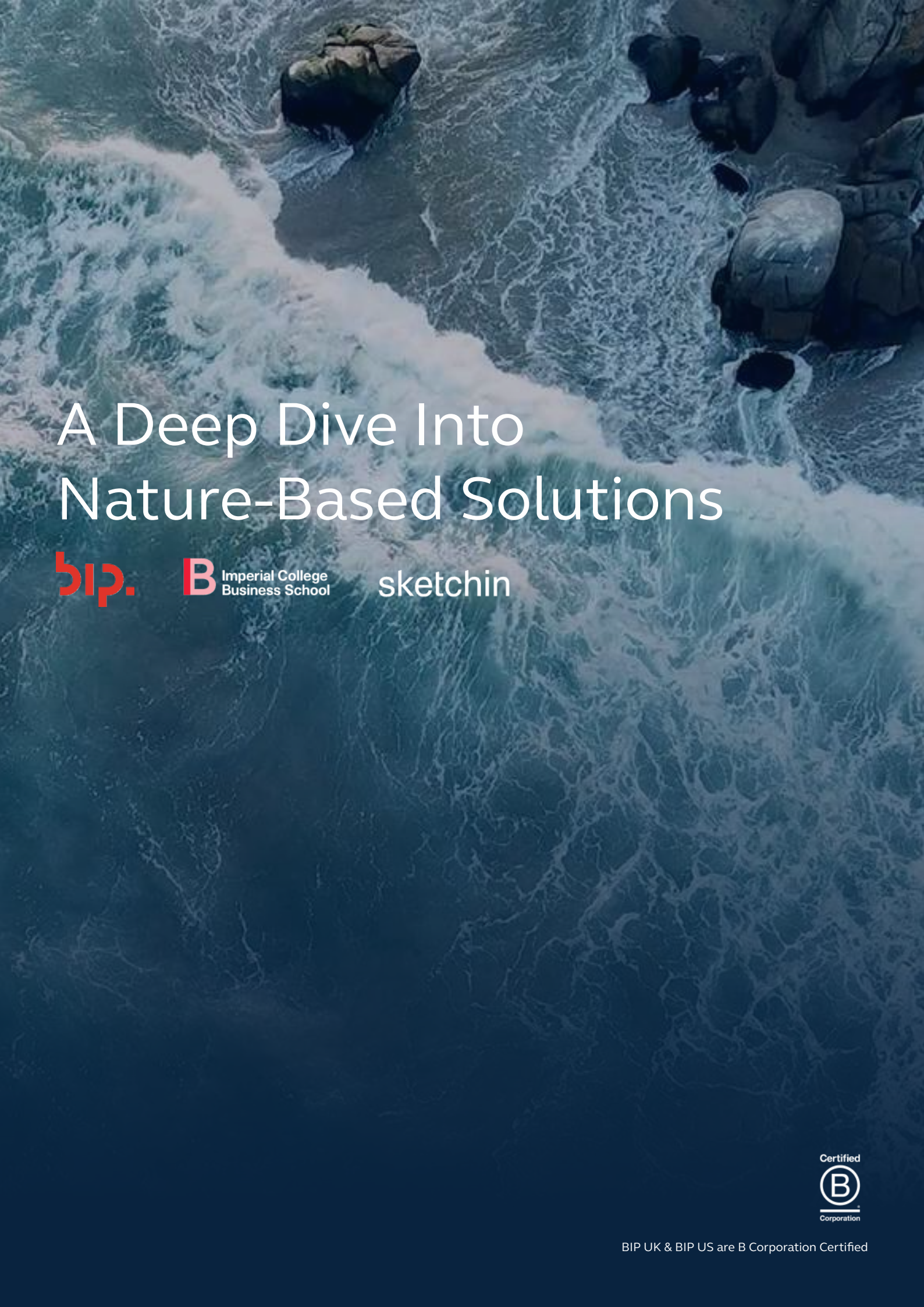

A Deep Dive Into Nature-Based Solutions

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Executive Summary

This deep-dive into ocean-based climate mitigation techniques lays out various issues that the ocean ecosystem is faced with, resulting in devastating impacts on biodiversity, loss of economic value, and inhibiting the ability of the oceans to act as climate regulators.

Our analysis identified biodiversity loss, sea-level rise, and extreme weather events as the most crucial topics to tackle in terms of impact, urgency, and geographical reach.

The oceans themselves can provide various services to help tackle these issues, and fourteen such solutions were evaluated using a holistic, multi-dimensional framework. Mangrove restoration and conservation emerged as one of the most effective nature-based solutions providing a carbon store and climate regulation services, coastal protection, biodiversity and habitat enhancement, a source of material (wood) and wider economic return.

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Project Brief and Scope

This project entails a comprehensive assessment of ocean-based techniques that hold promise in addressing identified ocean climate-related challenges. Within the prevailing climate context, this project focuses on selecting key ocean-related problems and associated techniques of interest and shines a light on business opportunities to deploy capital in ocean restoration. This research carefully examines these strategies in practice and gauges how they fit into a particular industry.

Introduction to the Context of the Oceans and Climate Crisis it Faces

The oceans play a pivotal role in sustaining life on earth, powering economies and guarding the global climate. Biodiversity is almost fully formed in the oceans: **94% of all life on Earth calls the oceans home**. This is transformed in economic value as **3 billion people** rely on marine and coastal resources as their main source of protein. In terms of climate regulation, the oceans absorb **90% of excess heat from human-made emissions** and provides **50-85% of all oxygen produced in the atmosphere**. Thus, it is clear how the oceans three-fold role is highly beneficial and necessary to human life.

The current climate crisis however is leading to a collapse in the oceans' ecosystems, leading to devastating effects on biodiversity, economies, and the climate. From **90% of all marine animals being at risk of extinction by 2100**, to **2 billion potential refugees by 2100 due to sea-level rise**, the oceans' ecosystem's collapse calls for immediate action.

Three main ocean-based problems stand out from our climate research, in terms of impact, urgency and geographical reach: biodiversity loss, sea-level rise, and extreme weather events. The common denominator found is the increase in greenhouse gas emissions (GHG) due to anthropogenic activities. In the context of the oceans, however, it is crucial to look beyond the CO2 prism, to avoid fixating on CO2 as the only metric to tackle to reach Sustainable Development. Doing so would lead to the risk of omitting other crucial consequences of the climate crisis. Natural ecosystems and wildlife are in fact experiencing the most negative impact from the climate crisis, due to, for instance, **90% of world's marine fish stock being fully exploited, overexploited or depleted**.

Considering all the above facts, this project focuses on exploring the existing ocean-based techniques. Several techniques to solve for GHG related problems are found: wetlands restoration and conservation, seaweed farming, floating solar, offshore wind, tidal energy, artificial upwelling, seawater carbon capture, liming and alkalinity enhancement. To solve the pollution related issues the following techniques are found: wastewater management and floating booms. Finally, to tackle the issue of unsustainable fishing, sustainable aquaculture and reduction in bottom trawling are the existing ocean-based techniques.

Criteria for Evaluating Ocean-based Techniques

To have a more detailed understanding of the abovementioned techniques, a holistic and multi- dimensional framework was applied.

This framework consists of seven criteria. All criteria ranged from a score of 1 (lowest) to 5 (highest), apart from costs and trade-offs criteria for which the order was reversed (1- highest, 5-lowest). These criteria were chosen, developed, and standardised through thorough research, to evaluate and compare the technique. Figure A shows the spider diagram created to visually represent the scoring assigned to each technique.

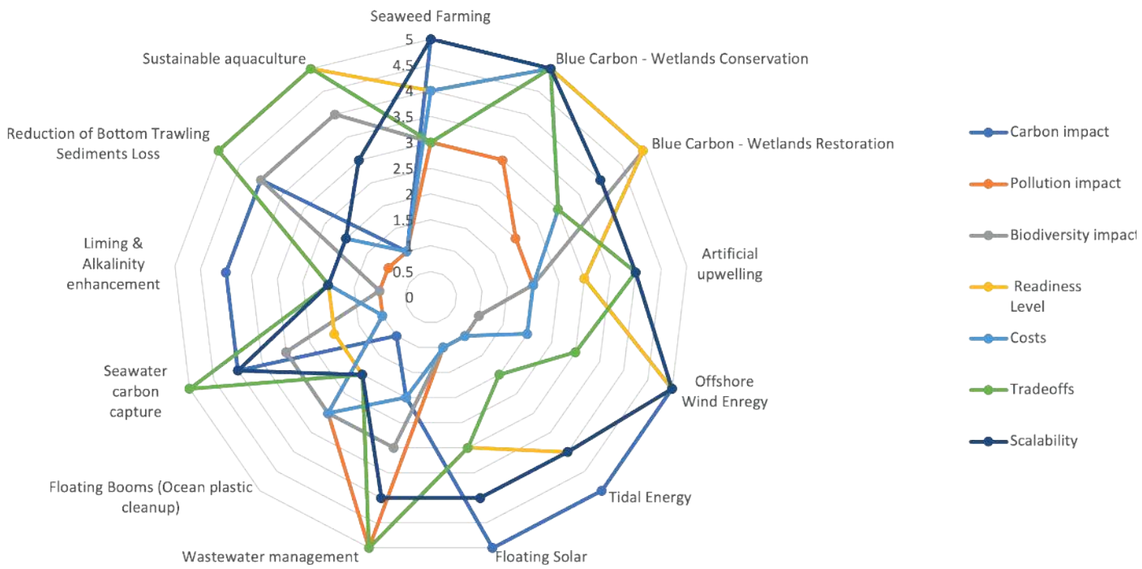

Figure A: Spider diagram including all criteria mapping/scoring for each ocean-based techniques

Criterion 1
Biodiversity impact: how positive the impact of the technique is on biodiversity conservation/restoration/enhancement.

Criterion 2
Pollution impact: extent to which the technique can reduce pollution in the oceans.

Criterion 3
Carbon impact: extent to which the technique can sequester carbon.

Criterion 4
Readiness level: technological readiness level of the technique.
Whether it is at a research, development, or deployment stage.

Criterion 5
Costs: capital expenditure of the technology (e.g. equipment, technology development costs, infrastructure).

Criterion 6
Trade-offs: the trade-offs that come with implementing the technology
(e.g. implementation of floating booms to reduce pollution in the oceans can potentially lead to reduction in marine wildlife).

Criterion 7
Scalability: extent to which the technology can grow in the market (compound annual growth rate CAGR), its potential geographical reach, its social and political acceptance and support.

Techniques Evaluation: Prioritization Matrix Using Component Weighting With Bigger Focus On CO2 Reductions

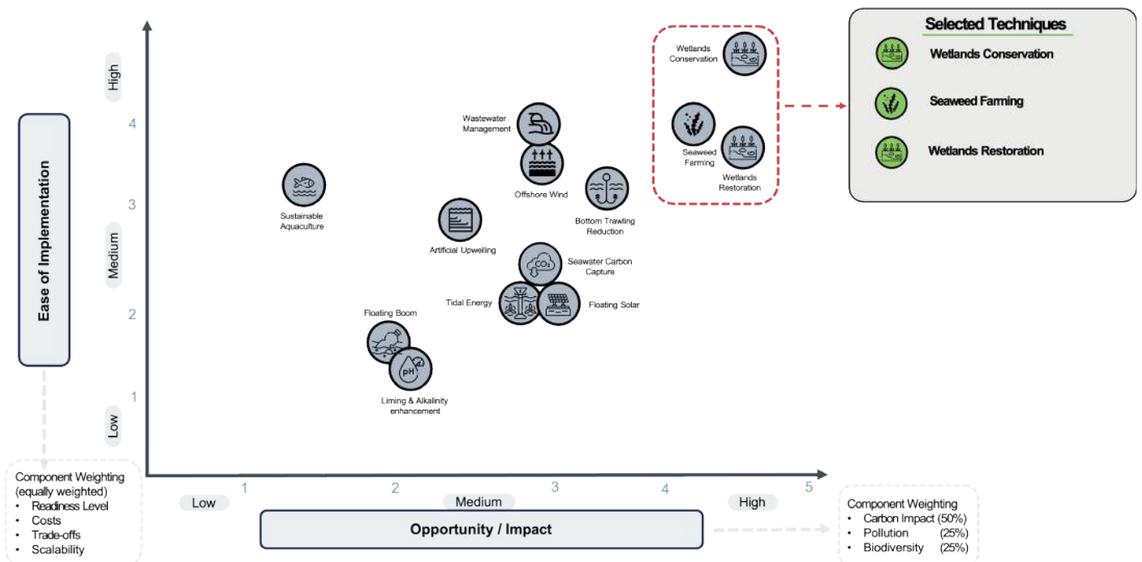

Figure B: 2x2 criteria mapping of ocean-based techniques

Based on all aforementioned criteria, every one of the 13 identified ocean-based techniques has been placed in a prioritisation matrix (Figure B).

The matrix captures two main dimensions of each technique:
(i) Ease of implementation and (ii) Opportunity and Potential Impact.

The former, representing the y-axis, involves all criteria that is essential in developing and implementing said techniques, including Technological Readiness Level, Costs, Trade-offs and Scalability. Since all of these are essential in the success of a project, all components have been weighted equally.

The latter, depicted on the x-axis, draws attention to the impacts of project on (i) carbon sequestration, (ii) ocean pollution and (iii) biodiversity. A greater weighting has been attached to **carbon impacts (50%)**, as reducing carbon emissions is the main goal to solve the climate crisis. However, the impacts of all techniques on **pollution** and **biodiversity** has also been considered **(25% each)**.

As a result, wetlands restoration and conservation as well as seaweed farming stood out as the most promising solutions.

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A New Layer : The Momentum Shift

Policymakers are driving the biodiversity and nature agenda, compelling businesses to extend their focus beyond GHG emissions and encompass nature holistically.

Until recently, emphasis has been put on CO2 emissions reporting, but the landscape is now evolving towards a comprehensive approach that integrates corporate impacts on nature and biodiversity. This shift is gaining prominence through multiple key recent events, that led to the enactment of legally binding commitments through the EU Nature Restoration Law in July 2023, which represents a tangible and transformative shift in both mindset and environmental reporting practices:

The EU Nature Restoration Law (Jul 2023): Establishing legally binding objectives, including the protection of **20% of Europe's Oceans** and Land by 2030.

Considering the current political momentum, and due to the scope of the Nature & Biodiversity Agenda which advocates for a holistic approach of conservation and restoration projects, seaweed farming was excluded. Consequently, we prioritized Wetlands Restoration and Conservation as the preeminent ocean-based techniques.

> "The science is crystal clear, showing that far too much of Europe's nature has been degraded or destroyed. It's vital to reverse that trend, and time is running out."

MEP César Luena,
Member of the European Parliament

Top Techniques

Among Wetlands Conservation and Restoration we find:

Growing seagrass meadows - these are a globally distributed group of marine flowering plants that form extensive meadows in shallow waters.

Tidal marshes - these usually fringe the interior of estuaries, bays, and low-energy inter-tidal zones.

Mangroves - these are plant species (trees and shrubs) which are tolerant to salty waters, normally growing in the intertidal zones subtropical sheltered coastlines and are the richest wetland eco-system from the perspective of biodiversity.

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Benefits of Wetlands Restoration

Multiple Co-benefits

In such business context, wetland restoration is most promising for its active aspect, as opposed to conservation. Besides restoration, activities being inclusive in nature can yield faster and more predictable outcomes through active stakeholder participation from a user-centric and whole systems perspective. In the process, the restoration approach creates additional jobs and contributes to the local economy in a sustainable way.

Wetlands provide co-benefits that contribute to the overall health and well-being of the environment and society. Among others, wetlands provide critical habitats, breeding grounds and sources of food for shellfish, birds, and other organisms. Wetlands play a central role for economies, as central for fishing and tourism. Finally, wetlands help mitigate climate change by storing carbon and reduce its impact by acting as a barrier against storms and sea level rise.

Some carbon sequestration details:

- **905 tons CO2e** sequestered/ha by seagrass meadows
- **2,235 tons CO2e/ha** by mangroves
- **86M - 144M tCO2e:** Total sequestration potential for seagrass and saltmarshes in Europe, and **>70M t CO2e** for mangroves in the US

Geographical Focus on the EU & US

Two geographical areas offer interesting opportunities for wetlands restoration based on political, and environmental momentum.

First, the US Southern regions of Louisiana and Florida. **50% of the mangroves** have been destroyed since **1980**, mostly for agricultural practices. However, there is a positive conservation and restoration trend, the loss rates having dramatically fallen in the last 6 years. If restored, those mangroves could sequester up to **70M tCO2e in the coming 20 years**. Besides, post-IRA political impulsion provide room for funding supports from public financial institutions.

The second geographical focus is on the European seagrass meadows and saltmarshes wetlands. **80%** have been **destroyed** since **1950**, and **51%** of the remaining are declining dramatically. If restored, those wetlands could sequester up to **144M tCO2e** (equivalent to **4%** of the annual EU emissions).

Besides, the political momentum is also advantageous, with the EU Nature restoration law voted.

Financial Resources Requirement and the Role of Blue Carbon

In a recent report published by the International Finance Corporation (IFC), (blue) carbon credits have been included as one means of financing sources for activities looking at coastal wetlands' conservation and restoration. The report notes that as blue carbon projects are in high demand, several large buyers are willing to commit to forward carbon credit agreements and offer amenities, including premium prices and upfront payments. Financial Institutions (FIs), amongst others, could play a key role in offering firm carbon purchase agreements.

Regarding costs of restoration per hectare, numbers vary greatly globally from the local context and the type of wetland restored. Based on research and averaging of restoration costs in West Africa and South America, a fair estimation of restoration costs would be:

Seagrass Meadows: ~$120,000/ha

Tidal Saltmarshes: ~$90,000/ha

Mangroves: ~$108,000/ha (incl. hydrological restoration)

When backed on sequestration potential per hectare, those estimates give us a cost per tCO2e sequestered of **$132** (seagrass), **$91** (saltmarshes), **$48** (mangroves). Given the high cost of wetlands restoration projects and inherent uncertainty in the desired outcomes, several funding mechanisms are employed to increase the financial capacity of the local systems and to reduce the risk for those investing in the projects. The total project cost may be covered through a variety of sources including, grants, philanthropic corporate funds, and blue carbon financing.

The first option encompasses grants and subsidies provided by public funding agencies and development finance institutions (DFIs). Within the United States, several ocean and coastline restoration funding agencies exist, such as Environment Protection Agency Fund. Likewise, in the European Union, significant sources of funding are available through programs like the Horizon Europe framework and various blue economy funds.

The second option encompasses blue carbon credit financing, that can cover most or even all the restoration project costs. With development of the Voluntary Carbon Markets (VCM), wetland restoration projects have increasingly been seen as a viable commercial opportunity. The market for carbon sequestered in marine ecosystems, called Blue Carbon, is picking-up. Companies can monetize those credits though a combination of forward sales, and pre-agreed offtakes. This allows the project developer to cover most (if not all) of the larger costs of the first years through the forward sale of credits, reducing revenue uncertainty through the offtake agreements and retaining some pricing upside by keeping credits on balance and selling them at spot rates on a later stage.

Currently, blue carbon credits prices range from **$5** to **$45**, with a lot of context specific factors affecting a premium or discount.

To ensure high additionality, permanence and low leakage and country risk, project developers are encouraged to follow the High-Quality Blue Carbon Principles and Guidance published at the COP27.

Important to mention, on top of blue carbon credits, some restoration projects have developed biodiversity credits as a financing contribution. Biodiversity credits are a tool used to measure both the unavoidable impacts on biodiversity from development and clearing at a development site and the predicted improvement in biodiversity condition gain at a stewardship site.

Industry Fit

Interestingly, wetlands restoration finds a compelling industry fit within the Travel & Tourism sector.

Case Study

Examining the Interest and Fit of Wetland Restoration for the Travel and Tourism Industry

Impact of the Tourism Industry on Marine Ecosystems

Wetlands restoration finds a compelling industry fit within the Travel & Tourism sector. Interestingly, this industry relies significantly on Nature, constituting approximately **80%** of its total value – a substantial market worth **$573 billion** – as healthy ecosystems help maintain operational viability and tourist appeal.

Paradoxically, harmful tourism practices harm natural ecosystems and, consequently, undermine the industry's appeal and economic viability.

Why the Tourism Industry Should Act

1. **An Increased Pressure on Regulatory Landscape | The end of the Carbon Tunnel Vision**
   As regulatory focus shifts beyond carbon emissions, investing in wetlands restoration aligns with evolving environmental priorities and demonstrates proactive commitment to broader sustainability objectives.

2. **Direct Economic Incentive | Coastal Travel & Tourism's survival depends on nature and biodiversity**
   For the Coastal Travel & Tourism sector, thriving wetlands directly correlate with business viability, offering natural attractions that draw visitors and contribute to economic prosperity.

3. **Climate Adaptation | Wetlands act as resilient barriers to adapt to long-term infrastructure impacts**
   Wetlands serve as natural buffers against climate impacts, providing cost-effective resilience against infrastructure vulnerabilities caused by rising sea levels and extreme weather events.

4. **Cost-Effective Carbon Sequestration and Diverse Ecosystem Services**
   Restoring wetlands not only offers a cost-effective means of carbon sequestration but also presents a broad spectrum of ecosystem services, outperforming alternative ocean negative emissions technologies.

5. **Additional Qualitative Benefits**
   Beyond direct economic advantages, investing in wetlands restoration yields qualitative benefits, including enhanced brand image, competitive edge, recognition through labels and certifications, and fostering increased customer loyalty.

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Conclusion

This in-depth exploration of nature-based solutions highlights the profound challenges confronting our oceans today. These challenges encompass a wide spectrum of issues, from the alarming loss of biodiversity to sea-levels rising and extreme weather events. The consequences of these problems reverberate across ecosystems, economies, and our planet's ability to mitigate climate change.

These issues demand our immediate attention due to their far-reaching impacts, their pressing urgency, and their ability to affect regions across the globe.

However, amidst these challenges, there is hope. The oceans, which have borne the brunt of human-induced climate change, also offer solutions to help rectify the damage. Our comprehensive assessment of potential solutions underscores the power of nature-based solutions. Among these, mangrove restoration and conservation have emerged as a beacon of promise. They not only serve as vital carbon stores and climate regulators but also provide coastal protection, promote biodiversity, enhance habitats, and offer a source of sustenance for countless communities.

Beyond the ecological benefits, these initiatives can also offer a substantial financial return on investment. The carbon offset markets and green financing mechanisms provide opportunities for organisations to generate revenue while contributing to the restoration and preservation of these crucial ecosystems. Engaging in nature-based solutions not only addresses pressing environmental challenges but also represents a smart financial decision for organisations looking to make a positive impact on the planet while securing long-term economic benefits in this emerging financial asset class.

Interested in exploring nature-based solutions for your organisation?

Get in touch

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Endnotes

1. Alves, B.R.C. et al. (2015) "*Coastal erosion perception and willingness to pay for beach management (Cadiz, Spain)*," Journal of Coastal Conservation, 19(3), pp. 269–280. Available at: https://doi.org/10.1007/s11852-015-0388-6.

2. B Corporation (2023) *B Impact assessment.* Available at: https://www.bcorporation.net/en-us/programs- and-tools/b-impact-assessment/.

3. Bayraktarov, E. et al. (2016a) *"The cost and feasibility of marine coastal restoration,"* Ecological Applications, 26(4), pp. 1055–1074. Available at: https://doi.org/10.1890/15-1077.

4. Beaumont, N. et al. (2019) *"Global ecological, social and economic impacts of marine plastic,"* Marine Pollution Bulletin, 142, pp. 189–195. Available at: https://doi.org/10.1016/j.marpolbul.2019.03.022.

5. CBD (2021) *A new global framework for managing nature through 2030: First detailed draft agreement debuts*. Available at: https://www.cbd.int/article/draft-1-global-biodiversity-framework.

6. CBD (2022) *Convention on Biological Diversity.* Available at: https://www.cbd.int/meetings/COP-15.

7. Cormier, N., Krauss, K.W., Demopoulos, A.W., Jessen, B.J., McClain Counts, J.P., From, A.S. and Flynn, L.L., 2021. *Potential for carbon and nitrogen sequestration by restoring tidal connectivity and enhancing soil surface elevations in denuded and degraded south Florida mangrove ecosystems. Wetland Carbon and Environmental Management,* pp.143-158.

8. Cornell University (2017) *Rising seas could result in 2 billion refugees by 2100* | Cornell Chronicle. Available at: https://news.cornell.edu/stories/2017/06/rising-seas-could-result-2-billion-refugees-2100.

9. Donofrio, S., Maguire, P., Zwick, S., & Merry, W. (2020). *State of the Voluntary Carbon Markets 2020*.

10. Forest Trends. https://www.forest-trends.org/publications/state-of-the-voluntary-carbon-markets-2020-2/

11. European Commission (2022) *Factsheet on Nature Restoration Law.* Available at: https://ec.europa.eu/commission/presscorner/detail/en/fs_22_3748.

12. European Commission (2023) *The EU #NatureRestoration Law.* Available at: https://environment.ec.europa.eu/topics/nature-and-biodiversity/nature-restoration-law_en.

13. European Parliament (2023) *Nature restoration law: MEPs adopt position for negotiations with Council | News | European Parliament*. Available at: https://www.europarl.europa.eu/news/en/press-room/20230707IPR02433/nature-restoration-law-meps-adopt-position-for-negotiations-with-council.

14. Giorgio, A. et al. (2018) "*Coastal tourism importance and beach users' preferences: the 'Big Fives' criterions and related management aspects,*" Journal of Tourism and Hospitality, 07(02). Available at: https://doi.org/10.4172/2167-0269.1000347.

15. GPT (2022) "*COP15: Travel & Tourism sector commits to reverse biodiversity loss by 2030*," GTP Headlines, 15 December. Available at: https://news.gtp.gr/2022/12/13/cop15-travel-tourism-sector-commits-to-reverse-biodiversity-loss-by-2030/.

16. Howell, M. (2023) *A kelp farmer's guide to blue carbon*. Available at: https://thefishsite.com/articles/a-kelp-farmers-guide-to-blue-carbon-mckinsey.

17. IPBES (2022) Media release: *Nature's Dangerous decline 'Unprecedented'; Species extinction rates 'Accelerating.'*Available at: https://www.ipbes.net/news/Media-Release-Global-Assessment.

18. Lewis III, R. (2001) *Mangrove restoration - Costs and benefits of successful ecological restoration.* Available at: http://mangrove.irwantoshut.com/Ecological_Restoration.html.

19. Menéndez, P. et al. (2020) "*The global flood protection benefits of mangroves,*" Scientific Reports, 10(1). Available at: https://doi.org/10.1038/s41598-020-61136-6.

20. Morello, L. (2010) *Phytoplankton population drops 40 percent since 1950.* Available at: https://www.scientificamerican.com/article/phytoplankton-population/.

21. NOAA (2023a) *Biden-Harris Administration announces $2.6 billion framework through Investing in America agenda to protect coastal communities and restore marine resources*. Available at: https://www.noaa.gov/news-releases/noaa-ira-framework-2023#:~:text=Today%2C%20the%20U.S.%20Department%20of,Inflation%20Reduction%20Act%20(.

22. NOAA (2023b) *Sea level rise and coastal flooding impacts.* Available at: https://coast.noaa.gov/slr/#/layer/slr/10/- 9116594.014983121/3335577.598815708/6/satellite/none/0.8/2050/interHigh/midAccretion.

23. NOAA (no date) *Blue Carbon*. Available at: https://coast.noaa.gov/states/fast-facts/blue-carbon.html.

24. NOC (2023) *New report predicts UK oceans to warm by more than three degrees by 2100* | National Oceanography Centre. Available at: https://noc.ac.uk/news/new-report-predicts-uk-oceans-warm-more- three-degrees-2100#:~:text=A%20new%20set%20of%20model,business%2Das%2Dusual%20scenario.

25. Northey, H. (2021) "*U.S. eyes wetland restoration as hedge against climate change*," E&E News by POLITICO, 24 September. Available at: https://www.eenews.net/articles/u-s-eyes-wetland-restoration-as-hedge-against-climate-change/.

26. NSW. (2023, May 12). *What are biodiversity credits?. NSW Environment and Heritage*. https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets- scheme/buying-selling-credits-market-information/what-are-biodiversity-credits

27. O'Connell-Domenech, A. (2022) "*The Hill,*" The Hill, 14 September. Available at: https://thehill.com/changing-america/sustainability/climate-change/3641255-rising-sea-levels-could- claim-millions-of-us-acres-in-next-few-decades-research- shows/#:~:text=Florida%2C%20Louisiana%20and%20Texas%20are,more%20than%2060%2C000%20i n%20Texas.

28. Owen-Burge, C. (2021a) *A threat and a solution – tourism's role in mangrove protection - Climate Champions*. Available at: https://climatechampions.unfccc.int/a-threat-and-a-solution-tourisms-role-in- mangrove-protection/.

29. Preferred by Nature (2023) *Sustainable Tourism certification*. Available at: https://preferredbynature.org/certification/sustainable-tourism/sustainable-tourism-certification.

30. Project Drawdown (2023) *Coastal Wetland Protection | Project drawdown*. Available at: https://drawdown.org/solutions/coastal-wetland-protection.

31. Skiver, R. and Skiver, R. (2023) "*When will Florida be underwater? Sea level rise will significantly impact the state,*" Green Matters [Preprint]. Available at: https://www.greenmatters.com/weather-and-global- warming/when-will-florida-be-underwater#:~:text=CBS%20Miami%20reported%20on%20a,Keys%2C%20and%20the%20Lower%20 Keys.

32. South Pole. (2021). *Muskitia Blue Carbon. South Pole*. Retrieved November, 2021, from https://www.southpole.com/projects/muskitia-blue-carbon

33. Statista (2023) *Travel & Tourism - Worldwide* | Statista Market Forecast. Available at: https://www.statista.com/outlook/mmo/travel-tourism/worldwide.

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34. Taillardat, P. et al. (2020a) "*Climate change mitigation potential of wetlands and the cost-effectiveness of their restoration*," Interface Focus, 10(5), p. 20190129. Available at: https://doi.org/10.1098/rsfs.2019.0129.

35. TFND (2022) *The TNFD Nature-Related Risk and Opportunity Management and Disclosure Framework, TNFD*. Available at: https://framework.tnfd.global/wp-content/uploads/2022/06/TNFD-Frame\work- Document-Beta-v0-2.pdf.

36. The Blue Carbon Initiative. (2021). *Mitigating climate change through coastal ecosystem management.* The Blue Carbon Initiative. Retrieved November, 2021, from https://www.thebluecarboninitiative.org/

37. The Guardian (2023, February 8). *Half the wetlands in Europe lost in past 300 years, researchers calculate*. The Guardian. https://www.theguardian.com/environment/2023/feb/08/world-wetlands-europe-lost-study-aoe

38. The Nature Conservancy (2022) *Palm Beach Resilient Island*. Available at: https://www.nature.org/en- us/newsroom/florida-palm-beach-resilient-island/.

39. UN (2023) *The ocean – the world's greatest ally against climate change* | United Nations. Available at: https://www.un.org/en/climatechange/science/climate-issues/ocean#:~:text=The%20ocean%20generates%2050%20percent,the%20impacts%20of%20climate%20change.

40. UNCTAD (2017) *A man-made tragedy: the overexploitation of fish stocks*. Available at: https://unctad.org/news/man-made-tragedy-overexploitation-fish-stocks#:~:text=Close%20to%2090%25%20of%20the,coast%20for%20example%20are%20overharvested.

41. UNCTAD (2022) *5 global actions needed to build a sustainable ocean economy*. Available at: https://unctad.org/news/5-global-actions-needed-build-sustainable-ocean-economy#:~:text=Trade%20in%20ocean%2Dbased%20goods,worth%20at%20least%20%2424%20trillion.

42. UNEP (2021) *Becoming #GenerationRestoration: ecosystem restoration for people, nature and climate.* Available at: https://www.unep.org/resources/ecosystem-restoration-people-nature-climate.

43. UNESCO (2022) "*Why the Ocean is so important for life on earth*," UNESCO [Preprint]. Available at: https://oceanliteracy.unesco.org/ocean-resources/#:~:text=The%20ocean%20is%20the%20largest,the%20water%20on%20the%20planet.

44. UNFCCC - *Climate champions*. (2023). Available at: https://climatechampions.unfccc.int/wp- content/uploads/2022/11/HQBC-PG_FINAL_11.8.2022.pdf

45. USGS (2018) *Blue carbon research contributes to largest tidal restoration in the Northeast* | U.S. Geological Survey. Available at: https://www.usgs.gov/centers/whcmsc/news/blue-carbon-research-contributes-largest-tidal-restoration-northeast.

46. VisitFlorida (2019) *Florida's Tourism Economy Experiences Another Record Year in 2019 But Shifts Into a Lower Gear of Growth*. Available at: https://www.visitflorida.org/media/30679/florida-visitor-economic-large-impact-study.pdf.

47. WaterLANDS (no date) *WaterLANDS: Water-based solutions for carbon storage, people and wilderness.* Available at: https://waterlands.eu/project-sites/venice-lagoon/.

48. Waterlands: *Water-based solutions for carbon storage, people and wilderness*. Water. (2022). https://waterlands.eu/

49. Webb, Silvermann-Roati and Gerrard (2022) *Removing carbon dioxide through artificial upwelling and downwelling: legal challenges and opportunities - CDR Law*. Available at: https://cdrlaw.org/resources/removing-carbon-dioxide-through-artificial-upwelling-and-downwelling-legal-challenges-and-opportunities/.

50. Wetlands International and The Nature Conservancy (2014) *Mangroves for coastal defence: Guidelines for coastal managers & policy makers*. Available at: https://www.nature.org/media/oceansandcoasts/mangroves-for-coastal-defence.pdf.

51. WHOI (2020) *Ocean warming*. Available at: https://www.whoi.edu/know-your-ocean/ocean- topics/climate-weather/ocean-warming/#:~:text=Scientists%20estimate%20the%20global%20ocean,bleaching%20and%20other%20w arming%20impacts.

52. WTTC (2022) *NATURE POSITIVE TRAVEL & TOURISM: Travelling in harmony with nature, World Travel and Tourism Council*. Available at: https://wttc.org/Portals/0/Documents/Reports/2022/Nature-Positive-Travel-And-Tourism.pdf.

53. WWF (2004) *Mediterranean water resources threatened by expanding tourism*. Available at: https://wwf.panda.org/wwf_news/?14176/Mediterranean-water-resources-threatened-by-expanding-tourism.

54. WWF (2022) "*Living Planet Report 2022,*" WWF. Available at: https://www.wwf.org.uk/our- reports/living-planet-report-2022.

55. WWF (2023a) *Four threats to manatees and mangroves in Florida – and how we can save them*. Available at: https://www.worldwildlife.org/stories/four-threats-to-manatees-and-mangroves-in-florida-and-how- we-can-save-them.

56. WWF (2023b) *Sustainable Seafood* | *Industries* | *WWF*. Available at: https://www.worldwildlife.org/industries/sustainable-seafood.

57. WWF. (2021). *Four threats to manatees and mangroves in Florida – and how to save them.* Available at: https://www.worldwildlife.org/stories/four-threats-to-manatees-and-mangroves-in-florida-and-how-we-can-save- them#:~:text=And%20in%20the%20past%20100,declined%20by%20nearly%2060%20percent.

58. Yirka, B. (2022) "*Study shows 90% of marine species at risk of extinction by 2100 if greenhouse gas emissions are not curbed,*" Phys.org, 23 August. Available at: https://phys.org/news/2022-08-marine-species-extinction-greenhouse-gas.html.

59. Zsl (2023) "*COP15 - The Global Biodiversity Framework*," The Zoological Society of London, 21 February. Available at: https://www.zsl.org/news-and-events/feature/spotlight-nature-cop15-global-biodiversity-framework.

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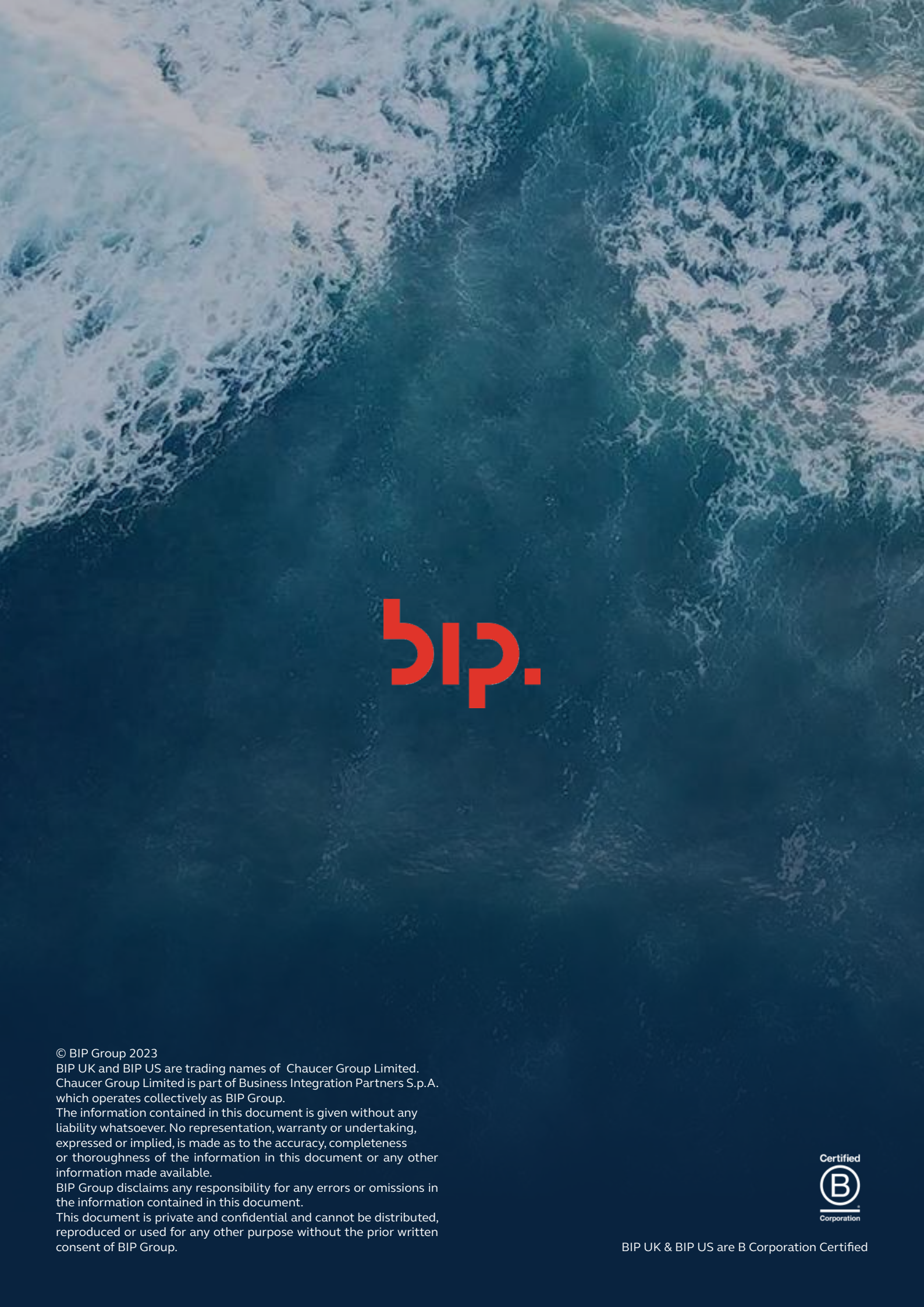

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