



SCIENCE Can sea vegetables provide a global sustainable form of agriculture?

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Words by Holly McHugh

Farming of edible marine plants such as kelp and sea lettuce, or seaweed to most, is receiving increasing interest as a sustainable form of agriculture.

It has been cultivated for centuries in offshore farms in Asian countries, particularly China where millions of tons are produced every year.

However, it is only recently gaining global attention due to its supposed environmental benefits, along with climate change becoming an ever increasing concern.

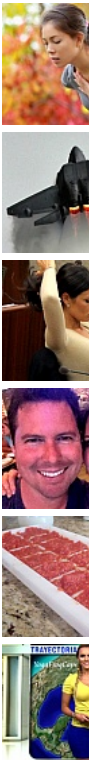


Outside of Asia, seaweed's unique salty taste and tough texture has not yet been fully embraced. Perhaps more commonly seen as foul smelling and slimy; something you might shriek at in horror, as it wraps itself around your limbs when going for a peaceful swim in the sea. No, definitely not getting those juices flowing.

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...ves as more than just a food source! It is in fact an extremely versatile plant that can be n a number of ways.





So what are they?

Animal food

Not only is it grown for human consumption, but it can also be dried and used as fodder for animals preventing the need for growth of feed crops. **Vast areas of land are currently cultivated in order to produce enough animal food**, causing a huge range of devastating environmental impacts.

What about food for all the starving people? Doesn't matter apparently. Need to feed those animals for human consumption!

Fertilisers

Crop agriculture requires high inputs from synthetic fertilisers which consume large amounts of greenhouse gases during production and cause pollution of nearby waters. Seaweed itself can actually be used as a fertiliser, a much more natural approach with less damaging effects on the environment.

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Also very popular within the cosmetics industry

Seaweed extracts are used in health or beauty products and treatments, as it is thought to be good for the skin and have magical restorative powers. Seaweed baths can even be found in some hotels and spas as a well sought after beauty treatment! The giant seaweed bath also known as the sea doesn't quite cut it.

Biofuel

Research into algal biofuel technologies has shown that seaweed could be an important resource for renewable energy. Methane produced from the plants when fermented can be harnessed and burnt for electricity; the oils from it can be extracted and converted into biodiesel; the production of ethanol from seaweed can be mixed with petrol or methane, the main component of natural gas heating the UK's homes.

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Human food

On top of all of these applications, the most popular well known reason it is cultivated is for human food consumption, due to its high nutrient content. The trend today is to refer to it as “sea vegetables”, perhaps to sound more exotic and appealing than “seaweeds” which doesn’t exactly sound appetising.

It has been a **staple item in the diets of people living in Korea, Japan and China** for centuries - we are all familiar with that little pot of tasty, crispy seaweed you can order with your Chinese takeaway. But what does it actually contain that’s so good for you?



Health Benefits

Their remarkable nutritional profile means seaweeds have impressive health benefits. They have a rich supply of minerals such as **calcium, iodine and iron, packed full of protein, fibre and vitamins (K and folic acid)**, and are low in fat - good for the waistline!

They are even thought to help the body fight illness and disease and improve cardiovascular function, even contributing to increased life expectancy. The Japanese have one of the highest **life expectancy rates at 83 Years**, thought to be related to their dietary habits - including regular consumption of seaweed.

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Coincidence?

Perhaps eating these “sea vegetables” is not everybody’s cup of tea, but could this delicacy become the new environmentally friendly and sustainable food for an ever growing global community?

What are the environmental benefits?

It is apparent that **the majority of our farming practices are unsustainable and harmful to the environment**, contributing massively to global warming. With a constantly growing population and an increasing global food shortage, the need for alternative methods such as seaweed farming are essential.

The most significant benefit is its **ability to remove carbon dioxide, nitrogen and phosphorous from the atmosphere and from our waters**. High carbon dioxide levels in water cause unfavourable acidic conditions. Kelp in particular helps reduce acidification by removing carbon dioxide and improving water quality.

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Seaweed is extremely resilient, growing quickly in cold coastal waters without the need for fertilisers, making it extremely easy to farm without the need for huge amounts of inputs.

Kelp farms also support an abundance of marine life, providing homes and shelter to hundreds of species - creating flourishing underwater forests!

Although biofuels are important greener alternatives to fossil fuels, they are often produced from food crops, driving up global prices. Again, not helping all those starving people in the world.

Biofuel production also consumes **vast quantities of fresh water** and land and the worst example – those from palm oil that can produce more carbon dioxide than diesel. Seaweed farming does not compete with other agriculture for land resources or freshwater.

All it needs is some nice, cold salt water and watch it grow!

Seaweed farming in the UK

The UK has extensive and under-utilized coastline with an ideal environment for seaweed aquaculture. Currently only 1% of seaweed is farmed in Europe, with Asia responsible for 96% of global seaweed

from coastal waters in the UK for years, farming like this is new. This farm was aimed mainly at the production of biofuels but also as food or animal fodder.

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Scotland has ideal conditions for seaweed, with its cold nutrient rich waters, much like the rest of the coastline in the UK. **Researchers are studying which species thrive the most in these waters** and potential adverse environmental impacts are being monitored. It's all well and good so far, but will there be a catch?



A three year project run by the **UK SeaGas collaboration**, is assessing the technical and financial viability of farming sugar kelp for bioenergy production – set for completion in June 2018. The project has three main focus areas: seaweed storage to ensure year round supply, potential for biomethane production and operational factors, the environmental and socio-economic effects. “This project will help strengthen the UK’s position as a world leader in biotechnology” said Santhana Krishnan, the project manager.

The future

Development of knowledge, technology, cultivation sites and proper management of cultivation are key to exploring the possibility of this becoming an economic and environmentally beneficial sector.

If successful, strict regulations to avoid the possibility of over exploiting this resource may be necessary.



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...try, learn some recipes, familiarise yourself with its salty goodness, and keep an eye out for its rise in power, battling to the fore front of shop shelves.

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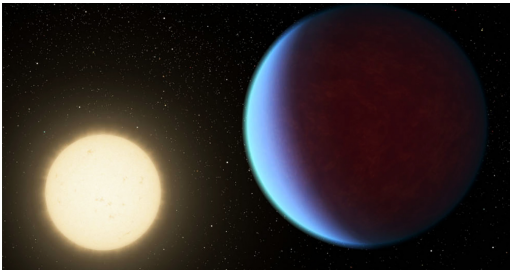
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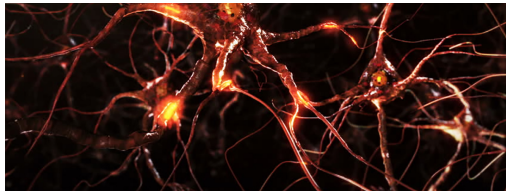
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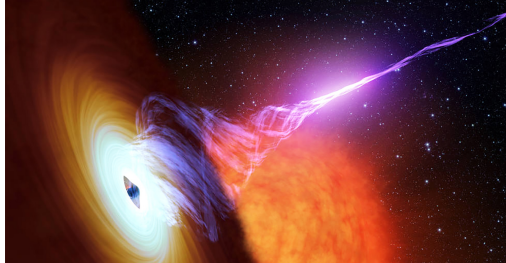
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