BRIEF FOR WWF RESEARCH COMMISSION – CALL FOR PROPOSALS

**Project title**

Quantifying the potential contribution of saltmarshes and kelp farming to mitigating nutrient pollution in Norfolk.

**Background**

Nutrient pollution is a growing environmental and economic issue in the UK, causing a number of detrimental effects within freshwater, estuarine, and marine ecosystems. The sources of excess nutrients, nitrogen and phosphorous in particular, can vary significantly across catchments but generally include sewage treatment works, farming and industrial processes. Whilst the first and most important step in mitigation of the impacts of nutrient pollution should be to reduce nutrient inputs at source, methods of mitigating in-situ water pollution are potentially useful in reducing the harmful impacts of nutrients on coastal ecosystems.

Recent guidance has been issued by Natural England to combat the adverse effects of nutrient pollution, requiring new developments across English planning authorities to consider treatment and mitigation of nutrient-rich waste water they would produce. If development in these regions, including Norfolk, is to be permitted, mitigation is required to protect vulnerable sites (under the Conservation of Habitats and Species Regulations 2017). In addition, the Environment Act targets for agriculture require reductions in nitrogen (N), phosphorus (P) and sediment pollution from agriculture into the water environment by at least 40% by 2038, compared to a 2018 baseline.

Suitable mitigation measures used to date include geo-engineered freshwater wetlands, changes in land management, and/or retrofitting Sustainable Drainage Systems (SuDS) within the catchment of the impacted site. The investment in these Nature-based Solutions (NbS) is made by the developer, creating a mechanism for ecosystem service payments. Coastal ecosystems and mitigation measures, such as saltmarshes or seaweed farming, offer previously underexplored mitigation methods for the removal of nutrients from estuarine and marine waters.

Saltmarshes and seaweed farms perform important ecosystem services including the absorption and assimilation of carbon dioxide, nitrogen, and phosphorous. Understanding their full capabilities to sequester and remove nutrients is critical if their use as a mitigation measure is to be recognised and accepted, while also seeking to reduce the underlying drivers of excess nutrient pollution.

In addition, seaweed farms create highly nutritious food, feed and fertiliser products and important bio feedstocks (fermentation, bioplastics) without the need for arable land, fresh water, fertilisers, or pesticides. Seaweed farms could provide opportunities for coastal communities, such as a means of revenue diversification for fishers. Farming seaweed reduces pressure on ecologically critical wild seaweed beds and can help to re-introduce native seaweed species in degraded areas. It has the potential to allow significant changes to the way the world produces food and contributes to addressing the [Triple Challenge](https://www.wwf.org.uk/triple-challenge). The products from seaweed can be used to replace a portion of our food and feed products with sustainable ingredients and lead to climate mitigation and an increase in marine biodiversity. As an island, the UK has significant opportunities to develop seaweed farming.

WWF-UK is developing a novel approach to understanding and improving the environmental health of large, connected areas of land, freshwater and sea. One project that is just starting is focussed on North Norfolk. This is a large area of predominantly agricultural land with adjacent coastal waters. The use of this land and its outputs has a direct effect on the health of the surrounding ocean in the form of nutrient pollution, particularly nitrogen (N) and phosphorous (P) from agriculture and sewage. WWF is particularly interested in the use of seaweed (kelp) farms to take up nitrogen and phosphorous and turn it into a saleable product including fertilisers. This would make use of the otherwise wasted nutrients whilst also reducing its polluting impact on the ocean.

With regards to nitrogen removal in saltmarshes, microbial nitrogen transformation, plant uptake, and sediment storage are acknowledged to be the major removal mechanisms. WWF is therefore interested in the value of saltmarsh in the uptake of nutrients and how this uptake could be improved through restoration of degraded saltmarsh in Norfolk. We would like to investigate the possibility of novel saltmarsh creation as a mitigation measure, identifying knowledge gaps around mechanisms for key nutrient removal processes as well as the impact of management measures such as grazing prohibition.

WWF is also interested in the use of seaweed produced in Norfolk as a replacement fertiliser in a more circular agriculture system and how this would affect the nitrogen cycle. Would this circularity reduce the circulation of excess nitrogen and phosphorous and help reduce the carbon footprint of Norfolk agriculture? Could seaweed-derived fertiliser feasibly substitute significant amounts of synthetic-nitrogen-based fertiliser, and what geographic and market scales would be needed? Another key question to be considered is what the impact of a 50% reduction in synthetic fertiliser use would have on the economics of seaweed farming in Norfolk. This is key as reducing nutrient pollution at source is essential and should be the first goal in reducing the impact of human activity on freshwater and coastal waters.

In this project, WWF would like to better understand the sources, quantity and bioavailability of nitrogen and phosphorous entering Norfolk coastal waters and the potential for mitigation by salt marsh and seaweed. We would like to understand the quantity of seaweed this could produce, both under a business as usual scenario and a scenario where nutrient pollution is reduced by 50% at source. We are looking for a discussion around the potential to apply seaweed-derived fertiliser in agriculture at scale and what the likely benefits of that would be. Finally, we would like to understand the mitigation potential of saltmarsh based on current extent estimates, as well as following managed realignment in priority areas as identified by the EA, MMO, or other sources. Ideally we would like the publish the work.

**Research questions and needs**

1. Characterisation of nitrogen and phosphorous sources across Norfolk catchments, including mapped nutrient flows and sinks across the ecosystem from catchment to coast where possible.
2. A literature review of nitrogen and phosphorous assimilation by seaweed, including native species cultivated in the UK, and uptake by saltmarsh, indicating management actions that may influence these rates particularly how this would change if initial nutrient inputs were cut by 50%.
3. High level calculations of volume of seaweed that could be produced from the volume of nitrogen (and phosphorous if possible) produced on land and reaching the coast based on growth per unit of N; how much of this nitrogen (and phosphorous if possible) could realistically be removed by common UK farmed species (based on N and P uptake per Ha of seaweed); including how this would change if initial nutrient inputs were reduced by 50%
4. The mitigation potential of saltmarsh based on current extent estimates, and following managed realignment across potential restoration sites in the region.
5. A closing chapter which discusses:
	1. The use of Norfolk seaweed in a circular agriculture system where seaweed fertiliser substitutes some chemical fertiliser and how this would affect the whole nutrient picture in Norfolk.
	2. The extent to which the situation in Norfolk is generalisable to other parts of the UK
	3. The extent to which future nitrogen flows could affect and be affected by use of seaweed production as fertiliser and restoration of saltmarsh, linking this to the need for overall nitrogen inputs to be reduced in future
	4. Recommendations for future work, for example increased data collection, recommendations for agriculture, water treatment companies.

**How WWF will use the work**

We would like the use the study to influence and inform future WWF work in Norfolk. We also intend to publish the work.

East Anglia is one of three WWF Exemplar Landscapes in the England UK and we have been investing in the area for over a decade. Our work has targeted the freshwater environment and we have supported Norfolk Rivers Trust to deliver farm advice for sustainable agriculture, restore and create habitats, rewild rivers and install nature-based solutions. More recently we have invested donations from corporate partners in the UK’s first water fund.

Our approach to on-the-ground delivery work in the UK aims to ensure that projects are coordinated and integrated and therefore provide multiple benefits at landscape-scale. However, there has been no marine work in East Anglia to date as our focus has predominantly been on river catchment work. Therefore, we have chosen the County of Norfolk (with some very small adjunct areas in Suffolk and Cambridgeshire) to deliver the WWF Wholescape Norfolk Programme, enabling us to bring together the landscape and seascape with the crucial connections between.

We will use this work across:

1. **WWF UK programmes:** guide future programmatic work across WWF UK seaweed programme, saltmarsh programme, blue carbon work, wholescapes work, and sustainable agriculture work
2. **Science and evidence:** improve linkages across different data sources, (ie plume models, discharge rates, fate models) to enable better science and evidence at the wholescape level, supporting integrated management of our land, rivers and seas
3. **Nature positive policy:** advocate for nature positive policy that supports management of land, river and seascapes for biodiversity recovery, food production, and climate mitigation
4. **Invest in nature:** Leverage resources to support delivery of the triple challenge at scale in the UK, through the lens of the wholescape

**Deliverables**

The main outcome is enhanced understanding of nitrogen and phosphorous pollution from human activity in Norfolk and the sequestration potential of these nutrients by Norfolk saltmarsh and potential kelp farms. This would be in the form of calculations, maps and infographics of nitrogen and phosphorous flow from source to sea with accompanying dialogue and discussion of the value of saltmarsh and seaweed farms in Norfolk as a tool for nitrogen pollution reduction and mitigation.

The work should be provided to WWF in report form, written in-keeping with the style and tone of other WWF publications. The work should be completed to a high standard so that WWF can publish it externally. Graphic design of the report and supporting infographics in line with WWF branding style should be included and budgeted into proposals, including cost of using stock photography.

We reserve the right to keep the report internal only if it does not meet our needs and/or expectations.

**Guidance on proposals**

Proposals should include:

* The approach and methodology you would take to deliver the required activities. Particular attention should be paid to addressing the research questions and needs according to a seascapes and ‘wholescape’ approach
* The geographical scope of work
* Appropriate sources of data that can be drawn upon (please note existing resources authored by WWF, including [WWF nitrogen report](https://www.wwf.org.uk/sites/default/files/2022-02/WWF_Comprehensive_Approach_to_N_Final.pdf), [Land of Plenty](https://www.wwf.org.uk/updates/land-of-plenty) Reports, [Save Our Earth](https://www.wwf.org.uk/sites/default/files/2018-04/WWF_Saving_The_Earth_Report_HiRes_DPS_0.pdf), and [Value of Restored UK Seas](https://www.wwf.org.uk/ocean-heroes/uk-seas#:~:text=The%20Value%20of%20Restored%20UK%20Seas%20report%20explores%20the%20benefits,UK%20as%20an%20island%20nation.))
* A list and description of deliverables, key milestones and any additional outputs that could be provided (ie webinar, accessible slide deck summarising main findings)
* A schedule of works in line with WWF’s proposed timeline
* The relevant experience of the proposed consultant(s) and examples of previous similar work
* A quote for the work. This should include:
* the breakdown of costs per task / deliverable / outputs provided
* consultant day rates and staff time required for each consultant assigned to the research team (the specific role of each team member should also be stated)
* any expected travel and accommodation costs (the consultant will be expected to provide all of their own office and communication facilities)
* costs excluding and including VAT

In addition:

* Bidders should return a completed Sustainable Procurement Questionnaire with their proposal
* The chosen supplier must commit to WWF UK’s Expenses Policy and Supplier Code of Conduct.
* It is our preference that an appointed external partner adopts our standards terms and conditions for engaging with us. These are attached. Please can you state whether or not you would be comfortable with this and whether or not there are any terms which might create difficulty for you.

**Assessment criteria**

* Fit to goal of work
* Robustness of proposed methodology
* Range and quality of deliverables / outputs provided
* Experience of the team
* Value for money
* Organisational sustainability

**Deadlines and schedule**

Please provide a proposal with written quote by 5pm 1st March 2023

Preferred time frame for work delivery(some flexibility may be possible):

* Assessment of proposals week commencing 6th March
* Successful contractor appointed by 14th March
* Kick off meeting week commencing 14th March
* First set of deliverables 14th April
* First draft report 14th May
* Reviewers comments 28th May
* Final report by 14th June

As much of the work as possible must be completed and invoiced for by June 30 2023, as funding for the project is linked to WWFs financial year which ends on this date. The payment schedule is designed to reflect this.

**budget and payment schedule**

The budget for the work is £30,000 - £45,000 inc VAT

The successful consultant will be issued with a contract and/or purchase order through WWF’s Panda Purchasing system. The proposed payment schedule is:

* 30% upon receipt of first set of deliverables – bidders to advise on what these deliverables will be as part of schedule of work. Deliverables must be provided by 14th April
* 50% upon receipt of the first draft of the entire report – draft by 14th May
* 20% upon reviewers approval of final report

Bidders may suggest alternative payment schedule around WWFs receipt of deliverables, but no more than 30% of project fees can be paid on inception.

**Please email your responses to Dr Piers Hart, Mollie Gupta and Tom Brook at WWF-UK,** **phart@wwf.org.uk** **,** **mgupta@wwf.org.uk** **,** **tbrook@wwf.org.uk**