



Developing high-integrity marine natural capital markets in the UK

Report for Consultation

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Preface

The UK has an opportunity to set the benchmark for establishing equitable, transparent, high-integrity, and standardised markets for marine natural capital. With funding from Blue Marine Foundation and The Crown Estate, Finance Earth and Pollination are leading an initiative to establish a roadmap for a marine natural capital market in the UK. The first phase of work involved engaging a diverse range of stakeholders within the UK and experts across the globe.

There is growing interest in developing markets for natural capital, the stock of renewable and non-renewable natural assets that yield a flow of benefits to people,¹ in marine and coastal environments in the UK. The health of our marine and coastal ecosystems underpins fish and seafood production, climate change mitigation and adaptation, and recreation and tourism. However, to date, these critical ecosystems have been inadequately protected and not managed sustainably, leading to their ongoing degradation, and threatening their ability to provide desired ecosystem services. Pressures are increasing on marine systems, owing to growing competing uses for limited coastal areas, impacts from terrestrial systems, and climate change.

It will not be possible to deliver on public targets for protection, restoration, and regeneration of the UK's marine natural capital, upon which the success of the blue economy depends, without private investment. An enabling market environment is needed to reverse the decline in the UK's marine natural capital as part of an inclusive and just transition to a nature-positive, net-zero economy. However, we do not yet have a clear roadmap in place to address research gaps, overcome policy barriers, implement new business models needed, and build broad support and engagement. Further, a just transition requires consideration of views across a diversity of actors in the marine sphere to ensure the path forward is representative of stakeholder interests.

This initiative aims to build consensus around identifying the priority barriers and solutions to a healthy marine natural capital market in the UK, as well as design a roadmap to market development. It will initially focus on blue carbon, marine net gain and voluntary biodiversity credits, coastal defence, and water quality, recognising that other payment for ecosystem services (PES) opportunities are evolving in the UK context.

The success of this initiative and its potential to drive improved outcomes for marine natural capital will depend upon the depth and diversity of participation from stakeholders. To date, the project team has engaged with nearly 100 stakeholders and global experts through a series of workshops and interviews. We aimed to capture a range of actors involved in relevant sectors to ensure diverse views were considered across civil society, private sector enterprises, academia, government, and financial institutions.

This report represents an initial synthesis based on stakeholder engagement and research conducted over the first phase of the work. It highlights key barriers to scaling marine natural capital markets in the UK and presents early recommendations to help unlock growth across the sector. Case studies included throughout provide illustrative examples. We now seek feedback to refine and enhance our initial findings, to help foster consensus around priority next steps and develop a shared roadmap for their implementation.

This initial synthesis report will be followed by a more detailed second phase over the summer and autumn of 2023. Continued stakeholder engagement in the second phase of work will provide additional opportunities to share views and shape the roadmap.

Executive Summary

Through a first-of-its-kind initiative aimed at creating consensus on how to develop high-integrity marine natural capital markets, an initial set of key barriers and potential solutions have been identified. The barriers have been categorised as financial, scientific and policy, although many are cross-cutting. Based on extensive stakeholder engagement and desktop research, including a review of existing initiatives to address known barriers, potential solutions were also identified and formulated into recommendations and associated actions. Their successful implementation will depend on collaboration across stakeholders.

	Barriers	Recommendations
Financial	 Investor confidence and understanding  Revenue stream challenges to scale marine natural capital markets  Complexity of marine ecosystems  Limitations in public funding	<ol style="list-style-type: none"> 1. Combine public and private capital to support pilot project development and proof of concept 2. Demonstrate the business case for bundled/stacked ecosystem services 3. Launch accelerator programmes to increase investment readiness of projects, accelerate technology, up-skill the industry, and support innovation 4. Set up a buyers alliance of corporates that are committed to high-integrity marine projects and willing to cover upfront development costs
Science	 Uncertainty around habitat extent and condition  Conservation and restoration efficacy  Lack of cross-sector dialogue	<ol style="list-style-type: none"> 1. Address evidence gaps identified by the UK Marine Evidence Partnership 2. Map the UK marine environment and generate baseline data around existing and potential future habitat ranges and restoration opportunities ensuring data is publicly available 3. Conduct local research to provide data for geographies specific to project sites 4. Create a central, publicly available warehouse for marine natural capital project data, with data collected and reported in a standardised way. This will include guidance to access existing baseline marine natural capital and opportunity mapping data sources 5. Carry out research into ecosystem services beyond carbon to enable the valuation of wider ecosystem services 6. Utilise predictive modelling tools to support management and decision-making in marine ecosystems
Policy	 Lack of demand drivers  Lack of consensus on framework to monetise marine natural capital  Lack of supporting policy and market infrastructure for blue carbon in the VCM  Marine spatial planning lacks a natural capital lens  Evolving approval process for marine natural capital projects  Lack of government resources for technical capacity building	<ol style="list-style-type: none"> 1. Develop a cross-cutting blue economy strategy and establish a clear government lead 2. Develop more integrated marine spatial planning 3. Improve understanding of approval processes and facilitate continued dialogue 4. Direct a cross-UK programme of work to address design challenges for marine net gain 5. Accelerate processes to achieve consensus around which codes and verification standards to quantify and monetise marine ecosystem services to support marine natural capital markets 6. Incorporate marine commitments into UK NDCs under the Paris Agreement to embed marine conservation within UK's decarbonisation targets 7. Provide government funding to help develop a network of "blue natural capital labs" 8. Within Levelling Up and other economic development initiatives, focus attention on technical upskilling 9. Jointly strengthen obligations to reduce water pollution into the marine environment, while also developing market infrastructure, such as nutrient credit trading, to monetise water quality benefits delivered by restoration, conservation or mariculture interventions 10. Develop integrated policymaking, including the consideration of terrestrial environment in marine policymaking, to incorporate impacts and dependencies



Vision

Vision

A vision for high-integrity marine natural capital markets

The world's oceans play an integral role in supporting all life on earth. They shape the climate system, having absorbed 20-30% of total anthropogenic CO₂ emissions since the 1980s and taking up over 90% of excess heat since 1970.² Our oceans also host a vast array of biodiversity, with countless species and dynamic ecosystems that ensure the stability and resilience of a healthy planet. Marine environments, such as saltmarshes, provide critical natural barriers against coastal erosion and flooding, while fish and other seafood support global food security.

These marine and coastal ecosystems underpin critical economic opportunities around the globe, but their degradation poses a significant threat. Rising temperatures, ocean acidification, deoxygenation, marine pollution, destructive fishing, and other anthropogenic impacts, in particular land-based pollution, drive deterioration of marine systems.³ Despite the importance of these ecosystems, government and philanthropic funding alone are insufficient to bridge the £56 billion funding gap needed for UK nature restoration. There is an urgent need for private funding to fill this funding deficit.⁴

As appreciation of the ecosystem services provided by the marine environment has grown, so too has the willingness to pay for these services through the nascent formation of natural capital markets. Shaping high-integrity markets in the UK creates an opportunity to protect and preserve vital marine ecosystems by providing much needed new sources of financing for restoration, conservation, and sustainable use. However, previous challenges around terrestrial natural capital markets, such as in ensuring additionality, permanence, and preventing leakage, have resulted in reservations in the market's ability to foster change.

The UK has the opportunity to create high-integrity marine natural capital markets that future-proof vital marine ecosystems and livelihoods to achieve and underpin a thriving sustainable marine economy. Critically, showcasing best practices for high-integrity markets in the UK can help inform market development in coastal communities around the world, turning the tide on marine restoration.

The process of stakeholder engagement to date has informed our vision for high-integrity marine natural capital markets in the UK, which:

- Incentivise the development of high-integrity projects through a fair price;
- Are based on robust and up-to-date scientific analysis;
- Provide measurable financial and non-financial benefits for coastal communities and those acting as stewards of marine natural capital;
- Are integrated with terrestrial natural capital markets to ensure continuity and synergies across ecosystems;
- Are structured in a way that considers the unique attributes and challenges of the marine environment; and
- Are transparent and enable a wide range of stakeholders, active in different sectors, to engage and participate.

This vision for high-integrity marine natural capital markets in the UK can be achieved over the short-term through support and coordinated action from government, private sector enterprises, financial institutions, civil society, and academia. Collaboration across sectors will be needed to shape a supportive ecosystem which facilitates access to capital at scale, realigns investment into activities enhancing the marine environment, draws on the best available scientific evidence, fosters innovation, and enables holistic decision-making through a natural capital lens across seascapes. There is no time to get it wrong, so the focus must be on what can be done now, and to create pathways for continued action and improvement. Looking ahead, we invite continued feedback from stakeholders to arrive at a shared vision of success for delivering systems change in support of new marine natural capital markets across the UK.

Setting the Scene



Setting the Scene

How marine natural capital underpins the UK's blue economy

The UK has a rich and diverse marine environment. Coastal areas, estuaries, and offshore waters contribute significantly to the country's blue economy, worth an estimated £47 billion and representing over 500,000 jobs.⁵ They also provide a multitude of vital services for the UK – including coastal defence, water quality, climate stability and resiliency, and support for wild capture and farmed fisheries.⁶ However, increased pressure from a wide range of human activities has led to the degradation of many of these ecosystems. In the UK, more than 90% of marine protected areas (MPAs) are still being bottom-trawled and dredged,⁷ causing widespread and long-term damage. Overfishing has led to shifts in the size, number, and distribution of fish species.⁸

Pollution from agriculture and urban runoff can enter waterways and significantly impact coastal and marine habitats and biodiversity by overloading these ecosystems with excess nutrients, heavy metals, and other toxins.^{9,10} Indeed, land-based pollution is one of the main drivers of degradation and loss of coastal ecosystem services. As a result, there is an inherent and important connection to working both on land as well as in marine environments, adding complexity. Resulting from these pressures, the UK has witnessed mass loss of its marine habitats: in Sussex, 96% of kelp has disappeared since the 1980s¹¹, whilst across the UK, 44% of seagrass habitats have been lost in the last century¹², with the majority of saltmarshes¹³ also expected to disappear by 2100.

As these systems are placed under continued strain, the services they provide begin to deteriorate resulting in negative consequences for the communities and economies depending on them. Overfishing has resulted in a decline of fish stocks in the UK and a decrease of 94% in commercial productivity since the late 1800s.¹⁴ Excess nutrients and other contaminants can affect oxygen availability and introduce harmful bacteria or viruses into waterways, impacting both ecosystem health, as well as food and bathing safety concerns.^{15,16} The current level of water pollution across the UK also increases the risk that restoration projects will fail, discouraging upfront investment in project development. Poor water quality has also affected the mariculture sector in the post-Brexit regulatory environment, creating additional hurdles for this industry to adopt regenerative business models. Loss of coastal habitats has increased exposure of agriculture, urban development, and vital public infrastructure to flooding and erosion.^{17,18,19} These consequences naturally become exacerbated with climate change, through impacts such as ocean warming, acidification, and sea level rise.

While some ecosystems have seen some signs of improvement, the duration and extent of impacts to these ecosystems can be uncertain and long-term. To help ensure the resiliency and health of these ecosystems, evidence has shown collaboration between public and private actors across UK jurisdictions is critical for maximising efficacy of solutions and optimising the benefits for the environment as well as dependent communities²⁰ While strong foundational evidence indicates the potential for marine natural capital markets to support a sustainable blue economy, efforts must shift towards pilots that deliver scalable, multifaceted ecosystem services, while accounting for climate mitigation and adaptation. To secure private sector participation and financing, these pilots must also support the creation of revenue streams that are measurable and tangible for businesses.

Marine natural capital markets remain nascent in the UK

Natural capital markets can be driven by voluntary or compliance (mandated through regulation) purposes, or a combination of both. Examples of voluntary markets include those facilitated by UK carbon codes (e.g., Woodland Carbon Code or Peatland Code). Examples of compliance markets include the Biodiversity Net Gain scheme in England or Natural England's nutrient neutrality pilot markets in selected Nutrient Advice Areas. In both cases, the markets are facilitated by payments in return for the provision of ecosystem services, which in turn can be delivered through a range of interventions.

Interventions (e.g., habitat restoration) can produce a range of revenues through the sale of commodities, service provision, rental income, and payment for ecosystem services. The generation of revenue streams from ecosystem service provision – or natural capital – creates the potential for a natural capital market. There is supply of an ecosystem service or services which can be quantified (e.g., a unit or credit) and, equally, there are buyers demanding and willing to pay for that service.

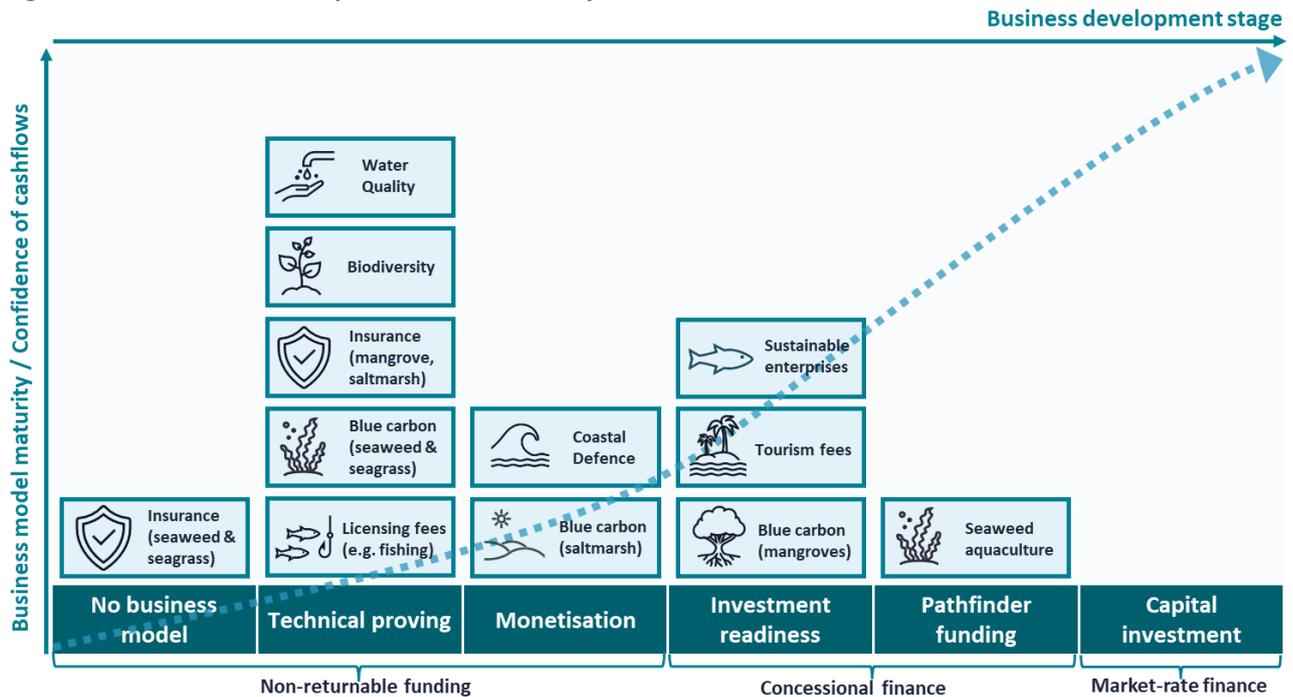
Compared to terrestrial markets, the UK marine natural capital market is nascent. Whilst the UK has been a leader in the development of terrestrial natural capital markets, progress in the marine sphere has been limited. The monetisation of marine ecosystem services remains generally unproven and non-standardised, and, as such, there is a notable lack of marine habitat restoration projects at an investment-ready level of maturity.

Initiatives are underway to develop this market, including the development of a range of codes for saltmarsh carbon, seagrass carbon, and kelp. There are a range of potential natural capital and ecosystem services which are relevant for a UK natural capital market, including:

- **Biodiversity:** Uplift of biodiversity in marine or coastal habitat is achieved resulting in quantified units through a range of existing methodologies. Standards and metrics for valuing biodiversity and the issuance of units/credits are still at a nascent stage.
- **Blue carbon:** Blue carbon refers to the carbon sequestered and stored by marine or coastal ecosystems. These ecosystems play a crucial role in carbon sequestration, removing large amounts of atmospheric carbon (e.g., saltmarsh, seagrass, macroalgae, seaweed).
- **Coastal defence:** Protecting marine ecosystems, such as saltmarshes, helps provide coastal protection against the impacts of erosion, storm surges and flooding.
- **Water quality:** Water quality can be improved through a range of natural capital solutions which address nutrient run-off and overall nutrient load in water systems.

There are other potential ecosystem services and associated markets which may develop as willingness to pay for these services increases, and the barriers to their development are addressed.

Figure 1. Marine natural capital market maturity overview



A number of marine natural capital projects around the UK are seeking to improve understanding of ecosystem services provided by coastal and marine habitats and provide a firm evidence base. One notable example is the Blue Carbon Mapping Project, initiated in 2022. Led by the Scottish Association for Marine Science (SAMS) and funded by WWF-UK, the project aims to quantify the total carbon stored in the UK's marine environments, providing a baseline which can then be utilised by future blue carbon projects.²¹

The importance of meeting high standards of integrity for market success

High-integrity marine natural capital markets in the UK need to fulfil both local and global scale integrity principles, drawing from emerging international and UK-specific guidance. Critically, the purpose of new marine natural capital markets is to help achieve publicly-determined goals for the health and function of the marine environment, where success is not possible with public funding alone. Public capital can be leveraged significantly with private investment.

At the local level, markets must ensure that tangible net positive impacts on nature and socially equitable outcomes are achieved within the area of the intervention. This includes local design with free, prior, and informed consent of stakeholders and the establishment of equitable benefit sharing mechanisms. Local communities in the UK and internationally have expressed concerns that natural capital projects have not always been developed in a way which directly benefited the local community.

Within the broader global context, increasing guidance and agreement has emerged on how natural capital projects can, and should, deliver measurable and verifiable outcomes for the environment and people. This includes meeting the goals set out in the Kunming-Montreal Global Biodiversity Framework (GBF), and agreed to by the UK at COP15, delivering additional, nature-positive outcomes in alignment with the Science-Based Targets Network (SBTN) mitigation hierarchy,²² and meeting integrity standards from the Integrity Council for the Voluntary Carbon Market (ICVCM) on supply, and the Voluntary Carbon Markets Integrity Initiative (VCMI) on demand. It's important that any high-integrity marine natural capital market in the UK embeds this guidance, ideally through domestic policy, in order to ensure positive outcomes for both nature and communities. An overview of emerging integrity principles in the context of blue carbon, biodiversity credits, and natural capital more broadly is provided in Annex 2.



Barriers to marine
natural capital market
development

Barriers to Marine Natural Capital Market Development

Based on the desktop research and stakeholder engagement conducted to date, we have identified the following barriers as key challenges preventing the growth of marine natural capital markets in the UK. They are divided across three categories:

- i. **Finance and project development barriers:** practical barriers to securing investment in projects and developing sustainable business models;
- ii. **Scientific barriers:** key areas of uncertainty affecting market confidence in marine natural capital projects and methodology development; and
- iii. **Policy, legal and regulatory barriers:** highlighting areas where policy reform may be necessary to create a more enabling environment for market development.

The barriers to market development remain complex and interrelated and, as such, will require innovative, cross-sectoral partnerships to be addressed.

1: Finance and project development barriers

Funding for the development of natural capital projects is one of the barriers which was noted by a range of stakeholders, in particular, funding to make projects more investment ready and able to meet high-quality standards. Defra's Green Finance Strategy has pledged £1 billion into the UK's natural recovery by 2030;²³ however, limited accessibility and understanding of marine environments means there is funding bias towards terrestrial environments.²⁴ This pledge also falls significantly short of the required £56 billion finance gap to achieve nature-positive outcomes over the next decade.²⁵ Critically, gaps of £516 million remain to increase the proportion of protected and well-managed seas, and £6 billion to ensure seafloor habitats are healthy and sustainable.²⁶ Previous estimates from WWF found that investment of £38 billion in actions to restore lost coastal ecosystems, fully protect a third of UK seas, make fisheries and seafood production nature and climate positive, and support net-zero climate action could deliver at least £50 billion in benefits by 2050.²⁷

Finance and project development barriers are explored below, highlighting key themes that prevent the flow of capital into marine natural capital markets within the UK. These have been split into three reoccurring observations from both literature and stakeholder engagement. These are identified and categorised as: (i) corporate and investor confidence and understanding (among wider misunderstanding and trust in natural capital markets and the idea of 'paying' for ecosystem services); (ii) revenue stream challenges to scale marine natural capital markets; and (iii) complexity of marine natural capital markets.

1. Investor confidence and understanding: Although there is interest from private investors to engage in marine natural capital markets, they often lack the expertise in marine environments. As a result, they are uncertain on how to effectively align investments with marine restoration. This is further hindered by a lack of supportive infrastructure, such as robust marine natural capital codes. As an emerging and undeveloped market, there are also concerns about project viability and return on investment. Specific barriers that impede investor understanding and confidence include:

- **Limited awareness:** Investors often have limited awareness and understanding of the concept of marine natural capital and the potential value of marine ecosystem services. They tend to be more familiar and comfortable with the concept of terrestrial environments and fail to be able to conceptualise the potential return opportunities associated marine environments. For example, woodland is a familiar and relatable concept, however, the mechanics of ecosystems such as kelp and seagrass are complex and less well known.^{28 29}

- **Lack of historical data:** As an emerging market, there is weak evidence on the returns and impact benefits of investing in marine natural capital projects, which plays a crucial role in assessing investment opportunities, understanding trends and making informed decisions. The scarcity of long-term data on marine ecosystem dynamics, resource availability and valuation models hamper investor’s willingness to engage³⁰. Risk transfer solutions that mitigate financial risk associated with marine habitat loss, such as insurance, can be expensive and challenging to design, owing to the lack of historical data. Where data does exist, it is often not over a long enough time horizon to meet investor requirements.
 - **High risk, low return:** Currently, the risk is high and returns are still low for most marine natural capital projects, as codes and standards are still under development and demand is uncertain, which affects the price of units or credits. Climate risk, regulatory uncertainty, and the lack of established business models creates more risk than investors are comfortable with in adjacent sectors, such as wind energy. Either returns need to go up or risk needs to come down to meet investor appetite, or there needs to be downside protection such as first loss capital or guarantees.³¹.
 - **Market ‘hype’:** There is a lot of noise in natural capital markets which creates uncertainty for corporates and financial institutions on what is backed by robust, credible science and what is ‘hype’. Many pilot projects are still not yet at an investment readiness stage and therefore have not developed a clear thesis for revenue generation over time.
 - **Lack of comfort with financing nature:** Natural capital projects are novel and nature has historically been maintained by public funding. Nature is also often seen as being intrinsically valuable and worthy of protection, with many unquantifiable social and cultural values. As such, there exists a general lack of familiarity or comfort with the idea of natural capital and generating returns from nature.
- 2. Revenue stream challenges to scale marine natural capital markets:** The diverse range of ecosystems services provided by marine environments, such as coastal protection, biodiversity and carbon sequestration often lack well-defined and easily monetised revenue streams, deterring financing opportunities from financial institutions. Specific barriers that prevent impactful revenue streams are:
- **Scale of projects:** The small scale of many projects means that individual investment opportunities have smaller ticket sizes compared to more established markets, which have well-established markets and investment instruments. As a result, marine natural capital markets don’t meet the scale requirements for many financial institutions, with the average ticket size of natural capital as a whole being less than US\$10 million.³² By comparison, the average ticket size of private equity investments in 2021 was US\$1.1 billion.³³ Approaches to achieve scale, such as building portfolios of projects, can present additional complexity.
 - **Level of revenue from natural capital:** To date, the revenue generation potential based on current carbon prices has not been sufficient to cover the costs of delivering marine natural capital projects. In order for projects to generate revenue sufficient to cover costs, there is often a need for stacking of revenues or bundling of outcomes, such as biodiversity and coastal defense. Stacking refers to, “when separate credits or units are issued for different ecosystem services from the same piece of land,” and bundling refers to a “single credit or unit which delivers a bundle of environmental benefits.”³⁴ There is significant interest from investors and buyers of credits or units if projects can be developed which demonstrate the ability to generate stable revenue covering costs and provide investor returns. However, some of the current policies, standards, and codes have issued at times confusing guidance on whether stacking or bundling will be allowed.
- 3. Complexity of marine ecosystems:** The additional challenge of gathering data on, and lower evidence baseline for marine ecosystems, as compared to the terrestrial environment presents a

significant financial barrier to scaling marine natural capital projects. Understanding and managing these ecosystems requires comprehensive scientific knowledge and research, advanced technology, and personnel with marine-specific expertise. The costs associated with conducting these activities are substantial. In addition, the dynamic nature of these ecosystems, such as climate change and ocean acidification further complicate the task of scaling marine natural capital projects. Complexity of marine ecosystems barriers are highlighted as below:

- **Ownership and regulations:** Although ownership of intertidal habitat is clear, there are a wide range of other existing agreements between stakeholders which can create uncertainty around how natural capital projects can be created and revenues generated and shared. The range of regulations associated with marine ecosystems can also deter investors as they are burdensome and increase transaction costs.³⁵ See Policy, legal, and regulatory barriers section for additional detail.
 - **Incomplete integration of terrestrial, coastal and marine planning:** While some policy frameworks in the UK do facilitate more integrated coastal management, such as Scotland's Third Land Use Strategy requiring terrestrial planning authorities to consider marine plans in local development plans,³⁶ these processes largely remain siloed. Without robust coordination between land use and marine planning decision-making, it is more challenging for investors and project developers to understand where interventions can deliver desired ecosystem services with sufficient permanence to participate in marine natural capital markets. This is of particular importance in the context of a changing climate and coastal squeeze on habitats like saltmarsh, which may need to migrate inland to retain current extents. Further, enforcement of managed realignment policies in coastal areas can pose significant risks for coastal landowners who may lack future options for their assets.
 - **Lengthy and complex project development with high upfront costs:** In comparison to terrestrial markets developing and scaling marine natural capital projects is often a lengthy process that includes research, planning, permits and implementation phases. The variables to implement successful marine projects are much more complex and costly. Marine habitats generally require specialist equipment and expertise. Site selection for marine natural capital projects can also be complex, considering designated sites and how to demonstrate additionality. Mapping and analysis of a variety of variables to maximise environmental benefit, social impact, as well as physical and ecological potential can be costly and complex and ultimately limit location options.³⁷ These factors reduce corporate interest as it increases the financial risks associated with the project and revenue generation in the short-term. It also results in the need for significant upfront financing and technical ability, which poses a major barrier for entry players. Ultimately this makes it difficult for marine natural capital projects to compete with more commercially viable activities.
- 4. Limitations in public funding:** Limited public funding is available to help develop marine natural capital projects. Often the marine sector is not eligible or competes with terrestrial projects for larger pots of public funding, which benefit from more well-developed frameworks, recognised carbon codes, and existing incentives related to agricultural practices, woodland, and peatland creation. Scaling marine natural capital projects will require more targeted funding specific to its unique context to help develop and replicate additional small-scale pilots to address evidence gaps, provide technical assistance to overcome implementation barriers, and help accelerate the development of commercial-scale projects. Innovative funds have emerged to crowd in private investment specific to the marine environment, as seen in Scotland's Marine Environment Enhancement Fund (SMEEF), address coastal flood risk through natural flood management, as seen in the Wales Flood and Coastal Erosion Risk management programme, as well as deliver sustainable growth in the mariculture space, as seen in Northern Ireland's Maritime Fisheries Fund. Continued

development of focused public funding to de-risk private investment in the sector will prove critical to crowding in the private sector. The landscape overview of public funding included in Annexe 3 provides additional detail on individual funds.

Funding initiatives underway to address financial barriers

Initiatives to overcome these barriers and channel funding into scaling marine natural capital markets are underway throughout the UK. Public funding, such as Natural Environment Investment Readiness Fund (NEIRF) and FIRNS (Annexe 3), aim to help natural capital pilots become investment ready. These grants help projects develop the business case for investment by calculating costs and revenues associated with improving or restoring natural capital provision. Public funding programs like these can help address some of the barriers identified around high **upfront costs** that are associated with complex marine projects. As projects through these programs are supported to develop robust and data backed business plans, this information can help to address the issues around **'market hype'**, and improve **investor confidence**, allowing them to make informed investment decisions based on **transparent risk-return profiles**. In their second round, NEIRF awarded over 50 nature restoration projects with grants of up to £100,000 each. The majority of the grants were awarded to projects focused on terrestrial ecosystems, but there were a few projects in marine environments that received support, including one focused on seagrass restoration and one on saltmarsh restoration.³⁸

The private sector has also developed a wide range of innovative initiatives which are crucial for the development of marine natural capital markets. Accelerator and incubator programmes, such as Bright Tide's initiatives,³⁹ aim to support projects with developing the business case to mobilise private investment. They are designed to support early-stage marine projects with the aim of scaling business models more rapidly than would be achieved without the accelerator support. Accelerators and incubators help overcome the barriers associated with **lengthy and complex project development**. Although there is limited guidance and regulation on the potential of stacking and bundling, accelerators and incubators can often be used to support innovation and trialling of new approaches aimed at combining **diverse revenue streams**.

Additionally, there are a range of impact funds and investment strategies from financial institutions focused on providing patient capital for marine natural capital projects and marine enterprises, including the Blue Impact Investment Strategy and Ocean 14 Capital. These funds and strategies help get more projects initiated and as projects are implemented, data on impact can be collected, improving the overall **availability of data and proof of concepts** for the wider market. There are an increasing number of initiatives focused on blended finance models, which aim to leverage public funding and finance to crowd in private capital. In 2022, Defra, Federated Hermes and Finance Earth announced the UK Nature Impact Investment Strategy, a blended finance fund with £30 million seed capital from Defra. The first-loss capital from Defra is earmarked for terrestrial projects, while the fund overall will be investing in marine habitats.⁴⁰ Blended finance models help **mitigate risk** associated with a nascent market. Concessional finance can also be used to achieve a blended **rate of return** and attract more mainstream private capital.

It is important to note that financing to date in the UK related with marine natural capital has been directed to marine enterprises which are often contributing to improvement of the marine environment and improving marine natural capital, but financing for projects or entities with a primary focus on restoration or protection have experienced greater challenges with mobilising private capital.

Annexe 4 lists the various private initiatives that are underway both in the UK and internationally.

2: Scientific barriers

The UK Blue Carbon Evidence Partnership (UKBCEP) was convened to help identify priority evidence gaps and shape future research development to support improved management, protection, and restoration of blue carbon habitats across the Defra, the Department for Energy Security and Net Zero (DESNZ), the Department of Agriculture, Environment and Rural Affairs (DAERA), Welsh Government, and the Scottish Government. UKBCEP recently published its *Evidence Needs Statement*, highlighting five key areas of evidence needs in order to deliver on its blue carbon objectives: (i) standardised methods and quality control; (ii) habitat mapping; (iii) carbon stock, accumulation, burial and emissions data; (iv) impacts of human activities and climate change; and (v) socio-economic benefits and costs.⁴¹

In alignment with UKBCEP's findings, the following key scientific barriers emerged as priority areas impeding the development of broader marine natural capital markets in the UK:

1. **Uncertainty around habitat extent and condition:** While data availability varies between habitat types, significant evidence gaps remain around historical and current boundaries and condition of coastal and marine habitats in the UK.⁴² Uncertainty around ecosystem extent, as well as the health and function of marine habitats, makes it difficult to understand the existing and future ecosystem service potential available in the UK, in particular for biodiversity uplift and carbon sequestration.
 - **Challenges in detailed mapping:** The turbid water conditions in the UK make identifying the location of certain habitats, such as kelp forests or seagrass meadows, challenging utilising conventional remote technology such as satellite imagery. This makes it difficult to cost-effectively produce detailed mapping at scale of how habitat has changed in recent years. As a result, mapping activities often occur where habitat ranges are already known or have been identified through Environmental Impact Assessment (EIA) processes. For instance, seagrass maps are often developed for areas where meadows are already known to exist, while new areas are still periodically discovered.⁴³ Gaps in detailed mapping make it more difficult to develop opportunity maps that indicate where restoration or conservation interventions would deliver the greatest impact over time, creating a barrier to project development. This is particularly important when considering adaptive management strategies in the face of climate change impacts on habitat.⁴⁴
 - **Data gaps around carbon:** Carbon accumulation and storage rates are highly dependent on habitat type and local biogeochemical conditions in the marine and coastal context. Without highly localised baseline data on carbon fluxes and habitat condition, establishing country-wide estimates remains difficult.^{45,46,47} For instance, total area of both saltmarsh and seagrass habitats in the UK remain uncertain. However, while estimates of carbon accumulation in saltmarshes have been estimated at the UK level by aggregating data from in-country sampling, there are no current estimates for carbon accumulation rates in seagrass ecosystems across the UK, due to a lack of UK-specific data.⁴⁸ Using data from other geographies, and other seagrass species may not be representative of the UK's ecological conditions.⁴⁹ Further, data that exists for blue carbon studies can often be dispersed across various institutions and can be difficult to access.⁵⁰ Significant uncertainty about blue carbon abatement potential in the UK discourages investment in project development.
 - **Variation across research and monitoring, reporting and verification (MRV) approaches:** A lack of standardisation across research and MRV methodologies in the UK also contributes to significant uncertainty around marine natural capital projects. For example, variation in how carbon stores are monitored and reported (e.g., the depth of sediment measured) has introduced high levels of variance between projects.^{51,52,53,54} Monitoring and reporting standards will also be important for the development of the biodiversity credit market and valuing additional ecosystem services.

- 2. Conservation and restoration efficacy:** Significant evidence gaps remain around what restoration and conservation approaches are most effective in the UK context. Much of what we know about how to help marine ecosystems recover is simply to address drivers of habitat degradation and allow for natural recovery; however, our understanding is still growing around how best to protect and restore them.⁵⁵ As a result, it is difficult to develop projects at a commercial scale.
- **Challenges in active restoration:** Evidence gaps remain in the understanding of why certain restoration approaches fail in the UK context. For example, restoration of seagrass beds is often expensive, and success of ecosystem establishment is highly variable. Research into how seagrass responds to active restoration interventions, such as replanting degraded areas, as well as changing local environmental conditions, such as efforts to improve water quality, is needed.
 - **Lack of agreement on what ‘good’ looks like:** There is not yet an agreed position on what successful projects will look like. For example, interventions might improve habitat condition but not achieve what is agreed to be a ‘good enough’ outcome in terms of ecological health and function. Without scientific alignment on what outcomes market mechanisms are driving towards, including as defined by biodiversity credit methodologies, it will be difficult to structure incentives and revenue streams around achieving these targets.
- 3. Lack of cross-sector dialogue:** Amongst the research community, there can be a lack of understanding of the function and limitations of different financing mechanisms, and the evidence needs for both public and private sector actors’ engagement with a natural asset or natural capital market. The same challenges arise within the private sector when scientific data communicating materiality of nature is not readily adopted. Without platforms in place to facilitate dialogue across diverse market stakeholders from the private sector, government, and academia, it is difficult to design research which produces decision-useful data for market-based mechanisms.⁵⁶

Research and other initiatives underway to address evidence gaps

While gaps in scientific evidence do present a major barrier to market development, the UK is uniquely well positioned to address these gaps owing to the wealth of expertise across civil society, academic, and government institutions. These include large-scale government and NGO-led restoration initiatives, development of new platforms to facilitate knowledge exchange about emerging new markets, initiatives to harmonise and centralise standards development, academic research to build foundational knowledge about the UK’s coastal environment, and development of new institutions to help bridge gaps in R&D for marine natural capital industries. A high-level landscape review of major research initiatives underway within the UK is provided in Annexe 5.

A breadth of blue carbon crediting methodologies relevant to habitats present in the UK are under different stages of development internationally. Domestic coalitions are already building upon these bodies of work to adapt and develop methodologies tailored to the UK marine environment, managing concerns about cost of implementation and suitability to local ecological conditions. Drawing on these emerging methodologies can help accelerate market development in the UK and build credibility around future credit streams from blue carbon projects. An overview of international methodologies and their status is presented in Annexe 6.

Voluntary biodiversity credit markets remain nascent but have gained significant attention over the last two decades, including for their innovation on how to measure change over time in ecosystem health. However, few have potential applicability to marine systems and even fewer are specifically targeted at marine and coastal ecosystems. Further, many are still under development or have yet to sell credits. In Annexe 7, we detail some of these biodiversity credit methodologies that have shown potential for marine and coastal biodiversity and could eventually provide helpful methodologies to build credibility and transparency in the UK context.

Finally, a range of emerging technologies are delivering promising solutions to help reduce project implementation costs, enhance MRV to build credibility across markets, and enhance regenerative aquaculture practices. Deploying enabling technologies as part of new marine natural capital interventions throughout the UK will help increase confidence in these nascent markets, while also helping to reduce both cost and technical barriers to entry. A high-level overview of technologies surveyed in the first phase of the work is provided in Annexe 7.

3: Policy, legal, and regulatory barriers

Development of supportive policy frameworks for marine natural capital markets lags behind progress made to date for terrestrial markets. This includes limited obligations on the private sector to help build willingness to pay for marine ecosystem services, nascent codes to quantify and monetise ecosystem services, in particular beyond carbon sequestration and storage, and the need for additional supportive market infrastructure for the voluntary carbon market (VCM) as marine ecosystems are largely not yet covered by compliance markets.

Structuring new demand levers related to offsetting harm remains sensitive, as environmental bodies in particular express concerns that they can lead to net loss and enable environmental harm. Safeguards against perverse outcomes and enforcement will be needed to ensure regulatory frameworks deliver net positive restoration or restoration impacts over and above mitigating damage.

Practical regulatory barriers also impede project development, including limitations in marine spatial planning, and obstacles to securing necessary approvals. Finally, government support for existing marine natural capital industries, in particular mariculture, is lacking and undermines the potential for a just transition across the sector. Specific gaps include:

1. **Lack of demand drivers:** Sufficient obligations do not yet exist for corporates to create significant willingness to pay for marine ecosystem services. Current appetite to invest into marine natural capital markets is primarily driven by the VCM. This barrier is most significant for monetising the water quality, biodiversity and coastal defence benefits provided beyond carbon. Scaling willingness to pay may require new or revised regulatory obligations regarding:
 - **Preference for on-site mitigation:** Existing water quality regulations in the terrestrial context, such as nutrient neutrality obligations on developers, prioritise on-site mitigation⁵⁷ and do not yet create a mechanism to value and reward the water quality improvements delivered by marine restoration, conservation, or regenerative mariculture interventions. Further, frameworks currently in place do not make a connection between terrestrial and marine environments (e.g., placing explicit obligations on the agricultural sector to mitigate marine impacts based on watershed connectivity to seascapes, or recognize the role marine ecosystems play in mitigating nutrient loading).
 - **Evolving demand signals for nature-based infrastructure:** While the UK has built strong experience in managed realignment and saltmarsh restoration in particular, investors have expressed challenges in securing a revenue stream tied to the avoided loss and reduced maintenance costs delivered by the resilience benefits of these restoration initiatives. This narrows opportunities for upfront investment from the private sector, but may present innovative opportunities from the insurance industry.
 - **Uncertainty around marine net gain parameters and scope:** Whilst stakeholders now largely accept the principles of marine net gain, significant uncertainty remains around its design. For example, consideration is still underway to establish which activities it will include, the evidence base and monitoring requirements, impact assessment and measurement approaches, inclusion of extra environmental benefits and services (e.g., coastal defence), and whether improvements within MPAs will count as net gain interventions.⁵⁸ Each Devolved Administration will need to

consider whether and how to shape an obligation for net positive impacts from development and other activities in the marine environment. Without clarity on obligations across the UK, both project developers and potentially regulated actors face significant uncertainty, curbing appetite for upfront investment in marine natural capital initiatives.

- 2. Lack of consensus on framework to monetise marine natural capital:** Compounded by scientific evidence gaps, development of new codes to value and monetise marine ecosystem services remains nascent and fragmented. Questions persist around how to capture the diversity of services delivered by restoration and conservation interventions beyond carbon sequestration and storage, and whether holistic codes reflecting the broader range of benefits are needed.
- **Code fragmentation and lack of funding:** Early-stage codes include a UK Saltmarsh Code, Seagrass Code, Kelp Code, Seaweed Code, Nitrogen Recycling Code, Marine Natural Capital Code, and application of the Wilder Carbon Code to marine environments, which seek to define units or credits. Without alignment on prioritisation of codes needed, these initiatives have not received sufficient funding or government support to address remaining evidence gaps, leading to prolonged delays. Private sector investors, project developers and regulators have expressed that codes are required to define what ‘good’ looks like, deliver confidence in outcomes, and provide line of sight into the potential production of tradeable credits. Additionally, it is not feasible to delay project development until a hypothetically perfect code is developed. An adaptive approach is therefore needed to incorporate improved scientific understanding over time, while allowing for near-term project development.⁵⁹ See Case Study 1 below.

CASE STUDY 1: Code fragmentation and lack of funding – the UK Saltmarsh Carbon Code

Barriers



Projects need blended finance sources to become financially viable and investable



Variation in carbon sequestration rates across saltmarsh sites in England



Lack of understanding and awareness from stakeholders on the benefits of saltmarshes



Additionality risk

Solutions



Improved and increased data collection on carbon sequestration potential of saltmarsh sites across the UK to ensure robust scientific data underpinning a Code



Demonstrate the business case for bundled and stacked ecosystem services, especially public grant funding



Accelerate development of existing codes and standards

Project Description

Saltmarshes can play an effective role in climate change mitigation by trapping and storing carbon dioxide, as well as an important role in coastal defence and habitat creation. A project was launched to bring together key stakeholders to determine what type of code or standard development was needed to direct more finance into saltmarsh restoration and creation. The project secured a £100,000 grant from Defra’s NEIRF initiative. Through the project, various gaps and barriers have been identified such as the need for public funding for the saltmarsh restoration projects to become financially viable, the variation in carbon sequestration rates across saltmarsh sites in England, and community concerns around managed realignment projects. Stakeholders have expressed reservations that saltmarsh restoration brings the sea closer to communities, creating a perceived increased risk of flooding. Further education and awareness raising is needed to showcase the benefits of natural sea defences, e.g., that they can result in avoided infrastructure costs, livelihood impacts, as well as reduced maintenance costs for sea defences.

- **Nascency of frameworks beyond carbon:** Significant uncertainty remains regarding the potential for marine voluntary biodiversity credit markets and marine net gain in the UK, which increases risk perception among potential investors. Similarly, a recognised code or tool is not yet in place to reward the improvements to water quality delivered by coastal habitats or regenerative mariculture production. Examples exist in other jurisdictions, such as the nutrient trading program for oyster aquaculture in the Chesapeake Bay. See Case Study 2 below.⁶⁰

CASE STUDY 2: Nascency of frameworks beyond carbon - Chesapeake Bay

Barriers



Demand for oyster credits



Regulations to meet water quality permit requirements



Complicated and lengthy regulatory requirements for projects

Solutions



Accelerate development of existing codes and standards to provide methodological guidance on calculating the generation of tradeable units



Streamline licensing and permitting for marine natural capital projects

Project Description

The Chesapeake Bay on the East Coast of the US has suffered a significant decline of oyster populations over the years owing to overharvesting and disease. This has had devastating impacts on the bay's ecosystems, including reduced water filtration, shore erosion and impacts to spawning habits of marine species. It has also negatively impacted the seafood industry and the livelihoods of communities that rely on the bay. To address the challenges and restore the health of the Chesapeake Bay, the state and its partners have invested in oyster restoration and aquaculture, using the approach of nutrient credit trading. This allows businesses to meet their water quality permit requirements by utilising the oysters' natural ability to filter pollutants and remove nutrient from the water. Oyster aquaculture operations can generate nutrient credits based on the amount of nitrogen and phosphorus removed from the water by their oysters. These credits can then be traded or sold to entities that struggle to meet their required pollution reduction targets, thus incentivising the expansion of oyster aquaculture as a tool to improve water quality.ⁱ

3. **Lack of supporting policy and market infrastructure for blue carbon in the VCM:** While UK-scale operation of the VCM for terrestrial solutions is already in place, comparable supportive infrastructure does not yet exist for blue carbon. Without clarity on the government's view for the role of marine environments in achieving net zero, it is difficult for the private sector to understand how best to engage in these markets.

- **Need for inclusion in the UK Greenhouse Gas Inventory:** The UKBCEP is developing a roadmap for inclusion of coastal wetlands in the UK Greenhouse Gas (GHG) Inventory, which will increase ambition and policy attention to these systems within the Natural Resources, Wastes and F-Gases sector.⁶¹ Without enhanced monitoring to support their inclusion in the inventory, it is difficult for government to maximise the contributions of blue carbon ecosystems to achieving

net zero⁶² and, as a result of limited policy attention to date, market developments lag behind forests, peatlands, and agricultural systems.

- **Unclear governance and registry infrastructure:** There is a lack of clarity in the market around which entity will be responsible for the governance and maintenance of a future blue carbon code. For example, Scottish Forestry's Secretariat function for the Woodland Carbon Code⁶³ and IUCN UK's recognised Executive Board to manage the Peatland Code⁶⁴ have provided scale and consistency for application of the codes across the UK.⁶⁵ Policymakers have not yet signalled how blue carbon codes will be governed or addressed through the Nature Investment Standards Programme, nor if blue carbon credits would be included in the UK Land Carbon Registry. Without supportive market infrastructure in place, it is not possible to achieve transparency, including clear price discovery mechanisms.
- **Lack of strategic guidance to manage trade-offs:** Policy frameworks are under development to help manage trade-offs in land-use decisions to help deliver net zero, as in the forthcoming Land Use Framework in England to create a systems approach to meeting net zero, food production, and environmental recovery ambitions.⁶⁶ Similar guidance has not yet been provided for multi-functional seascapes, where competing pressures are growing in complexity.

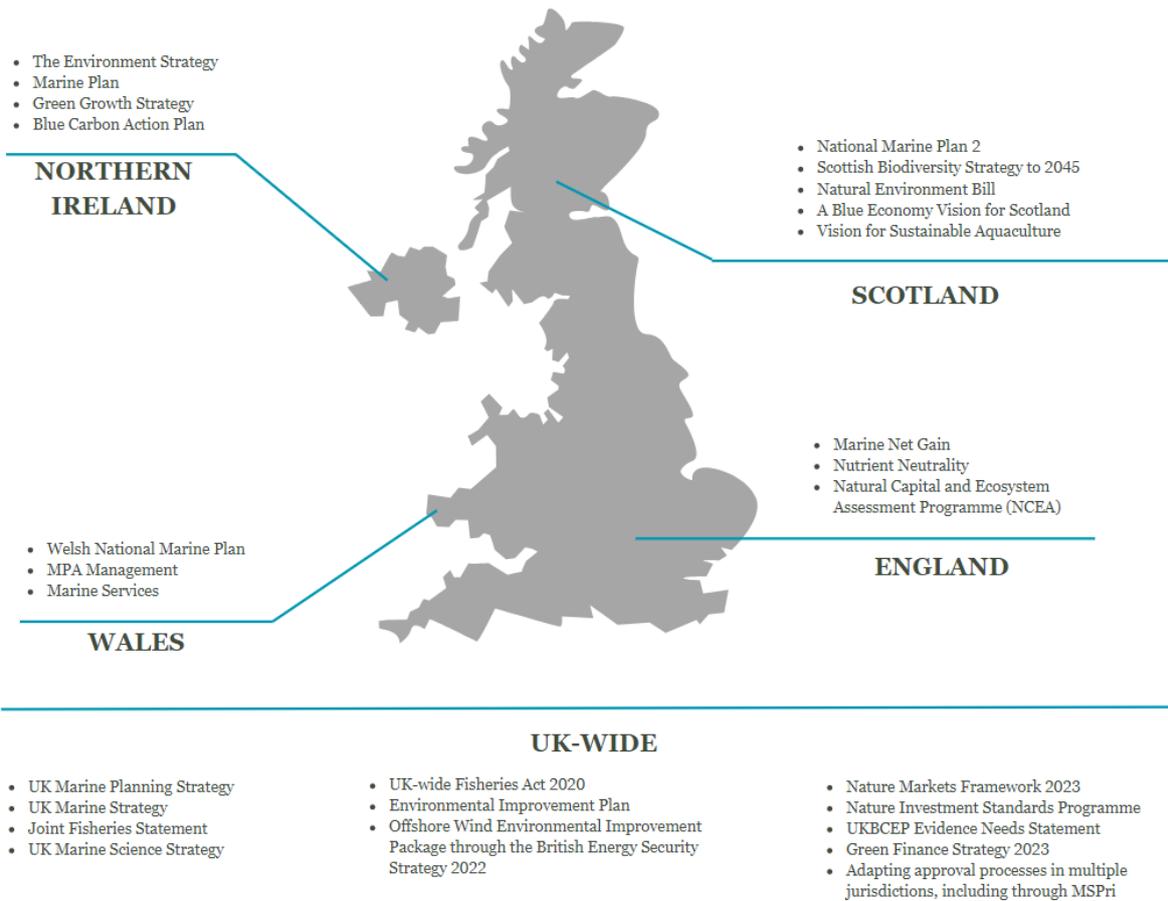
4. Marine spatial planning lacks a natural capital lens: Marine spatial planning processes are not currently fit for purpose to facilitate development of marine natural capital projects. While competitive pressure for use of marine space increases, frameworks are not yet fully developed to identify and facilitate access to coastal areas well-suited to project development.

- **Insufficient recognition of marine natural capital:** The sectoral approach to marine spatial planning across the UK does not yet explicitly recognise marine natural capital, such as blue carbon or biodiversity opportunities, as a sector in its own right. Rather, impacts to marine ecosystems by economic activity in other sectors are regulated. Current structures therefore do not readily enable clear seascape-level planning to prioritise areas where marine natural capital enterprises could help meet local environmental targets – creating greater complexity and bureaucratic hurdles for project developers. Change is underway, including through initiatives at The Crown Estate and government agencies, though progress remains slow, owing in part to challenges around data gaps discussed previously.
- **Lack of support for siting regenerative mariculture:** Regenerative mariculture enterprises will maximise their value and benefit through siting which enables both high productivity and potential to address environmental degradation. However, this can often mean busy inshore areas in view of coastal communities, and it can be challenging to manage trade-offs between competing activities. Similarly, lack of coordination and opportunity mapping means it is difficult to facilitate co-location of mutually beneficial enterprises, such as seaweed cultivation, shellfish production, and restoration interventions, in a holistic way which can deliver seascape scale benefits. Policy processes are already underway to improve support for siting, which will help address this barrier over time.
- **Lack of support for inclusive regional planning:** Limited frameworks are available to help facilitate seascape-level determination of local marine recovery targets in the same way as for terrestrial systems. Early regional marine planning efforts in Scotland have found lack of financial and political support for their processes inhibited progress.⁶⁷ In England, the emerging view is that Local Nature Recovery Strategies (LNRS) will extend beyond the low water mark, as in the case of the Cornwall LNRS pilot which considered its marine and coastal environment.⁶⁸ A blueprint is not yet widely available for coordination across multiple coastal local authorities to help mitigate fragmentation in decision-making. This makes it more challenging to conduct robust stakeholder engagement and ensure the community buy-in needed to deliver high-integrity projects that also form part of a broader network of ecologically connected initiatives across a seascape.

5. **Evolving approval processes for marine natural capital projects:** Securing consents, permissions, leases, licenses, and other approvals required for conservation and restoration projects remains complex and challenging for project developers. Work is underway to better adapt statutory processes which were designed to minimise risk from infrastructure development to new demands for projects designed to deliver long-term benefits. Similarly, policy processes are focusing on mainstreaming the diversity of consents required in coastal settings, simplifying leases to facilitate new projects, and providing clear guidance to project developers to help build their capacity to engage with existing frameworks. However, project developers currently find that securing approvals, including building the necessary evidence base to demonstrate the clear long-term business case that a given use of the seabed is in the nation’s best interest can prove lengthy and challenging, owing to the varied and nascent nature of evolving marine natural capital markets. Further, existing awards of rights, some of which have been in place for decades, can sometimes prevent emerging activity types, such as restoration projects, because they weren’t envisaged in previous legal arrangements. In turn, it can be time consuming to make legal changes necessary to allow for new project types on a given site.
6. **Lack of government resources for technical capacity-building:** Scaling new marine natural capital markets will create new employment opportunities but require a range of skillsets, including highly technical skills. Marine conservation and restoration initiatives will require ecological expertise and use of sophisticated and emerging MRV technology. Regenerative mariculture will also require specialised experience, technical equipment (particularly in offshore environments), as well as supportive coastal infrastructure, such as processing facilities for seaweed-based products. These present barriers to entry for the sector and limit the incentives available. UK governments do not yet consistently offer sufficient support to manage a just transition in the marine natural capital sector, including through education and upskilling, as compared to terrestrial initiatives. There is a lack of pipeline for developing individuals interested in entering these industries for both low and highly-skilled roles. For example, reforms to agricultural subsidies are underway to support the transition to regenerative agriculture on land. A similar programme of support is not in place to help scale the regenerative mariculture sector.

Policy processes underway to address current gaps

Exciting reforms at the policy, legislative, and regulatory level are underway across the UK to transform governance of the marine environment in direct response to barriers identified and competing pressures for use of the marine space in a changing climate. As most decision-making for the marine environment is devolved, each constituent country of the UK has taken a unique path forward, in alignment with UK-level policy frameworks: the UK Marine Policy Statement (MPS), the UK Marine Strategy, the Joint Fisheries Statement, the Marine Spatial Prioritisation programme and UK Marine Science Strategy. Key opportunities will emerge to engage in processes underway and advance solutions to address outstanding policy barriers affecting market growth. The map below sets out key policy developments and commitments identified, and additional detail is provided in Annexe 9.



Recommendations



Recommendations for Marine Natural Capital Market Development

High-level synthesis of recommended actions

Based on a review of the status of marine natural capital markets in the UK, the current barriers and extensive stakeholder engagement to discuss potential solutions, the following high priority recommendations have been identified.

Finance (F)

1. Combine public and private capital to support pilot project development across a range of marine natural capital markets, to demonstrate feasibility and impact.
2. Demonstrate the business case for stacked and bundled ecosystem services.
3. Develop capacity through accelerator programmes to increase the investment readiness of prospective projects, accelerate technology development, upskill the industry, and support innovation.
4. Aggregate a buyers alliance of corporates committed to high-integrity marine projects, willing to cover upfront project development costs to support trials for a range of marine natural capital project types, while codes and standards remain under development.

Science (S)

1. Address evidence gaps identified by the UK Marine Evidence Partnership (scale public funding available to support research, data collecting, and surveying).
2. Map the UK marine environment, including coastal areas, and generate publicly available baseline data around existing and potential future habitat ranges, as well as restoration and conservation opportunities.
3. Conduct more local research to provide data for geographies specific to project sites.
4. Create a central, publicly available data warehouse with data collected and reported in a standardised way.
5. Carry out research into ecosystem services beyond carbon to enable the valuation of wider ecosystem services.
6. Utilise predictive modelling tools to support management and decision-making in marine ecosystems, while simultaneously reducing costs.

Policy (P)

1. Develop a cross-cutting blue economy strategy with clear objectives and establish a clear government lead.
2. Develop more integrated marine spatial planning that is fit for purpose to facilitate marine natural capital project development.
3. Provide additional capacity-building for project developers to improve understanding of how to secure approvals needed to deliver marine natural capital projects and facilitate continued dialogue about how to make different processes more fit for purpose.
4. Direct a cross-UK programme of work to address design challenges for obligations for net positive impacts from development and other activities in the marine environment (such as marine net gain), shaping devolved approaches which still provide alignment of incentives and preventing leakage.
5. Accelerate processes to achieve consensus around which codes are needed in the marine environment to focus greater investment of resources in their development.
6. Incorporate marine commitments into UK Nationally Determined Contribution (NDC) under the Paris Agreement to embed marine conservation within the UK's decarbonisation targets.
7. Provide government funding to help develop a network of 'blue natural capital labs' including facilitating uptake of emerging technologies suited to local environments, to reduce project implementation and management costs.
8. Within 'Levelling Up' and other economic development initiatives, focus attention on technical upskilling to support the workforce development needed to ensure a just transition to new marine natural capital opportunities.
9. Develop market infrastructure, such as nutrient credit trading, to monetise water quality benefits delivered by restoration, conservation or mariculture interventions.
10. Develop integrated policymaking, including the consideration of the terrestrial environment in marine policymaking, to incorporate impacts and dependencies.

Stakeholder actions

In order to take the recommendations outlined above forward, clarity around the role of various stakeholders and what actions they can take is needed. Actions have been identified for financial institutions, private enterprises, civil society, academia and policymakers and regulators.

Critically, we see significant opportunities for collaboration across stakeholder groups and would be keen to facilitate innovative partnerships in future phases of the work.

Financial institutions

Financial Institutions (organisations in the financial services sector dealing with financial and monetary transactions, including banks)

Recommendation	Actions
<p>Finance 1 (F1)</p> <p><i>Combine public and private capital to support pilot project development across a range of marine natural capital markets, to demonstrate feasibility and impact.</i></p>	<ul style="list-style-type: none"> • Design long-term financing mechanisms for marine natural capital projects, including impact investment funds and blended finance mechanisms. • Create a mechanism for investors to pool funding for pilot projects which can test the impact of codes and standards and ability to achieve high-integrity impacts. Investors can be incentivised through first right of refusal for purchase of credits.
<p>Finance 2 (F2)</p> <p><i>Demonstrate the business case for stacked and bundled ecosystem services.</i></p>	<ul style="list-style-type: none"> • Engage with corporate clients to explore the willingness to pay for potential stacking and bundling of marine ecosystem services such as biodiversity, blue carbon and coastal defence.
<p>Finance 3 (F3)</p> <p><i>Develop capacity through accelerator programmes to increase the investment readiness of prospective projects, accelerate technology development, upskill the industry, and support innovation.</i></p>	<ul style="list-style-type: none"> • Allocate funding to support accelerator programmes through match-funding, seed capital and/or first loss for investment-ready projects. • Provide financial mentorship and expertise to early-stage projects.
<p>Policy 6 (P6)</p> <p><i>Incorporate marine commitments into the UK NDC under the Paris Agreement to embed marine conservation within the UK's decarbonisation targets.</i></p>	<ul style="list-style-type: none"> • Create demand for marine natural capital projects by incorporating environmental and social governance (ESG) into investment decisions and business strategies. This includes actively seeking ESG investment opportunities or offsets from marine restoration projects.

Private sector enterprises

Private Sector Enterprises (Individuals and companies not state-controlled but rather owned by private groups, such as sole traders and limited companies)

Recommendation	Actions
<p>Finance 2 (F2) <i>Demonstrate the business case for stacked and bundled ecosystem services.</i></p>	<ul style="list-style-type: none"> Engage with project developers to explore the potential to deliver multiple outcomes – both environmental and social. Engage in and demonstrate willingness to pay for multiple outcomes from projects that support a range of ecosystem services, such as carbon sequestration, biodiversity and coastal defence, as well as wider livelihood improvements. Develop model contracts to begin to clarify outstanding legal questions around developer obligations and credit ownership in an open forum.
<p>Finance 3 (F3) <i>Develop capacity through accelerator programs to increase the investment readiness of prospective projects, accelerate technology development, upskill the industry, and support innovation.</i></p>	<ul style="list-style-type: none"> Support research and development into technology and innovation which supports the delivery of marine ecosystem services. Identify ways to deploy skills and expertise to marine natural capital markets from adjacent sectors (e.g., engineers). Support the development of accelerators and incubators to help scale technological solutions and new business models in the marine sector. For example, Bright Tide Blue Carbon Accelerator and Propellor.
<p>Finance 4 (F4) <i>Aggregate a buyers alliance of corporates committed to high-integrity marine projects, willing to cover upfront project development costs to support trials for a range of marine natural capital project types, while codes and standards remain under development.</i></p>	<ul style="list-style-type: none"> Form a buyers alliance of corporates – possibly to include an advance market commitment – aimed at pooling capital to support marine natural capital projects, in exchange for claims around support for nature and access to future credits. Request proposals and provide funding for high-integrity projects that serve as a proof-of-concept initiatives with sufficient potential to scale. Primarily, projects should be in line with best practice natural capital frameworks and guidance, such as the High-Quality Blue Carbon Principles Guidance.⁶⁹

Civil society

Civil Society (or ‘third sector’, to cover families, community groups, non-governmental organisations and charities, labour unions, Indigenous groups, faith-based organisations, professional associations, and foundations, but excluding government and businesses). Examples of civil society actions can be found in Case Studies 3,4 and 5.

Recommendation	Actions
<p>Finance 1 (F1) <i>Combine public and private capital to support pilot project development across a range of marine natural capital markets, to demonstrate feasibility and impact.</i></p>	<ul style="list-style-type: none"> • Develop projects which integrate a range of potential funding streams to pilot innovative financing approaches. • Contribute to the development of codes and standards to assess impact across environmental and social criteria.
<p>Finance 2 (F2) <i>Demonstrate the business case for stacked and bundled ecosystem services.</i></p>	<ul style="list-style-type: none"> • Develop projects which diversify and stack/bundle revenue streams which can help to support financial self-sufficiency, as well as attract investment. • Measure and report on impact of projects which have successfully bundled/stacked revenues.
<p>Policy 4 (P4) <i>Direct a cross-UK programme of work to address design challenges for obligations for net positive impacts from development and other activities in the marine environment (such as marine net gain), shaping devolved approaches which still provide alignment of incentives and prevent leakage.</i></p>	<ul style="list-style-type: none"> • Engage with policymakers to feed in local expertise and insights on how to deliver marine net gain. • Contribute scientific and project delivery expertise to policy thinking around how to ensure that policies are fit for purpose and deliver positive environmental and social benefits.
<p>Policy 5 (P5) <i>Accelerate processes to achieve consensus around which codes are needed in the marine environment to focus greater investment of resources in their development.</i></p>	<ul style="list-style-type: none"> • Establish an adaptive approach to update codes over time to reflect the latest scientific research, while enabling medium-term project development based on current understanding. • Adopt a coordinating role to achieve consensus across sectors on what is needed for development of marine natural capital codes. This includes drawing on lessons learned from emerging models of carbon credit standards (e.g., The Nature Conservancy’s Blue Carbon Resilience Credits) to identify where investment and resources are most needed to develop standardised and robust codes.
<p>Policy 7 (P7) <i>Provide government funding to help develop a network of ‘blue natural capital labs’ including facilitating uptake of emerging technologies suited to local environments to reduce project implementation and management costs.</i></p>	<ul style="list-style-type: none"> • Create a blueprint of public funding available to support the development of an interconnected network of ‘Blue natural capital labs’ which could be integrated into regional marine plans. • Build a platform for regular exchange between labs and project types, to facilitate flow of information, capture of data, and promote uptake of best practices.

Recommendation	Actions
<p>Policy 8 (P8)</p> <p><i>Within 'Levelling Up' and other economic development initiatives, focus attention on technical upskilling to support the workforce development needed to ensure a just transition to new marine natural capital opportunities.</i></p>	<ul style="list-style-type: none"> • Mirror training provided in the terrestrial environment on the Woodland Carbon Code (WCC) and Peatland Carbon Code (PCC) carried out by the Soil Association.
<p>Science 3 (S3)</p> <p><i>Conduct more local research to provide data for geographies specific to project sites.</i></p>	<ul style="list-style-type: none"> • Engage with counterparts within marine departments, governments and regional academic institutions to facilitate improved coordination between pilot projects, academic research, and efforts to build improved, centralised access to data about the UK's marine environment. • Engage and educate communities to implement citizen science initiatives to collect data and fill research gaps. This has been implemented by Nature Metrics, who are collating data on biodiversity, utilising eDNA collected by the community.

CASE STUDY 3: Plymouth Sound – Seagrass Project

Barriers

-  Lack of legal protections of marine habitat
-  Lack of confidence in protection mechanisms
-  Community engagement
-  Lack of high-quality data
-  Lack of funding for R&D of advance planting technology

Solutions

-  Regulation and enforcement on anchoring/ fishing
-  Regulation/policy for seabed protection
-  R&D funding to reduce seed collection & deployment costs

Project Description

England's largest seagrass planting programme started in Plymouth in 2021. A total of 16,000 seagrass seed bags and 2,200 seedling bags are being planted by the OCT as part of the LIFE Recreation ReMEDIES project being led by Natural England to help support and improve the resilience of our marine environment. Anchoring in the area causes a problem as it disrupts the sediment, damages plants and releases any stored carbon. Eco-moorings in Plymouth have been implemented which are less impactful on sediments than traditional mooring. However, with only 10-15 eco-moorings, this provides limited protection in the context of the total number of water users. Ongoing work funded through NEIRF has identified the need for full no-anchor zones to act as a high-quality keystone habitat. The project also identified the level of seabed protection that is offered means you cannot guarantee permanence of carbon (or biodiversity gain). Ultimately, for a robust seagrass carbon natural capital market, there needs to be policy from UK Government to allow for seabed protection from anthropogenic pressures.

CASE STUDY 4: The Virginia Coast Reserve Seagrass Restoration Projectⁱⁱ

Barriers

-  Ensuring permanence
-  Uncertainty about credit potential
-  Delivering scale
-  Need for upfront philanthropic capital
-  Lack of legal clarity on role of the Department of the Environment as an actor in the carbon market

Solutions

-  Conservation covenants on surrounding land significantly improved water quality
-  Deployment of locally appropriate restoration techniques
-  Partnerships with local universities, supporting robust data collection
-  State-led fly-over surveys to monitor the project area
-  Allocation of project revenue to further monitoring and research
-  Project designed as a grouped project to expand restoration area over time
-  Upfront project costs supported by philanthropic funding, state partners, and select high-integrity corporates
-  Passage of state legislation to establish clear authority for participation in the market

Project Description

The Virginia Coast Reserve Seagrass Restoration Project, initiated in 2015, seeks to restore over 60,000 hectares of native seagrass coastal wetlands. Project activities focus on restoring a native species of seagrass (*Zostera marina*), whose population collapsed in the 1930s due to a combination of natural disasters and the outbreak of a specific pathogen. The innovative initiative represents one of the world's largest and most successful seagrass restoration projects, enabled in part by significant improvements in the region's water quality over past decades.ⁱⁱⁱ

The project area is owned by the Commonwealth of Virginia, under authority of the Virginia Department of Environmental Quality, and Virginia state government will eventually own the carbon credits once generated.

However, the project faced significant uncertainty about its potential to generate carbon credits, owing to inherently challenging conditions of seagrass restoration projects. Initially, the project relied on a combination of philanthropic, public, and grant funding to cover upfront implementation costs, as the developers were unable to commit to the delivery of credits to potential investors seeking clear returns. In particular, TNC partnered with corporate investors who were comfortable with the uncertainty around potential credit streams from the project. These early funding partners engaged to help develop a high-integrity project to deliver local impact and showcase an example of best practice – modelling how private sector can play a role in scaling up successful projects with philanthropic-style investment.

CASE STUDY 5: Sussex Kelp Recovery Project

Barriers



Lack of data



Lack of leases/licensing for conservation activities

Solutions



Regulation banning bottom trawling



Research consortium focused on gaps in terms of location and impact of ban on trawling

Project Description

96% of the kelp along Sussex coastline has been destroyed since the late 1980s, in part due to trawling. In 2021, a byelaw banning trawling with bottom-towed fishing gear on 304km² of the Sussex seabed was introduced, providing the opportunity for kelp forests to naturally regenerate. The byelaw was initiated by the Sussex Inshore Fisheries and Conservation Authority (IFCA) and supported by the Help Our Kelp campaign. After the law was passed, the Sussex Kelp Recovery Project, a collective of research organisations, regulators, conservation groups, and local communities, was established to monitor kelp recovery and the ecosystem benefits it provides. The data will also show the impacts of other factors on kelp recovery, such as storm events, sedimentation, pollution and climate change. The research also includes an assessment of the carbon and biodiversity benefits generated from kelp recovery to provide opportunities for income generation through the sale of ecosystem services. To date, there have been challenges with evidencing additionality for carbon, but there is potential to support these types of projects through biodiversity markets and pending forthcoming marine net gain legislation.

Academics and other researchers

Academia (includes members of an educational institution (such as a university or institute of higher education), or the institution itself)

Recommendation	Actions
<p>Science 1 (S1)</p> <p><i>Address evidence gaps identified by the UK Marine Evidence Partnership (scale public funding available to support research, data collecting, and surveying).</i></p>	<ul style="list-style-type: none"> • Work collaboratively with government to identify opportunities for future academic research to comprehensively address evidence gaps and inform decision making. • Endeavour to deliver academic research which is conducted at “decision useful” spatial and temporal scales to address key policy questions, as well as meet market needs in alignment with emerging blue carbon codes.
<p>Science 2 (S2)</p> <p><i>Map the UK marine environment, including coastal areas, and generate publicly available baseline data around existing and potential future habitat ranges, as well as restoration and conservation opportunities.</i></p>	<ul style="list-style-type: none"> • Contribute scientific evidence to building the nationally coordinated mapping efforts needed to inventory and more accurately understand marine natural assets and the potential for market scalability.⁷⁰ • Draw on example projects such as the Environment Agency and Natural England saltmarsh and seagrass mapping tool,⁷¹ and the Marine Management Organization’s marine habitat restoration site identification,⁷² provide examples of the existing efforts to map habitats that can serve as a foundation for academic research.
<p>Science 3 (S3)</p> <p><i>Conduct more local research to provide data for geographies specific to project sites.</i></p>	<ul style="list-style-type: none"> • Establish partnerships with local communities, projects or focus groups to provide spatially relevant data, which is particularly important as certain ecosystem services (such as carbon sequestration rates) are very location-dependent.^{73,74,75} • Develop research programmes around strategic placement of comprehensive pilots across different regions and habitats to provide an opportunity to ground truth local potential for scalable ecosystem services, marine natural capital markets and investment opportunities.
<p>Science 4 (S4)</p> <p><i>Create a central, publicly available data warehouse with data collected and reported in a standardised way.</i></p>	<ul style="list-style-type: none"> • Engage in processes to come up with core variables, core measurement methods, and standardised reporting, modelled on the process used for peatlands. • Agree and align on standards for data collection in reporting for inclusion in the repository as part of future research.
<p>Science 5 (S5)</p> <p><i>Conduct research into ecosystem services beyond carbon to enable the valuation of wider ecosystem services.</i></p>	<ul style="list-style-type: none"> • Increase research efforts and pilots that focus on a suite of ecosystem services beyond carbon to strengthen the value proposition of marine natural capital markets and identify habitats and natural assets with the largest potential for scalability in the UK.

Recommendation	Actions
	<ul style="list-style-type: none"> • Draw upon ongoing work to actively address this gap, such as the wetland and saltmarsh studies being conducted by UKCEH.⁷⁶
<p>Science 6 (S6)</p> <p><i>Utilise predictive modelling tools to support management and decision-making in marine ecosystems while simultaneously reducing costs.</i></p>	<ul style="list-style-type: none"> • Utilise sophisticated modelling to provide guidance to where adaptation-aligned restoration would be the most impactful and successful⁷⁷ which can be a time- and cost-effective approach to optimising pilot design and placement in a way that builds resiliency and supports adaptive management.
<p>Policy 4 (P4)</p> <p><i>Direct a cross-UK programme of work to address design challenges for obligations for net positive impacts from development and other activities in the marine environment (such as marine net gain), shaping devolved approaches which still provide alignment of incentives and prevent leakage.</i></p>	<ul style="list-style-type: none"> • Support the development of methods to characterise impacts and compensatory interventions under marine net gain and ensure the use of cross-cutting approaches to address existing knowledge gaps with a more comprehensive perspective and guarantee open-source practices. • Ensure open and regular dialogue between academia, government, industry, and finance to ensure existing methods are accounted for and optimised in a way that is directly tangible to regulatory and market needs.^{78,79}
<p>Policy 5 (P5)</p> <p><i>Accelerate processes to achieve consensus around which codes are needed in the marine environment to focus greater investment of resources in their development.</i></p>	<ul style="list-style-type: none"> • Create links between the research community, governments, industry, and finance to support open dialogues and ensure outcomes are adequately adopted into decision-making. • Engage with supporting efforts already underway with groups such as the Blue Carbon Forum and UKCEH, who are working to implement a minimum standard on reporting and data collection.
<p>Finance 3 (F3)</p> <p><i>Develop capacity through accelerator programmes to increase the investment readiness of prospective projects, accelerate technology development, upskill the industry, and support innovation.</i></p>	<ul style="list-style-type: none"> • Establish partnerships directly between academia, industry and financial institutions to help accelerate the development of new technology needed to bring down the cost of marine natural capital projects. • Consider ‘Propeller’ as a useful model - a climate-tech fund formed in partnership with Woods Hole Oceanographic Institution (WHOI) which helps accelerate the commercialisation of solutions emerging from research labs while also investing in other entrepreneurs in the sector.⁸⁰

Policymakers and regulators

Policymakers/regulators (those individuals or entities, operating in the policy field, including governments and government employees responsible for formulating policies and/or with regulatory or supervisory authorities). An example of policymakers and regulators actions can be found in Case Study 6.

Recommendation	Actions
<p>Finance 1 (F1)</p> <p><i>Combine public and private capital to support pilot project development across a range of marine natural capital markets, to demonstrate feasibility and impact.</i></p>	<ul style="list-style-type: none"> • Ensure the allocation of ongoing nature investment readiness funds to support marine natural capital projects specifically. • Provide additional funding to help cover upfront project costs to help deliver more small-scale pilot projects, with clarity on how they could inform the design of commercial-scale interventions in future, and help de-risk private investment over time through blended financing structures.
<p>Finance 3 (F3)</p> <p><i>Develop capacity through accelerator programmes to increase the investment readiness of prospective projects, accelerate technology development, upskill the industry, and support innovation.</i></p>	<ul style="list-style-type: none"> • Partner with private sector actors and financial institutions to deliver local accelerator programmes to provide targeted funding and technical assistance to support the investment readiness of prospective projects and build local technical capacity. • Ensure that public participation complements increased private sector finance, e.g., VC funding, into the marine sector to help bridge R&D gaps and accelerate development of locally appropriate technology, with government leading on adopting an aligned place-based approach.⁸¹
<p>Science 1 (S1)</p> <p><i>Address evidence gaps identified by the UK Marine Evidence Partnership (scale public funding available to support research, data collection, and surveying).</i></p>	<ul style="list-style-type: none"> • Share information, and advance conservation and restoration of marine and coastal habitats as part of UKBCEP partners' commitment to work with the blue carbon community to produce new research.⁸² • Produce an implementation plan to clarify how each partner will deliver the necessary research – including through additional funding for research, partnerships with academic institutions, and connection to local pilot projects to help build the necessary evidence base.
<p>Science 2 (S2)</p> <p><i>Map the UK marine environment, including coastal areas, and generate publicly available baseline data around existing and potential future habitat ranges, as well as restoration and conservation opportunities.</i></p>	<ul style="list-style-type: none"> • Ensure coordination between relevant government bodies at the UK and devolved levels (e.g., JNCC, Cefas, Defra, DAERA, Marine Scotland, Natural Resources Wales) to establish an accessible, shared platform to make baseline data about marine habitat extent and condition more easily publicly available. • Avoid duplication of existing repositories of spatial data (e.g., Marine Scotland Open Data Network and Defra MAGIC) but rather comprise a joint effort to collate the results from efforts underway to address local evidence gaps and help clarify priority opportunities to deliver projects. • Make resources available to ensure ongoing updates to the map reflect the latest understanding of habitat extent and condition, more regularly than broader marine assessments are conducted.

Recommendation	Actions
<p>Science 3 (S3)</p> <p><i>Conduct more local research to provide data for geographies specific to project sites.</i></p>	<ul style="list-style-type: none"> Local authorities should engage with their counterparts within marine departments, project developers, and regional academic institutions to facilitate improved coordination between pilot projects, academic research, and efforts to build improved, centralised access to data about the UK's marine environment. Local governments may choose to deliver on this recommendation by adopting the blue natural capital lab model to facilitate coordination.
<p>Science 4 (S4)</p> <p><i>Create a central, publicly available data warehouse with data collected and reported in a standardised way.</i></p>	<ul style="list-style-type: none"> Build and fund an open-access data repository and where possible create obligations for data to be shared and centralised. Establish a consensus-based process to come up with core variables, core measurement methods, and standardised reporting, modelled on the process used for peatlands. Agree standards for data collection in reporting for inclusion in the repository. Coordinate to house existing data resources between government bodies, as well as housing the growing body of evidence emerging from pilot projects, in an accessible data warehouse environment. Design and maintenance of the warehouse should reflect parallel processes to standardise methods and quality control for marine natural capital data. Make the warehouse accessible to both academic researchers, the private sector, and financial institutions; requiring co-design to ensure data products are suited to market needs.
<p>Science 5 (S5)</p> <p><i>Conduct research into ecosystem services beyond carbon to enable the valuation of wider ecosystem services.</i></p>	<ul style="list-style-type: none"> Ensure that government funding for external research initiatives, internal research priorities, and provision of data platforms helps bridge evidence gaps around broader ecosystem services and is aligned with the objectives of the UKBCEP to achieve climate change mitigation, adaptation, and biodiversity benefits from blue carbon habitats.⁸³ Include research capturing the water quality benefits delivered in the marine environment through restoration and conservation interventions.
<p>Policy 1 (P1)</p> <p><i>Develop a cross-cutting blue economy strategy with clear objectives and establish a clear government lead.</i></p>	<ul style="list-style-type: none"> Develop a cross-cutting blue economy strategy with clear objectives for each devolved administration, using the model of Scotland's Blue Economy Vision.⁸⁴ Assign a clear government lead for implementation and help mainstream consideration of a blue economy and marine natural capital approach across broader government decision-making.

Recommendation	Actions
<p>Policy 2 (P2)</p> <p><i>Develop more integrated marine spatial planning that is fit for purpose to facilitate marine natural capital project development.</i></p>	<ul style="list-style-type: none"> • Provide additional devolved administration public funding to support their respective local marine planning processes, which could be delivered through the development of blue natural capital labs. • Provide enhanced guidance for local marine planning on how to manage trade-offs between production of blue foods, achieving net zero, delivering biodiversity outcomes, and improving water quality across multifunctional seascapes. • Build upon enhanced mapping of marine and coastal habitats to provide greater guidance at a seascape level on priority opportunity areas for project development, including helping to align regional restoration priorities, ecologically appropriate interventions, and sites suited to regenerative mariculture production. • Use zoning practices to develop working waterfronts that support local community engagement in emerging marine natural capital markets.
<p>Policy 3 (P3)</p> <p><i>Provide additional capacity-building for project developers to improve understanding of how to secure approvals needed to deliver marine natural capital projects and facilitate continued dialogue about how to make different processes more fit for purpose.</i></p>	<ul style="list-style-type: none"> • Continue producing guidance already under development to help project developers understand how to engage with approval processes and expand capacity-building, for example, through training and town-hall meetings, to address market perceptions of complexity in engaging with existing processes, as well as help project developers better prepare the evidence needed to secure approvals. • Conduct ongoing stakeholder engagement with project developers involved in nascent marine natural capital projects to clarify barriers more precisely and where there may be opportunities to either adapt to or evolve existing statutory frameworks.
<p>Policy 4 (P4)</p> <p><i>Direct a cross-UK programme of work to address design challenges for obligations for net positive impacts from development and other activities in the marine environment (such as marine net gain), shaping devolved approaches which still provide alignment of incentives and prevent leakage.</i></p>	<ul style="list-style-type: none"> • Establish a cross-UK working group made up of relevant marine authorities for each of the devolved administrations that considers how a strategy similar to Marine Net Gain could be established within each jurisdiction and accelerate implementation to provide clarity to the private sector. • Align on obligations on marine industries across nations where possible, mindful frameworks will be tailored to different contexts.

Recommendation	Actions
<p>Policy 5 (P5)</p> <p><i>Accelerate processes to achieve consensus around which codes are needed in the marine environment to focus greater investment of resources in their development.</i></p>	<ul style="list-style-type: none"> • Coordinate on providing sufficient devolved government funding to accelerate the development of a priority short-list of marine natural capital codes, expanding the stakeholder engagement process of BSI's Nature Investment Standards Programme and consensus on new standards needed⁸⁵ to cover the marine environment. • Provide resources to support outstanding primary research needed to complete the codes, pilot their implementation, and address remaining uncertainties around how to capture the breadth of ecosystem services provided by marine and coastal habitats.
<p>Policy 6 (P6)</p> <p><i>Incorporate marine commitments into the UK NDC under the Paris Agreement to embed marine conservation within the UK's decarbonisation targets.</i></p>	<ul style="list-style-type: none"> • Produce a roadmap for inclusion of blue carbon habitats into the UK Greenhouse Gas Inventory (GHGI) as soon as is practical. • Align on a clear governance structure for priority blue carbon codes (e.g., if a government or civil society entity will serve in a secretariat role to manage codes over time) and support the development of necessary market infrastructure, such as inclusion of blue carbon habitats within the UK Land Carbon Registry or development of a bespoke registry for marine habitats. • Incorporate commitments to restore blue carbon habitats into the UK's NDC following inclusion in the GHGI. • Provide legal clarity regarding credit ownership and export potential under Article 6 for VCM participants.

Recommendation	Actions
<p>Policy 7 (P7)</p> <p><i>Provide government funding to help develop a network of 'blue natural capital labs' including facilitating uptake of emerging technologies suited to local environments, to reduce project implementation and management costs.</i></p>	<ul style="list-style-type: none"> • Allocate funding to local authorities across the UK to establish a network of Blue Natural Capital Labs, with the objectives to: <ul style="list-style-type: none"> ▪ Help better embed marine natural capital into local authorities' decision-making processes; ▪ Support target setting for the local marine environment; ▪ Facilitate better identification of project opportunities; ▪ Provide a forum for stakeholder engagement and collaboration; and ▪ Build a network of project developers to help share best practices. • Design each lab according to the devolved administration and its specific local context. • Consider blueprints emerging from existing initiatives such as the Restoring Meadow, Marsh and Reef (ReMeMaRe)⁸⁶ and the Sussex Bay Blue Natural Capital Lab prior to developing the new Labs.
<p>Policy 8 (P8)</p> <p><i>Within 'Levelling Up' and other economic development initiatives, focus attention on technical upskilling to support the workforce development needed to ensure a just transition to new marine natural capital opportunities.</i></p>	<ul style="list-style-type: none"> • Allocate national levelling up resources to support local governments to deliver locally-appropriate solutions to bridge gaps in technical skills in order to scale marine natural capital markets. Interventions could include: <ul style="list-style-type: none"> ▪ Analysis to understand how many jobs could be created in the future and understand demands based on expected trends in current marine industries; ▪ Co-designing courses on skills needed to deliver marine natural capital projects with vocational training providers; ▪ Developing a scheme to match students with relevant training; and ▪ Providing study grants. • Look to existing government-funded schemes such as the SAMS Enterprise Seaweed Academy⁸⁷ and the Shellfish Centre.⁸⁸

Recommendation	Actions
<p>Policy 9 (P9)</p> <p><i>Develop market infrastructure, such as nutrient credit trading, to monetise water quality benefits delivered by restoration, conservation, or mariculture interventions.</i></p>	<ul style="list-style-type: none"> • Collaborate with the devolved administrations to take action to reduce water pollution in the marine environment and, to start developing market infrastructure to incentivise restoration and conservation interventions. • Prioritise implementing its commitments to reduce water pollution first, such as in the Plan for Water⁸⁹, for example, its commitment to support farmers through the Water Management Grant. • Work with local authorities to create a scheme piloting nutrient crediting for the marine environment. • Consider the Government’s existing approaches to terrestrial nutrient crediting, for example, Natural England’s Nutrient Mitigation Scheme.⁹⁰
<p>Policy 10 (P10)</p> <p><i>Develop integrated policymaking, including the consideration of the terrestrial environment in marine policymaking, to incorporate impacts and dependencies.</i></p>	<ul style="list-style-type: none"> • Build upon regional initiatives such as regional marine planning, local nature recovery strategies, and ‘blue natural capital labs’ to pilot more integrated approaches across local coastal authorities and identify opportunities for enhanced coordination. • Expand existing consideration of the coastal and marine environment within agricultural regulatory and subsidy frameworks to reward interventions which benefit marine natural capital.

CASE STUDY 6: Restoring Meadow, Marsh and Reef (ReMeMaRe) & Championing Coastal Coordination (3Cs) initiative

Barriers



Evidence gaps



Complex governance of the marine environment



Interconnected landscapes and seascapes



Lack of local capacity



Need for blended finance



Difficulty of monetising range of benefits from restoration

Solutions



Restoration trials to clarify successful approaches



Localised solutions and blueprint development for approaches to facilitate cross-jurisdictional collaboration



Capacity-building to scope projects into investable opportunities



Developing models of stacked revenue streams

Project Description

ReMeMaRe is an ambitious multi-stakeholder, habitat restoration initiative with the aim of addressing the baseline shift and reversing the decline of estuarine and coastal habitats, with a particular focus on seagrass meadows, saltmarshes and European native oyster reefs.

ReMeMaRe's mission is to restore at least 15% of priority habitats along the English coast by 2043, through six strategic goals: (i) enhanced health and connectivity of coasts; (ii) improved habitat restoration and protection; (iii) improved socio-economic regeneration; (iv) better awareness; (v) research and development of tools, guidance, and monitoring and evaluation resources; and (vi) scaled blended finance.^{iv}

The initiative will deliver restoration potential maps – clarifying a priority list of areas across the coast where restoration would be the most beneficial – and help socialise their consideration within marine, shoreline, fisheries, and river basin management plans, as well as make a direct link to Local Nature Recovery Strategies. This holistic planning approach will facilitate blended finance to support ecologically-appropriate project development grounded in local priorities.

The Environment Agency's related 3Cs initiative will help build capacity across coastal partnerships to facilitate connectivity of local actors to fund projects. Funding will support initiatives across three themes: (i) coordination of planning and delivery of locally owned plans, (ii) Coastal Champions to strengthen capacity and capability, and (iii) restoration and recovery of natural habitats. The initiative will play a critical role in scoping restoration projects delivering multiple benefits into investable opportunities.^v

Annexe 1: Glossary

Biodiversity Net Gain (BNG): BNG is an approach to development that requires developers in England to enhance biodiversity in order to mitigate biodiversity loss due to development, such that an overall increase in natural habitat and ecological features is achieved. BNG is expected to become a legal requirement for most terrestrial development in England by the end of 2023.

Blended Finance: The strategic use of capital from public or philanthropic sources to mobilise private capital flows towards impact-orientated investments. Originally used in the context of sustainable development, the strategy is increasingly being utilised to stimulate climate and nature-related investment.

Blue Carbon: The term used to refer to carbon captured by and stored in the world's marine and coastal ecosystems.

Blue economy: Economic activities related to sustainable use of ocean resources. This includes ecosystem services such as carbon storage, coastal protection, cultural values and biodiversity.

Blue Finance: The financing of environmental goods, services and projects that aim at restoring, protecting or enhancing ocean-related natural capital assets. In addition to environmental benefits, it may also involve social improvements and financial returns.

Bundling: When a suite of ecosystem services produced by the same activity is sold as a single combined unit in the market.⁹¹

Carbon credits: Carbon credits are transferrable tokens representing the avoidance or removal of greenhouse gas emissions, measured in tonnes of carbon dioxide equivalent (tCO₂e). The purchaser of a carbon credit can "retire" it to claim the underlying reduction towards their own GHG reduction goals.

Carbon markets: Trading systems in which carbon credits are sold and bought. Companies or individuals can use carbon markets to compensate for their greenhouse gas emissions by purchasing carbon credits from entities that remove or reduce greenhouse gas emissions. Carbon markets can therefore provide a flow of capital to marine restoration projects that are proven to sequester carbon, such as the restoration of wetland habitats.

Carbon offsets: A carbon offset is a reduction or removal of emissions of carbon dioxide or other greenhouse gases made in order to compensate for emissions made elsewhere. Blue carbon (see above) projects such as mangrove or seagrass restoration can register the impact of their activities on reducing or removing emissions and issue an equivalent volume of carbon credits for sale, provided their net carbon removal is quantified and adheres to certain standards set by governments or independent certification bodies.

Coastal defence: Management techniques designed to protect shorelines from flooding and erosion caused by waves and rising water levels. Historically these have consisted of hard engineering solutions such as the construction of sea walls and groins; in recent years however there has been an increase in the deployment of schemes inspired and supported by nature. Coral reefs, seagrass meadows, mangrove forests, salt marshes, and sand dunes are all effective at dissipating wave energy and acting as a buffer against tidal storms and surges. A key benefit of nature-based interventions over hard interventions is that they often increase the resilience of existing ecosystems, and provide a wide range of benefits for other sectors, such as tourism and fisheries, as well as coastal protection.

Developer/biodiversity offsets: Developer offsets are payments for conservation or restoration activities to compensate for unavoidable environmental damages that occur during development. Biodiversity offsets are a subcategory of measurable conservation outcomes resulting from actions designed to compensate for biodiversity impacts associated with development.

Ecosystem: The complex of living organisms, their physical environment, and all their interrelationships within a particular geographic area.

Ecosystem markets: Used to trade positive outcomes resulting from an intervention on the management of a natural capital that aims to enhance the underlying ecosystem services. Ecosystem markets are also called environmental markets or natural capital markets.

Ecosystem services: The benefits that can be obtained from ecosystems, including provisioning, regulating, cultural and supporting services.

First loss capital: Capital provided by an investor who agrees to bear first losses in an investment in order to catalyze the participation of co-investors that would not have otherwise entered the deal.

Managed realignment: Managed realignment is the planned breach or relocation of sea defences further inland which creates sustainable, environmentally beneficial intertidal habitat in the form of mud flats and salt marshes. These coastal marshes help to dissipate wave energy and protect against erosion.

Marine Net Gain: Aims to support marine ecosystem recovery by requiring in-scope developments to deliver an overall environmental gain, and thereby embed environmental improvement into infrastructure planning and delivery. In 2022, Defra issued a consultation on MNG policy to support the design of an appropriate MNG regime.

Nature-based solutions: Nature-based solutions are actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature. Nature-based Solutions are underpinned by benefits that flow from healthy ecosystems. They target major challenges like climate change, disaster risk reduction, food and water security, biodiversity loss and human health, and are critical to sustainable economic development.

Risk Transfer Solutions: Risk transfer solutions for marine natural capital refer to strategies and mechanisms, such as insurance, that aim to mitigate or transfer the financial risks associated with the

degradation or loss of marine ecosystems and the services they provide. These solutions are designed to help ensure the sustainable management and conservation of marine resources while providing economic incentives for stakeholders to avoid actions that could harm these ecosystems.

Regenerative aquaculture/mariculture:

The cultivation of aquatic organisms in marine environments using methods that act to enrich and protect marine ecosystems, with the potential to generate net positive environmental outcomes.

Stacking: When multiple different ecosystem services produced by the same activities are sold as separate units in the market.⁹²

Strategic Compensation (marine): As part of the government's proposed Offshore Wind Environmental Improvement Package (OWEIP), if an offshore wind farm has significant negative impacts on protected habitats and species which cannot be avoided, reduced or mitigated, developers are required to take compensatory measures. The OWEIP is aimed to accelerate deployment of offshore wind and was proposed as part of BEIS Energy Bill 2022.

Voluntary Biodiversity Credits (VBCs): Standardised units of positive biodiversity outcomes. These biodiversity units are generated by one or more actors through conservation or restoration of biodiversity, monitored over time, and verified. The credits could be acquired by those wanting to invest in positive biodiversity outcomes on a voluntary basis.

Annexe 2: Synthesis of emerging principles for high-integrity marine natural capital markets

Key Attribute	Blue Carbon Credits	Biodiversity Credits	Natural Capital
Global-scale integrity			
Respect mitigation hierarchy: Prevention is prioritised, and interventions serve as a parallel step to the SBTN mitigation hierarchy and action framework (of avoid, reduce, restore & regenerate, and transform)	Blue carbon credits may only be used to neutralise residual emissions once Scope 1, 2, and 3 emissions have been reduced to zero or a residual level, in alignment with the SBTi mitigation hierarchy. Blue carbon credits can be purchased in for beyond value chain mitigation. ⁹³	Biodiversity credits cannot be used to offset harm done to biodiversity, but it can only be used for contribution claims towards nature positive alignment.	UK Government's Environmental Reporting Guidelines provide clear guidance on when it is appropriate to use offsetting. ⁹⁴
Contribution to both global and local goals: Ensure that the project contributes to recognised global conservation priorities and aligns with regional and local conservation plans	Contributes to the objectives of the Paris Agreement and the Montreal-Kunming Global Biodiversity Framework, as well as the UK's net zero commitment. ⁹⁵	Contributes to the Montreal-Kunming Global Biodiversity Framework, as well as the biodiversity-related targets outlined in the UK Environment Improvement Plan.	Contributes to the Montreal-Kunming Global Biodiversity Framework, as well as the biodiversity-related targets outlined in the UK Environment Improvement Plan.
Data, methods and standards: Uses best available data, methods and standards from recognised and credibly governed standard-setting bodies for baselining, accounting, and MRV. This includes undergoing independent third-party verification.	Best practices include conducting a root-cause analysis that uncovers the drivers of ecosystem destruction and tailoring interventions accordingly. ⁹⁶ Use of strong MRV system can ensure the longevity of sequestration. ⁹⁷	For example, biodiversity credits can be created through a credible methodology, and should then undergo independent verification through a recognised body such as Plan Vivo. Measurements should focus on the positive local change in biodiversity, and monitoring should be cost-effective to ensure scalability.	Investment in natural capital for carbon management should be both measurable and verifiable, such as through the government-backed Codes. When considering investment or trades, stakeholders should seek professional advice and use established Codes and reputable brokers. ⁹⁸
Leakage: Ensures that activities are not displaced from the intervention area to other areas (both locally and internationally when considering traded products).	A way to tackle local leakage is to implement an integrated approach across different governance levels and actors, and invest in nested and jurisdictional programs.		
Additionality: Emissions and impact reductions and/or removals are considered additional only when finance plays a decisive role in instigating the project activity and intervention.	Additionality may be demonstrated through investment analyses and/or barrier analyses that prove that project activities would not likely occur without additional funding, technical expertise, or policy intervention. Different tests can be applied to assess additionality, for example considering existing legal obligations (so that units are not issued for activities that were already legally		

Key Attribute	Blue Carbon Credits	Biodiversity Credits	Natural Capital
		mandated) or whether the environmental improvements would have been likely to happen in the absence of market finance. Additionality may also be demonstrated by benchmarking against an appropriate comparable reference site (e.g., geography, size, and ecosystem type).	
<p>Permanence/Durability: Ensuring the delivery of lasting benefits through high-standard adaptive management plans (e.g., building resilience through by protecting and restoring neighbouring ecosystems)</p>	<p>“Durability” is more appropriate for blue carbon because it allows comparison of the longevity of carbon stocks. Durability threats are direct or indirect anthropogenic impacts (e.g., natural disturbances associated with climate change). Scientific models should be used to estimate durability horizons, which should be communicated when setting up a project. Some standards require project developers to set aside a buffer pool of credits (that cannot be purchased) to cover any reversals of carbon benefits over time.⁹⁹</p>	<p>Conduct evidence-based adaptive management with regular monitoring and evaluation, drawing on scientific understanding and indigenous, traditional, and local knowledge. Adaptive management should adopt an iterative learning framework that is applied throughout the intervention cycle.</p>	<p>Credits issuance schemes must recognise delivery risks and mitigations, e.g., risk of fire or disease, and could involve a range of measures including: only issuing credits periodically once outcomes have been verified; the use of restocking orders requiring suppliers to restore any losses; mandating the use of insurance; and using buffers to protect against losses.¹⁰⁰</p>
<p>Transparency: Information and data should be publicly available on a digital platform to avoid double counting, and ensure that stakeholders have access to adequate data for monitoring and due diligence. Data should be recorded in standardised ways for monitoring and oversight purposes.</p>	<p>Internationally, the transparency platforms fit for blue carbon include: Verra, Gold Standard, Plan Vivo, and the American Carbon Registry.</p>	<p>Similarly to the VCM, platforms are emerging to ensure transparency for biodiversity credits; for example, Plan Vivo issues biodiversity credits with unique serial numbers to ensure that there is no double-counting or double-selling of Plan Vivo biodiversity credits.</p>	<p>Where rights to or control over carbon or other natural capital are transferred to a third party, this information should be made available in an open and transparent way such as through the UK Carbon Registry.¹⁰¹</p>
<p>Local-scale integrity</p>			
<p>Local design: Involving Indigenous Peoples and Local Communities (IPLCs) in the design, and leveraging indigenous, traditional, and local knowledge to ensure that interventions respect and account for the diverse</p>	<p>IPLCs who have lived in or near project locations possess extensive traditional knowledge regarding native vegetation and ecosystem dynamics. To optimise project outcomes, scientific and historical knowledge of the local landscape should</p>	<p>Involving IPLCs from the start of the project, including in the design phase, to ensure that projects are designed appropriately. Projects should adopt locally defined indicators of biodiversity value and well-being, and incorporating</p>	<p>Investment and management decisions should recognise and respond to local circumstances, acknowledge the suitability of land for particular uses and seek to protect and</p>

Key Attribute	Blue Carbon Credits	Biodiversity Credits	Natural Capital
ways in which IPLCs use and value nature.	therefore be paired with traditional knowledge as well as proven conservation and project methods. ¹⁰²	local conservation priorities and indicators of ecological success into monitoring and verification schemes.	enhance existing natural capital. ¹⁰³
Involvement of IPLCs in decision-making: Ensure that IPLCs are central to the decision-making and obtain Free Prior and Informed Consent (FPIC), and ensure that there is ongoing engagement with IPLCs.	Participation and design are based on mutual respect and uphold the right of Free, Prior, and Informed Consent (FPIC) for all individuals affected by the project. Decision-making responds to the rights and interests of all stakeholders involved in the intervention, and a well-defined feedback and grievance mechanism is fully agreed upon before the intervention is initiated. This includes being clear on where legal responsibilities and liabilities lie.		If seeking to secure carbon units or natural capital value, investors should consider whether ownership of land is necessary. Where possible they should consider opportunities for management agreements and collaboration/ partnerships with communities that can deliver wider social and economic benefit. ¹⁰⁴
Benefit sharing: Ensure equitable sharing of benefits (e.g., through benefit-sharing mechanisms).	Ensure efficient and equitable distribution of societal and ecological benefits through well-designed benefit-sharing agreements. Societal outcomes should be identified, benchmarked, and periodically assessed.		Where there are leases or other forms of tenure in place, investors should identify and engage relevant parties early in decision-making and consider opportunities for shared benefit. ¹⁰⁵
Safeguards: Ensure the interventions do not create negative social and biodiversity impacts.	Include strong safeguards to prevent adverse social and ecological impacts, e.g., rights relating to land, food, and Indigenous Peoples must be respected in private-sector climate actions. Safeguards need to be respected so that any negative trade-offs associated with interventions do not impact the most disadvantaged. Safeguards should be periodically reviewed and mutually agreed.		Investment and management decisions should demonstrate consideration of positive and negative impacts across all four capitals (natural, social, economic, human). ¹⁰⁶

Annexe 3: Landscape review of public funding available

Fund	Purpose	Activities Supported	Funding Amount	Timeline
SCOTLAND				
Nature Restoration Fund 2023 ¹⁰⁷	Restoring wildlife and habitats on land and sea, and addressing the twin crises of biodiversity loss and climate change	Priority activities for the current round include coastal and marine initiatives which promote restoration, recovery, enhancement, or resilience	£65M fund; over 30 projects were awarded a total of £7.6M in a most recent round	Launched 2021, ongoing, next application later in 2023
Edinburgh Process Fund ¹⁰⁸¹⁰⁹	Second stream of the Nature Restoration Fund that is allocated to councils	Priorities for coastal and marine protection and eradication of non-native species	£5 with option to apply top-ups from a £1.5m pot	Stream within Nature Restoration Fund
Scotland's Marine Environment Enhancement Fund (SMEEF) ¹¹⁰	Funding from marine industries to reinvest in the health of the marine environment	Projects and activities that recover, restore or enhance the health of marine and coastal habitats and species, including baseline assessment and monitoring; recent grants have covered seagrass, native oyster, and cetacean restoration and enhancement	£3.3M in public money distributed to date (£2.9M from the Nature Restoration Fund) with £400K from private finance, primarily from the offshore wind industry ¹¹¹	Opened 2022, ongoing
Highlands and Islands Enterprise Green Jobs Capital Fund ¹¹²	Support businesses and enterprises to create and retain jobs that produce goods or services that benefit the environment or conserve natural resources	Capital expenditure to help organisations retain or create green jobs; priority areas include aquaculture, shellfish, and seaweed	HIE funds 30-50% of projects with remainder crowded in by private investment	Ongoing
Marine Fund Scotland ¹¹³	Projects contributing to an innovative and sustainable marine economy, reducing carbon emissions, and supporting coastal communities	Projects should benefit outcomes in categories relating to Scotland's Blue Economy Vision: <ul style="list-style-type: none"> • Innovation and economic impact • Sustainable, high-quality seafood • Achieving net zero • Successful communities • Delivery of quality projects 	£14M	2023-2024

Fund	Purpose	Activities Supported	Funding Amount	Timeline
Innovation with Natural Resources (INR) Challenge Fund¹¹⁴	Supports innovation across a wide range of sectors including aquaculture	Promote new sustainable ways of using natural resources to produce energy, food and other products	£3M, part of Crown Estate challenge funds totalling £9M; capital grants between £150K and £500K	Last round of applications closed in June 2022; not yet continued
Funding to Adapt to Sea Level Rise¹¹⁵	Adapt to sea-level rise and protect natural coastal defences from erosion	Government budgetary commitment	£12M	2022 - 2023
Facility for Investment Ready Nature in Scotland (FIRNS)¹¹⁶	Supporting projects that leverage private finance and market-based mechanisms to restore Scotland's nature	Development of viable business cases and investment models for restoring and improving the natural environment; Activities that support project developers with engaging with emerging environmental markets, including exploring natural capital market infrastructure (e.g., codes, standards)	Grants of up to £240,000	Opened in 2023, ongoing
WALES				
Welsh Marine and Fisheries Scheme¹¹⁷	Supports environmentally & economically sustainable growth in Welsh seafood industry and coastal communities	Activities which: <ul style="list-style-type: none"> • Support sustainable aquaculture • Contribute to conservation and restoration of marine ecosystems • Support marine spatial planning & sustainable use of resources • Promote innovation etc. 	£3m, announced alongside a £800,000 challenge fund to build capacity in coastal communities	The closing date for the last part of the scheme was May 2023
Nature Networks Fund¹¹⁸	National Lottery Heritage Funding scheme in partnership with Welsh Gov, to improve the condition and connectivity of protected sites	Both terrestrial & marine projects including projects to support wild Atlantic salmon, sustainable bait collection, mammal survey, coastal squeeze project	£45m over three years	2022-25. Round two closed in Feb
Flood & Coastal Erosion Risk Management Programme¹¹⁹	Funding provided by Welsh Government for capital projects undertaken by Risk Management Authorities (Local Authorities, Natural Resources Wales, and Water Companies)	Includes commitment to expand natural flood management approaches	£75m across the whole programme (coastal & terrestrial)	2023-2024

Fund	Purpose	Activities Supported	Funding Amount	Timeline
ENGLAND				
Flood and Coastal Resilience Innovation Programme ¹²⁰	Support for innovative projects to improve coastal resilience in England	25 projects including a project to restore sub-tidal habitats, e.g., kelp beds, oyster reefs, to reduce wave energy near South Tyneside	£150m	2021-2027
Coastal Transition Accelerator Programme (CTAP) ¹²¹	A part of England's National Flood and Coastal Erosion Risk Management Strategy. Aims to accelerate strategic planning and support trialling early on-the-ground innovative actions in support of medium and long-term plans	With a focus on East Riding of Yorkshire and North Norfolk, interventions could include repurposing land in coastal erosion zones for different uses such as restoring and creating habitats	£36m	2022-2027
Natural Environment Investment Readiness Fund (NEIRF)	Stimulate private investment and market-based mechanisms to improve natural environment	England-based projects including: <ul style="list-style-type: none"> • Development of seagrass carbon code • Carbon credit model for saltmarsh • Kelp forest restoration Sussex coast 	£10m, up to £100k per grant	Last round was considered the final round, may fully transition to Big Nature Impact Fund/UK Nature Impact Investment Strategy
Big Nature Impact Fund/UK Nature Impact Investment Strategy ¹²²	Upfront capital provided by Defra to a blended finance vehicle facility with the aim of raising at least £500 million in private finance for investment in nature-based solutions and enterprises in the nature restoration value chain	<ul style="list-style-type: none"> • NBS "real assets"/nature restoration projects • Businesses in the nature restoration value chain 	£30m first loss capital from Defra provided through Big Nature Impact Fund	First raise planned for 2023
Fisheries and Seafood Scheme (FaSS) ¹²³	Marine Management Organisation (MMO) grants to help support catching, processing, and aquaculture sectors	The scheme provides funding for projects that deliver: <ul style="list-style-type: none"> • Creating a more sustainable and resilient sector • Achieving good environmental status through the conservation and restoration of the marine environment 	At least £6m every year until 2025	2022-2025

Fund	Purpose	Activities Supported	Funding Amount	Timeline
NORTHERN IRELAND				
Environment Fund	Administered by DAERA to support projects which will help deliver key environmental outcomes across Northern Ireland ¹²⁴	The Fund contributes to two Environmental Impact Priority areas: <ul style="list-style-type: none"> • Nature and Climate Recovery: Building Ecological and Climate Resilience (landscape, water, habitats, species and earth science condition and extent maintained and improved) • Connecting People with the Environment 	The Environment Fund budget is limited. DAERA will not provide funding of less than €25,000	2023-2028
Peace Plus Programme ¹²⁵	A cross-border funding programme created to strengthen peace and prosperity within and between border countries of Ireland and Northern Ireland	Targets investment in six key thematic areas Environment and conservation are key for theme 5, supporting a sustainable and better-connected future. It will focus on land, coastlines and the wildlife within Northern Ireland and the border counties	Combined with the UK's financial commitment, and additional national co-financing, the total investment is €1.1 billion	2021-2027. NB: the next step is the conclusion of a financing agreement between the Commission, Ireland and the United Kingdom. This agreement will allow the implementation of the PEACE PLUS programme on the ground
Maritime Fisheries Fund ¹²⁶	Designed to support maritime and fisheries activity and help deliver the objectives of the Common Fisheries Policy - also geared to encourage the development of Integrated Maritime Policy	Support is available for projects that deliver on sustainable economic growth in the sea fisheries and aquaculture sector Areas open for application include: <ul style="list-style-type: none"> • Aquaculture, Processing and Marketing • Investments to Shore Based Facilities • Partnership, Information Sharing, Advisory Services, Job Creation and Training • Marine Environment and Inland Fishing 	Total €37.2 million Maritime and Fisheries Fund with €3.6 million available in Northern Ireland	2022-2023

Fund	Purpose	Activities Supported	Funding Amount	Timeline
UK				
Resilient UK Coastal Communities and Seas¹²⁷	Providing research grants for UK-based research organisations to enhance the resilience, health, and wellbeing of UK coastal communities and seas	<ul style="list-style-type: none"> • Enhance community knowledge mobilisation • Improve resilience in the management of UK coastal areas and seas 	Fund total of £11.5m; awards ranging from £2.5m-£2.9m	Grants start in 2024

Annexe 4: Landscape review of private initiatives to overcome finance barriers

Funding Initiative	Scope	Method of Action	Timeline
Bright Tide Blue Economy Ocean Accelerator ¹²⁸	Assistance for EU or UK SMEs in the fields of sustainable plastics, aquaculture, sustainable fisheries, shipping, or offshore wind.	8-week programme offering: legal, financial, and scientific support; mentorship; access to networks; pitching opportunities to potential funders.	Programme operated from June – August 2022.
Bright Tide Blue Carbon Accelerator Programme ¹²⁹	Support for 10 blue carbon ventures covering nature-based and technological solutions	8-week programme offering: legal, financial, and scientific support; mentorship; access to networks; pitching opportunities to potential funders	Programme operated from May – July 2023.
Blue Impact Investment Strategy ¹³⁰	Funding for UK enterprises producing sustainable seafood and/or aquatic plants.	Raising up to £75 million to invest £1 – 10 million per project.	Ongoing.
Sustainable Aquaculture Innovation Centre ¹³¹	Funding for innovative Scottish R&D projects addressing marine health and aquaculture.	Award funding up to 50% of total project costs.	Launched in 2014 with funding awarded in rounds
SAMS Seaweed Academy ¹³²	Seaweed industry facility to offering advice and support to start-ups in the field.	Offers courses of 1 day to 1 week covering farming processes to licensing and economics and marketing.	Ongoing - regular courses offered.
Blue Carbon Buyers Alliance ¹³³	Body serving to aggregate and educate buyers of blue carbon and scale demand.	Provides opportunities for co-learning, scaling impact, and opportunities to co-invest with peers.	Ongoing.
IUCN Blue Carbon Accelerator Fund ¹³⁴	Global fund supporting the development of blue carbon restoration and conservation projects.	Offers support and funding on investment readiness, implementation, and access to technical guidance and collaborative networks.	Readiness support offered through rounds, with latest call to close in July 2023.
Ocean Stewardship Fund (OSF) ¹³⁵	Provides grants for fishery improvements and funds important research into bycatch reduction, protecting marine habitats, and the effects of climate change.	Using 5% of royalties from MSC certified product sales, OSF has given \$4.9 million in grants since 2020, along with supporting fisheries improvement and funding research.	Grants awarded on an annual basis.
Hatch Blue ¹³⁶	Global provider of early stage investment and accelerator programme for climate-smart, sustainable aquaculture.	Invested € 1.76 million through early stage and venture growth investments, with 39 companies supported through the accelerator.	Funding and accelerator participation awarded in rounds.

Funding Initiative	Scope	Method of Action	Timeline
Green Finance Institute Hive ¹³⁷	A central hub for knowledge sharing and collaboration for UK nature investment.	Share knowledge for private investment in nature, identify barriers and co-design solutions, and work with stakeholders to identify investment opportunities.	Ongoing.
Fisheries Improvement Fund ¹³⁸	A fund providing upfront and ongoing funding for the implementation of Fishery Improvement Projects (FIPs) by experienced partners on the ground.	Funding is given to FIPs implementers who deliver the project; returns are linked to the volume of fish purchased through the projects.	Currently in pilot phase.
Althelia Sustainable Ocean Fund (SOF) ¹³⁹	An impact fund that invests in predominantly emerging market enterprises and projects in three key areas – sustainable seafood, the circular economy and ocean conservation.	The fund has a blended structure with funding from private equity investors and USAID. SOF provides loans, equity and quasi equity to enterprises and projects in its portfolio.	Completed its final close in May 2020, with the fund to end in 2027.
Ocean Conservation Trust Grant ¹⁴⁰	Ocean conservation charity focused on advocacy and habitat restoration.	Provision of grants to small scale marine conservation projects around the world.	Ongoing; 13 projects around the world supported.
Ocean 14 Capital ¹⁴¹	An investment advisory to Ocean 14 Capital Fund 1, a private equity fund focused on SDG 14.	Private equity investment in growth-stage companies that generate positive environment impact contributing to SDG 14.	Ongoing.
Oceans 5 ¹⁴²	An international funders' collaborative dedicated to stopping overfishing, establishing marine protected areas, and constraining offshore oil and gas development	Oceans 5 makes direct grants, leverages matching grants, provides in-kind services and shares strategic guidance to support projects and campaigns to constrain overfishing and to establish marine reserves	Ongoing.

Annexe 5: Landscape review of research initiatives underway to address evidence gaps

Name	Main Objectives	Timeline	Lead of Work
Initiatives			
Nature Investment Standards Programme ¹⁴³	Create a new, consensus-based, UK-wide standards framework for nature. Scale up “high-integrity markets” for private investments into nature to improve nature recovery in the UK.	2023-2026	BSI, the UK's National Standards Body
Marine Natural Capital and Ecosystem Assessment Programme (mNCEA) ¹⁴⁴	Assess the value of marine natural capital and ecosystems to the UK economy with a suite of tools and a robust evidence base.	2022-2024	Defra
Natural Capital and Ecosystem Assessment Programme ¹⁴⁵	Marine components of the work aim to provide a marine natural capital evidence baseline, a comprehensive monitoring programme, evaluation system for shared marine space, database for natural capital evidence, and advancements in evidence collection.	Launched in 2022, end date not specified	Managed by Defra, in partnership with Cefas, EA, Forest Research, Natural England, JNCC, MMO, Royal Botanic Gardens, Kew, UK CEH
Restoring Meadow Marsh and Reef (ReMeMaRe) ¹⁴⁶	Restore seagrass meadows, saltmarshes and European native oyster reefs through habitat creation in the UK, at least 15% of priority habitats on the English coast by 2043.	Launched in 2021, end date not specified	Defra
UK Blue Carbon Evidence Partnership ¹⁴⁷	Gather evidence on the role of blue carbon habitats in climate change mitigation to advance the UK's commitment to protect and restore blue carbon habitats.	Launched in 2021, end date not specified	Centre for Environment, Fisheries, and Aquaculture Science (Cefas)
Scottish Blue Carbon Forum ¹⁴⁸	Enhance understanding of how blue carbon resources in Scotland can contribute to adaptation, mitigation and resilience.	Launched in 2018, end date not specified	Scottish Government
UK Blue Carbon Forum ¹⁴⁹	Strengthen the links between climate mitigation and ecological benefits in blue carbon, improve communication, standardise methodologies.	Launched in 2018, end date not specified	Coalition supported by Calouste Gulbenkian Foundation
Blue Carbon Mapping Project ¹⁵⁰	Map the distribution and size of blue carbon stores in the UK.	2022-2023	Scottish Association for Marine Science
Dynamic Coast ¹⁵¹	Improve understanding of the coastal erosion in Scotland by improving evidence and awareness.	Not specified	University of Glasgow

Name	Main Objectives	Timeline	Lead of Work
Reducing and Mitigating Erosion and Disturbance Impacts (ReMEDIES)¹⁵²	Planting seagrass meadows to demonstrate new habitat restoration and management approaches.	2020-2023	Natural England
Marine Climate Change Impacts Partnership¹⁵³	Assess the impacts of climate change on the UK marine environment through research and stakeholder engagement.	Launched in 2005, end date not specified	Chaired at Plymouth Marine Laboratory, supported by funded secretariat at Cefas
Sustainable Management of UK Marine Resources (SMMR)¹⁵⁴	Closing gaps in marine research through research funds and networking and breaking down barriers between science and policy.	2019 -2024	Natural Environment Research Council (NERC), Economic and Social Research Council (ESRC)
Solent Seascape Project¹⁵⁵	Restore and protect seagrass meadows in the Solent.	2022-2027	Blue Marine Foundation
Sussex Kelp Recovery Project¹⁵⁶	Monitor the recovery of kelp in Sussex and estimate its ecosystem benefits.	Launched in 2021, end date not specified	Sussex Wildlife Trust
Project Seagrass¹⁵⁷	Operate a range of projects with local partners across the UK coast to restore seagrass meadows at scale.	Ongoing	Project Seagrass in partnership with Swansea University

Annexe 6: International blue carbon crediting methodologies relevant to the UK context

Standard	Methodology	Blue Carbon Project Type	Status	Indicative TRL
VCS	VM0007 REDD+ Methodology Framework (REDD-MF)	Peatland and Tidal Wetland Conservation	Active	High, 77 project that are seeking to apply this methodology with a 20+ already receiving registration.
VCS	VM0024 Methodology for Coastal Wetland Creation	Wetland Restoration	Active	Low, no projects have used this methodology.
VCS	VM0033 Methodology for Tidal Wetland and Seagrass Protection	Wetland and Seagrass Conservation	Active	Moderate, 7 project are seeking to apply this methodology at various stages of development.
VCS	Methodology for Avoided Bottom Trawling	Seabed Conservation / Avoidance	Under Development	Low, methodology still under development.
VCS	Methodology for Carbon Removals Through Seaweed Aquaculture	Seaweed	Under Development	Low, methodology still under development.
VCS	Methodology for Creation of Seaweed or Kelp Farms	Seaweed	Under Development	Low, methodology still under development.
VCS	Methodology for Usage of E-fuels for Shipping ¹	Fuel Conversion	Under Development	Low, methodology still under development.
VCS	VM0022 Methodology (Quantifying N ₂ O Emission Reductions in Agricultural Crops through Nitrogen Fertilizer Reduction)	Use of seaweed biomass as a biostimulant to displace fertilizer	Active	Low. No projects have used this methodology (one under validation)
CDM ³	AR-AMS003 Afforestation and Reforestation Project Activities Implemented on Wetlands	Reforestation (Riparian / Coastal)	Active	High, removal-based carbon calculations present less uncertainty, and methodology has existed under multiple standards. 2 VCS projects and unknown CDM projects use this methodology.
SD VSta	Methodology for Coastal Resilience Benefits from Restoration and Protection of Tidal Wetlands	Coastal Resiliency	Under Development	Low, methodology still under development.

Standard	Methodology	Blue Carbon Project Type	Status	Indicative TRL
Gold Standard	Afforestation / Restoration GHG Emissions Reduction and Sequestration Methodology	Reforestation (Riparian / Coastal)	Active	High, removal-based carbon calculations present less uncertainty, and methodology has existed under multiple standards. 43 Gold Standard projects apply the A/R methodology.
Plan Vivo	PM001 Agriculture and Forestry Carbon Benefit Methodology ²	Reforestation (Riparian / Coastal)	Active	Moderate, 9 projects apply this methodology using the afforestation / reforestation project type. The general nature of this methodology makes it challenging to assess on a technical level.
Social Carbon	SCM0007 Methodology for the Treatment of Harmful Algae Blooms	Algae Bloom Reduction	Active	Low, no projects have used this methodology.

Annexe 7: Overview of international voluntary biodiversity crediting methodologies relevant to the UK context

	Methodology	Description
Active	Wallacea Trust	Under the program, biodiversity credits are based on a “basket” of at different metrics that represent the conservation objectives within the ecoregion. This methodology is being implemented into Plan Vivo’s Nature verification standard that is applicable to both terrestrial and aquatic systems. Currently, it is being trialled as part of the Solent Seascape Project proposed framework. ^{158,159}
	GreenCollar Reef Credit	While serving the Great Barrier Reef, credit applications address upstream pollution by quantifying reductions in fertiliser and sediment runoff. ¹⁶⁰ As of 2021, over 18,000 credits have been sold to the Queensland Government. ¹⁶¹
Under Development	Niue Ocean Conservation Commitments (OCCs)	Yet to be launched, OCCs will support the capitalisation of a Niue and Ocean Wide (NOW) Trust Fund, ultimately providing sustained funding to maintain and protect the MPA for the next 20 years. ¹⁶² An OCC will be different than a credit in that it is not tradeable, nor provide a return on investment. ¹⁶³
	Queen Mary Biodiversity Stewardship Credits	This biodiversity credit method attempts to quantify the amount of avoided biodiversity loss through business operations, and has the potential to be applied to terrestrial as well as freshwater and marine systems. ¹⁶⁴ Credits have yet to be administered to date.
	Methodology for Coastal Resilience Benefits from Restoration and Protection of Tidal Wetlands	This methodology is verified by Verra’s SD VISTa standard, and applies to the creation, restoration, and protection of tidal wetlands in order to provide coastal flood reduction benefits (but could eventually be applied to other coastal habitats such as oyster beds or coral). ^{165,166} This methodology is still under development and has not yet been piloted.
	Open Earth	OpenEarth, a research and innovation non-profit based in California, is proposing a digitally native class of marine ecosystem credits (MEC), designed to support funding at scale for the protection and restoration of ocean ecosystems. While no projects exist to date, OpenEarth plans to establish an issuance project for the Cocos Island National Park, Costa Rica. ¹⁶⁷

Annexe 8: Landscape review of emerging technologies

Company	Technology product provided	Marine natural capital barrier addressed
planblue ¹⁶⁸	Seafloor mapping technology combining a seafloor survey system and underwater hyperspectral imaging sensors, as well as AI-driven approaches to process the data.	MRV for seagrass projects to enhance transparency and credibility in blue carbon markets.
Hortimare ¹⁶⁹	Culture and propagate high-quality seaweed and supply starting materials and machinery to seaweed farmers.	Overcome barriers to entry to help scale the seaweed sector.
Woods Hole Oceanographic Institution ¹⁷⁰	Automatic seaweed seed-string deployment device.	Facilitates faster, more efficient seeding than traditional methods.
Sea6 Energy ¹⁷¹	Mechanised cultivation system that can simultaneously harvest and replant seaweed.	Bringing down costs for ocean farming to support faster materialisation.
Kuva Space ¹⁷²	Hyperspectral satellites constellation capable of calculating the biomass of kelp.	MRV for kelp projects, to enhance transparency and credibility in blue carbon markets.
echoview ¹⁷³	Bio-acoustic data processing tool, seismo-acoustic mapping, using side-scan sonar and echosounders to map the seafloor and sub-seafloor with sound waves.	MRV to help detect changes in biodiversity variables, allowing for biodiversity credit verification. Sonar is used to map habitats, particularly seagrass, which are difficult to image underwater; can be used to estimate carbon stocks by combining sonar data with soil sediment cores. ¹⁷⁴
NatureMetrics ¹⁷⁵	Kit for analysis of eDNA to assess biodiversity.	MRV facilitating biodiversity credit verification.
seaforester ¹⁷⁶	Mobile seaweed nurseries, seeded stones for planting without diving, and spore banks.	Accelerated and more efficient seeding to enhance seaweed cultivation.
kelp blue ¹⁷⁷	Helping to design "lawn-mower" harvesting equipment for use in commercial kelp cultivation.	Facilitates faster, more efficient harvest to bring down operational costs of seaweed cultivation.
Blue Earth ¹⁷⁸	Scanning kelp using bathymetry surveys.	MRV (monitoring and verification) of carbon sequestration.
X: The Moonshot Factory ¹⁷⁹	Use of computer vision, field of AI in which computer systems derive information from images and videos, to map and monitor seagrass.	Enhance MRV for seagrass restoration.

Company	Technology product provided	Marine natural capital barrier addressed
Hexagon ¹⁸⁰	LiDAR for mapping of ecosystem topography and measurement of above ground or seafloor vegetation.	Enhance MRV, such as for seagrass mapping as deployed in the Bahamas in partnership with Beneath the Waves.
Plant Ecology Beyond Land (PEBL) ¹⁸¹	PEBL provides marine cultivation services for the seaweed and shellfish sector.	They offer monitoring services to assess the environmental impacts, structural integrity and crop quality of sea-farms including cameras, environmental and water quality sensors.
Biome Algae ¹⁸²	Production and processing of high-quality seaweed into biomass products and extracts.	Create sustainable business model which restores marine habitats and biodiversity and facilitates faster carbon sequestration.

Annexe 9: Policy processes underway to address current gaps

Developments in the UK

Development	Description
<p>The UK MPS, the UK Marine Strategy, the Joint Fisheries Statement, and the UK Marine Science Strategy</p>	<p>Comprise the broad policy framework governing integrated ocean management in the UK following passage of the Marine and Coastal Access Act in 2009.¹⁸³ The MPS, jointly adopted across the UK Administrations, provides the framework for marine planning systems established through primary legislation and direction for marine licensing.¹⁸⁴ The UK Government is currently considering whether the MPS should be revised, including with respect to more effectively delivering net gain and restoration targets.¹⁸⁵ The second implementation cycle of the UK Marine Strategy has already begun with the publication of Part 1 in 2019 creating an ongoing opportunity to update the framework used to assess, monitor, and act to achieve Good Environmental Status in UK seas, as well as recognise the role of coastal habitats for climate mitigation and adaptation.¹⁸⁶</p>
<p>The UK-wide Fisheries Act 2020</p>	<p>Provides a framework for the management of fishing and aquaculture activities, setting a goal of 70% of water bodies at Good Status by 2027. The accompanying Joint Fisheries Statement, drafted by all four nations, identifies net zero and blue carbon as key priorities and commits to working together to support innovative solutions to realise carbon savings.¹⁸⁷</p>
<p>The Environmental Improvement Plan</p>	<p>Commits to protect 30% of land and sea, including through enhanced protections for marine protected areas, such as the designation of Highly Protected Marine Areas.¹⁸⁸ In December 2022, the UK Government also set a target of 70% of designated features in MPAs in favourable condition by 2042, as part of target setting under the Environment Act 2021.¹⁸⁹</p>
<p>Offshore Wind Environmental Improvement Package (OWEIP) through the British Energy Security Strategy 2022</p>	<p>Increases the target for offshore wind to 50 GW and creates the impetus to introduce compensatory approaches to the development of offshore wind. The introduction of the Energy Security Bill in July 2022 included further commitment to pilot and introduce “Strategic Compensation” for offshore wind farm development.¹⁹⁰</p>
<p>Nature Markets Framework 2023</p>	<p>Seeks to improve clarity and confidence for investors in natural capital markets, both terrestrial and marine, by introducing a set of core principles. The framework recognises the potential role for marine net gain in growing the marine natural capital market, the undervalued importance of marine carbon, and the need for coastal managers to access nature markets and investment to deliver restoration.¹⁹¹</p>

Development	Description
Nature Investment Standards Programme	Launched by Defra and the British Standards Institute to help create standardised methodologies for natural capital projects to help scale the market, with an initial focus on building consensus on what standards are needed. ¹⁹²
UKBCEP Evidence Needs Statement	Sets the stage for inclusion of blue carbon habitats in the UK Greenhouse Gas Inventory and development of a domestic market for blue carbon credits. ¹⁹³
Green Finance Strategy 2023	Commits to consult on actions to scale the VCM, with specific targets to ensure blue carbon markets are developed and implemented in alignment with principles for credibility and quality. ¹⁹⁴ Enhancing the domestic VCM will prove critical, as biological removals like blue carbon will not likely be included within the UK ETS in the near future, ¹⁹⁵ though HMG has committed to responding to the call for evidence for their inclusion. ¹⁹⁶
Adapting approval processes in multiple jurisdictions	Defra is leading a cross-government programme of work on Marine Spatial Prioritisation, which helps inform changes in marine spatial planning processes underway. ¹⁹⁷ The Crown Estate is also engaging in reviews of how to update statutory processes which were established to mitigate risk from infrastructure development, and so are not yet fit for purpose to meet the evolving demands of varied and nascent marine natural capital markets. They are also in the process of developing new guidance for project developers and soliciting input on how processes may need to evolve over time. In parallel, The Environment Agency and the MMO are leading efforts to streamline lease processes for restoration projects to help reduce the number of individual approvals needed across multiple departments, and a licensing review is similarly underway in Wales.

Developments in England

Development	Description
Marine Net Gain (MNG)	An approach to Biodiversity Net Gain (BNG) in England was developed in 2019 in the National Planning Policy Framework (NPPF) in response to the UK's 25 Year Environment Plan. Its introduction is anticipated to create a significant market in off-site compensation requiring developers to provide a measurable net gain in biodiversity, including in coastal areas. In 2022, Defra released a consultation on MNG extending BNG principles to marine habitats. The implementation of MNG is anticipated to be significant for developing a market in off-site compensation for marine natural capital, however it is still unclear how it will evolve ¹⁹⁸ .

Development	Description
<p>Nutrient Neutrality</p>	<p>Introduced by Natural England in 2018 to ensure there is no additional nutrient burden to protected sites or ‘Habitat Sites’ termed in the NPPF.¹⁹⁹ This includes marine sites that are deemed special protected areas (SPA), special areas of conservation (SAC) and marine conservation zones (MCZs) within England. Nutrient Neutrality provides a market for nutrient credits which are purchased by developers to mitigate nutrient loads through development. More recently in 2023, Natural England and Defra announced the Nutrient Mitigation Scheme, which aims to ‘fast track’ the delivery of nutrient neutrality and has been implemented in 74 Local Planning Authorities (LPAs). This includes coastal areas such as the Solent, which completed a pilot scheme this year, looking into how to scale the trading of nutrient credits.</p>
<p>Natural Capital and Ecosystem Assessment Programme (NCEA)</p>	<p>As also covered in the review of research initiatives underway, the NCEA aims to deliver a joined-up approach for Defra marine-linked policy areas, help shape an evaluation system for marine planning, and advise on the management of UK marine environments.²⁰⁰</p>

Developments in Northern Ireland

Development	Description
<p>Climate Change Adaptation Programme 2019-2024²⁰¹</p>	<p>Published by DAERA and identifies natural capital, including protecting coastal and marine ecosystems as a key objective. Along with the Climate Change Act (Northern Ireland) 2022, these overarching frameworks form the foundation for a range of policy developments underway.</p>
<p>The Environment Strategy,²⁰² Marine Plan,²⁰³ and Green Growth Strategy²⁰⁴</p>	<p>All still remain in draft format. The Draft Environment Strategy has committed to developing and publishing an initial Northern Ireland Natural Capital Asset Register by 2022, but is awaiting approval from the Assembly. The Draft Marine Plan seeks to inform and guide the regulation, management, use and protection of the Northern Ireland marine area and focuses on 'do no harm' to the marine environment and the required environmental impact assessments required for marine planning proposals. The Draft Green Growth Plan sets out a 10-year plan for tackling climate change and creating opportunities through green growth. It includes a commitment to publish Northern Ireland’s first Climate Action Plan, which will cover the 2023-2027 carbon budget. The strategy acknowledges the natural environment as one of the most important assets. Critically, it will establish Green Growth Tests for new developments to meet requirements around biodiversity, carbon benefits, and other natural capital considerations.</p>

Development	Description
<p>Blue Carbon Action Plan</p>	<p>Expected to be published for public consultation imminently, in addition to sectoral plans (including fisheries), as per the recommendation from the Blue Carbon Restoration in Northern Ireland – Feasibility Study.²⁰⁵ It will examine available funding streams to realise the Executive’s vision of protecting, restoring, and creating blue carbon habitats in Northern Ireland. There is strong appetite within DAERA to include blue carbon within Northern Ireland’s GHG inventory as soon as possible to encourage market development. In any future framework, recognition is expected for the full benefits of blue carbon ecosystems including carbon storage, coastal defence, and biodiversity, as well as taking a ‘polluter pays’ approach.</p>
<p>Maritime and Fisheries Fund (Northern Ireland)²⁰⁶</p>	<p>A consultation closed earlier this year seeking views on Northern Ireland’s proposed approach to marine and fisheries support, following EU funding being withdrawn owing to Brexit. The replacement European fisheries funding will be known as the Maritime and Fisheries Fund (Northern Ireland), with other funding being provided from within DEARA’s Green Growth budgetary allocation. The emerging strategy will need to complement the pan-UK focus on Green Growth, net zero, blue-economy and sustainability, with all successful applications required to demonstrate a quantifiable impact on at least one of these areas of focus. DAERA proposes to support projects that research the potential to develop and/or restore blue carbon resources within the marine environment, as well as support other natural capital proposals that positively contribute to the protection and restoration of coastal and marine ecosystems.</p>
<p>Research on evidence gaps</p>	<p>DAERA continue to work closely with the UKBCEP and are partnering with Cefas on research on the impacts of fishing on marine sediments, as well as working to produce a seabed habitat map for the Northern Ireland zone in the next 4-5 years. There are remaining key evidence gaps and DAERA is keen for the UK to establish a full natural capital map, including seabed mapping.</p>

Developments in Scotland

Development	Description
<p>Scottish Biodiversity Strategy to 2045 (Biodiversity Strategy)</p>	<p>Includes key commitments which will shape opportunities for new marine natural capital markets to help deliver detailed outcomes and priority actions to achieve Nature Positive by 2030, including enabling investors to help enhance ecosystems while generating returns.²⁰⁷ Core components of the Biodiversity Strategy for marine natural capital include:</p> <ul style="list-style-type: none"> • Recognising the importance of coastal habitats as natural defences and committing to removing infrastructure inhibiting natural change in habitats.²⁰⁸ It also calls for coastal protections so undisturbed blue carbon habitats can regenerate naturally, as well as enhanced fisheries management to protect carbon stored in seabed sediments.²⁰⁹ Marine Scotland is already exploring applying a cap to fishing activity in inshore waters up to 3 nm to reduce seabed disturbance.²¹⁰ Commitments are also made to the preservation of habitats for marine and coastal biodiversity.²¹¹ • Echoing the commitment made in Scotland’s <i>National Strategy for Economic Transformation</i> to establish a values-led, high-integrity market for responsible private investment in natural capital.²¹² The Scottish Government has supported this strategy by establishing <i>Interim Principles for Responsible Investment in Natural Capital</i>.²¹³ • Calling to maintain and increase public funding into nature restoration through the Nature Restoration Fund, increase investment into SMEEF, and provide additional investment to support the development of new carbon codes as appropriate.²¹⁴
<p>Scotland’s Private Investment in Natural Capital programme</p>	<p>Is expected to publish a Natural Capital Market Framework later this year to help align shared interest in actions at the UK scale, and clarify separate actions required to deliver on Scotland’s unique vision for a Just Transition and uphold the <i>Interim Principles</i>. Future guidance may be needed on how blended finance can operate in the marine context based on learnings from terrestrial markets.</p>
<p>Natural Environment Bill</p>	<p>Will establish statutory targets for nature restoration to implement the Biodiversity Strategy and require five-year delivery plans, as well as an investment plan, to set out public and private funding sources for biodiversity, identify funding gaps, and provide approaches to crowd in private and philanthropic finance.²¹⁵</p>
<p>A Blue Economy Vision for Scotland:²¹⁶</p>	<p>Will shape Scotland’s approach to the marine environment going forward. The vision sets out Scotland’s ambition across six outcomes to organise policy development, decision making and delivery throughout government – specifically calling for: (i) healthy marine ecosystems with activities managed using an ecosystem-based approach; (ii) a resilient blue economy contributing to both climate mitigation and adaptation in alignment with Net Zero and Nature Positive commitments; and (iv) for Scotland to lead globally on production of sustainable Blue Foods.</p>

Development	Description
<p>Regional Blue Economy pilot programme</p>	<p>Will be established by Marine Scotland to trial new approaches in support of implementing the Blue Economy Vision, which will be complemented by the development of new internal mechanisms to mainstream consideration of natural capital as well as the Blue Economy across the Scottish Government. The Scottish Government is already mapping funding and financing opportunities to help support marine natural capital markets.²¹⁷</p>
<p>Scotland's National Marine Plan²¹⁸</p>	<p>Along with evolutions in regional marine planning processes,²¹⁹ Scottish Ministers have already begun work to produce an updated National Marine Plan 2 (NMP2) by summer 2025, which will be more prescriptive in managing trade-offs²²⁰ to guide use of the marine environment to achieve both net zero and biodiversity commitments,²²¹ take an ecosystem-based approach in the dynamic context of a changing climate,²²² and review policy, planning, and licensing frameworks for offshore wind.²²³ Adjustments to the National Marine Plan will be particularly important in the context of the Scottish Government's commitment to achieve 8-11 GW of offshore wind in Scottish waters by 2030²²⁴, which is currently under consultation with potential to increase.²²⁵</p>
<p>Vision for Sustainable Aquaculture</p>	<p>Will be developed by Marine Scotland to set a new direction for the development of the sector to support sustainable practice, enhance consideration of environmental protection, and streamline regulatory processes.²²⁶ The Islands Growth Deal in the sector has already produced the Shell-Volution project to transform shellfish aquaculture in an environmentally sensitive, low-carbon manner. Similarly, the Marine Aquaculture Programme within the Argyll Bute Growth Deal is investing £25M to catalyse growth in high-value seaweed and shellfish industries, including through the SAMS International Seaweed and Shellfish Industry R&D Centre.²²⁷ The Scottish Government has also stated the need to develop a more comprehensive policy and regulatory framework for the seaweed sector, and will conduct an independent review of regulatory processes in the aquaculture sector.²²⁸</p>

Developments in Wales

Development	Description
Welsh National Marine Plan	<p>In 2019, the Welsh Government published the Welsh National Marine Plan, its first cohesive plan for the management of Welsh inshore and offshore marine regions, setting out the devolved government's vision, objectives, and policies for the forthcoming 20-year period. The plan followed from a series of legislative commitments made by the government for ensuring a sustainable future for Wales. The Well-being of Future Generations Act of 2015 provided the legal footing for the delivery of seven wellbeing goals tied to the Sustainable Development Goals (SDGs), whilst the Environment (Wales) Act of 2016 introduced the concept of Sustainable Management of Natural Resources (SMNR), including a focus to enhance biodiversity and contribute to wider ecosystem resilience. The plan states its overarching objective is to, “support the sustainable development of the Welsh marine area..., supporting the SMNR through decision making and by taking account of the cumulative effects of all uses of the marine environment.” The plan sets out general policies along themes including ‘achieving a sustainable marine economy’ and ‘living within environment limits’, as well as sector-specific policies in areas such as aquaculture, energy, and fisheries.²²⁹</p>
MPA Management	<p>The National Marine Plan includes a commitment to deliver an ecologically coherent and well-managed network of MPAs, complementing guidance published in the MPA Network Management Framework for Wales 2018, which provided a governing steer for management authorities and other stakeholders on the management of the MPA network.²³⁰ In 2022, Natural Resources Wales published a report highlighting the blue carbon potential of Welsh MPAs, stressing the need to particularly prioritise the protection and restoration of intertidal and shallow subtidal habitats within these areas for their carbon sequestration properties.²³¹</p>
Marine Services	<p>The Welsh Government’s Prosperity for All: A Low Carbon Wales, 2019,²³² highlighted the potential role of carbon sequestration on Natural Resources Wales’ estate in meeting emissions targets, though blue carbon was not explicitly recognised. The Welsh Government has also consulted on and supported research into marine mitigation and compensation measures, including relevant policies such as marine net gain.²³³</p>

Annexe 10: Acknowledgements

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Annexe 11: References

- ¹ Dasgupta, P. (2021) The Economics of Biodiversity: The Dasgupta Review.
- ² IPCC (2019) Summary for Policymakers. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate.
- ³ UNESCO IOC (2022) State of the Ocean Report 2022: Pilot Edition.
- ⁴ GFI, eftec, & Rayment Consulting Services (2021) The Finance Gap for UK Nature.
- ⁵ Armour, C. (2019) How the UKHO is supporting the Blue Economy.
- ⁶ Environment Agency (2023) State of the Environment: the Coastal and Marine Environment.
- ⁷ Oceana (2023) UK Government Permits Destructive Trawling in Marine Protected Areas.
- ⁸ Lynam, C.P., et al. (2018) Size Composition in Fish Communities: UK Marine Online Assessment Tool.
- ⁹ Malone, T., et al. (2020) The Globalization of Cultural Eutrophication in the Coastal Ocean: Causes and Consequences.
- ¹⁰ Environment Agency, see note 6.
- ¹¹ Blue Marine Foundation (2023) Sussex Kelp Recovery Project.
- ¹² Green, A.E., et al. (2021) Historical Analysis Exposes Catastrophic Seagrass Loss for the United Kingdom.
- ¹³ Horton, B.P., et al. (2018) Predicting Marsh Vulnerability to Sea-Level Rise Using Holocene Relative Sea-Level Data.
- ¹⁴ Thurstan, R., et al. (2010) The Effects of 118 years of Industrial Fishing on UK Bottom Trawl Fisheries.
- ¹⁵ Malone, Thomas, et al. (2020), see note 9.
- ¹⁶ Environment Agency, see note 6.
- ¹⁷ Sayers, P.B. et al. (2020) Third UK Climate Change Risk Assessment (CCRA3): Future Flood Risk.
- ¹⁸ Jacobs (2018) Research to Assess the Economics of Coastal Change Management in England and to Determine Potential Pathways for a Sample of Exposed Communities. Report for the Committee on Climate Change.
- ¹⁹ Jacobs (2018) Managing the Coast in a Changing Climate. Report for the Committee on Climate Change.
- ²⁰ Environment Agency, see note 6.
- ²¹ WWF UK (2022) Scientists Embark on World-First Study to Reveal Carbon Stored in UK Seas.
- ²² SBTN (2020) Science-Based Targets for Nature: Initial Guidance for Business.
- ²³ Defra (2023) Green Finance Boost for Nature in UK.
- ²⁴ Climate Tech VC (2023) The Uncertain-Seas of Ocean CDR.
- ²⁵ GFI, eftec, & Rayment Consulting Services, see note 4.
- ²⁶ GFI, eftec, & Rayment Consulting Services, see note 4.
- ²⁷ WWF (2021) The Value of Restored UK Seas.
- ²⁸ Schroders (2022) Q&A: What is “Natural capital” and Why Should Investors Care?
- ²⁹ Teytelboym, A. (2019) Natural Capital Market Design.
- ³⁰ PWC (2023) Accelerating Finance for Nature: Barriers and Recommendations for Scaling Private Sector Investment.
- ³¹ PWC, see note 30.
- ³² PWC, see note 30.
- ³³ Bain & Company (2022) Private Equity Reached New Heights in 2021 as Average Deal Size Pushed Past the \$1 Billion Mark for the First Time Ever.
- ³⁴ Defra (2023) Nature Markets: A Framework for Scaling Up Private Investment in Nature Recovery and Sustainable Farming.
- ³⁵ Teytelboym, see note 29.
- ³⁶ Scottish Government (2021) Scotland’s Third Land Use Strategy 2021-2026.
- ³⁷ Urban Ocean Lab (2023) Advancing Regenerative Ocean Farming in the U.S.
- ³⁸ Defra & Environment Agency (2022) 50 Projects Receive up to £100,000 to Boost Investment in Nature.
- ³⁹ Bright Tide (2023) About Bright Tide.
- ⁴⁰ Federated Hermes (2022) Defra to Make £30 Million Investment into New Strategy to Help Deliver HMG’s 25 Year Environment Plan.
- ⁴¹ UK Blue Carbon Evidence Partnership (2023) Evidence Needs Statement.
- ⁴² Climate Change Committee (2022) Briefing: Blue Carbon.
- ⁴³ Gould, A. (2023) Cumbria Action for Sustainability Climate Solutions for Cumbrian Landscapes Coastlines Event: Blue Carbon.
- ⁴⁴ Climate Change Committee (2021) Independent Assessment of UK Climate Risk: Advice to Government for the UK’s Third Climate Change Risk Assessment (CCRA3).
- ⁴⁵ Climate Change Committee, see note 42.
- ⁴⁶ Shafiee, Roxana (2021) SPICe Briefing: Blue Carbon.
- ⁴⁷ Fujita, R., et al. (2022) Carbon Sequestration by Seaweed: Background Paper for the Bezos Earth Fund – EDF Workshop on Seaweed Carbon Sequestration.
- ⁴⁸ Climate Change Committee, see note 42.
- ⁴⁹ Climate Change Committee, see note 42.

- ⁵⁰ Climate Change Committee, see note 42.
- ⁵¹ Climate Change Committee, see note 42.
- ⁵² Shafiee, see note 46.
- ⁵³ Fujita, see note 47.
- ⁵⁴ WEF, et al. (2022) High-Quality Blue Carbon Principles and Guidance: A Triple-Benefit Investment for People, Nature, and Climate.
- ⁵⁵ Gould, see note 43.
- ⁵⁶ Dilling, et al. (2011) Creating Usable Science: Opportunities and Constraints for Climate Knowledge Use and their Implications for Science Policy.
- ⁵⁷ Defra, see note 34.
- ⁵⁸ Defra (2023) Consultation on the Principles of Marine Net Gain: Consultation Outcome Summary of Responses.
- ⁵⁹ Maxwell, et al (2014) How Much is New Information Worth? Evaluating the Financial Benefit of Resolving Management Uncertainty.
- ⁶⁰ TNC (2021) Global Principles of Restorative Aquaculture.
- ⁶¹ HM Government (2023) Powering Up Britain: The Net Zero Growth Plan.
- ⁶² R Hon Chris Skidmore MP (2022) Mission Zero: Independent Review of Net Zero – Final Report.
- ⁶³ Woodland Carbon Code (2023) Woodland Carbon Code Governance.
- ⁶⁴ IUCN UK (2023) Peatland Code Governance.
- ⁶⁵ Defra, see note 34.
- ⁶⁶ HM Government, see note 61.
- ⁶⁷ Scottish Parliament (2020) Development and Implementation of Regional Marine Plans in Scotland: Final Report.
- ⁶⁸ Cornwall & Isles of Scilly Local Nature Partnership (2021) Cornwall Nature Recovery Strategy.
- ⁶⁹ WEF, et al., see note 54.
- ⁷⁰ UK Blue Carbon Evidence Partnership, see note 41.
- ⁷¹ Environment Agency, et al. (2022) Seagrass and Saltmarsh Habitat Development.
- ⁷² Marine Management Organisation (2019) Identifying Sites Suitable for Marine Habitat Restoration or Creation.
- ⁷³ Climate Change Committee, see note 42.
- ⁷⁴ Shafiee, R., see note 46.
- ⁷⁵ Fujita, Rob, et al., see note 47.
- ⁷⁶ UKCEH (n.d.) Salt Marshes: Research and App.
- ⁷⁷ Energy Futures Initiative (2020) Uncharted Waters: Expanding the Options for Carbon Dioxide Removal in Coastal and Ocean Environments.
- ⁷⁸ Gould, A., see note 43.
- ⁷⁹ CIEEM (2022) Consultation Response Document: Marine Net Gain Principles.
- ⁸⁰ Propeller (2023) Accelerating Ocean-Climate Companies.
- ⁸¹ Green Alliance (2023) The Cluster Effect: Why the UK Needs a Place-Based Green Industrial Strategy.
- ⁸² UK Blue Carbon Evidence Partnership, see note 41.
- ⁸³ UK Blue Carbon Evidence Partnership, see note 41.
- ⁸⁴ Marine Scotland (2022) A Blue Economy Vision for Scotland.
- ⁸⁵ BSI (2023) Nature Investment Standards Programme.
- ⁸⁶ Estuarine & Coastal Sciences Association (2023) Restoring Meadow, Marsh and Reef (ReMeMaRe).
- ⁸⁷ SAMS Enterprise (2023) Seaweed Academy.
- ⁸⁸ Shell Fish Wales (2023) The Shellfish Centre / Canolfan Pysgod Cregyn.
- ⁸⁹ Defra (2023) Plan for Water.
- ⁹⁰ Natural England and Defra (2023) Natural England’s Nutrient Mitigation Scheme for Developers.
- ⁹¹ Defra, see note 34.
- ⁹² Defra, see note 34.
- ⁹³ WEF, see note 54.
- ⁹⁴ Defra, see note 34.
- ⁹⁵ WEF, see note 54.
- ⁹⁶ WEF, see note 54.
- ⁹⁷ Murray et al., (2009) Including International Forest Carbon Incentives in Climate Policy: Understanding the Economics.
- ⁹⁸ Scottish Government (2022) Interim Principles for Responsible Investment in Natural Capital.
- ⁹⁹ WEF, see note 54.
- ¹⁰⁰ Defra, see note 34.
- ¹⁰¹ Scottish Government, see note 98.
- ¹⁰² Scottish Government, see note 98.
- ¹⁰³ Scottish Government, see note 98.
- ¹⁰⁴ Scottish Government, see note 98.
- ¹⁰⁵ Scottish Government, see note 98.
- ¹⁰⁶ Scottish Government, see note 98.

- ¹⁰⁷ NatureScot (2023) Scottish Government Nature Restoration Fund.
- ¹⁰⁸ Forestry Journal (2022) Edinburgh Process Fund.
- ¹⁰⁹ Scottish Government (2022) Protecting and Enhancing Nature.
- ¹¹⁰ Scottish Marine Environmental Enhancement Fund (2023) What is SMEEF?
- ¹¹¹ Scottish Marine Environmental Enhancement Fund (2023) Impact Report 2021-2023.
- ¹¹² Highlands and Islands Enterprise (2023) The Blue Economy in the Highlands and Islands: Towards a Regional Delivery Plan; & Highlands and Islands Enterprise (2023) Support: Green Jobs Capital Fund.
- ¹¹³ Marine Alliance for Science and Technology for Scotland (2023) Opportunity: Marine Fund Scotland 2023-2024 – Now Open!
- ¹¹⁴ Crown Estate Scotland (2022) Crown Estate Scotland Delivers £60m for Public Spending and Secures Scotland’s Global Lead in Offshore Wind.
- ¹¹⁵ Scottish Government (2021) Scotland’s Third Land Use Strategy 2021-2026.
- ¹¹⁶ NatureScot (2023) FIRNS: The Facility for Investment Ready Nature in Scotland.
- ¹¹⁷ Welsh Government (2022) Welsh Marine and Fisheries Scheme: Guidance Relevant to All Rounds.
- ¹¹⁸ Heritage Fund (2023) Nature Networks Fund (Round Two).
- ¹¹⁹ Welsh Government (2023) Record Level of Funding for Flood Defences.
- ¹²⁰ Environment Agency & Defra (2023) Flood and Coastal Innovation Programmes.
- ¹²¹ Environment Agency (2023) Coastal Transition Accelerator Programme (CTAP).
- ¹²² Finance Earth (2023) UK Nature Impact Investment Strategy.
- ¹²³ MMO (2022) Fisheries and Seafood Scheme (FaSS).
- ¹²⁴ DAERA (2023) Environment Fund 2023 - 2028.
- ¹²⁵ Special EU Programmes Body (2023) Peace Plus Programme.
- ¹²⁶ DAERA (2023) Maritime and Fisheries Fund (NI) 2022-2023.
- ¹²⁷ UK Research and Innovation (2023) Resilient UK Coastal Communities and Seas: Outline Stage.
- ¹²⁸ Bright Tide (2023) Blue Economy Ocean Accelerator.
- ¹²⁹ Bright Tide (2023) Blue Carbon Accelerator Programme.
- ¹³⁰ Finance Earth (2023) Blue Impact Investment Strategy.
- ¹³¹ Sustainable Aquaculture Innovation Centre (SAIC) (2023) About SAIC.
- ¹³² SAMS Enterprise (2023) Seaweed Academy.
- ¹³³ Business Alliance to scale Climate Solutions (2023) Blue Carbon Buyers Alliance.
- ¹³⁴ IUCN (2023) Blue Carbon Accelerator Fund.
- ¹³⁵ MSC (2023) Ocean Stewardship Fund.
- ¹³⁶ Hatch Blue (2023) About Hatch Blue.
- ¹³⁷ GFI (2023) GFI Hive.
- ¹³⁸ Finance Earth (2023) Fisheries Improvement Fund.
- ¹³⁹ SOF (2023) About Althelia SOF.
- ¹⁴⁰ Ocean Conservation Trust (2023) Ocean Grant Projects.
- ¹⁴¹ Ocean 14 Capital (2023) Ocean 14 Capital Ecosystem.
- ¹⁴² Oceans 5 (2023) Our Approach.
- ¹⁴³ BSI, see note 85.
- ¹⁴⁴ Szylarski, L. (2022) Introducing the Marine Natural Capital and Ecosystem Assessment Programme (mNCEA)
- ¹⁴⁵ Defra (2022) Policy Paper: Natural Capital and Ecosystem Assessment Programme.
- ¹⁴⁶ Estuarine & Coastal Sciences Association, see note 86.
- ¹⁴⁷ Blue Carbon Evidence Partnership, see note 41.
- ¹⁴⁸ Scottish Blue Carbon forum (2023) Projects: Blue Carbon Projects.
- ¹⁴⁹ UK Blue Carbon Forum (2023) Ensuring the Ocean is at the Heart of Addressing the Climate Crisis.
- ¹⁵⁰ Patterson, E. (2022) Study to Reveal Carbon Stored in UK Seas
- ¹⁵¹ Dynamic Coast (2023) Research Summary.
- ¹⁵² JNCC (2023) LIFE Recreation ReMEDIES.
- ¹⁵³ Marine Climate Change Impacts Partnership (2023) About MCCIP
- ¹⁵⁴ Sustainable Management of UK Marine Resources (2023) UKRI Fund.
- ¹⁵⁵ Blue Marine Foundation (2023) Our Projects: Solent Seascape Project.
- ¹⁵⁶ Sussex Wildlife Trust (2023) Sussex Kelp: Sussex Kelp Recovery Project.
- ¹⁵⁷ Swansea University (2023) The UK’s Biggest Seagrass Restoration Project.
- ¹⁵⁸ The Wallacea Trust (2023) Developing a Biodiversity Credit.
- ¹⁵⁹ Plan Vivo (2023) PV Nature Plan Vivo Biodiversity Standard: Pilot Project Summaries.
- ¹⁶⁰ GreenCollar (2023) Reef Credits: A Win for Farmers and for the Great Barrier Reef.
- ¹⁶¹ GreenCollar (2021) Over 18,000 Reef Credits Sold.

- ¹⁶² Secretariat of the Pacific Regional Environment Programme (2022) Niue Touts Ocean Conservation Credit As Innovative Climate Change Solution At COP27.
- ¹⁶³ Niue Ocean Wide (2022) Overview of Ocean Conservation Commitment.
- ¹⁶⁴ Rossberg, A. G. (2022) Quantifying Biodiversity Impact: Relations Amongst Local and Global Metrics, Why They Matter, and How to Offset Impacts.
- ¹⁶⁵ Verra (2010) Sustainable Development Verified Impact Standard: Methodology for Coastal Resilience Benefits from Restoration and Protection of Tidal Wetlands.
- ¹⁶⁶ Verra, see note 165.
- ¹⁶⁷ Open Earth (2022) Marine Ecosystem Credits: Advanced Credit Class Design to Scale Ocean Conservation Finance.
- ¹⁶⁸ Planblue (2023) Our Data Products.
- ¹⁶⁹ Hortimare (2023) Our Services.
- ¹⁷⁰ Woods Hole Oceanographic Institution (2022) Woods Hole Oceanographic Institution receives Seagrass Innovation Awards.
- ¹⁷¹ Lewis, N. (2022) An Indian Startup Could Revolutionize Ocean Farming with its 'Sea Combine Harvester'.
- ¹⁷² Kuva Space (2023) Cutting-Edge Space Technology and AI: The World's Most Extensive Hyperspectral Satellite Constellation and Advanced AI-Based Analytics.
- ¹⁷³ Echo View (2023) Products and Services: Echoview: Sound Knowledge.
- ¹⁷⁴ Blue Marine Foundation (2023) Innovative Technology in Blue Natural Capital Projects.
- ¹⁷⁵ Nature Metrics (2023) Products: NatureID.
- ¹⁷⁶ Seaforester (2023) Our Solution to Restore the Forgotten Forests.
- ¹⁷⁷ Kelp Blue Biotche (2023) Products.
- ¹⁷⁸ Blue Earth Bathymetry (2023) Generalised GEBCO Data for Seafloor Mapping.
- ¹⁷⁹ Temple, J. (2022) Inside Alphabet X's New Effort to Combat Climate Change with Seagrass.
- ¹⁸⁰ Tuggle, H. (2022) How Beneath The Waves Partnered with Hexagon to Promote Ocean Conservation with LiDAR Scanning.
- ¹⁸¹ Plants Beyond Land (2023) Cultivation.
- ¹⁸² Biome Algae (2023) Bio-Refinery.
- ¹⁸³ Howell Marine Consulting (2021) Offshore Wind Enabling Actions Programme – UK Marine Policy & Legislation Review for Implementing Marine Net Gain.
- ¹⁸⁴ HM Government, Northern Ireland Executive, Scottish Government, Welsh Assembly Government (2011) UK Marine Policy Statement.
- ¹⁸⁵ Howell Marine Consulting, see note 183.
- ¹⁸⁶ Defra (2019) Marine Strategy Part One: UK Updated Assessment and Good Environmental Status.
- ¹⁸⁷ UK Parliament (2020) Fisheries Act 2020.
- ¹⁸⁸ Defra (2023) Environmental Improvement Plan 2023: First Revision of the 25 Year Environment Plan.
- ¹⁸⁹ Defra (2022) New Legally Binding Environment Targets Set Out.
- ¹⁹⁰ Defra & BEIS (2023) Energy Security Bill Factsheet: Offshore Wind Environmental Improvement Package.
- ¹⁹¹ Defra, see note 34.
- ¹⁹² BSI, see note 85.
- ¹⁹³ UK Blue Carbon Evidence Partnership, see note 41.
- ¹⁹⁴ HM Government (2023) Mobilising Green Investment: 2023 Green Finance Strategy.
- ¹⁹⁵ CCC (2022) Letter: Development of the UK Emissions Trading Scheme (UK ETS).
- ¹⁹⁶ Defra, see note 34.
- ¹⁹⁷ Defra, see note 188.
- ¹⁹⁸ Defra, see note 34.
- ¹⁹⁹ Local Government Association Planning Advisory Services (2023) Nutrient Neutrality FAQs.
- ²⁰⁰ Defra (2022) Policy Paper: Natural Capital and Ecosystem Assessment Programme.
- ²⁰¹ DAERA (2019) Northern Ireland Climate Change Adaptation Programme 2019-2024.
- ²⁰² DAERA (2021) Draft Environment Strategy for Northern Ireland.
- ²⁰³ DAERA (2018) Draft Marine Plan for Northern Ireland.
- ²⁰⁴ DAERA (2021) Consultation on the Draft Green Growth Strategy for Northern Ireland.
- ²⁰⁵ Ulster Wildlife (2021) Blue Carbon Restoration in Northern Ireland – Feasibility Study.
- ²⁰⁶ DAERA (2023) Maritime and Fisheries Fund (NI) 2022-2023.
- ²⁰⁷ Scottish Government (2022) Biodiversity Strategy to 2045: Tackling the Nature Emergency.
- ²⁰⁸ Scottish Government, see note 207.
- ²⁰⁹ Scottish Government, see note 207.
- ²¹⁰ Marine Scotland (2022) Delivering Scotland's Blue Economy Approach.
- ²¹¹ Scottish Government, see note 207.
- ²¹² Scottish Government (2022) Scotland's National Strategy for Economic Transformation.
- ²¹³ Scottish Government, see note 98.
- ²¹⁴ Scottish Government, see note 207.

- ²¹⁵ Scottish Government, see note 207.
- ²¹⁶ Marine Scotland, see note 84.
- ²¹⁷ Marine Scotland, see note 210.
- ²¹⁸ Scottish Government (2021) National Marine Plan Review 2021: Three Year Report on the Effectiveness of Scotland’s National Marine Plan.
- ²¹⁹ Scottish Parliament (2020) Development and Implementation of Regional Marine Plans in Scotland: Final Report.
- ²²⁰ Scottish Forum on Natural Capital (2023) Business in the Blue Economy Conference Summary.
- ²²¹ Marine Scotland (2020) Delivering Scotland’s Blue Economy Approach.
- ²²² Marine Scotland, see note 210.
- ²²³ Marine Scotland, see note 210.
- ²²⁴ Scottish Government (2020) Offshore Wind Policy Statement.
- ²²⁵ Scottish Government (2023) Draft Energy Strategy and Just Transition Plan.
- ²²⁶ Marine Scotland (2022) Delivering Scotland’s Blue Economy Approach & Marine Scotland (2023) Scotland’s Blue Economy: Review of Current Status.
- ²²⁷ Marine Scotland (2022) Strategy for Seafood: Domestic and International Trade and the Supply Chain.
- ²²⁸ Marine Scotland (2022) Seaweed Review Statement.
- ²²⁹ Welsh Government (2019) Welsh National Marine Plan.
- ²³⁰ Welsh Government (2018) Marine Protected Area Network Management Framework for Wales.
- ²³¹ Natural Resources Wales (2022) The Blue Carbon Potential of the Marine Protected Area Network in the Welsh Marine Environment.
- ²³² Welsh Government (2019) Prosperity for All: A Low Carbon Wales.
- ²³³ ABPmer (2020) Mitigation and Compensation Opportunity in Marine Consenting.