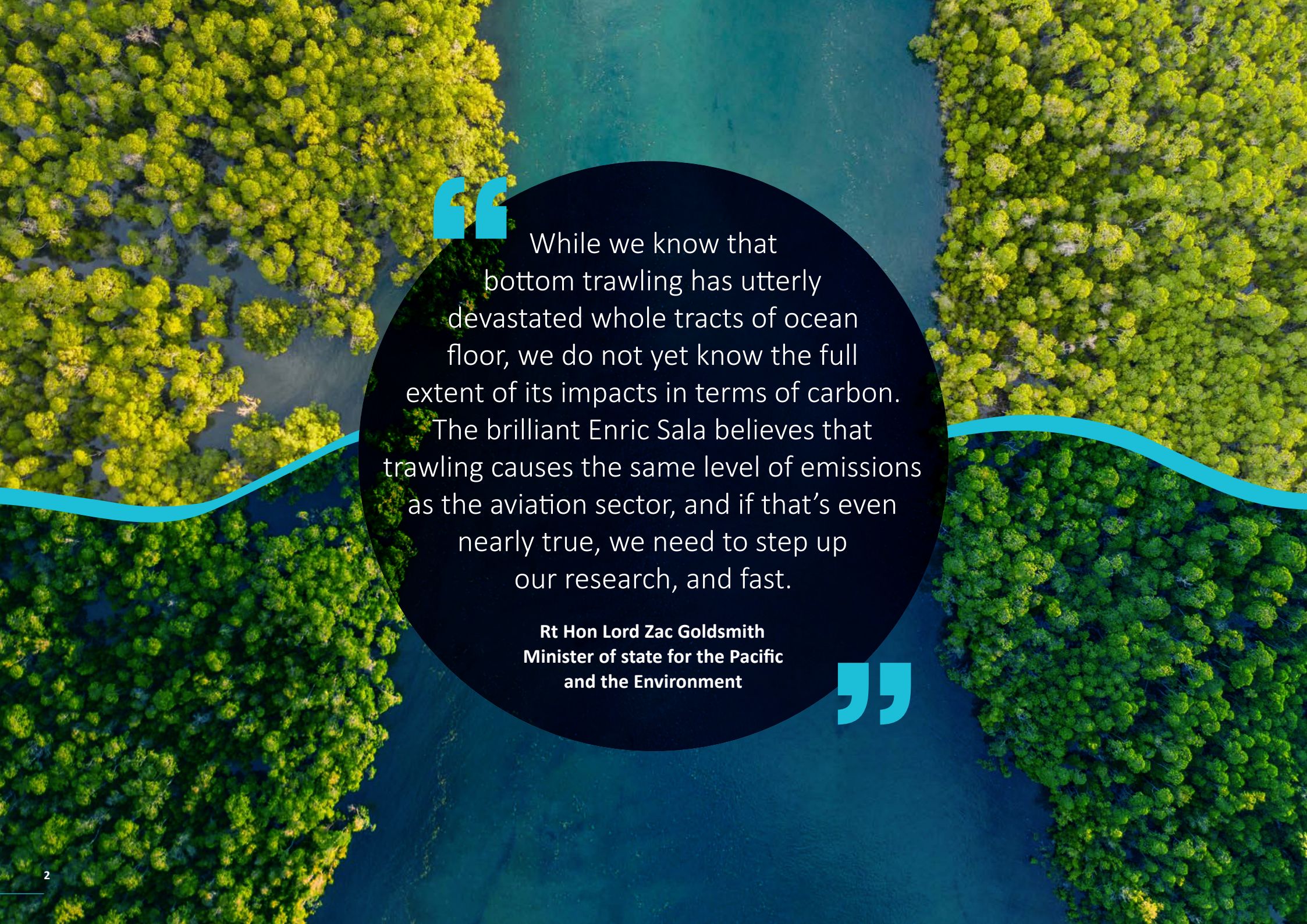
BLUE MARINE FOUNDATION

BLUE CARBON

A NEW FRONTIER FOR CONSERVATION?

CONFERENCE REPORT

JULY 2021



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>
> **Rt Hon Lord Zac Goldsmith**
> **Minister of state for the Pacific and the Environment**

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> As a woman from a coastal village in Madagascar, I have one closing message. It is imperative that negotiations at COP26... keep coastal communities in mind.
>
> **Lalao Aigrette, Blue Ventures**

EXECUTIVE SUMMARY

Dan Crockett, Development Director, BLUE

The emerging topic of blue carbon could play a huge role in the future protection and restoration of the ocean. Blue Marine Foundation (BLUE) has developed a blue carbon programme with several workstreams. We are seeking to quantify the carbon sequestration and storage potential in a number of our projects in partnership with the University of Exeter. We are funding carbon mapping and seeking to better understand the impacts of mobile contact bottom fishing on carbon stocks and the carbon cycle. For nine months, we have conducted a discovery phase to explore the potential for a large investment in blue carbon projects, on behalf of a corporate partner. We are closely involved in answering key scientific questions, removing the barriers to blue carbon projects and actively channelling investment into the right kind of projects.

These rich seams of work have enabled us to reach out to many different experts within the blue carbon community. We have assembled an advisory group including Blue Ventures, Conservation International, IUCN, UNEP, and members of the BNCFF and the BCI. This includes leading blue carbon scientists such as Professor Carlos Duarte, Dr Dan Friess, Dr Enric Sala and Professor Hilary Kennedy.

This wealth of knowledge has played a key role in the evolution of our own strategy and tactical approach to blue carbon. Increasingly we have seen the need to draw together the many emerging conversations grouped under this banner. This one-day conference, which we believe was the first in England specifically on this topic, aimed to unite the community and share evidence and ambition ahead of COP26.

We were grateful to be joined by blue carbon leaders from around the world. Lalao Aigrette of Blue Ventures emphasised the need for blue carbon projects to place community ownership and engagement at their heart. Monitoring and reporting on the impacts of blue carbon projects can help to unlock access to climate mitigation finance - providing a solid, measurable basis for investment. Ms Aigrette concluded by highlighting the importance of nature-based solutions within efforts to improve gender equality. In many areas, mangroves also provide the means for small-scale fishing without the need for vessels or expensive equipment. *"As a woman from a coastal village in Madagascar, I have one closing message,"* Lalao concluded. *"It is imperative that negotiations at COP26… keep coastal communities in mind."*

Several key themes can be identified from the day; Lord Goldsmith highlighted just how severe an impact trawling and dredging may have in terms of carbon emissions, pointing to a *Nature* paper by Dr Enric Sala that drew a global comparison with the aviation industry; Lord Goldsmith stressed that further research must be a priority; Dr Sala (Pristine Seas) joined the conference later to highlight his work, concluding that: *"we can see a future, hopefully not too far, where reducing bottom trawling effort and protecting carbon-rich areas is not only going to reduce a significant source of greenhouse gas emissions, but is also going to help finance these local conservation projects."* Moving our concept of blue carbon beyond the 'traditional' blue carbon ecosystems of mangroves, seagrass, and saltmarsh requires substantial scientific evidence; Renowned carbon market expert Dr Steve Crooks (Silvestrum) announced the launch of a Verra working group focused on this opportunity; The need to better understand the role of the

seabed, and human impact on its processes, is now a key scientific question of our time; The United Nations Decade of Ocean Science should recognise this.

But do we have a decade? Can we wait for the UNFCCC process to properly recognise blue carbon habitats, amid a backdrop of massive global declines in mangroves, seagrass, and saltmarsh? Our UK Nationally Determined Contribution includes the Intergovernmental Panel on Climate Change guidance for coastal wetlands, but leans on existing policy instruments to deliver proper protection of blue carbon habitats. Current UK government targets are for our protected areas to be in favourable condition by 2043. Where is the ambition here? The rapid application of emerging blue carbon evidence to existing policy mechanisms – better protection of these habitats that offer us so much – must be a priority. Meanwhile, our sixth carbon budget pays almost no attention to the role of the ocean in mitigating and adapting to climate change; the ocean isn't even in our GHG inventory.

Another major theme highlighted during the day was the need for better coordination between blue carbon stakeholders – scientists, government agencies and NGOs. The development of a UK blue carbon forum to bring together all parties was identified as a key tool to achieve this. The need for cohesion is also played out in international fora. One of the conclusions made by BLUE's Executive Director Charles Clover, is that the great conventions to manage our climate and biodiversity are siloed and scarcely seem to be talking to each other. This must change. Dorothée Herr of IUCN reiterated that countries must be encouraged, through international pressure and support, to make coastal ecosystems high priorities in their NDCs for both blue carbon and the other benefits they provide; this sends important signals to the private sector for where investment can and should go.

An expert on Nationally Determined Contributions, Tom Hickey of Pew, pointed out the extraordinary value of blue carbon coastal wetland systems to sequester and store carbon, improve biodiversity, and adapt to the effects of climate change. The co-benefits of blue carbon are truly extraordinary, and this was emphasised by rapid-fire speakers on each habitat type. These speakers were introduced by Professor Callum Roberts who noted the relevance of shifting baselines to blue carbon. Stefanie Simpson of The Nature Conservancy pointed out the ability of resilience credits that stack the role of blue carbon and coastal resilience offered by blue carbon habitats, attracting a premium price. The need to make co-benefits granular and measurable is key. Dr James Kairo of KMFRE provided an example of how the Mikoko Pamoja project fulfils many UN Sustainable Development Goals through financially supporting communities, funding education, providing water, sequestering carbon, restoring mangrove ecosystems, and creating partnerships with international institutions. *"Mikoko Pamoja is a very good example of a 'triple-win' project,"* James concluded, *"a win for climate, a win for community, and a win for biodiversity."*

Discussion about a voluntary blue carbon market occurred throughout the day; BLUE's perspective is that a voluntary market for blue carbon must be underpinned by rigorous scientific evidence, just as it must be transparent and equitable. One of the key conclusions of the event, emphasised by leading blue carbon specialist Jennifer Howard at Conservation International, is that credits delivered to the blue carbon market must be of the highest possible quality; anything else is a huge risk. John Vermilye of Fair Carbon also advocated for better cohesion between financiers and project developers. Fair Carbon has many smart solutions to expedite this change, while making blue carbon projects more cost-effective for local communities. James Mansfield in turn presented the ideas that came from BLUE's commissioning of Finance Earth to frame a concept for an accelerator fund to bring much-needed finance, (and the right kind of finance) to these initiatives. BLUE is also looking at the evolution of a domestic voluntary blue carbon market and the necessary standards to allow this to happen.

Leading blue carbon scientist Professor Carlos Duarte highlighted the phenomenal potential of blue carbon habitats; *"Collectively,"* he said, *"we might be looking at 15% of [target] greenhouse gas removal by activating all these blue carbon strategies."* Ocean economist Torsten Thiele pointed out the need for broad stakeholder involvement in these emerging asset classes. Professor Dan Laffoley, IUCN, highlighted the need for ambition, urgency and joined-up policy to support this transition.

BLUE would like to thank all speakers, panel hosts Elsa Palanza and James Cameron, breakout chairs and audience participants. We would also like to thank the Calouste Gulbenkian Foundation for sponsoring the event and Mindfully Wired for technical delivery of the day. Our goal with this conference was to bring together a mix of stakeholders from local communities, research institutions, businesses, civil servants, and politicians. We hope that the ambition of this broad community carries through to CBD COP15, UNFCCC COP26, and beyond into this all-important decade. We were delighted to host the day and hope that you enjoy reading some of the key conclusions in the following report. We look forward to a bright future for blue carbon and a prominent role for the ocean in international climate and biodiversity negotiations moving forward.

INTRODUCTION

Marine and coastal ecosystems are believed to have great potential for carbon sequestration, a fact that is garnering attention around the world as public and private organisations seek effective ways to mitigate climate change. However, ecosystems have to be intact and thriving to reach this potential. Currently, many marine ecosystems are degraded or under threat.

'Blue carbon' is a term used to describe the carbon sequestered within these ecosystems. Quantifying this blue carbon, and making efforts to integrate it within carbon markets (attaching a monetary value to it), can help fulfil nations' and private organisations' climate commitments. This monetisation also represents an investment opportunity. Already, projects around the world are accessing significant funds to conserve or restore coastal and marine ecosystems, often with the intention that funders will see returns on their investments through the creation of 'carbon credits' that can be traded on the carbon market.

Nature-based solutions to mitigating climate change can also bring much wider benefits: for biodiversity, for local communities, and for resilience. This is achieved through the provision of ecosystem services, such as flood defence, opportunities for tourism, or habitats for fish nurseries. Through these co-benefits, blue carbon projects based on nature-based solutions represent 'win-win' scenarios, but challenges and knowledge gaps remain in how best to bring these projects to the scale needed for effective climate mitigation. Connecting with carbon markets and the wider worlds of finance and policy are key challenges for blue carbon initiatives.

To explore the potential for blue carbon, and to address any barriers to progress, BLUE Marine Conference convened an international, digital conference on June 9th 2021.

The conference sought to answer four key questions:

1. Can the ocean make a greater contribution to mitigating climate change than previously thought?

2. Where can significant progress be made in the short term regarding the effecting of nature-based solutions?

3. Are there overlaps between habitats being conserved to protect marine biodiversity, and habitats that have significant carbon sequestration potential?

4. Is there a credible way of selling carbon credits to industry and other stakeholders?

The conference occurred online, attracting over 750 attendees, who heard from a wide range of expert speakers from all over the world. Presentations and videos were followed by a series of breakout sessions, for further discussion of the issues at hand.

SESSION 1

BLUE CARBON VISION

Why ocean action is climate action

Minister of State for the Pacific and the Environment, the Rt Hon Lord Zac Goldsmith

International Environment Minister Lord Goldsmith spoke of the UK's progress in protecting the ocean, and the need for further action across the world.

Lord Goldsmith emphasised the importance of the ocean for human life, highlighting that over 1 billion people depend directly on it for sustenance, and that it has absorbed over 30% of the carbon dioxide emitted by humans to date. Despite this, the ocean is under grave threat and ocean ecosystems have seen significant decline within recent decades.

"While we know that bottom trawling has utterly devastated whole tracts of ocean floor, we do not yet know the full extent of its impacts in terms of carbon," said Lord Goldsmith. *"The brilliant Enric Sala believes that trawling causes the same level of emissions as the aviation sector, and if that's even nearly true, we need to step up our research, and fast."* He said he was delighted that the UK's Centre for Environment, Fisheries and Aquaculture Science (Cefas) are publishing a new report on blue carbon, and that the G7 group of nations have committed to supporting the UN Decade of Ocean Science for Sustainable Development.

He added that commitments at COP26 to fulfil the Paris Agreement would be crucial to sufficiently protect the ocean, underscoring that none of the UN's 17 Sustainable Development Goals could be realised without the protection and restoration of nature. Despite the high efficacy of nature-based solutions, nature receives less than 3% of climate finance, and the ocean less than 1%.

"As President of COP and G7 this year, we are putting nature at the heart of our response to climate change," said Lord Goldsmith. From a climate finance fund of £11.6 billion, the UK has committed at least £3 billion to nature-based solutions. Lord Goldsmith also announced the imminent launch of a new £500 million Blue Planet Fund by the UK, to support some of the world's most fragile marine and coastal environments, and the communities that depend upon them. This will build upon the Blue Belt Programme, which protects an area larger than India. The UK is co-leading the Global Ocean Alliance 30by30, to which all the G7 members have now committed, which aims to protect at least 30% of the global ocean by 2030. The UK is also pushing for international mechanisms to protect the high seas.

"At this point, no government can honestly claim to be doing enough," said Lord Goldsmith. *"The gap between where we are now and where we need to be is vast. Closing it is the defining challenge of our age."* He concluded by emphasising the need to properly value ecosystems and attach a cost to damaging them, and asserting that all the necessary tools for action are in place; all that is needed is the political will.

Launching the largest blue carbon restoration project in history

Chief Minister Syed Murad Ali Shah, Sindh Government

Syed Murad Ali Shah, Chief Minister of Sindh, described the Sindh Government's commitments to combating climate change and its pioneering work to conserve and restore mangroves in the Indus Delta, with the aim to support biodiversity, local communities, and carbon sequestration.

Minister Shah said the Sindh region's growing population, alongside the effects of climate change, imperilled its mangrove forests. *"The protection, restoration, and sustainable management of this delicate ecosystem is an environmental emergency and a priority for the Government of Sindh."*

In 2015, the Sindh Government entered a public-private partnership with Indus Capital, to implement the Delta Blue Carbon Project - the largest nature-based solution of its kind in the world. Through methods led by science, economics, and best industry practice, 80,000 hectares of mangroves have already been restored and local communities have been effectively engaged. Minister Shah emphasised the untapped potential of nature-based solutions for climate adaptation and sustainable development, and highlighted the crucial role of industry within this.

The pioneering initiative incorporates projected future changes, such as rises in sea level and temperature, which have implications for land use. He also advocated for nature-based solutions to be recognised as part of nations' Nationally Determined Contributions (NDCs) to fulfill the Paris Agreement, so they are properly valued. *"I am confident that the project will become an iconic symbol and prototype for sustainable development in other parts of the world,"* he concluded.

> Collectively, we might be looking at 15% of [target] greenhouse gas removal by activating all these blue carbon strategies.
>
> **Professor Carlos Duarte, Kaust University**

The future of blue carbon science

Professor Carlos Duarte, Kaust University

Professor Carlos Duarte, Distinguished Professor at Kaust University and Tarek Ahmed Juffali Research Chair in Red Sea Ecology, focused on a number of practical avenues for increasing blue carbon capacity into the future, using nature-based solutions to "*de-carbonise the atmosphere to re-carbonise the biosphere*".

Professor Duarte introduced mangroves, saltmarshes, and seagrass meadows (collectively referred to as angiosperm-dominated marine habitats) as responsible for 50% of organic carbon burial in marine sediments, holding carbon stocks 50-100 times larger than forests. He advocated for strategies that conserved and restored these ecosystems. *"We estimate that the contribution of these blue carbon strategies to climate action probably would amount to about 3% of the emission reductions needed to be able to meet our climate goals under the Paris Agreement,"* he said.

Seaweed is often not fully considered in blue carbon discussions, despite its great potential. Professor Duarte's team have created a global network of seaweed farms to calculate estimates for carbon sequestration. Around half of the seaweed that grows on these farms becomes detached and drifts away before harvesting, and some of this later acts as a carbon sink on the seafloor. They found that this industry had significant potential to contribute to global climate mitigation through sequestration, with one estimate of industry growth predicting removal of 0.3Gt of carbon per year by 2050.

Other under-researched areas include the role of different sand types, with carbonate sands under blue carbon habitats providing an extra, inorganic route for sequestration. In the Red Sea, Professor Duarte's team found that mangrove ecosystems with this sand can sequester 23 times more carbon than through organic sediment burial alone. He also described how whales and other large marine animals can act as biological pumps, transporting carbon from surface waters (e.g. by eating krill and fish) to bottom sediments (when they die or defecate). Offshore shelf sediments were introduced as a final possible route for blue carbon, which are currently not protected by international agreements, but may see boosts to their carbon sequestration capacities such as through regulating seafloor-disturbing activities like trawling.

Professor Duarte concluded by describing the blue carbon potential of mangroves, saltmarshes, and seagrass as 'market ready' - in other words, ready for significant efforts to restore or conserve these ecosystems - whereas further research is needed for the other sequestration methods described to assess their effectiveness and viability. *"Collectively, we might be looking at 15% of [target] greenhouse gas removal by activating all these blue carbon strategies,"* he concluded.

Blue carbon, co-benefits and local communities

Lalao Aigrette, Blue Ventures

Lalao Aigrette, Blue Ventures' National Technical Advisor for Mangroves in Madagascar, described how community-led action in the Tahiry Honko project is boosting sequestration and local resilience to climate change.

Ms Aigrette described how mangroves and other blue carbon ecosystems are a cornerstone of climate adaptation for over 200m people, not just for small island states or lower-income countries, but also for higher-income countries. *"It is estimated that the livelihoods of over 4 million small-scale fishers are heavily dependent on mangroves,"* she said. Despite mangroves' value as fish nurseries and the provision of many other ecosystem services, destruction of mangroves (to provide timber or space for agriculture) is often the only source of reliable income available for many in lower-income nations.

She emphasised the need to transition to sustainable practices, to benefit not just ecosystems but the communities that depend upon them, adding that blue carbon projects can support this change if they place community ownership and engagement at their centre. Monitoring and reporting on the impacts of blue carbon projects can help to unlock access to climate mitigation finance - providing a solid, measurable basis for investment.

In southwestern Madagascar, the Tahiry Honko project in the Velondriake Locally Managed Marine Area (LMMA) is the largest community-led mangrove carbon project in the world. Ten villages have come together to manage 1,300 hectares of intact and degraded mangroves, to understand what leads to mangrove loss and to create solutions to address these issues.

In 2019 the Plan Vivo Carbon Standard approved the project, allowing the carbon offsets generated by the project to be sold on the carbon market. The resulting funds are divided between the villages involved to support education and healthcare, the government that supports the project, and the organisation responsible for managing the project's marine area. *"Mangroves do not exist in isolation,"* she said. *"If coastal communities are to be resilient in the face of the climate emergency, integrated marine management is essential."*

Ms Aigrette concluded by highlighting the importance of nature-based solutions within efforts to improve gender equality. In many areas, mangroves provide the means for small-scale fishing without the need for vessels or expensive equipment. This role is often traditionally filled by women, highlighting mangroves' value for providing accessible food and a reliable income for women in local communities. *"As a woman from a coastal village in Madagascar, I have one closing message,"* she said. *"It is imperative that negotiations at COP26… keep coastal communities in mind."*

Blue carbon in political practice

Dorothée Herr, IUCN - Blue carbon in political practice

Dorothée Herr, Manager of Ocean and Climate Change at the IUCN, set out the policy context within which blue carbon projects sit, and discussed the related activities of the UNFCCC.

Ms Herr described the evolution of the blue carbon concept in international policy, from the 1992 UNFCCC agreement in which the key components for blue carbon action were enshrined, to the increasing recognition of blue carbon in the 2016 Paris Agreement and associated Nationally Determined Contribution reports (NDCs).

Ms Herr emphasised two points; firstly, that blue carbon can play a role at a national level in greenhouse gas accounting; and secondly, that nature-based solutions must be just one of a range of actions, stating that: *"they are not a substitute, by all means, for taking increased action in other areas - like renewable energy, energy efficiency, transportation – to get us away from fossil fuels."* In contributing to both national greenhouse gas accounting and climate change mitigation, investment in marine and coastal nature-based solutions presents a win-win solution for coastal communities.

Ms Herr stated that there is now *"action on all fronts":* highlighting that in addition to coalitions such as the Blue Carbon Initiative, there is increased interest from governments - including the International Partnership for Blue Carbon, run by the Australian government and currently governed by IOC-UNESCO. Both the Blue Carbon Initiative and the IUCN support countries to include marine nature-based solutions and blue carbon in their NDCs.

The UNFCCC 'ambition cycle' requires that nations update their NDCs every five years, which then feed into a 'Global Stocktake' in order to review progress made. Ms Herr encouraged attendees to review the recommendations of the IUCN report, to ensure the appropriate inclusion of blue carbon. In the first round of NDCs – submitted in 2015 and 2016 – coastal wetlands were referenced by 28 counties in terms of mitigation, and by 59 countries in terms of adaptation. With the second round currently underway, there are encouraging signs of further progress, such as the updated NDCs of Chile including MPAs, and Kenya proposing to conduct a blue carbon readiness assessment, integrate nature-based solutions, and deliver a mangrove management programme. Ms Herr emphasised that international agreements such as the UNFCCC *"should not act in silos. We all understand these linkages - not just to SDGs, but also with the Biodiversity Convention - and having this underscored is highly encouraging."*

Ms Herr highlighted the financial challenges of implementing nature-based solutions and the role which NDCs can play in overcoming these challenges. Countries must be encouraged, through international pressure and support, to make coastal ecosystems high priorities in their NDCs for both blue carbon and the other benefits they provide; this sends important signals to the private sector for where investment can and should go.

In conclusion, Ms Herr emphasised that the engagement of both coastal communities and broader politics is vital for the success and growth of blue carbon projects, both to create successful case studies or blueprints to inform policy, but also to bring new channels of finance for blue carbon solutions.

The climate opportunities of protecting the seabed

Dr Enric Sala, National Geographic Pristine Seas

Dr Enric Sala is a National Geographic explorer-in-residence and founder of the Pristine Seas project, which is working with communities and governments to create MPAs around the world.

In 2008, the Pristine Seas project was born when Dr Sala assembled a team of economists and scientists to design a new framework in order to identify hotspots in the ocean that, if protected, would serve to protect marine biodiversity, increase the marine food supply, and to mitigate climate change.

The project found that for non-coastal marine ecosystems there is little or no data on sequestration rates, and therefore no way of calculating the additional sequestration value of protecting those areas. When producing a map of carbon stocks in the ocean, starting with the seafloor, the team found that the top one metre of sediment on the seafloor holds twice the carbon of all soil on land – far more than they had expected. However, this carbon is at risk of being released through disturbances of the seafloor, such as through bottom trawling or deep-sea mining.

Using data from Global Fishing Watch to map the tracks of individual trawlers, the team found that on average, bottom trawling releases one gigaton of carbon dioxide globally every year, "*larger than the emissions of aviation, globally.*" The team also found that carbon emissions varied depending on the area being trawled, with areas which have been trawled for at least nine years producing 60% of the carbon emissions of virgin seabed.

Dr Sala explained that Pristine Seas are now working to develop and verify their methodology so it can be used for conservation projects, concluding: *"we can see a future, hopefully not too far, where reducing bottom trawling effort and protecting carbon-rich areas is not only going to reduce a significant source of greenhouse gas emissions, but is also going to help finance these local conservation projects."*

QUESTIONS & ANSWERS

CHAIRED BY JAMES CAMERON, POLLINATION

Q How can lessons from the past help us improve efforts into the future?

A **Lalao Aigrette** said that involvement of the local community was essential for the success of nature-based solutions, including good local governance and secure tenure rights for that community - providing local actors with a long-term stake in the protection of blue carbon ecosystems.

A **Carlos Duarte** said there is a need to activate both verification and scale. Private sector willingness to invest and engage is increasing, but this brings the risk that actors may 'cut corners' to access such investment. Verification is therefore key so that there is no reputational impact on 'real' blue carbon projects. He said that scaling-up has been done in the past, such as the restoration of 200km² of mangrove in Vietnam, which established the benefits of such projects, but there is a need to match the opportunities on the ground with investments and accelerate projects.

Q How do we resolve the tensions between integrity and scale?

A **Dorothée Herr** said that standards and accounting are necessary for confidence in blue carbon crediting, even though they can be costly and time-consuming. On the other hand, demonstrably viable projects are intrinsically more investable, and funders can be willing to pay a premium if co-benefits (such as to local communities and ecosystem services) are clear.

Q What is ready for investment now?

A **Dorothée Herr** said there is a trade-off between building comprehensive scientific knowledge and beginning serious investment in any potential blue carbon system. The process of inclusion of new areas within international criteria, such as via the UN's NDCs, can be very slow.

Q What considerations should the British government make for their NDC, and how should blue carbon be built into it?

A **Dorothée Herr** said the UK government should include quantified targets in the mitigation section of their NDC, which is expected from developed countries given they have sufficient scientific information. She said they should outline programmes for implementation over time, bearing in mind some aspects (such as impacts of bottom trawling) are not ready for full quantification. In terms of adaptations, there are a lot of opportunities to highlight restoration, such as through demonstrating synergies between the SDGs and NDCs.

Q How can the co-benefits of blue carbon ecosystems be integrated into carbon finance?

A **Carlos Duarte** mentioned the significant savings possible for the insurance sector, given coastal ecosystems' role in protection of property and infrastructure from floods and sea level rise. The insurance sector could become the main stakeholder, but there is a need to quantify these benefits of coastal protection to obtain their buy-in.

Q Could collaboration between the two COPs (climate and biodiversity) aid the blue carbon movement?

A **Dorothée Herr** said that this bridge exists at the project level, but is lacking at the international level. For individual countries, working on indicators of progress besides carbon dioxide - such as adaptation metrics - could help facilitate this bridge and ensure progress contributes to international targets. The degree to which projects can fulfil this depends on developers' capacity.

Q How can we address the time-lag between investment and return?

A **Lalao Aigrette** emphasised the importance of involving communities to ensure local buy-in. This involvement can also reduce the cost of project activities through voluntary efforts.

A **Dorothée Herr** recommended that projects include diverse revenue sources, such as tourism and sustainable aquaculture, to reduce risk and maximise return on investment. She said that some investors are willing to take the risk and wait for several decades for a return on investment; and even if the carbon credits are not realised, will still be content with a good conservation project. Nature-based solutions are also increasingly being linked to green infrastructure, which offers a different opportunity for revenue creation.

“Mikoko Pamoja is a very good example of a ‘triple-win’ project – a win for climate, a win for community, and a win for biodiversity.”

Dr James Kairo, Kenya Marine and fisheries Research Institute

SESSION 2

THE OPPORTUNITIES AND CHALLENGES OF BLUE CARBON

Sustaining community momentum in blue carbon projects

Dr James Kairo, Kenya Marine and Fisheries Research Institute

Dr Kairo, of the Kenya Marine and Fisheries Research Institute's Blue Carbon Unit, introduced Mikoko Pamoja, Kenya's first community-led blue carbon project, which aims to restore and protect mangroves through the production and sale of carbon credits.

Consultation began in 2009, and the project has passed many milestones since then, including approval by Plan Vivo, first sales of carbon credits, and winning the UNDP 2017 Equator Prize. The project is also expanding to include seagrasses.

The project helps fulfil a number of UN Sustainable Development Goals, through financially supporting communities, funding education, providing water, sequestering carbon, restoring mangrove ecosystems, and creating partnerships with international institutions. *"Mikoko Pamoja is a very good example of a 'triple-win' project - a win for climate, a win for community, and a win for biodiversity,"* he said.

Dr Kairo detailed the challenges that the project had encountered. A lack of clear boundaries as the forest expanded led to illegal harvesting, leading to a need to re-delineate boundaries every two years. Some goals, such as planting ambitions were not met due to deficiencies in project governance and the dynamic nature of the ecosystem. Furthermore, capacity building through training had been limited by financing and available personnel, and income diversification had been recommended, given the volatility and unreliability of the carbon market, but had not been carried out.

Going forward, Dr Kairo spoke of a number of future goals. The inclusion of seagrass within the project's remit raises potential for additional carbon credits. Support for low carbon cooking stoves, better for health and fuel efficiency, could also possibly be incorporated into the carbon market. The project team is also influencing national policy on blue carbon, through demonstrating their positive contribution towards NDCs: *"We hope by incorporating blue carbon into NDCs, the government can mobilise resources and prioritise carbon actions related to blue carbon ecosystems,"* he concluded.

The economic possibilities of blue carbon

Torsten Thiele, Global Ocean Trust

Torsten Thiele of the Global Ocean Trust outlined how blue carbon could be integrated into existing and novel economic systems.

Mr Thiele began by demonstrating that blue carbon credits can justify the cost of mitigation techniques, indicating that this value of providing mitigation means that all key blue carbon ecosystems can be economically competitive in scale and price, especially oceanic mangroves.

He highlighted a recent paper that suggests the restoration costs between different ecosystems and local sites can vary significantly, though the benefits to ecosystem services, including carbon sequestration, can justify these costs. However, there is a dilemma: though the economic benefits of protecting natural capital far exceed the cost, there remain large gaps in global biodiversity funding. There are inherent risks tied to the experience of project developers, the scale of the project, or possible pitfalls during assessment, which have led to less investment than is economically warranted.

"We need to think about blue carbon economics in a broader sense, and think about how we can scale sustainable blue carbon finance in an integrated way that takes on board innovative pathways for investment," said Mr Thiele.

He suggested moving beyond voluntary carbon credit trades to regulated markets with set price points. Value drivers for both sellers and buyers needed to be considered. The framework would expand beyond just blue carbon credits to a valuation of broader blue natural capital, a journey that would lead to a greater understanding of the underlying economics.

This would extend to integrating nature-based solutions within coastal structures and infrastructure, which should consider how ecosystems can be used to deliver resilience to infrastructure. This approach both promotes adaptation to climate change and delivers opportunities for local communities, an attractive long-term investment given the resilience it bestows through ecosystems protecting infrastructure and properties from storms and sea level rise, among other benefits.

Mr Thiele finished by spelling out his key messages. He proposed blended finance solutions to help de-risk blue carbon investments and attract a broader range of investors. He suggested robust metrics and monitoring of blue carbon stocks to create funding opportunities, and a government-supported enabling framework based on NDCs for blue finance delivery. He stated that blue carbon and blue natural capital are emerging asset classes, and engaging all stakeholders can help deliver benefits for resilience and the economy. *"That is what we describe as a just and equitable transition because a new blue carbon deal works if it has a broad base of participation and in that way is also economically sound,"* he concluded.

Lessons learned from blue carbon project development

Dr Jennifer Howard, Conservation International

Dr Jennifer Howard is the Senior Director of Conservation International's Blue Carbon Program and introduced their collaborative work with experts and partnerships, and thoughts on scaling-up blue carbon efforts.

Dr Howard introduced CI's pilot credit projects, focusing on Vida Manglar in Colombia, the first to use the Verified Carbon Standard blue carbon modules approved the previous year. The project's principal objectives are mitigation and adaptation, but expand to include effective mangrove management, promotion of sustainable development, and support of local governance and biodiversity.

Dr Howard described the project in more detail, explaining how the second phase will expand the area of mangroves within the project's remit, leading to more carbon credits. She described how despite high levels of poverty and many drivers of deforestation, the team hopes to achieve approximately 1 million tonnes of avoided emissions. However, significant funding gaps remain: *"We do think that blue carbon credit sales could cover 50-70% of this funding gap... [and] other funding streams coming from tourism and compensation from other companies doing business in Colombia would fill the rest of that gap,"* she explained.

The project is in the process of auctioning off the first tranche of credits, with more to follow. A transparent third party is responsible for a centralised fund, where all profits will be held, and distributed according to prior agreements regarding funding mangrove management, social and environmental benefits, and community participation.

Following these pilot successes, CI hopes to replicate and scale-up such efforts. This involves clear agreements on roles and objectives, partners and priorities, and processes for decision making. Projects will need to meet set standards for quality (such as VCS), and local government and community will need to be engaged ahead of time. Teams will need to include people with complementary areas of expertise, collaborating closely with partners and stakeholders. A defined communications strategy and a transparent benefit-sharing mechanism are also essentials. *"Making sure that your partnerships and the group that you've built are happy with the processes is the most important piece to ensure longevity of your project,"* she concluded.

Expanding the carbon market from landscapes to seascapes

Dr Steve Crooks, Silvestrum

Dr Steve Crooks, Silvestrum's Principal of Wetland Science and Coastal Management, spoke on the process for developing methodologies on quantifying and verifying blue carbon assets.

Dr Crooks gave some context to the history of carbon markets, beginning 30-40 years ago when the idea of including the biosphere within climate mitigation actions was first raised. In around 2000, it was assumed most sequestered carbon was held in soil, and only around 2010 did the marine environment and blue carbon begin to be seriously considered - but lacked the necessary evidence to quantify sequestration, a gap that scientists have been working to fill since.

"What do you need to connect to the carbon market?" Dr Crooks asked. *"First of all you need a recognised standard,"* such as Plan Vivo or the Verified Carbon Standard. Then, methodologies are needed to set out the procedures to follow to fulfil the standard's requirements. This can be challenging if blue carbon avenues are not currently included within standards, as can developing the necessary methodologies given investors' focus on short-term production of credits.

Dr Crooks described working with VCS a decade prior to revise the standard to include wetlands restoration and conservation. and Verra's recent work to develop two methodologies for the conservation and restoration of blue carbon. He said investors are learning to become more patient with the vision of greater long-term benefits.

"Verra and Silvestrum are partnering, along with other partners… to explore whether we can take what we've learned in terms of developing connections to the carbon market to include the broader seascape," said Dr Crooks, introducing the Seascape Partner Initiative. The initiative will set out a framework for science and communities to collaborate, with the goal of creating methodologies to enable sustainable marine management to deliver large-scale climate solutions. Ecosystems of interest to the initiative include kelp beds, wild/farmed seaweeds, seabed management, and oyster reefs. Research is needed to see whether these ecosystems can be incorporated into carbon finance and their wider impacts on the marine environment.

Resilience Credits and engaging industry with blue carbon

Stefanie Simpson, The Nature Conservancy

Stefanie Simpson, the Coastal Wetlands Program Manager for TNC Global, talked about 'resilience credits' and their potential as a 'stacked benefit' to blue carbon, the methodology for developing these credits, and the potential market interest in them.

Ms Simpson began by outlining that climate mitigation is just one of many benefits provided by coastal ecosystems. Carbon credits are not the only possible way that conservation can be financially incentivised; there is increasing interest in giving other ecosystem services an explicit financial value, such as through the creation of 'resilience credits'.

Verra's Sustainable Development Verified Impact Standard (SD VISta) programme offers the dual advantages of a flexible framework and Verra's high standards of transparency, asset accounting, and reporting. Resilience credits can respond to SDG 13.1: 'Strengthen resilience and adaptive capacity to climate related hazards and natural disasters.'

Ms Simpson went on to say that the draft coastal resilience methodology is now in the validation process under SD VISta, with approval expected before the end of the year. The aim of the project is: *"to be able to combine existing carbon offset methodologies with this new coastal resilience methodology, to generate third-party verified Blue Carbon Resilience Credits."* Sales of these credits can financially support otherwise under-funded areas of ecosystem management.

Given ecosystems provide carbon storage and climate resilience simultaneously, carbon credits and resilience credits can stack, and potentially then fetch a premium price. A small study found that the level of interest in stacked credits varies, but increases if linked to measurable co-benefits, particularly related to the SDGs.

In closing, Ms Simpson shared that TNC is planning to pilot the stacked credit methodology, once verified, in Texas, Mexico, Belize, China and New Zealand, and invited attendees to contact her with any opportunities for collaboration.

> We can see a future, hopefully not too far, where reducing bottom trawling effort and protecting carbon-rich areas is not only going to reduce a significant source of greenhouse gas emissions, but is also going to help finance these local conservation projects.
>
> **Dr Enric Sala, National Geographic Pristine Seas**

Including blue carbon in Nationally Determined Contributions

Tom Hickey, Pew

Tom Hickey, Senior Officer at Pew's Coastal Wetlands and NDCs programme, started by giving an overview of Pew Charitable Trusts' comprehensive portfolio of marine work in the policy space.

Mr Hickey stated that Pew's work supporting NDC development focuses on the three main blue carbon coastal wetland systems – mangroves, seagrass, and salt marshes – as the carbon value of these systems is measurable and is recognised by IPCC-approved methodologies, allowing countries to include related mitigation efforts within their NDCs. Given their combined carbon, ecosystem and adaptation values, focus on these ecosystems offers a "triple win". Mr Hickey stated that: *"That combination of the full suite of benefits, but also the continued threat, positions them as a very strong candidate to look at the additionality of climate policy in incentivising their protection."*

Mr Hickey shared that Pew aims to support the governments of Belize, Costa Rica, and the Seychelles to develop their NDCs by 2021. In Belize, this consists of mangrove conservation and restoration, as well as the inclusion of seagrass and coral reef ecosystems in their NDC. The focus in Costa Rica is also on mangroves, looking to expand a related Payment for Ecosystem Services model to finance protection and restoration, as well as the more general inclusion of blue carbon in their NDC. The project in the Seychelles looks at mapping seagrass, pioneering new technologies, and capacity building. All three nations have made significant commitments to conserving and restoring blue carbon ecosystems.

Pew is also involved in broader global partnerships. Working alongside the Blue Carbon Initiative, they have helped develop the guidelines for including blue carbon ecosystems in the NDCs: *"Some of the first iteration NDCs referenced the potential of blue carbon, but very few included specific policy and goals, so it's that translation of potential into action that we're focused on,"* said Mr Hickey. Pew have convened world seagrass experts to advance global understanding of seagrass coverage, and continues to be engaged in the broader oceans and climate change dialogue within the UNFCCC.

Mr Hickey concluded that *"ecosystem and adaptation values are key,"* and that while carbon benefits are critical, it is important to recognise and value the range of other benefits these ecosystems provide. He went on to state that: *"capacity building is essential to the delivery of any policy, and no more so than with long-term climate goals."* Finally, Mr Hickey stated that there is growing interest in other blue carbon ecosystems, highlighting that Pew is collaborating with the Scottish Blue Carbon Forum to hold a symposium to coincide with COP26, looking at what other marine ecosystems and protections could bring to carbon policy.

A blue carbon accelerator vehicle

James Mansfield, Finance Earth and Clare Brook, BLUE

Clare Brook, CEO of BLUE, explained that the impetus behind the Blue Carbon Accelerator vehicle was BLUE's ambition to help small and medium-scale blue carbon projects gain access to sustained funding, and to deliver carbon credits.

Operating in the field of 'patient capital', the middle-ground between philanthropy and investment, this proposed fund aims to unlock significant finance for blue carbon project development, *"mobilising not just hundreds of thousands, but tens of millions."* Ms Brook said that BLUE asked: *"Could we ensure that the fund ultimately delivered a return to the philanthropist investors, whilst still protecting biodiversity, furthering science, and putting money back into local communities?"* BLUE is working with Finance Earth to draft a framework for this fund, and shared their early thoughts to help inform similar work currently in development.

Mr Mansfield, co-founder and Managing Director of Finance Earth, began by emphasising that BLUE and Finance Earth were eager to understand people's views on how to develop a Blue Carbon Accelerator, to act as a vehicle linking the blue carbon market with impactful, small-scale community projects.

Mr Mansfield referenced the rapid growth in the carbon market and demand for carbon offsets, but also highlighted that: *"some of the most impactful and precious projects, which could benefit from the growth of this market are simply too small, or don't have the capacity or technical skillsets, to be able to access the value that this market can bring."* The Blue Carbon Accelerator aims to join the dots between those markets and community programmes.

The initial stage of this project involved a global review of blue carbon projects and opportunities, and of the barriers to instigating, scaling, and replicating successful projects. For almost 50% of the projects so far reviewed, the real barriers to deployment or scale are access to suitable funding but encouragingly, there are also a range of actors looking at how to provide funding for the creation and delivery of small-scale blue carbon projects.

Mr Mansfield then presented the four challenges identified by the global review of blue carbon projects, which the Blue Carbon Accelerator programme aims to address:

- The **complexity of cashflow** around blue carbon, given both the reliance of many projects on multiple income streams, and the significant time between initial investment and actual sale of credits.

- The **high-risk nature** of these projects, given the uncertainty of carbon pricing combined with both the complexity of calculating carbon benefits and fundamental fixed costs of projects, make it difficult to attract early-stage funding.

- **Challenges to the viability** of blue carbon projects at small scale, due to fundamental fixed costs. These costs incentivise much larger projects, though small-scale projects can be the most innovative and pioneering, so should be supported.

– The **complexity of the market infrastructure**, divergences in scientific consensus, and onerous verification and marketing processes, make it challenging to navigate. These challenges are exacerbated for under-resourced small-scale projects.

The Blue Carbon Accelerator aims to "*create the series of blended portfolios which actually helps to align and breakdown those fixed cost issues and aggregate those smaller portfolios with much larger projects, where we can share those costs and more efficiently deliver those programmes, as well as creating programmes of aligned projects that we can use as advocacy vehicles.*" Both speakers invited attendees to get involved in shaping the fund.

Scaling Blue Carbon – the obstacles and how to overcome them

John Vermilye, Fair Carbon

John Vermilye of the Gallifrey Foundation spoke about scaling up blue carbon projects, given the current supply of blue carbon credits and investment opportunities are insufficient to meet the demand from investors.

Beginning with obstacles to scaling, Mr Vermilye said that the Gallifrey Foundation's 2020 study, 'Blue Carbon – Mind the Gap', identified three main obstacles.

- **Project design** is both complex and often employs the services of external consultants, which is expensive and misses an opportunity for local capacity building.
- **Seed funding** is a particular challenge for projects which may not yield revenues for several years.
- **Validation and accreditation** are expensive and time-consuming processes using external consultants.

The study also found that the services of external intermediaries in these three areas of design, valuation, and accreditation consume 60-80% of project funding, a fact which he said is *"not efficient and not motivating."*

Mr Vermilye told the conference that the study also identified four 'pillars' which if done correctly, are the foundations of a successful project:

- The **'legal'** pillar encompasses the need to solve rights to both land tenure and carbon credits, and to avoid double counting.
- The **'management'** pillar describes the need for competent project management and also good governance, community engagement, and transparency.
- The **'financial'** pillar necessitates solving the time lag between receiving seed funding and producing revenue, but also a basic assessment of financial viability before a project begins.
- The **'scientific'** pillar involves applying the rigorous requirements of accreditation to the project itself.

To address the issues surrounding project design, validation, and accreditation, the Gallifrey Foundation has created the Fair Carbon project. *"This is independent of the Gallifrey Foundation and all the others and, while the Gallifrey Foundation is taking the lead on it right now, we expect that this will be an independent, not-for-profit, self-sustaining entity over the coming year,"* said Mr Vermilye. He went on to say that the project has already created an online platform for decision guides and the checklists needed to take a project from start to end, based on the four pillars.

The online platform will facilitate sharing best practice in project design, through online guides and decision trees. To support validation, projects are required to upload evidence at each step of development and implementation. Furthermore, remote sensing technologies enable remote assessment and evaluation. Finally, Fair Carbon is working with accreditation agencies to simplify the accreditation process and to provide step-by-step guides, including translation into local languages. The project aims to reverse the expenditure dynamic, directing 60-80% of project funding directly to the projects themselves.

Mr Vermilye concluded by saying *"The Fair Carbon project is actually revolutionary – we're changing the way the system works. We're building an infrastructure that allows all the current players to plug in and do what they do best, but making the system far more efficient and usable by the local projects. We hope you understand the importance of this - and the potential - and we hope you will join us, the Gallifrey Foundation, as co-funders as we unleash the potential of blue carbon and beyond."*

QUESTIONS & ANSWERS

FOLLOWING THE PRESENTATIONS

CHAIRED BY ELSA PALANZA, BARCLAYS

Q How do we ensure good governance for blue carbon projects, and that they are productively run?

A **Dr James Kairo** referred to Mikoko Pamoja as a prime example, principally built on science but also dependent on support from communities and government. Community input relies on bringing tangible benefits to the community. Transparency and accountability are essential.

Q Could stacked credits be diversified beyond resilience and carbon to other types of credit, for example biodiversity or fish stocks?

A **Stef Simpson** emphasised the many benefits of ecosystems beyond carbon sequestration, but noted it is difficult to quantify the financial values of these services. Pricing resilience is the next step, in line with expectations of verifiers and investors. She added that arguably, there are more benefits to preventing loss rather than restoration, but this presents additional challenges in aligning with investors' perspectives. The key is to bridge the gap between investors' expectations and what can be delivered, without losing sight of the fact that these should be providing benefits for communities.

Q Could an ocean development bank enable a global market for blue carbon?

A Torsten Thiele said that existing initiatives tend to speak in the language of small equity similar to tech start-ups. He said that speaking in the language of large infrastructure projects would be more appropriate, given that blue carbon gives medium-type, potentially stable returns, and would lead to a more long-term and patient approach to accruing natural capital that would be more approachable to many investors. He said the marine space lacks a centralised knowledge hub to facilitate this, but a new institution based on public-private partnership - such as an ocean development bank - would give a modern model to bring these components together and help integrate nature-based solutions into the infrastructure space.

A Dr Jennifer Howard agreed, and also voiced concerns about scaling given that many blue carbon projects depend on delivering community benefits at the local scale. She said care needed to be taken to ensure benefits continue to filter down to local communities. She also advocated for those involved in blue carbon projects learning the language of financiers, and vice versa, both for effective communication and collaboration and to ensure local communities can also be actively involved.

A Dr Steve Crooks added that a lack of connection between development banks and local communities has stymied investment. He added that as many development projects are in very urban areas, these could provide a useful focus. This is opposed to pristine ecosystems, where the best carbon benefits come from protection. Restoration, while a slower process, generates tangible returns compared to a baseline.

A Tom Hickey advocated for capitalising on economies of scale, such as sharing setup costs between projects or countries. From a policy perspective, he said that overlapping priorities and responsibilities from government departments can lead to a lack of confidence from financiers, given lack of clarity over who is responsible for different aspects of the project. He added that fantastic regulatory frameworks may be in place, but they need sufficient monitoring for them to be useful in practice.

A James Mansfield added that while scaling needs to happen rapidly, it comes with risks to quality. Effective governance structures are needed to ensure communities benefit and communicate these benefits to buyers and investors.

A Dr James Kairo voiced concern over the market's focus on the voluntary carbon market, which can be unreliable. Communities need guarantees of benefits, which becomes more challenging with larger projects. He said there was a need to move from potential benefits to real benefits.

SESSION 3

BUILDING AMBITION

MANGROVES

Dr Dan Friess
University of Singapore

Given their anoxic soils and high productivity, mangrove forests can sequester four times more carbon per year than equivalent land ecosystems. Mangroves are being lost at a rate of 0.1-0.2% per year, especially in Southeast Asia, and have a disproportionately large contribution to carbon emissions. Conservation projects such as in Kenya, Madagascar, and Colombia, are helping to combat this trend.

An estimated 20% of the world's mangroves are possibly able to qualify for 'avoided deforestation' blue carbon projects, around half of which could be profitable. Important opportunities also exist for restoration, with approximatively 800,000 hectares around the world suitable for restoring mangroves. Carbon returns can be higher than terrestrial projects, with opportunities for a high density of carbon credits for local communities. Care needs to be taken over planting the most appropriate species, issues of land tenure, and community involvement. Mangrove blue carbon has gained huge momentum from government and commercial stakeholders.

ZOSTERA SEAGRASS

Dr Richard Unsworth
Project Seagrass

Seagrasses are increasingly being recognised for their important role in combating climate change. *Zostera* seagrass, which grows at a medium rate, has seen significant declines in recent years. There are opportunities for restoration, and while knowledge gaps remain regarding storage and emission rates, it is likely highly comparable or possibly better than other nature-based solutions.

A more thorough understanding of carbon accumulation is needed to maximise rates of sequestration. Scalability is the next step following this: building on experience of scaling within countries such as the US, incorporating new scientific understanding, and applying across temperate seas. Regulators, funders, and stakeholders all need to be engaged.

POSIDONIA SEAGRASS

Dr Nuria Marba
Mediterranean Institute for Advanced Studies

Posidonia seagrasses, while slow-growing, can sequester fifty times more carbon than tropical forests in a given area. This carbon can be preserved for millennia. Accumulation of carbon-rich soils also helps coastlines keep pace with sea level rise, given the seabed rises at the same rate. By preventing coastal erosion, seagrasses are a highly effective coastal protection tool.

Since the end of the 19th century, *Posidonia* has experienced a 13-50% reduction around the world. Since then, policies and interventions have decelerated the rate of loss, but the species has a slow recovery rate. Seagrass remains an important tool for sequestration and delivering co-benefits, and future blue carbon projects should conserve and restore seagrass meadows.

WILD SEAWEED

Dr Dorte Krause-Jensen
Aarhus University

Seaweeds, or macroalgae, have a substantial role in carbon sequestration, as well as supporting biodiversity. Brown kelps are the most significant, occurring in all climate zones, and covering 7 million square kilometres globally. Most of their biomass is exported, and around 11% of their production ends up in sediments in the deep sea. This amounts to sequestration of around 173 teragrams of carbon annually.

Macroalgae's role in carbon sequestration remains controversial given the difficulties documenting quantifying the proportion that ends up in sediments beyond the production habitat. Nevertheless, they remain a potentially significant avenue for blue carbon sequestration.

FARMED SEAWEED

Dr Nichole Price, Bigelow Laboratory

Seaweeds have been part of humanity's food system for centuries, and given rapid growth in the sector, production is projected to exceed potatoes by 2050. They form a low-carbon ingredient and can even be part of carbon removal strategies. As they grow they shed biological matter, some of which likely gets sequestered, although quantities for each species remain little understood.

With current estimates, it is possible that current seaweed farms sequester 1.5 million tonnes of carbon annually, with a further 41 million tonnes possible each year as the industry grows. There is also the possibility of deliberately sinking farmed seaweed rather than harvesting it for blue carbon potential, but the carbon costs and ecological consequences of moving and sinking large quantities of seaweed are unknown. More research is needed to ascertain whether seaweed has more value as a harvested crop.

OYSTERS

Hannah Lee & Dr. Bill Sanderson
Heriot-Watt University

The Dornach Environmental Enhancement Project (DEEP) seeks to restore oysters to the Dornach Firth. Oysters were present there from the last glaciation to the 1800s, when they were likely fished to local extinction. Oysters have important ecosystem functions besides carbon sequestration and biodiversity value, including benefits to water quality and provision of habitat.

Oysters are filter feeders, filtering particles from the water column and depositing many on the seafloor. They enhance water clarity and also capture some carbon through shell formation. There remain knowledge gaps in quantifying oyster beds' carbon sequestration compared to carbon release (such as through respiration). Challenges include protecting habitats to ensure the carbon that is sequestered remains undisturbed. Once methodology is developed, it can be applied elsewhere in the world.

SALTMARSHES AND CO-BENEFITS

Angus Garbutt
Centre for Ecology and Hydrology

As well as defending coasts from floods and erosion, saltmarshes are also effective carbon stores, capturing carbon-rich sediments (much sourced originally from land) and storing in muddy deposits. They accumulate carbon much faster than terrestrial systems.

Creation of new marshes can enable greater long-term carbon storage. Breaching coastal defences allows tidal ingress and settoling of marine deposits. In one site in the UK, it is estimated that 30,000 tonnes of carbon were sequestered in the first year. Saltmarshes are an important nature-based solution, and also deliver many cultural, economic and biodiversity co-benefits.

SEASCAPE SCALE

Dr Graham Epstein, University of Exeter

The seabed is the ultimate carbon sink, fed with organic matter by the entire biological pump. Subtidal sediments are estimated to store 3.1 teratonnes of organic carbon in the top one metre, most concentrated in near-coast areas, which form the largest (and most significant) carbon store in the ocean. Effective sequestration requires a functioning ecosystem at whole seascape scale. Primary production could be boosted through seaweed aquaculture, benefiting ecosystem services. Wider impacts such as fishing, should be controlled to enable effective functioning of the biological pump.

Due to low annual sequestration rates, avoiding disturbance is the optimal method. A recent estimate indicated that bottom trawling could have a profound impact on carbon release. Full evidence-based carbon considerations need to be integrated into seabed management, with conservation and restoration at the scale of whole seascapes.

BREAK-OUT DISCUSSIONS

Conference participants were divided into themed break-out rooms to discuss the further development and implementation of blue carbon concepts and projects, and possible solutions to barriers. Chairs of each break-out room then reported back to all participants in a session chaired by **Professor Dan Laffoley, Marine Vice Chair of the World Commission on Protected Areas**. A synthesis of agreed points is provided here, alongside the discussion that followed.

Closing Gaps in Blue Carbon Science

Chaired by Dr Hilary Kennedy

There is a split between established and future blue carbon systems. Mangroves are most robust in terms of data availability, whereas there remain knowledge gaps for other established systems such as seagrass and saltmarsh, and greater knowledge gaps for other potential blue carbon systems. There are also knowledge gaps regarding interactions between ecosystems following restoration - whether there are co-benefits or competition. There is also significant variability within each ecosystem depending on location, and further research is needed to understand how this affects carbon storage.

Verifying Innovative Blue Carbon Projects

Chaired by Amy Schmid

There was agreement on the need for more data and understanding to support verification, but there is a need to balance requirements for evidence and accuracy with the necessity for urgent action. Allowing conservative or streamlined methodologies was suggested in order to speed up project development and implementation, with those initial projects serving as pilots to collect data and build understanding. Collaboration and coordinating efforts to further research are also crucial for effective data gathering. New technologies, such as advances in remote sensing and eDNA, should be incorporated into methodologies. Valuing of wider, non-carbon services provided by blue carbon ecosystems is needed, but a balance must be struck between the additional complexity of procedures to quantify these benefits, and the opportunities granted by additional funding.

Pricing Blue Carbon Credits

Chaired by Steve Crooks

There was recognition that while voluntary carbon market prices are flexible and compulsory prices are fixed, neither are anywhere near the social price of carbon. There is a need for buyers to pay a more representative price, but this is difficult without in-depth analysis (which is costly in itself). Projects are generally small and quite isolated; the creation of a blue carbon 'cartel' similar to the OPEC model could help counter this, where credit generators can between them discuss and set a fixed price. Given buyers are often interested in lower prices, a better incentive could be to offer early opportunities for buying credits if they financially support the project.

Blue Carbon and Industry

Chaired by David Tudor

Seaweed aquaculture (the most direct link between blue carbon and industry) remains at early stages of development regarding integration into blue carbon schemes. Opportunities include collaboration with large corporate stakeholders, and sharing sea space with other industries such as offshore wind. For many countries such as the UK, there is a need to streamline the licensing process and to build in carbon offsetting into Ecosystem Impact Assessments. To secure long-term support, expectations should be managed honestly and collaborative opportunities prioritised.

Policies to Support Blue Carbon

Chaired by Adrian Gahan

There is a need to include politicians and policymakers within discussions around blue carbon. The focus should not just be on developed states, especially given that developing states can have reduced access to science and media. Steps are being made: in the UK, Cefas is producing a statement on an assessment of UK trawling emissions. There are similarities with agriculture, where farmers are being encouraged to transition to pro-biodiversity farming; a similar situation needs to happen to encourage the fishing industry to adapt its practices.

Blue Carbon Accelerator Fund

Chaired by James Mansfield

A strong need for a Blue Carbon Accelerator Fund was identified with donors, project developers, and financiers voicing support. Many projects could benefit from a relatively small amount of funding to progress. There is a need to lower the technical costs and burdens on projects to streamline their development, and a need to recognise the wider co-benefits of blue carbon projects. In the terrestrial sector, projects such as REDD+ indicate the value in the role of aggregation in creating portfolios, which could lower the cost of verification.

DISCUSSION

Chaired by Professor Dan Lafolley

To summarise, Professor Dan Laffoley emphasised that there was a need to use all available technologies. He said while there will need to be compromise and trade-offs, there are also opportunities for innovation, including inspiration from terrestrial projects, as well as integration and streamlining. He reminded attendees of Lord Goldsmith's remarks that no nation is doing enough, and that there needs to be a sense of urgency to protect and restore at an unprecedented scale. There is a need to *"stop the rot"*, by preventing further carbon release from natural carbon sinks, including those only recently recognised such as sediments and oyster beds, alongside the more 'traditional' systems of mangroves, seagrass, and saltmarsh. There is also a need to *"rebuild the future"*, to recover lost blue carbon potential through restoration and, where possible, integration of ecosystem restoration into carbon markets.

Q How can we involve policy that fulfils ambitions of both climate and biodiversity frameworks?

A **Steve Crooks** answered that the latest round of NDCs had seen a significant focus on MPAs, adding weight to the perceived benefits they bestow on climate resilience. Once such measures are quantified within NDCs, they can attract funds. He said carbon financing could be a part of the solution in the future, but progress should be carried out in the near term regardless, and quantification and integration into the carbon market can happen later on.

A **David Tudor** added that legislation is driven by policy, and industry has a role to play in delivering policy. He said this provides incentive to streamline aspects of legislation such as licensing, to make the process easier for biodiversity-beneficial projects. Additionally, development projects that negatively impact biodiversity are expected to compensate this loss through enabling equivalent or greater biodiversity elsewhere; if carbon impacts were also to be included, this offset significantly magnifies. This provides incentive to incorporate biodiversity and carbon legislation together.

Q How quickly should we act regarding policy and legislation?

A **Adrian Gahan** said that while UNFCCC timetables can be drawn out and encumbered by bureaucracy, nations are theoretically free to act within their own NDCs, such as incorporating coastal blue carbon emissions.

A **David Tudor** added that regulation will catch up if industry takes the lead, as demonstrated by the UK's target of 30GW offshore wind capacity by 2030, increasing to 40GW by 2030 as industry brought costs down.

A **James Mansfield** said that links to policy need to be created from a biodiversity perspective but warned that the same for offsetting can be dangerous if not approached in the right way. He said the market should grow but there should also be recognition that carbon incomes are being used for biodiversity processes, so there is a need to grow wider biodiversity markets.

Q As a case study, how politically 'carbon-ready' is the UK, with regards to integration of sustainable fisheries policy into nature-based solutions involving blue carbon?

A **Adrian Gahan** said that UK politicians are looking into the implications of Enric Sala's paper on climate impacts of bottom trawling and whether UK carbon budgets should be reassessed. However, Defra is not currently looking into integration of this with sustainable fisheries policy.

A **David Tudor** added that there remain knowledge deficits surrounding many aspects of blue carbon, especially regarding seabed sediments. He said that in the interests of urgency, there is a need for the community to accept some knowledge gaps and take action regardless.

Q Is there a need for an integrated forum to connect people working on blue carbon?

A **Hilary Kennedy** and David Tudor said the blue carbon community would definitely benefit from a forum to break silo working. She said there is a need for more cross-communication for effective work.

A **Amy Schmid** added that as the science moves forward, there comes a realisation that different information is needed to inform policy or other methodologies. Coordination between groups can facilitate information sharing.

A **Adrian Gahan** said that one of the first collective actions the forum should undertake would be to encourage the UK government to fully implement the Benyon review on HPMAs.

A **Steve Crooks** agreed that there needs to be an authoritative body to speak on blue carbon, informing both policymakers and local stakeholders.

CONCLUDING REMARKS

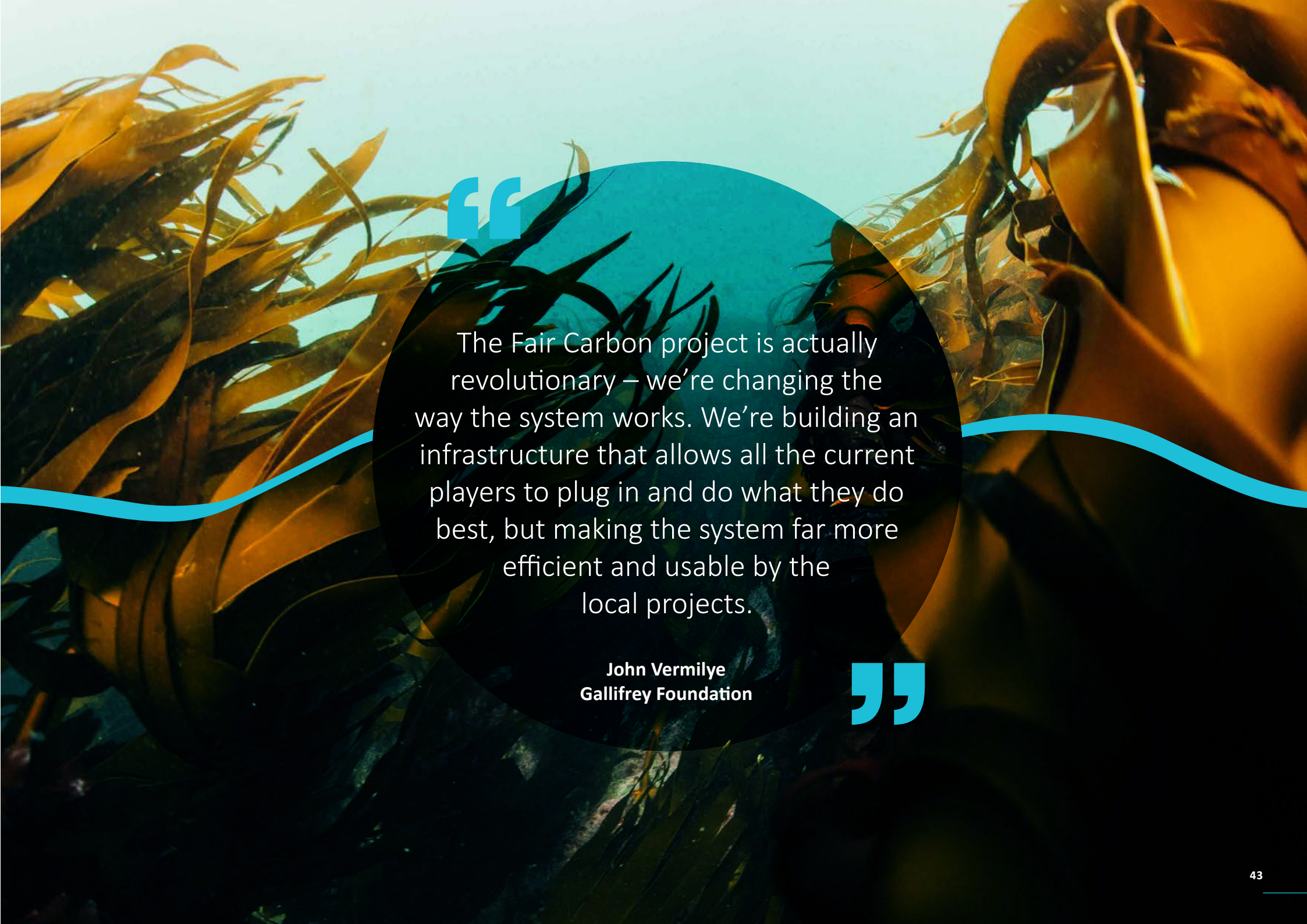
BLUE's Executive Director, Charles Clover, shared his concluding thoughts with the conference.

"We clearly have identified a need to talk to each other more, and outside our various silos," he said *"We need a UK Blue Carbon Forum, and here's an offer: BLUE is prepared to help fund that."* Mr Clover invited participants to get involved and help shape the forum, "*which should be inclusive of everybody, from the markets, to the science, to the policy*."

Summarising the themes of the day, Mr Clover said that blue carbon is a huge opportunity, and blue carbon credits should have a high value within the carbon market: "*We just need to get out there and sell them and explain them, and explain them to politicians so we get policies which support them.*"

There is a need to gather more science, and quickly, to enable countries to include trawling and other activities in their NDC inventories. BLUE is hoping to deliver a 15-million-dollar science programme, and participants were encouraged to contact Callum Roberts and Graham Epstein at the University of Exeter about the programme. In regard to the Blue Carbon Accelerator, BLUE will continue to bring people together to discuss and develop this idea. Looking to the UK, Mr Clover said that "*the UK needs to do more as a country to crystallise the science, as Minister Goldsmith says. We seem to be trying to recover our Marine Protected Areas by 2043, at the moment without including them as carbon projects, but we could act now on both those fronts.*" He urged attendees to continue trying to influence policy.

In closing, Mr Clover looked to the wider policy context within which blue carbon sits: "*At a higher level, and perhaps a subject for the UK Blue Carbon Forum, there is a need for better connectivity between these two great conventions agreed in the nineties on climate and biodiversity; they are not talking to each other. We need to reflect on how to do that, so let's set off by having the forum in which to do it.*"



> The Fair Carbon project is actually revolutionary – we're changing the way the system works. We're building an infrastructure that allows all the current players to plug in and do what they do best, but making the system far more efficient and usable by the local projects.

John Vermilye
Gallifrey Foundation

CROSS-CUTTING CONCLUSIONS

AMBITION AND URGENCY

There is a need for bold and urgent action at a global scale. Most blue carbon projects are currently at a small scale, so expanding them to become significant in a global context should be a key priority. Given the rate of climate change and the existing threats to blue carbon ecosystems, time is of the essence. The Blue Carbon Accelerator was created to help smaller blue carbon projects access sustained funding and overcome barriers to progress.

There are caveats surrounding this, namely ensuring that ambition is matched by funding and capacity, and that scale does not come at the expense of efficacy or benefits to local communities. Close partnerships and collaborative efforts, along with transparency at every stage, will help address these concerns. There are also variations in 'market readiness' of blue carbon ecosystems, with some needing further research before inclusion.

COMMUNITY INVOLVEMENT

Many speakers emphasised the need to ensure local communities are involved and engaged from the outset. This is vital to ensure the long-term effectiveness of projects, as local communities become stewards of blue carbon ecosystems. There is also the need for communities to feel tangible benefits of such projects, which is most effectively brought about through ensuring a significant proportion of funds generated from carbon credit sales directly support local livelihoods, education, and healthcare.

Community ownership is forming a vital part of conservation projects in many areas, and this extends to the need for good local governance and secure tenure rights.

COLLABORATION

The blue carbon space is complex and involves many key players at every level, from legislation, to finance, to grassroots engagement. Ensuring that these stakeholders work together is vital. There is also capacity for engagement of further sectors; for instance, the insurance sector could benefit greatly from the coastal protection aspects of blue carbon ecosystems, but this has to be demonstrated to secure their support.

Such collaboration involves learning to communicate effectively between the different groups - learning the different 'languages' of science, finance, and industry. Within projects, there is need for cohesion and complementary skillsets, with defined goals and values from the outset. The Fair Carbon project aims to help different blue carbon projects work together, such as through sharing best practice and simplifying validation and accreditation processes.

INTEGRATION AND STREAMLINING

Many projects face prohibitive costs during initial setup stages. Robust methodologies that can be shared between different projects can help mitigate these costs. There is a trade-off between comprehensive measurement and rate of progress which has to be carefully managed. Knowledge sharing between projects, such as via the Seascape Partner Initiative, can help mitigate project costs particularly for ecosystems whose sequestration capacities have been less explored.

There is evidence that blue carbon credits can invariably justify the cost of mitigation techniques, though risks for investors remain. Diverse revenue sources, beyond carbon credits alone, are recommended to de-risk blue carbon projects. These can include tourism or sustainable aquaculture, among others. There are also calls to expand the focus of credits to include natural capital more widely, given the high economic value of ecosystem services.

CLOSING KNOWLEDGE GAPS AND INNOVATION

For many blue carbon ecosystems, notably non-coastal marine ecosystems, significant knowledge gaps remain. This is especially true for those ecosystems who have only relatively recently been considered in terms of blue carbon, such as wild kelp beds or oyster reefs. Further research is vital to understand the sequestration capacities of these ecosystems, additional effects with regards to biodiversity and local livelihoods, and variations and interactions between and within ecosystems.

The value of co-benefits is often high. There is increasing interest in monetising these co-benefits through stacked credits that offer not only carbon sequestration, but other ecosystem services such as climate resilience. Innovation also extends to technologies such as remote sensing, which can lower the costs of quantifying sequestration or tracking ecosystem recovery.

ROBUST VERIFICATION AND VALIDATION

To ensure the reputational integrity of blue carbon systems, there has to be a robust and trusted verification process. Though this inevitably requires expenditure of funds and time, it also opens avenues for investment, given that demonstrably viable projects will be more investible. This is especially true if co-benefits are also accounted for.

This applies for accreditation too. Several carbon credit schemes incorporate blue carbon from some ecosystems, but there is significant room for expansion. Recognised standards require strong underlying methodologies. Though historically the development of methodologies has suffered from a lack of investor interest, this is now changing.

POLICY ENGAGEMENT

Blue carbon can play a role at national and international levels within carbon accounting. There are calls to recognise nature-based solutions as part of Nationally Determined Contributions. This would help boost political support for blue carbon initiatives, and help countries fulfil their NDCs through innovative methods that bring a range of vital co-benefits. Collaboration between the two COPs on biodiversity and climate, and recognition of synergies between NDCs and SDGs could help reconcile such indicators of progress.

This policy involvement can also pave the way for engagement with the private sector, by demonstrating that such ecosystems are highly valued by governments.

GLOSSARY

SCIENTIFIC TERMS

Blue Carbon – the carbon captured and stored by marine and coastal ecosystems.

Carbon Credits – a permit held by an organisation allowing the emission of a certain quantity of greenhouse gases. Carbon credits can be traded on (voluntary or compulsory) carbon markets, as a way of attaching a cost to carbon emissions and a value to avoiding these emissions, since any carbon credits not needed by an organisation can be sold to another. If certified, carbon sequestration projects can generate and sell carbon credits that represent the carbon stored.

Carbon Market – where carbon credits are traded by organisations, through voluntary or certified means, as a tool for reducing net carbon emissions.

Carbon Sequestration – the process of capturing and storing atmospheric carbon dioxide, such as through organic processes in vegetation or sediments, or through technological means.

Climate Resilience – the ability to weather and recover from climate-related events or trends, such as through adequate preparation and responses.

Ecosystem Services – the benefits provided by ecosystems to humans.

Nature-based Solutions – addressing societal challenges, such as climate change or inequality, through the conservation or restoration of ecosystems.

Stacked Credits – credits that fix a defined value to several different ecosystem services at once - in this context, placing monetary values on carbon sequestration and climate resilience during the generation of credits through conservation and restoration.

ORGANISATIONS AND INITIATIVES

BCI – Blue Carbon Initiative. A coordinated global programme focused on the conservation and restoration of coastal and marine ecosystems, led by Conservation International, IOC-UNESCO, and IUCN.

BNCFF – Blue Natural Capital Financing Facility. Managed by the IUCN, the Facility supports the development of investable blue natural capital projects.

CBD – Convention on Biological Diversity. A multilateral treaty focused on the conservation of biodiversity.

COP – Conference of Parties. CBD COP15 will take place in Kunming, China, in October 2021. UNFCCC COP26 will take place in Glasgow, Scotland, in November 2021.

IUCN – International Union for Conservation of Nature. The global authority on the status of the natural world and the measures needed to safeguard it.

NDCs – Nationally Determined Contributions. Each country's intended post-2020 climate actions, to collectively fulfil the goals of the Paris Agreement.

Paris Agreement – a legally binding international treaty on climate change, signed at UNFCCC COP21 in Paris, 2015.

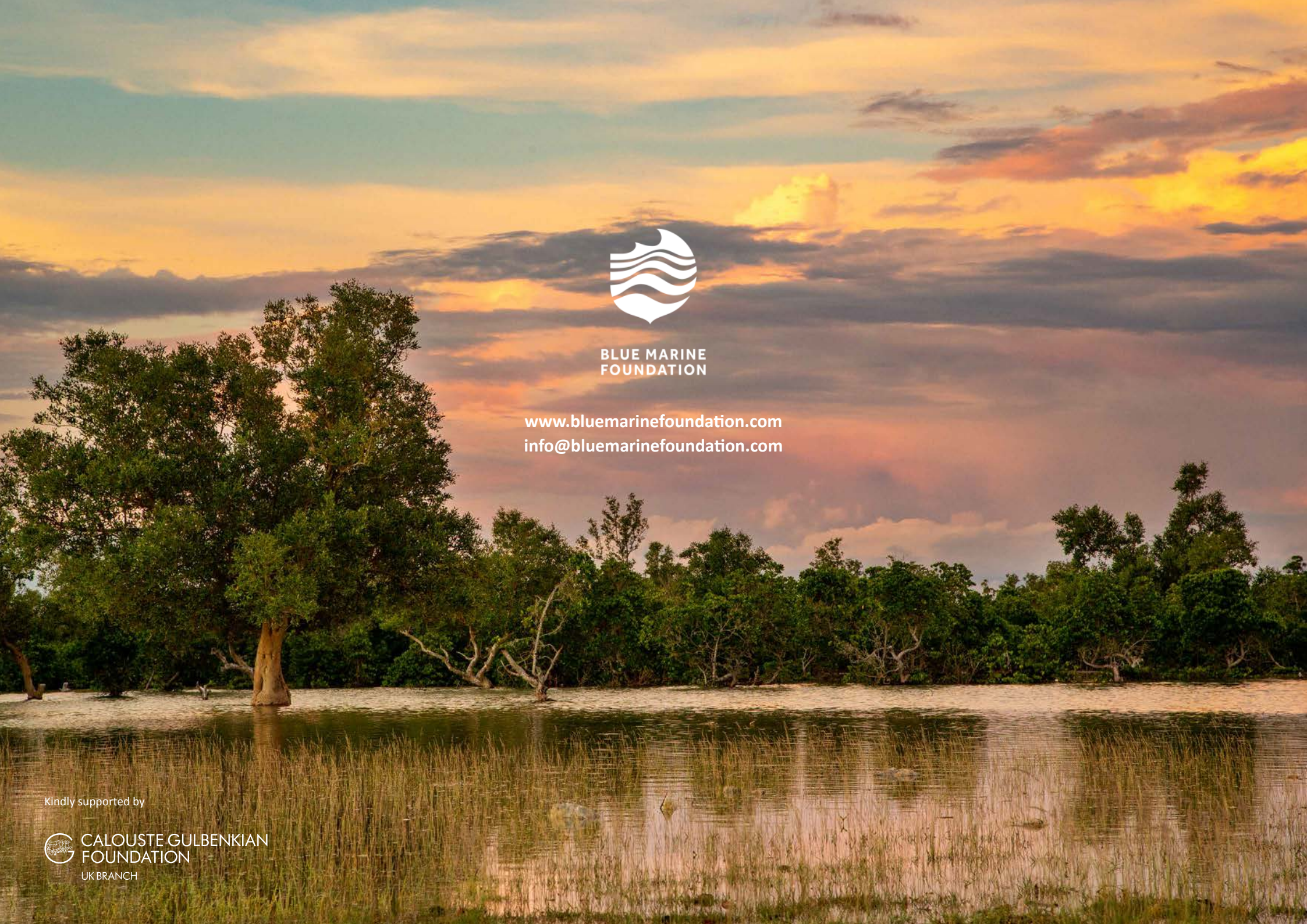
SDGs – Sustainable Development Goals. Adopted by all UN Member States in 2015 as part of the 2030 Agenda for Sustainable Development, the 17 SDGs lay out a blueprint for a sustainable future.

UNEP – United Nations Environment Programme. The branch of the UN that focuses on sustainable development, climate, and biodiversity.

UNFCCC – United Nations Framework Convention on Climate Change. An international treaty to combat climate change.

Verra/VCS – Verra's Verified Carbon Standard Program enables certified projects to transform greenhouse gas emission reductions and removals into tradable carbon credits.

> We clearly have identified a need to talk to each other more, and outside our various silos. We need a UK Blue Carbon Forum, and here's an offer: BLUE is prepared to help fund that.
>
> **Charles Clover, BLUE Executive Director**



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