



OCEANIUM[®]

Impact Explainer

OCEANIUM mission

OCEANIUM develops and makes seaweed-based ingredients for People Health and Ocean Health.

Key messages

- OCEANIUM's activities have numerous environmental, economic and social benefits by enabling the growth of seaweed farming
- OCEANIUM's ingredients can make significant contributions to healthy diets and the transition from resource intensive food feedstocks and materials feedstocks
- OCEANIUM's use of seaweed as its raw material:
 - Provides wide ranging environmental benefits for ocean health
 - Enables the growth of seaweed as an important crop in future food systems



OCEANIUM's impact methodology

OCEANIUM measures impact based on a theory of change model integrating the United Nations' Sustainable Development Goals. OCEANIUM has chosen to measure targets in 6 of the 17 goals.



OCEANIUM has a staggered approach to measurement, recognising that we cannot measure everything overnight. Please see more about our impact measurement in our **2023 Impact Report**.

Biodiversity and ocean remediation benefits of seaweed farming

- **Nutrient remediation.** Seaweed growing's potentially important role in the fight against climate change, through nutrient absorption which helps with ocean eutrophication¹
 - A single hectare of restorative farms (combination of vegetative and bivalve) removes more than half a ton of nitrogen which would cost ~\$50k to remove through wastewater treatment.
- Seaweed farms have been estimated to **generate habitat** for 1.4x more marine life than nearby sites without restorative aquaculture gear.² They have been found to [increase species and abundance in research](#).
- Research has shown that seaweed farming has the capacity to alter pH levels in surrounding areas, **mitigating acidification**.³
- Seaweed farms contribute a higher net oxygen input to seawater than wild seaweed stands, which partially decompose in the environment (about 37.3% of their net production, on average), thereby consuming oxygen, whereas the seaweed crop is removed from coastal waters with harvest.⁴
- By 2026, we will have collected additional data on how the farmed seaweed that we are purchasing contributes to mitigating ocean eutrophication, supports nutrient uptake, supports biodiversity and coastal erosion.

¹ CEFAS (2016) [Seaweed in the UK and abroad](#)

² Principles of Restorative Aquaculture, 2021

https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_PrinciplesofRestorativeAquaculture.pdf

³ Xiao et al, Seaweed farms provide refugia from ocean acidification, *Science of the Total Environment*, 2019, 776:145192, DOI:10.1016/j.scitotenv.2021.145192

⁴ Xiao, X. et al. Nutrient removal from Chinese coastal waters by large-scale seaweed aquaculture. *Sci. Rep.* 7, 46613 (2017) in Duarte, Bruhn and Krause-Jensen, A seaweed aquaculture imperative to meet global sustainability targets, *Nature Sustainability*, 2021, <https://doi.org/10.1038/s41893-021-00773-9>



Seaweed to counter food security challenges and land-based feedstock risks

- **Food insecurity is still increasing:**
 - Global hunger affected around 9.2% of the world population in 2022 compared with 7.9% in 2019.⁵
 - Already, 3 billion people cannot afford a healthy diet. A further billion would join them if a global shock reduced their income by a third.⁶
- Seaweed can provide **food source diversification and security** in the face of increasing soil erosion and drought conditions.
- There are 1000s of seaweed species, many untapped. 0.1 % of ~12,000 species – are commercially farmed.
 - OCEANIUM is conducting R&D in tropical and native species to diversify supply which supports ocean health by avoiding monoculture, ensuring only local species are grown. OCEANIUM has also conducted early R&D on a species that is an algal bloom in the global south.
- Seaweed has proven **health benefits** as a source of protein, fibre, and nutrients such as zinc, magnesium, vitamins B12, A and K and many other minerals, and can contribute to **improved diets and nutrition**
 - 95% of people in the US do not meet their recommended intakes of dietary fiber (IPCC). In Europe, one estimate suggested that low fiber intake was responsible for 60,000 deaths in the EU in 2019 (European Union). OCEANIUM's ingredients are a source of dietary fiber that can be integrated into various products, thus contributing to improved digestive health.

⁵ FAO, 2023 <https://www.fao.org/3/cc3017en/online/state-food-security-and-nutrition-2023/food-security-nutrition-indicators.html>

⁶ FAO 2021, *The State of Food and Agriculture*



Seaweed for economic benefit

- **Job creation** and **economic diversification** which can support the resilience of coastal communities.
- The development of state-of-the-art **infrastructure** and world-class **innovative solutions and R&D**.
- Shared ownership models and licensing opportunities for biorefineries so local communities share the benefit.
- In some developing countries, women make up to 80% of seaweed farmers (e.g. Tanzania) providing economic empowerment, independence and increase in income diversification.

Carbon sequestration and sinking

- Research on sinking seaweed for carbon sequestration and seaweed's climate benefits is still at a relatively early stage in comparison to scientific research on nutrient removal or habitat⁷ - the benefits remain unclear.
- Sinking seaweed or carbon sequestration does not feature in OCEANIUM's impact measurement.

⁷ Principles of Restorative Aquaculture, 2021, p24
https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_PrinciplesofRestorativeAquaculture.pdf

- If farmers see this as a viable option for them, then we hope that it is the farmers who benefit directly from mechanisms that would pay them for the carbon offsetting and the role they play in climate change mitigation.
- Our products replace carbon intensive products – avoided emissions could be 2x of sequestration value.
- **The protection of existing kelp forests** and vegetative ecosystems is imperative – these are important carbon stores that play a valuable role in carbon sequestration and is why we focus on farmed seaweed.