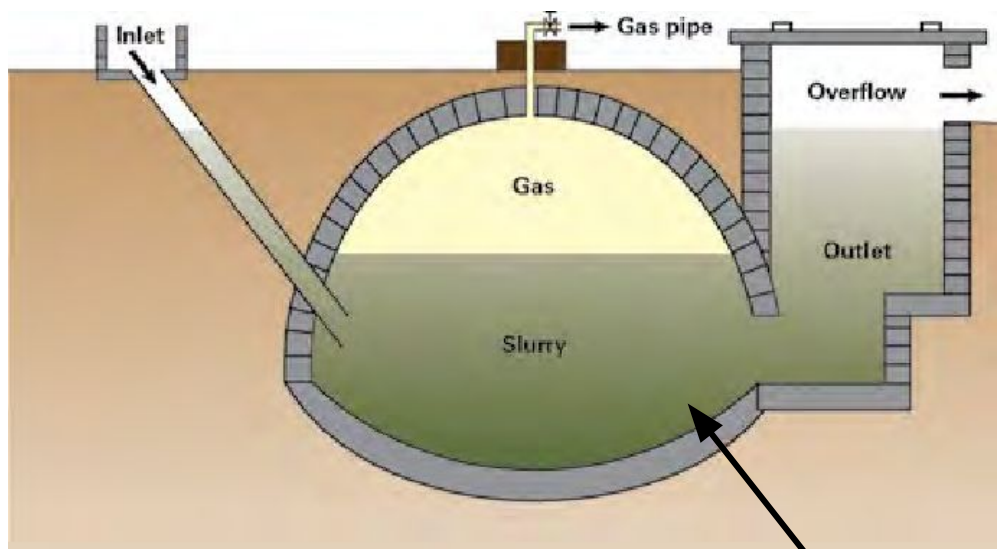




# What pelagic sargassum can be used for – Bioenergy (gas)

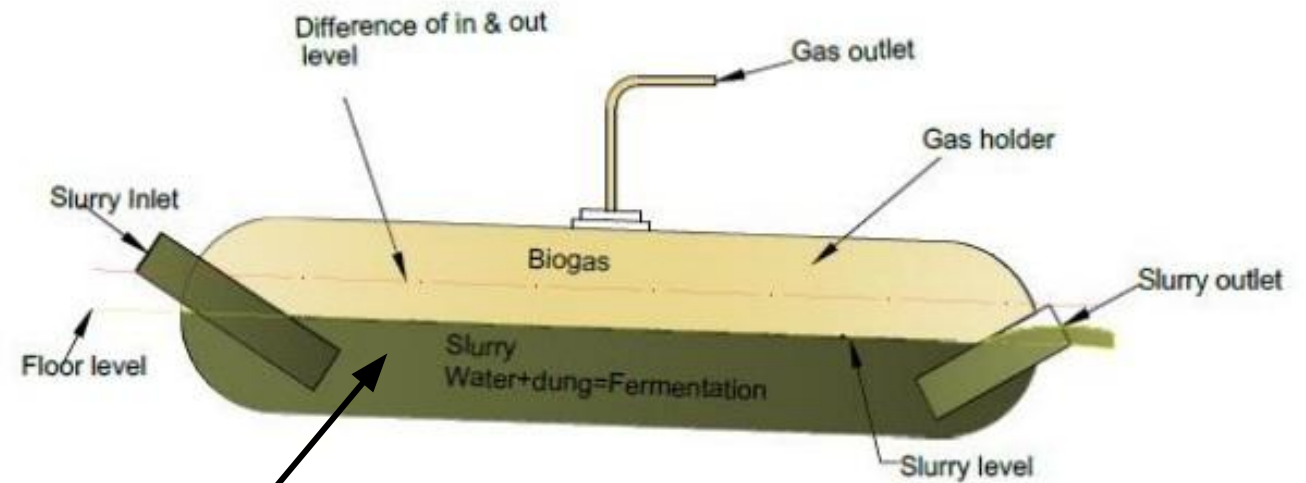


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Fixed-dome digester

Low Cost Flexible Bio gas Digester



Ballon digester





## What pelagic sargassum can be used for – Bioenergy (gas)



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- Production of biogas (methane) by anaerobic digestion
- Gas for cooking and to produce electricity
- Anaerobic digesters can be implemented at different scales
- Residues of biodigestion can be used as fertiliser





# What pelagic sargassum can be used for – soil amelioration



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- Liquid fertilisers for vegetables and crops





# What pelagic sargassum can be used for – soil amelioration



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- Soil amelioration is improving the quality of the soil, for example by providing important compounds such as nitrogen, phosphorus and potassium
- Pelagic sargassum can be used in different ways for soil amelioration:
  - Compost
  - Mulch
  - Liquid fertiliser
- Several companies in the Caribbean are commercialising liquid fertilisers based on pelagic sargassum: Algas Organics, Carbonwave







# What pelagic sargassum can be used for – soil amelioration



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- Sargassum-based compost for mangrove restoration



*Sargassum events*



*Red mangrove*



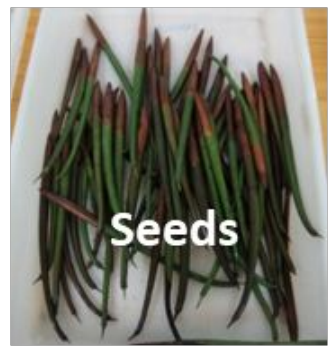
*Sargassum  
compost*

+



*Sand/soil*

+



*Seeds*



**Dry nursery**



**Restoration**



# What pelagic sargassum can be used for – mangrove restoration



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- Mangroves are important for: shoreline protection, water quality improvement, biodiversity support through the provision of a range of habitats, and carbon sequestration
- However, rapid and extensive loss because of: mariculture, timber harvest, deforestation for development, and rising sea levels which force mangroves to recede to unsuitable land margins
- Need restoration, and quality of soil is important to support good growth of mangrove trees
- Example of work in Jamaica



# What pelagic sargassum can be used for – Other applications



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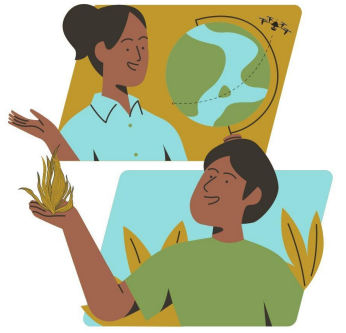


## What pelagic sargassum can be used for – Other applications



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- Many other products can be obtained from pelagic sargassum, but the biomass will have to be processed for most of them
- This will need specific investment, process, and infrastructures
- Several examples of companies investigating brown seaweeds for the production of bioplastic for packaging



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# Acknowledgments

