**COMMISSION BRIEF - THE FUTURE VALUE OF SEAWEED FARMING IN THE UK**

**Date:** April 2023

**Commissioned by:** WWF-UK, Living Planet Centre, Brewery Road, Woking, GU21 4LL

**Contacts:** Piers Hart, Seafood and Aquaculture Specialist ([PHart@wwf.org.uk](mailto:PHart@wwf.org.uk)), Mollie Gupta, Seaweed Solutions Project Manager, ([mgupta@wwf.org.uk](mailto:mgupta@wwf.org.uk))

**Alternative contact:** Tom Brook ([tbrook@wwf.org.uk](mailto:tbrook@wwf.org.uk))

WWF-UK is working on regenerative seaweed farming because it has the ability to deliver positive environmental outcomes on climate, food, biodiversity, land and ocean, whilst also supporting livelihoods and growing new supply chains across a range of versatile products. Regenerative ocean farming will be a critical part of solving the ‘triple challenge’ in years to come – providing sustainable and nutritious food to a global population, whilst also averting catastrophic climate breakdown and restoring our precious nature.

Seaweed farming has already scaled in locations such as South Korea, Japan and China, where direct consumption of seaweed and its use in a wide range of industries is commonplace. The [Nature Conservancy](https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_PrinciplesofRestorativeAquaculture.pdf) and contributing authors identified UK waters as one of the areas with the greatest potential for seaweed and shellfish aquaculture across the globe.

Seaweed wild harvesting has been present in the UK for some time, and in some places has been practised for generations. However, recent efforts to grow seaweed aquaculture activity has been slow. As concerns around climate change, food provision and nature restoration become only more urgent, the success and growth of regenerative seaweed farming offers hope and a nature-based solution to address these challenges. WWF-UKs long term vision for seaweed farming in the UK is:

*Regenerative seaweed farms and their products help to address the challenges of climate, food and nature restoration, across UK land, seas and rivers, whilst creating new supply chains, providing jobs and helping to regenerate coastal communities.*

There is already significant data that highlights potential carbon sequestered and nitrogen bioremediated per tonne of seaweed produced that can be used to estimate certain environmental benefits. Some literature on optimal conditions for seaweed growth is also available, along with factors that should be considered in siting, for example marine designations and competition with other marine industries and activities. There have also been efforts to map the suitability of different areas for seaweed cultivation in [England](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/854128/MMO1184_AquaPotential_forPub_191210.pdf) and [Scotland](https://www.crownestatescotland.com/resources/documents/prospects-and-opportunities-for-large-scale-restorative-aquaculture-in-scotland-low-res), and there are projects looking to do this in Wales, see [here](https://naturalresources.wales/about-us/our-projects/marine-projects/assessing-welsh-aquaculture-activities/?lang=en) and [here](https://afallen.cymru/seaweed-social-licence/). However, the maximum potential for seaweed production taking into account all UK devolved nations in one unified picture does not exist and there is no baseline of where the UK seaweed industry is at today. We want to understand particular opportunities across devolved UK nations, given the differing coastal geographies and cultural links to seaweed wild harvesting, for example in Wales where laverbread and other foods using seaweed ingredients have been eaten for centuries.

This commission intends to build out further from the vision statement above to produce a tangible and pragmatic target for the growing UK seaweed sector, inspiring the audience around what could be possible. It will increase clarity around the future potential value of regenerative seaweed production in the UK, plus what needs to happen to realise this value.

**This commission**

The commission should start by reviewing existing literature , internal WWF materials and materials provided by the steering group, and outline:

* the global context for seaweed aquaculture and trends in demand and production, including main producing countries, most common products and value of these, and key areas of ongoing research
* the UK context for seaweed and trends in demand and production, including wild harvest
* an explanation of the licensing process in the UK including the statutory licensing requirements (eg Marine Management Organisation) and landowner permission (eg The Crown Estate)
* principles and criteria that need to be met for a seaweed or ocean farm to be considered ‘regenerative’
* outline some advantages and disadvantages of the different kinds of production and harvesting systems used (ie IMTA, poly vs monoculture, wild harvest vs. farmed)

The commission should then proceed to address the following research questions:

1. Building a baseline for UK seaweed production:
   1. Where are existing farms? What area do they cover (ie hectares)? Including licenses in process of approval. Licenses for wild harvest are out of scope.
   2. What is current production capacity? Broken down into devolved nations.
   3. What is the current market for seaweed in the UK? How is market value distributed across different products (i.e. food, feed, fertiliser, bioplastics, etc.)? Allude to any differences across devolved nations.
   4. Stakeholder mapping with key players (e.g. national stakeholder map) across devolved nations including those involved in licensing.
   5. What are the current challenges, obstacles and risks to scaling up the farmed seaweed sector in the UK (i.e. public perception, licensing, infrastructure, market access)
2. Where can future farms go? / Optimal areas for seaweed expansion
   1. Review existing geospatial studies for seaweed farm potential in the UK including CEFAS study of England, ABPmer study of Scotland and Project MADOC in Wales. Compare methodologies and criteria and discuss alternative and additional criteria that could be used to take into account socioeconomics and the Triple Challenge Criteria (carbon sequestration, food production, nature restoration).
   2. Using the results from 2a, recalculate which locations around the UK could be best suited to seaweed farming based on:
      1. triple challenge criteria, including carbon, food, nature
      2. local socioeconomic context, for example supply chain readiness, skills development and job opportunities, inward investment
      3. social license to operate and local community needs;
      4. other important use of marine space such as offshore wind, fisheries and aquaculture)
   3. Where are the UKs existing wild kelp beds? Where are the UKs degraded wild kelp beds? Could this information be used to inform the location of future kelp farms? Eg refer to MaRePo
   4. Any devolved nation specific considerations/trade-offs should be highlighted.
3. What could the value of these future farms be? All must be broken down by devolved nations:
   1. What would maximum production capacity be? Using existing projections of the European seaweed market, estimate what proportion of European demand could be met with UK produced seaweed
   2. What would the economic value of seaweed-derived products be with focus on food, feed additives (methane reduction), feed proteins (soy alternative), fertiliser and biomaterials?
   3. What would be the value of ecosystem services provided? Including carbon (both sequestered and avoided), nitrogen, phosphorus, biodiversity, coastal protection, and cultural services
   4. How many jobs could be created and what would the economic value be?

The research should conclude with a closing chapter and discussion around what needs to happen to realise these potential future benefits. It should also explore how scale up of seaweed farms in the UK can be responsible and sustainable. This discussion should be tailored to devolved nations, and should cover:

* Recommendations to industry and other stakeholders on scaling up the commercial use of seaweed grown in the UK, including recommendations to the UK governments (delivering net zero, habitat protection, 25 Year Plan, GES, etc.). Ideally an action plan or roadmap would accompany the recommendations
* Particular attention should be paid to recommendations for the food industry, including retailers and brands. In what areas is the food industry best positioned to invest? What are the near-term opportunities? What are the longer-term opportunities?
* What factors will limit maximum seaweed production capacity? How can co-location with other marine industries be optimised, for example via adaptations to the licensing system? (ie offshore wind, fisheries, and aquaculture)
* How can seaweed IMTA bring about additional opportunities, for example resilience and income diversification (the valuation of other non-seaweed IMTA products is out of scope of the research questions).
* What could some of the positive spill over effects be? For example habitat provision for commercial fisheries, support to marine ecosystems, supporting a shift to more circular UK agriculture with reduced environmental impact, stimulating job creation for local communities. Particular attention should be paid to the potential for avoided carbon emissions from seaweed displacing fossil fuel intensive products.
* Allude to how the food industry could use seaweed-derived products in the future to help reach corporate targets and commitments on net zero, biodiversity recovery, and sustainable food production (including the WWF Basket and Retailers Commitment to Nature)
* What potential negative impacts could there be from expanding too far (look at South Korea)? Is there such thing as too large a seaweed industry?

**Motivations for this commission – why we think these research questions need answering:**

* Create an inspiring vision for the future of seaweed farming in the UK which will motivate external influential stakeholders into action to improve policy and increase market support
* Provide a WWF perspective/target on what a successful seaweed industry might look like in the UK and what benefits it would bring to UK nature. The study will also function as a baseline and action plan for how progress towards this vision could be made
* Unite those with an interest in seaweed farming and the seaweed value chain behind a powerful shared vision for growth
* Explore whether cultivated seaweed from the UK can provide meaningful carbon reductions either directly through uptake and storage or indirectly through displacement of terrestrial products, in addition to other ecosystem services. However, this is not a roadmap for offsetting carbon emissions from industry by seaweed cultivation
* Support future investment in seaweed farming and use of seaweed-derived products produced in the UK, particularly from the food and farming industry given the benefits seaweed farming can offer with respect to reducing environmental impact of food business supply chain operations
* Explore the potential dangers of expanding too far and what critical consequences of this may be

**Essential deliverables and suggested methods:**

The final output of this project is a WWF branded public facing open access report, suitable for a use with a range of audiences, ready for immediate dissemination. The language must be concise and accessible, and in line with other WWF publications such as [Low Opportunity Cost Feeds](https://www.wwf.org.uk/sites/default/files/2022-06/future_of_feed_full_report.pdf), [Roadmap to scaling up insect protein in feed](https://www.wwf.org.uk/sites/default/files/2021-06/The_future_of_feed_July_2021.pdf) report, including high impact infographics embedded within the report.

The report must include at minimum the following deliverables:

1. Executive summary that is stand alone to body of report, no longer than 3 A4 double spreads, and includes impactful infographics and maps
2. Literature review to set context
3. Marine spatial mapping / GIS of:
   1. Degraded and existing natural kelp beds, this may require model extent mapping
   2. Existing extent of seaweed cultivation in the UK
   3. Suitable hotspots for expansion of regenerative seaweed aquaculture (plus associated calculations on maximum biomass capacity)
4. Economic analysis to value:
   1. the ecosystem services provided by the expansion scenario,
   2. the value of the resulting products.

All calculations should be broken down by devolved nation.

1. Policy analysis to inform the recommendations to policy makers, market and other stakeholders, across all devolved nations
2. Closing discussion section with calls to action/roadmap for at least the following: The Crown Estate, Natural Resource Wales, Marine Management Organisation, NatureScotDefra, Agriculture industry, Retailers and brands, civil society, academia. Bidders should identify other key stakeholders.
3. Complete bibliography

We would welcome bids which include at least one peer-review consultative stage(s) with external stakeholders and the steering group to finalise the end report, ideally including seaweed and shellfish operators.

Due to the multi-disciplinary nature of this work we would encourage consortia bidders to submit proposals. Bidders should advise on their experience working on the colocation of offshore wind with other sustainable industrial uses, as there is a potential for expanded scope on this if the selected bidder has the relevant skillset.

To support WWF to disseminate the research we would also be interested to hear whether any additional communications materials can be included in proposals:

* 1 minute report highlights video for policy makers
* 1 minute report highlights video for food industry
* Series of infographics designed for social media

**Submission and assessment of proposals**

Proposals should be no longer than 10 A4 sides and include:

* Proposed methodology and rationale
* Cost estimate(s) for the project broken down by deliverable and by daily rates
* Detailed Schedule of works including the number of days required
* Role and responsibilities of each partner in the case of consortia bids

Appended to the proposal:

* Relevant background of the consultant/partners involved, including any similar work
* Examples of infographics produced for previous similar projects

As part of your tender proposal, please complete the enclosed WWF Supplier Sustainable Procurement Questionnaire.

Proposals will be assessed across multiple criteria, likely including: fit to brief, previous experience of consultancy, robustness of schedule of works, robustness of proposed methodology, value for money.

Please confirm your acceptance of the following:

* the WWF-UK T&C’s
* to abide by the WWF Supplier Code of Conduct
* If successful, to register on Panda Purchasing (the WWF PO & invoice platform)

**Budget:** £85,000 to £95,000 inc VAT

**Call for proposal issued :** Friday 14th April

**Send proposals to:** Piers Hart ([Phart@wwf.org.uk](mailto:Phart@wwf.org.uk)), Mollie Gupta ([mgupta@wwf.org.uk](mailto:mgupta@wwf.org.uk)) by **5pm Friday 26th May 2023**

**Proposal shortlist and interviews:** June 2023

**Ideal start date:** July 2023

**Ideal delivery date for final report:** as soon as possible, or no later than end April 2024