

COASTAL AND MARINE ECOSYSTEMS AS NATURE-BASED SOLUTIONS IN NEW OR UPDATED NATIONALLY DETERMINED CONTRIBUTIONS

Provisional Analysis as of June 2021



CONSERVATION
INTERNATIONAL



giz
Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

The Nature
Conservancy 

Recommended Citation

Lecerf, M., Herr D., Thomas, T., Elverum, C., Delrieu, E. and Picourt, L., (2021), Coastal and marine ecosystems as Nature-based Solutions in new or updated Nationally Determined Contributions, Ocean & Climate Platform, Conservation International, IUCN, GIZ, Rare, The Nature Conservancy and WWF.

Acknowledgements

This analysis was coordinated by Loreley Picourt (Ocean & Climate Platform) and co-authored by Marine Lecerf (OCP), Esther Delrieu (OCP), Dorothée Herr (IUCN), Tamara Thomas (Conservation International) and Claire Elverum (CI).

The writing team was supported and the analysis reviewed by Lisa Schindler Murray (Rare), Victoria Romero (IUCN), Pauli Merriman (WWF), Julika Tribukait (WWF), Shirley Matheson (WWF), Karen Douthwaite (WWF), Thilanka Seneviratne (GIZ), Emily Landis (The Nature Conservancy), Beatriz Granziera (TNC), John Verdieck (TNC), Moushumi Chaudhury (TNC), and Françoise Gaill (OCP).

The co-authors would also like to thank the following experts for their external review, expert opinion and valuable contributions: Dr Robert Blasiak (Stockholm Resilience Centre), Courtney Durham (Pew Charitable Trust), Sylvie Goyet (FPA2), Thomas Hickey (Pew Charitable Trust), Kirsten Isensee (IOC-UNESCO), Anna-Marie Laura (Ocean Conservancy), Olivia Lopez (Ocean Conservancy), Rémi Parmentier (Because the Ocean initiative), Dr Torsten Thiele (Global Ocean Trust) and Dr Anna Zivian (Ocean Conservancy).

The writing and review of the document was made possible through the generous support of the French



Agency for Development (AFD) and French Office for Biodiversity (OFB):

Cover picture: © Toby Matthews

This document was designed by Natacha Bigan.

Disclaimer

The suggestions, recommendations and opinions provided in this report belong solely to the authors and do not necessarily represent the policies of Conservation International, GIZ, IUCN, Ocean & Climate Platform, Rare, The Nature Conservancy or WWF.

ACRONYMS

AFOLU: Agriculture, Forestry and Other Land Use

BTR: Biennial Transparency Report

CBD: Convention on Biological Diversity

COP: Conference of Parties

DESA: UN Department of Economic and Social Affairs

EbA: Ecosystem-based Adaptation

EEZ: Exclusive Economic Zone

G7: Group of Seven

GCA: Global Climate Action Agenda

GHG: Greenhouse Gas Emission

ICTU: Information to facilitate Clarity, Transparency and Understanding

IGO: Intergovernmental Organization

INDC: Intended Nationally Determined Contributions

IPCC: Intergovernmental Panel on Climate Change

IPLC: Indigenous People and Local Communities

IUCN: International Union for Conservation of Nature

LMMA: Locally Managed Marine Areas

LULUCF: Land Use, Land-Use Change and Forestry

MRV: Monitoring, Reporting and Verification

MSP: Marine Spatial Planning

MPA: Marine Protected Areas

NAP: National Adaptation Plans

NbS: Nature-based Solutions

NDC: Nationally Determined Contributions

OECM: Other effective area-based conservation measures

R&D: Research and Development

RPC: Representative Concentration Pathway

REDD: Reducing Emissions from Deforestation and Forest Degradation

SBSTA: Subsidiary Body of Scientific and Technological Advice

SDG: Sustainable Development Goal

SIDS: Small Island Developing States

SMA: Special Management Areas

SROCC: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate

UN: United Nations

UNFCCC: UN Framework Convention on Climate Change

KEY TERMINOLOGY

Nature-based Solutions (NbS) are defined by the International Union for Conservation of Nature (IUCN) as “actions to protect, sustainably manage and restore natural and modified ecosystems in ways that address societal challenges effectively and adaptively, to provide both human well-being and biodiversity benefits.”

Applying the definition above to NbS specific to coastal and marine environments, **Nature-based Solutions in coastal and marine ecosystems** (coastal and marine NbS) are actions to protect, sustainably manage and restore coastal and marine ecosystems in ways that address societal challenges effectively and adaptively. Coastal and marine NbS are based on the ability of coastal and marine ecosystems to sequester CO₂ (i.e., blue carbon ecosystems), and/or their ability to foster adaptation and resilience of communities and ecosystems, by acting as buffers against climate change impacts while improving livelihoods.

Ocean-based solutions refer to the opportunities offered by - and related to - the global ocean to sustainably contribute to mitigate climate change and adapt to its impacts. It includes areas of focus such as restoring coastal blue carbon ecosystems, developing marine renewable energy, sustainable and climate-smart fisheries and aquaculture, and greening the shipping sector¹. While coastal and marine NbS aim to achieve multiple socio-economic benefits, the sole objective of ocean-based solutions is climate mitigation and adaptation.

Blue carbon is “the carbon stored in coastal and marine ecosystems.” **Blue carbon ecosystems** (further defined as mangroves, seagrasses and saltmarshes) sequester and store large quantities of blue carbon. In addition to climate mitigation benefits, these ecosystems provide multiple services such as climate adaptation benefits, and resultant ecosystem services to local populations. The term “blue carbon” is also increasingly being applied to other ecosystems beyond mangrove, seagrass and saltmarshes and potential mitigation benefits that may be achieved by protection of these places. However, at this time, only mangrove, seagrass and saltmarsh have IPCC approved guidance (the 2013 Wetlands Supplement⁴) on the measurable extent to which these protections can contribute to a country’s emission reduction efforts.

Ecosystem services are the beneficial interactions of ecosystems to human populations⁵. Coastal and marine ecosystem services include: provisioning services (e.g., fisheries, building materials); supporting services (e.g., life-cycle maintenance for both fauna and local communities, element and nutrient cycling); regulating services (e.g., carbon sequestration and storage, erosion prevention, waste-water treatment, moderation of extreme events); and cultural services (i.e., tourism, recreational, aesthetic, and spiritual benefits).

1/ IUCN (2020b). Defining Nature-based Solutions.

2/ World Resources Institute (2021). 4 Ocean-based Solutions to Advance Climate Action Through NDCs.

3/ The Blue Carbon Initiative (2021). Guidelines for Blue Carbon and Nationally Determined Contributions

4/ IPCC. (2014a). 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands, Hiraishi T, Krug T, Tanabe K, Srivastava N, Baasansuren J, Fukuda M, and Troxler TG. (eds). Published: IPCC, Switzerland.

5/ OCEAN AND CLIMATE (2015). Ecosystem Services and Marine Conservation, Ocean and Climate Platform.

TABLE OF CONTENT

| | |
|----|--|
| 6 | EXECUTIVE SUMMARY AND HIGHLIGHTS |
| 11 | PURPOSE OF THIS BRIEF |
| 12 | INTRODUCTION |
| 16 | 1. COASTAL AND MARINE NATURE-BASED SOLUTIONS IN MITIGATION EFFORTS |
| 19 | (a) Mitigation capacities of coastal blue carbon ecosystems |
| 20 | (b) Mitigation capacities of other coastal and marine ecosystems |
| 22 | 2. COASTAL AND MARINE NATURE-BASED SOLUTIONS IN ADAPTATION EFFORTS |
| 26 | (a) Protecting and restoring coastal and marine ecosystems |
| 26 | (b) Coastal zone management and protected areas |
| 27 | (c) Climate-ready fisheries and fishing communities |
| 28 | 3. MITIGATION AND ADAPTATION CO-BENEFITS IN COASTAL AND MARINE NATURE-BASED SOLUTIONS |
| 30 | (a) Mitigation co-benefits of adaptation measures: Enhancing carbon sinks and reservoirs |
| 31 | (b) Adaptation co-benefits of mitigation measures: Protecting coastal communities and infrastructure |
| 31 | (c) Providing other socioeconomic benefits to local populations |
| 34 | 4. CREATING THE CONDITIONS TO EFFECTIVELY IMPLEMENT COASTAL AND MARINE NATURE-BASED SOLUTIONS |
| 37 | (a) Feasibility: strengthening support for action |
| 38 | (b) Societal engagement: inclusiveness and participation |
| 39 | (c) Reporting, monitoring and transparency |
| 40 | 5. COASTAL AND MARINE NATURE-BASED SOLUTIONS: COMPARING UPDATED NDCS WITH FIRST (I)NDCS |
| 44 | CONCLUSION: KEY TAKEAWAYS AND WAYS FORWARD |

Fig. 1: Overview of coastal and marine NbS as mitigation and/or adaptation measures in new or updated NDCs

Fig. 2: Countries including coastal and marine NbS as mitigation and/or adaptation components in their new or updated NDCs

Fig. 3: The NDC ambition cycle

Fig. 4: Countries including coastal and marine NbS as mitigation components in their new or updated NDCs

Fig. 5: Countries including coastal and marine NbS as adaptation component in their new or updated NDCs

Fig. 6: Overview of coastal and marine NbS as mitigation and/or adaptation measures in new or updated NDCs

Table 1. Coastal and marine NbS as part of new or updated NDCs

Table 2. Coastal and marine NbS as mitigation components of new or updated NDCs

Table 3. Coastal and marine NbS as adaptation components of new or updated NDCs

Table 4. Co-benefits in coastal and marine NbS as part of new or updated NDCs

Table 5. Creating the conditions to effectively implement coastal and marine NbS

Table 6. Comparing first and updated NDCs to assess their level of ambition on the inclusion of coastal and marine NbS for mitigation and/or adaptation measures

EXECUTIVE SUMMARY AND HIGHLIGHTS

This policy brief examines the new or updated Nationally Determined Contributions (NDCs)⁶, submitted as part of the first revision cycle mandated by the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC), with regard to the inclusion of specific efforts addressing coastal and marine Nature-based Solutions (NbS) as climate mitigation and/or adaptation measures.

This policy brief follows a two-step publication process: (1) the present and provisional draft being published after the UNFCCC inter-sessions (June 2021) which reviews new or updated Nationally Determined Contributions (NDCs) submitted until 8 June 2021; and (2) the final report which will be published ahead of UNFCCC COP26 (November 2021) containing a review of all new or updated NDCs submitted as part of the first NDC revision cycle.

As part of the Paris Agreement under the UNFCCC, Parties must submit updated NDCs every five years, with a review process that is intended to continually increase ambition (Art 4.3 and 4.9 of the Paris Agreement). Following the submissions of initial NDCs, prior and during UNFCCC COP21 in 2015, the first NDC revision was nine months ahead of the relevant COP (thus March 2020). Given the global COVID-19 pandemic, Parties to the Paris Agreement were given additional flexibility to submit their new or updated NDCs ahead of COP26, now scheduled to take place 1-12 November 2021.

Coastal and marine Nature-based Solutions - 'coastal and marine NbS' - provide significant opportunities in terms of climate mitigation, adaptation and resilience, both for people and nature⁷. When initially submitted in 2015, 112 out of 161 countries' NDCs (i.e., 70%⁸) acknowledged climate change vulnerability of coastal and marine ecosystems and communities, as well as means for ocean-based mitigation and adaptation strategies, including coastal and marine NbS among others. The present brief focuses exclusively on coastal and marine NbS in new or updated NDCs. As a result, other ocean-based solutions, such as offshore renewable energy or shipping-related measures, were not considered in this analysis.

The present analysis aims to highlight how countries have considered coastal and marine NbS as mitigation and/or adaptation solutions within enhanced ambition in their new or updated NDCs. It also provides details on how countries have included adaptation and mitigation co-benefits of coastal and marine NbS, along with other enabling conditions to effectively implement coastal and marine NbS (e.g., capacity-building, indigenous and local knowledge, finance, monitoring). This analysis further considers whether ambition has increased, remained unchanged or decreased compared to the 2015 NDCs.

^{6/} The analysis in this brief includes new (i.e., first country submission) and updated (i.e., second country submission) NDCs. New NDCs will be marked with an asterisk (*).

^{7/} Narayan, S., et al. (2016). The Effectiveness, Costs and Coastal Protection Benefits of Natural and Nature-Based Defences. *PLoS ONE* 11(5): e0154735. <https://doi.org/10.1371/journal.pone.0154735>

^{8/} Gallo, N., Victor, D., & Levin, L. (2017). Ocean commitments under the Paris Agreement. *Nature Climate Change*. 7. nclimate3422. 10.1038/nclimate3422.

HIGHLIGHTS

The provisional draft of this analysis reviews 63 new or updated NDCs submitted between 29 March 2019 and 8 June 2021.

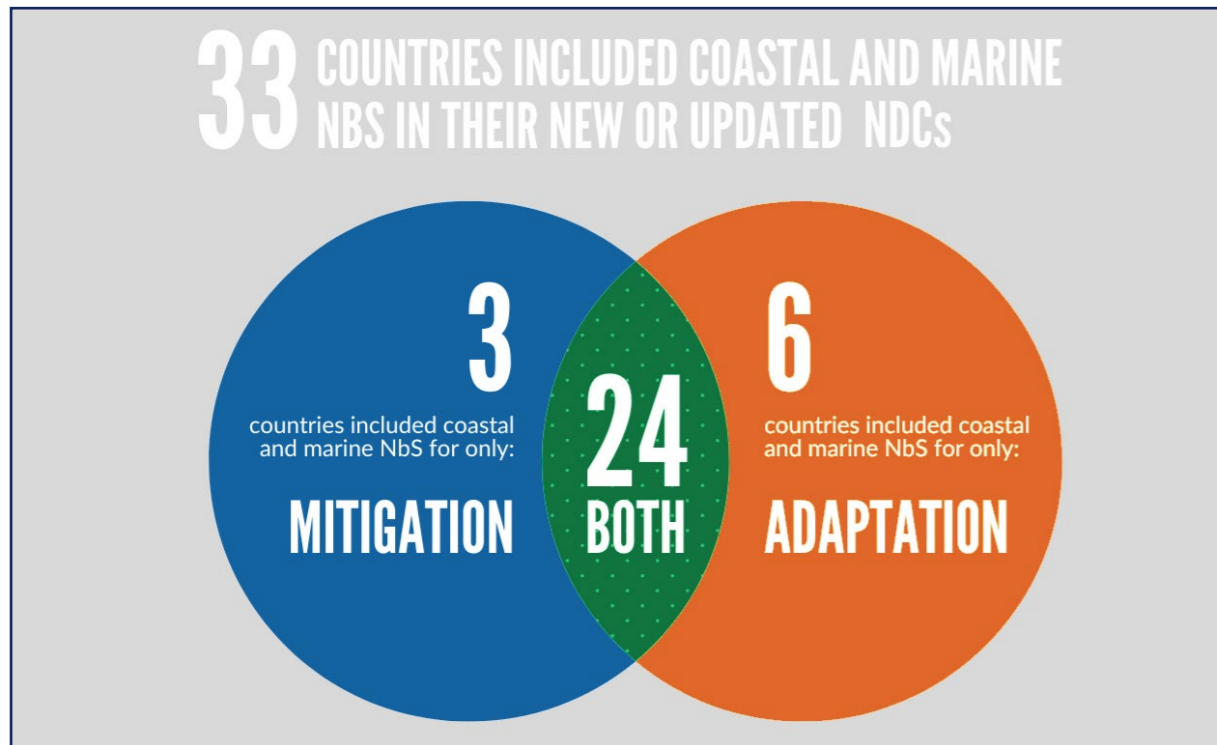


Fig.1: Overview of coastal and marine NbS as mitigation and/or adaptation measures in new or updated NDCs

This analysis suggests that there is a greater recognition and appreciation of the role played by coastal and marine NbS in achieving climate objectives in line with the Paris Agreement, compared to INDC or first NDC. In that regard:

- 29 countries have submitted an updated NDC considering coastal and marine NbS ;
- 25 countries have added coastal and marine NbS for climate mitigation and/or adaptation in their most recent NDC compared to their (I)NDCs ;
- Among these, 15 countries now include coastal and marine NbS in the mitigation part where before there were none; and 19 did so for adaptation.

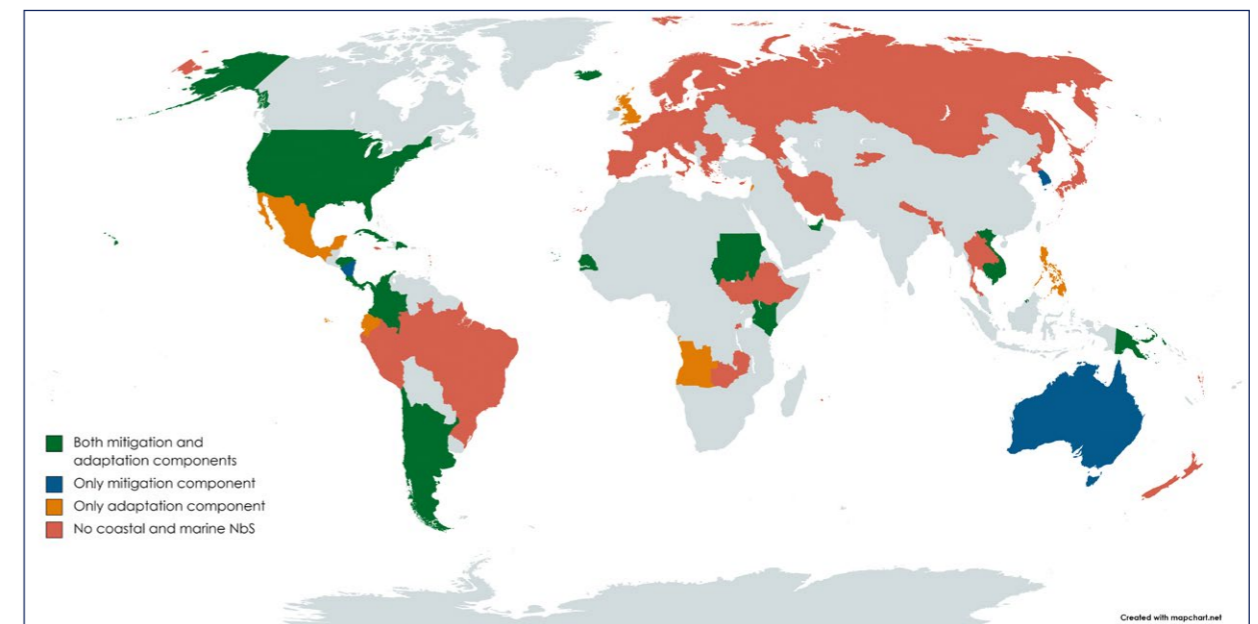


Fig. 2: Countries including coastal and marine NbS as mitigation and/or adaptation components in their new or updated NDCs [temporary: out of 63 NDCs received to date, 8 June 2021]
Source: Ocean and Climate Platform via <https://mapchart.net/>

| Action Type | Countries (out of 63 submissions) |
|--|---|
| I. Coastal and marine NbS Countries that included coastal and marine NbS in their new or updated NDC | 33 countries: Angola, Argentina, Australia, Brunei Darussalam*, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador*, Fiji, Honduras, Iceland, Kenya, Lebanon, Maldives, Mexico, Nicaragua, Panama, Papua New Guinea, Philippines*, Republic of Korea, Saint Lucia, Senegal*, Singapore, Sudan, Tonga, United Arab Emirates, United Kingdom, United States, Vietnam |
| a. NbS for both Mitigation and Adaptation Countries that included coastal and marine NbS in both mitigation and adaptation efforts | 24 countries: Argentina, Brunei Darussalam*, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Fiji, Honduras, Iceland, Kenya, Maldives, Panama, Papua New Guinea, Saint Lucia, Senegal*, Singapore, Sudan, Tonga, United Arab Emirates, United States, Vietnam |
| b. NbS only for Mitigation Countries that included only coastal and marine NbS in mitigation efforts | 3 countries: Australia, Nicaragua, Republic of Korea |
| c. NbS only for Adaptation Countries that included only coastal and marine NbS in adaptation efforts | 6 countries: Angola, Ecuador*, Lebanon, Mexico, Philippines*, United Kingdom |
| II. No coastal and marine NbS Countries that have submitted their new or updated NDCs but do not include coastal and marine NbS | 29 countries and the European Union: Andorra, Armenia, Bangladesh, Brazil, Bosnia Herzegovina, Democratic People's Republic of Korea (DPRK), Ethiopia, European Union (27 countries**), Georgia, Grenada, Jamaica, Japan, Kyrgyzstan*, Lao People's Democratic Republic, Marshall Islands, Monaco, Mongolia, Nepal, New Zealand, Norway, Peru, Republic of Macedonia, Russian Federation*, Rwanda, South Sudan*, Switzerland, Thailand, Vanuatu, Zambia |

Table 1. Coastal and marine NbS as part of new or updated NDCs

Countries marked with an asterisk in this analysis refer to countries that submitted a new NDC (i.e., Brunei Darussalam, Ecuador*, Philippines* and Senegal*)

**The EU-27 member countries: Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France (including its NDC Supplement), Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal,

Disclaimer

The analysis in this brief focuses exclusively on countries that have integrated coastal and marine NbS in their new or updated Nationally Determined Contributions (NDCs). As a result, countries that did not refer to coastal and marine NbS in their new or updated NDCs, despite mentioning such solutions in their initial NDCs (submitted in 2015), or including other ocean-based measures such as offshore renewable energy or emission-reduction measures for shipping, have not been included.

In addition, this brief analyses the content of 63 new or updated NDCs submitted between 29 March 2019 and 8 June 2021. NDCs submitted past this date will be included in a revised version of this brief, which will be published ahead of UNFCCC - COP26, 1-12 November 2021. Some countries have expressed their intention to amend their NDCs in the upcoming months. Such additions will be integrated in the final draft of this brief.

Purpose of this brief

The first revision cycle of NDCs offers an opportunity for Parties to make greater use of coastal and marine NbS in their national strategies and actions. In a context of growing attention given to ocean-related measures in climate strategies and actions over the last 6 years, the present brief analyses the extent to which Parties to the Paris Agreement have increased, remained unchanged or decreased through the inclusion of NbS in coastal and marine ecosystems in their mitigation and/or adaptation measures as part of their new or updated Nationally Determined Contributions.

Since 29 March 2019, 63 Parties have officially submitted their new or updated NDCs (Table 1). This brief analyses the 63 NDCs submitted up to 8 June 2021 to quantitatively and qualitatively assess whether and how coastal and marine NbS have been included within the new or updated NDCs. NDCs submitted past 8 June 2021 will be included in a revised version of this brief, which will be published shortly before UNFCCC - COP26, 1-12 November 2021.



INTRODUCTION

The Nationally Determined Contribution revision cycle under the Paris Agreement

The Nationally Determined Contributions (NDCs) are at the core of the Paris Agreement. As an innovative and bottom-up approach, NDCs combine voluntary and legally binding elements that enable governments to have the flexibility needed to detail and submit country-level plans to address climate change based on the country's context, capacity and flexibility. Communicated every five years, NDCs periodically demonstrate Parties' mitigation and adaptation intentions, while also describing how the NDCs will be achieved. The NDC cycle provides an opportunity for Parties to update¹⁰, assess and review their national climate commitments, as each successive NDC is required to showcase increased ambition compared to the previous NDC (Article 4.3 of the Paris Agreement).

The Paris Agreement adopted by all 196 Parties to the United Nations Framework Convention on Climate Change (UNFCCC) at the 21st Conference of the Parties (COP21), on 12 December 2015, commits to take action to limit global temperature rise to "well below" 2°C and pursue efforts to limit it to 1.5°C (Article 2).

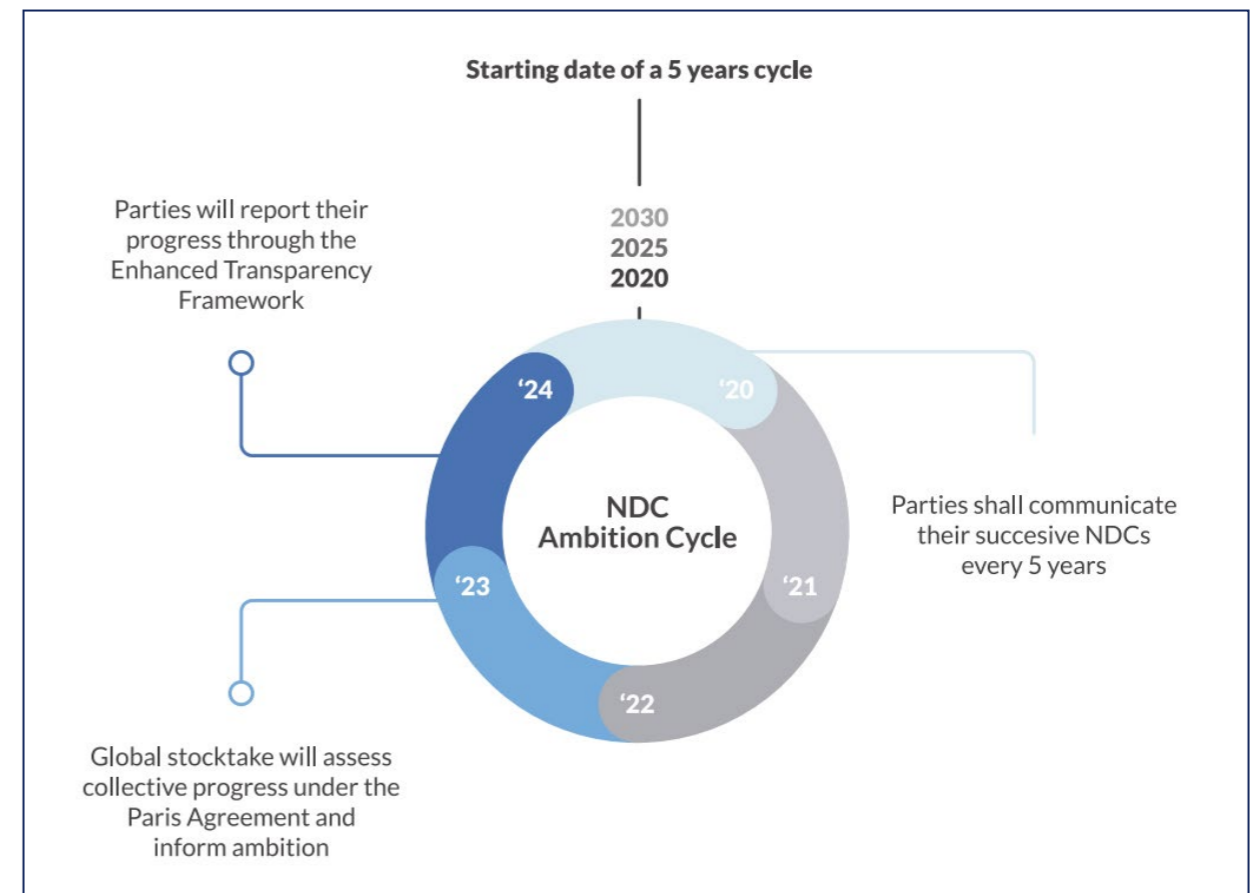


Fig. 3: The NDC ambition cycle (Source: Adapted from a presentation by Joanna Post, UNFCCC Secretariat, at the Because the Ocean workshops held in Madrid and Suva, April-May 2019)¹¹

^{10/} Fransen, T., et al. (2019), Enhancing NDCs: A Guide to Strengthening National Climate Plans by 2020, Washington, DC: World Resources Institute.

^{11/} Because the Ocean (2019), Ocean for Climate: Ocean-Related Measures in Climate Strategies

The growing inclusion of coastal and marine Nature-based Solutions in climate strategies

In 2015, when countries submitted their (I)NDCs, ahead of and immediately following the 2015 UNFCCC COP 21 in Paris¹², 112 out of 161 NDCs (i.e., 70%¹³) acknowledged climate change vulnerability of coastal and marine ecosystems and communities and the role of ocean-based solutions¹⁴ for mitigation and adaptation - including coastal and marine NbS, as well as other ocean-based solutions such as marine renewable energy and shipping-related measures within the scope of the Paris Agreement¹⁵. However, despite the many ocean-inclusive NDCs, only 19% of Parties with coastal wetland ecosystems included them specifically in their 2015 NDC for mitigation, recognizing their carbon storage and sequestration values¹⁶. The NDC ambition gap¹⁷ highlighted a need for improved communication around options for specific targets, actions and next steps to be taken around identified ocean-based solutions¹⁸.

Since then, the ocean has been receiving growing attention at the climate negotiations. A number of state-led initiatives (e.g., Because the Ocean initiative, Ocean Pathway Partnership, High-level Panel for a Sustainable Ocean Economy) and

coalitions from civil society, UN agencies and IGOs (e.g., Ocean & Climate Platform) emerged to voice the important role of the ocean in regulating the global climate system¹⁹ and advocate for a better inclusion of the ocean under the Paris Agreement and UNFCCC processes and mechanisms. For instance, since 2016 country signatories to the Because the Ocean initiative have paved the way by encouraging for greater inclusion of ocean-related and ocean-based solutions and measures within the scope and implementation of NDCs²⁰ and other mechanisms, such as the National Adaptation Plans (NAPs) and Adaptation Communications²¹. Furthermore, significant progress has been achieved in terms of generating and compiling scientific knowledge (e.g., IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC), process of UN Decade of Ocean Science for Sustainable Development), mobilising civil society under the UNFCCC Marrakesh Partnership (e.g., Global Climate Action Agenda (GCA)-Ocean and Coastal zones), and policy mainstreaming (e.g., Subsidiary Body of Scientific and Technological Advice (SBSTA) Dialogue on Ocean and Climate).

Identified as “low-regret options²²”, local coastal and marine NbS offer significant and cost-effective mitigation and adaptation measures, while providing multiple co-benefits to communities and ecosystems. For instance, services provided by mangrove habitats to human livelihoods are estimated to be worth at least \$US 1.6 billion

annually²³. While contributing to climate change mitigation and adaptation, coastal and marine NbS also have the potential to contribute greatly to a suite of Sustainable Development Goals (SDGs) including SDG 14 to “sustainably manage and protect marine and coastal ecosystems,” as well as other global goals (e.g. food security, clean energy, clean water, decent work and climate change)²⁴.

Adopting and scaling-up coastal and marine NbS can, for some countries, act as a multi-purpose solution for climate mitigation and adaptation²⁵. They have the potential to enhance systemic integration, connecting across climate and biodiversity goals²⁶. It is crucial to ensure that climate action is complementary to, rather than in conflict with, biodiversity conservation. Net-zero targets must be aligned to the goals of the Paris Agreement and biodiversity-positive, or at least biodiversity-neutral²⁷.

12/ Prior to and during UNFCCC COP 21, in 2015, 163 countries submitted their intended NDCs (INDCs), and 81 countries published their first NDC. In absence of such publication, INDCs were automatically counted as the country's first NDC at the ratification of the Paris Agreement.

13/ Gallo, N., Victor, D., & Levin, L. (2017)

14/ Northrop, E., et al. (2020). “Enhancing Nationally Determined Contributions: Opportunities for Ocean-Based Climate Action” Working Paper. Washington, DC: World Resources Institute.

15/ Gallo, N., Victor, D., & Levin, L. (2017)

16/ Herr, D. & Landis, E. (2016). Coastal blue carbon ecosystems. Opportunities for Nationally Determined Contributions. Policy Brief. Gland, Switzerland: IUCN and Washington, DC, USA: TNC.

17/ UNEP (2018). Emissions Gap Report. United Nations Environment Programme, Nairobi.

18/ Von Unger, M. et al. (2020). Blue NbS in NDCs. A booklet for successful implementation. GIZ.

19/ OCEAN AND CLIMATE (2019a), Scientific Fact Sheets, Ocean and Climate Platform, p.1-130

20/ Because the Ocean (2016), Second Because the Ocean Declaration

21/ Because the Ocean (2019)

22/ Magnan, A.K. et al. (2018). Ocean-based measures for climate action. IDDRI, Policy Brief N°06/18.

23/ Ibid

24/ IPBES-IPCC. (2021). IPBES-IPCC Co-Sponsored Workshop Report on Biodiversity and Climate Change.

25/ IUCN (2020a). Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS.

26/ Diz, D. et al. (2021). Blueprint for a Living Planet: Four Principles for Integrated Ocean-Climate Strategies.

27/ Deprez, A. et al. (2021). Aligning high climate and biodiversity ambitions in 2021 and beyond: why, what, and how? IDDRI, Study N°05/21.



COASTAL AND MARINE NATURE-BASED SOLUTIONS IN MITIGATION EFFORTS

Reducing greenhouse gases (GHG) emissions, and in particular CO₂ emissions, is essential to maintain the health of marine life, as well as the climate regulating functions and ecosystem services provided by the ocean²⁸. It is currently the only option to mitigate ocean warming, acidification, deoxygenation, sea level rise, impacts of extreme weather events and destruction of particularly sensitive ecosystems at a global scale²⁹.

While reducing emissions is critical, intact “blue carbon” ecosystems (i.e., mangroves, saltmarshes, seagrasses) are particularly efficient in mitigating climate change, as they have a high CO₂ sequestration and storage capacity. Despite covering only 2% of the total ocean area, coastal ecosystems account for approximately 50% of the total carbon sequestered in ocean sediments³⁰. Other coastal ecosystems (e.g., kelp forests, coastal peatlands, soft-bottom benthic habitats³¹) are also recognized for the role they play in the global carbon cycle, however the measurable amount by which they remove carbon from this cycle is still being assessed and not yet recognized by IPCC-approved methodologies. “Blue carbon ecosystems” hence refers to mangrove, seagrass and saltmarshes. Despite their significant carbon sequestration and storage capacity, as well as providing a range of benefits in helping people to adapt and become more resilient to a changing climate, these ecosystems are disappearing globally at a high rate, as they are particularly vulnerable to the impacts of climate change and other anthropogenic pressures (e.g., pollution, coastal development, artificialisation, overexploitation).

In that regard, the protection, restoration and conservation of blue carbon ecosystems represent an effective coastal and marine NbS to contribute to achieving emission reduction plans and climate action in line with the Paris Agreement. For instance, mangrove habitats store around 6.4 billion tons of carbon at a global scale³². In 2014, they sequestered the equivalent of more than 1% of national fossil fuel emissions for large countries like Colombia, Nigeria and Bangladesh³³. It is also worth noting that these solutions could be further developed, as blue carbon ecosystems are widely spread across the globe. Indeed, 151 countries around the world possess at least one of these three ecosystems, and 71 countries contain all three of them³⁴.

The present section looks at the 27 countries which have included coastal and marine NbS for mitigation purposes in their new or updated NDCs (Figure 4). Table 2 outlines the protection and restoration of (a) coastal blue carbon ecosystems and (b) other coastal ecosystems (e.g., kelp forests, peatlands, plankton). Only 2 countries (Chile and Costa Rica) included the protection and restoration of both ecosystem types in their new or updated NDC. Additionally, frameworks and mechanisms related to the UNFCCC (i.e., the IPCC Wetland Supplement or LULUCF³⁵ accounting) were included in updated or new NDCs in relation to coastal and marine NbS, thereby giving additional substance to the commitments undertaken. →

28/ IPCC (2019). Summary for Policymakers. In: Special Report on the Ocean and Cryosphere in a Changing Climate (H.-O. Portner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N. M. Weyer (eds.)).

29/ *ibid*

30/ The Blue Carbon Initiative (2021). Mitigating Climate Change through Coastal Ecosystem Management.

31/ Solan M, et al. (2020) Benthic-based contributions to climate change mitigation and adaptation. *Phil. Trans. R. Soc. B* 375: 20190107. <http://dx.doi.org/10.1098/rstb.2019.0107>

32/ The Nature Conservancy (2020a). The carbon sequestration power of coastal wetlands, *Mapping Ocean Wealth*.

33/ Taillardat et al., (2018) Mangrove blue carbon strategies for climate change mitigation are most effective at the national scale, *Biol. Lett.* 14: 20180251.

34/ The Blue Carbon Initiative (2020). Guidelines for Blue Carbon and Nationally Determined Contributions.

35/ Land Use, Land-Use Change and Forestry (LULUCF) is a GHG inventory sector for countries to quantify and account for the emissions and removals of GHGs from terrestrial lands.

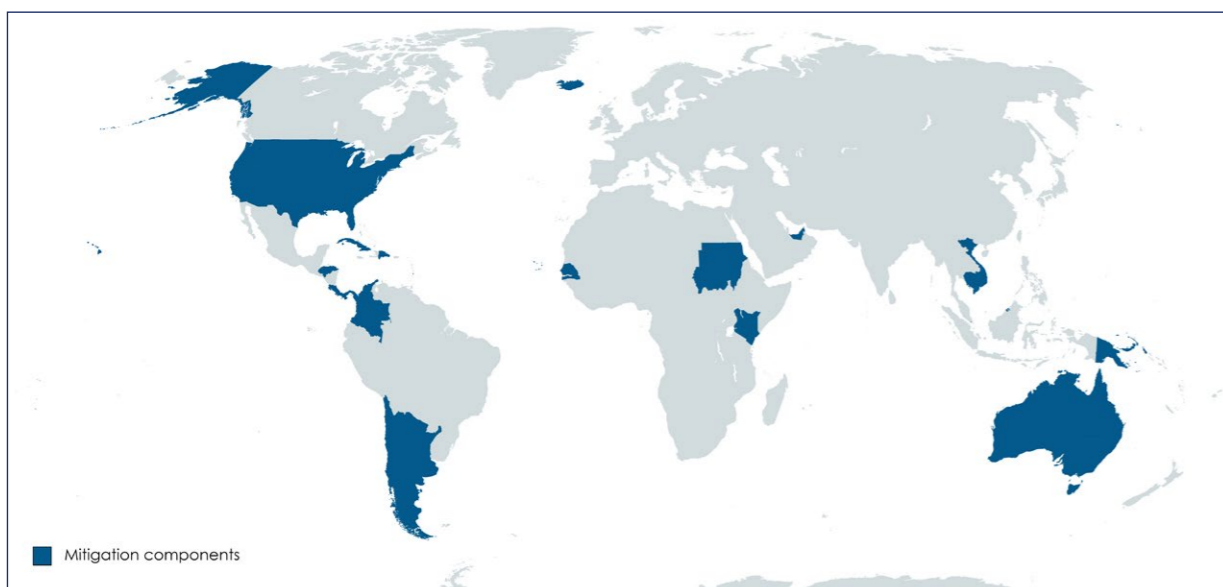


Fig. 4: Countries including coastal and marine NbS as mitigation components in their new or updated NDCs [temporary: out of 63 NDCs received to date, 8 June 2021]

Countries (27): Argentina, Australia, Brunei Darussalam*, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Fiji, Honduras, Iceland, Kenya, Maldives, Nicaragua, Panama, Papua New Guinea, Republic of Korea, Saint Lucia, Senegal*, Singapore, Sudan, Tonga, United Arab Emirates, United States, Vietnam

Source: Ocean and Climate Platform via <https://mapchart.net/>

| Types | Countries (out of 63 submissions) |
|---|---|
| I. Protecting and restoring marine and coastal ecosystems Countries that included coastal and marine NbS as mitigation components of their new or updated NDCs (i.e., conservation and restoration of mangroves, seagrasses, saltmarshes, and other coastal wetlands) | 27 countries: Argentina, Australia, Brunei Darussalam*, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Fiji, Honduras, Iceland, Kenya, Maldives, Nicaragua, Panama, Papua New Guinea, Republic of Korea, Saint Lucia, Senegal*, Singapore, Sudan, Tonga, United Arab Emirates, United States, Vietnam |
| a. Coastal blue carbon ecosystems Countries that included the conservation or restoration of mangroves, seagrasses, and/or saltmarshes as mitigation components of their new or updated NDCs | 25 countries: Australia, Brunei Darussalam, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Fiji, Honduras, Iceland, Kenya, Maldives, Nicaragua, Panama, Papua New Guinea, Saint Lucia, Senegal*, Singapore, Sudan, Tonga, United Arab Emirates, United States, Vietnam |
| b. Other marine and coastal ecosystems Countries that included the protection or restoration of other coastal and marine ecosystems (e.g., algae, kelp forests, peatlands) as mitigation components of their new or updated NDCs | 5 countries: Argentina, Chile, Costa Rica, Fiji, Republic of Korea |
| II. Frameworks and mechanisms | |
| a. IPCC Wetlands Supplement Countries that included a reference to the IPCC 2013 Wetlands Supplement for coastal wetlands in their new or updated NDCs | 7 countries: Australia, Fiji, Lebanon, Panama, Republic of Korea, Singapore, United Kingdom |
| b. LULUCF and forest management policies Countries that included a reference to the Land-Use Change and Forestry (LULUCF) Framework, in relation to coastal and marine NbS, in their new or updated NDCs | 5 countries: Australia, Honduras, Panama, Singapore, Vietnam |

Table 2. Coastal and marine NbS as mitigation components of new or updated NDCs

Countries marked with an asterisk in this analysis refer to countries that submitted a new NDC (i.e., Brunei Darussalam, Ecuador*, Philippines*)

(a) Mitigation capacities of coastal blue carbon ecosystems

In total, 27 countries have included protection, conservation and restoration measures related to marine and coastal ecosystems (Table 2.1). Of these 27 countries, 25 new or updated NDCs mention mangroves, seagrasses and/or saltmarshes (see Table 2.1.a).

- The **United Arab Emirates** has included mangroves protection and restoration measures. Its updated NDC mentions the planting of 30 million mangrove seedlings by 2030, as well as the inclusion of at least 20% of marine blue carbon ecosystems within its national protected areas. The United Arab Emirates is working towards incorporating the value of blue carbon stocks into national policies.

- **Sudan** directly referred to “blue carbon” ecosystems and committed to restore and conserve mangrove forests in Red Sea State in order to achieve its 2021-2030 GHG emission reduction targets.

- **Senegal*** integrated the restoration of 4000 hectares of mangrove areas on an annual basis. More generally, the country has recognized the role of mangrove forests in sequestering carbon emissions.

- **Costa Rica** recognized the mitigation potential of coastal and marine habitats like mangroves, and directly referred to them as “blue carbon ecosystems”. It has committed to restore 80% of mangroves forests located in the Gulf of Nicoya by 2030, and expressed its intention to make sure that protected and restored coastal wetlands are effectively managed and monitored.

- **The United States of America** considered multiple pathways to reduce GHG emissions in its updated NDC, including ocean-based solutions, and committed to scale-up efforts to increase sequestration in the

ocean by pursuing blue carbon.

Chapter IV of the IPCC Wetlands Supplement provides scientific knowledge and guidelines on the inclusion of coastal wetlands, specifically seagrasses, saltmarshes and mangroves, into national inventories and communications using a tiered approach allowing for flexibility around technical capacities³⁶. 7 countries included a reference to the IPCC Wetlands Supplement in their new or updated NDCs.

- **Australia** expressed its intention to apply the IPCC 2006 Guidelines, and to use nationally appropriate methods consistent with that guidance and informed inter alia by the IPCC 2013 Wetlands Supplement. In addition, Australia committed to continue updating its methodology across the GHG inventory, including for wetlands, to improve data accuracy.

- **The Republic of Korea** is preparing to apply 2006 IPCC Guidelines and the IPCC 2013 Wetland Supplement to its national GHG inventory demonstrating how it will achieve its GHG emission reduction targets.

Many countries expressed an intention to reduce deforestation and forest degradation, and to enhance sustainable forest management in updated NDCs as part of a mitigation strategy³⁷. Depending on a country’s National Forest Definition, mangroves may be included in its overall forestry related activities, including REDD+, and in its GHG inventory under LULUCF. While many countries address LULUCF and REDD+ activities in their new or updated NDCs, this report does not include an analysis of the supporting documentation that may provide a clearer indication if mangroves are included. The report only included countries which specifically referred to mangroves in their forestry management policies. Additionally, a few countries, such as Papua New Guinea, are in the process of exploring how a national REDD+ programme can further maintain the forest cover, including mangroves, therefore strengthening their coastal NbS mitigation components. Table 2 shows that 5 countries specifically referred to LULUCF

36/ IPCC (2014a)

37/ UNFCCC (2021). Nationally determined contributions under the Paris Agreement. Addendum to the Synthesis report by the secretariat. UNFCCC. /PA/CMA/2021/2/Add.2.

activities in line with protecting coastal ecosystems for mitigation purposes, and more specifically with mangrove-related NbS.

- **Papua New Guinea** aims to include blue carbon ecosystems in the GHG inventory and UNFCCC reporting, with international technical and capacity building support, including to identify pathways to incorporate blue carbon by building upon existing Agriculture, Forestry and Other Land Use (AFOLU) and REDD+ efforts and monitoring, reporting and verification (MRV) capacity, and to further emphasise mangroves and seagrasses in national climate policies.

- **Vietnam** committed to «implementing the target programme for sustainable forestry development for the 2016-2020 period; conserving and enhancing forest carbon stocks; protecting, restoring and planting mangrove and coastal protection forests aiming to exceed over 30% of the plan to 2020³⁸.» The **Vietnamese** NDC therefore contributes to preserving and sustaining such ecosystems in accordance with its forestry policies.

(b) Mitigation capacities of other coastal and marine ecosystems

Beyond mangroves, saltmarshes and seagrasses, the potential mitigation benefits of protecting other marine and coastal ecosystems (such as peatlands, algae, soft bottom habitats or kelp forests) with mitigation potential exist³⁹. However, the measurable mitigation benefits of protecting these ecosystems still needs additional scientific evidence to be quantifiable and included in national GHG inventories. Table 2 I.b. identifies countries which include the protection and restoration of other coastal and marine ecosystems as mitigation components. Only 5 countries have integrated such ecosystems within their revised NDCs.

- **Argentina** expressed its intention to implement ecosystem-based action plans to protect wetlands, peatlands and other ecosystems with significant carbon content to increase its mitigation capacities.

- **Chile** has announced that it will identify peatlands, as well as other categories of wetland under a national inventory framework by 2025, recognizing and quantifying the mitigation value of such areas.



38/ Vietnam's updated NDC (p.19)

39/ Taillardat P. et al. (2020). Climate change mitigation potential of wetlands and the cost-effectiveness of their restorationInterface Focus.102019012920190129 <http://doi.org/10.1098/rsfs.2019.0129>



COASTAL AND MARINE NATURE-BASED SOLUTIONS IN ADAPTATION EFFORTS

NDCs shall embody national efforts to reduce GHG, but Parties to the Convention decided at UNFCCC COP 20 (2014) that Parties should “consider communicating their undertakings in adaptation planning or consider including an adaptation component⁴⁰” in NDCs. Article 7.11 of the Paris Agreement establishes that adaptation communication can be submitted as a component of or in conjunction with other communications or documents, including an NDC⁴¹. While the inclusion of adaptation measures remains optional, most countries have used their NDC to highlight adaptation objectives alongside mitigation components. Adaptation measures are crucial to protect goods, people and ecosystems from increasing climate risks and vulnerability⁴².

Coastal regions and island states already face the destruction of coastal and marine ecosystems, as well as the degradation of the vital services they provide⁴³. The IPCC stated that, in a business-as-usual scenario, global sea level could rise by up to a meter by 2100⁴⁴. Extreme events linked to sea level rise, which previously happened once in a century, could now occur much more frequently. For instance, extreme El Niño events are projected to occur about twice as often under a low-emission scenario (i.e., RCP2.6) in the 21st century when compared to the 20th century⁴⁵. Meanwhile, populations living on the coasts, which are increasingly vulnerable, continue to densify. By 2025, more than 70% of the urban population is expected to be living in coastal cities⁴⁶.

In this context, coastal and marine NbS for adaptation have the potential to protect vulnerable coastal communities and ecosystems from the impacts of climate change (i.e. extreme weather events, coastal erosion, sea-level rise), increasing their resilience and providing key ecosystem services to local populations. For example, coral reefs significantly reduce wave heights during coastal storms and tsunamis by reducing wave energy by an average of 97 %, while providing a range of adaptation measures and helping communities to better cope with climate disasters⁴⁷. This is among the reasons why several countries, such as Papua New Guinea and the Maldives, have included coral reefs in their NDCs.

This section focuses on the 30 countries that have included coastal and marine NbS for adaptation in their new or updated NDC, as illustrated in Figure 5. Table 3 outlines three types of solutions for adaptation: protecting and restoring coastal and marine ecosystems (I.a.); coastal zone management and marine protected areas (I.b.); and climate-ready fisheries and aquaculture (I.c.). 13 countries⁴⁸ included all three solutions types in their new or updated NDC, 9⁴⁹ included two and 8⁵⁰ only included one. Additionally, 7 NDCs mentioned the vulnerabilities facing coastal and marine ecosystems, as well as coastal communities, without including a coastal and marine NbS for adaptation in their NDC (Table 3. II).

→

40/ UNFCCC. (2015). Report of the Conference of the Parties on its twentieth session, held in Lima from 1 to 14 December 2014.

41/ Article 7.11 of the Paris Agreement: “The adaptation communication referred to in paragraph 10 of this Article shall be, as appropriate, submitted and updated periodically, as a component of or in conjunction with other communications or documents, including a national adaptation plan, a nationally determined contribution as referred to in Article 4, paragraph 2, and/or a national communication”

42/ OCEAN AND CLIMATE (2019b). Policy Recommendations: A healthy ocean, a protected climate.

43/ Nichols, C., Zinnert, J., Young, D., (2019). Degradation of Coastal Ecosystems: Causes, Impacts and Mitigation Efforts.

44/ IPCC (2019)

45/ ibid

46/ United Nations Human Settlements Programme. (2011). Global report on human settlement. Cities and Climate Change. Table 1.2.

47/ Ferrario, F. et al. (2014). The effectiveness of coral reefs for coastal hazard risk reduction and adaptation. Nature communications.

48/ Argentina, Cape Verde, Cambodia, Costa Rica, Fiji, Lebanon, Maldives, Panama, Senegal*, Sudan, United Arab Emirates, United Kingdom, Vietnam

49/ Angola, Chile, Colombia, Cuba, Dominican Republic, Kenya, Papua New Guinea, Saint Lucia, Singapore

50/ Brunei Darussalam*, Ecuador*, Honduras, Iceland, Mexico, Philippines*, United States, Tonga

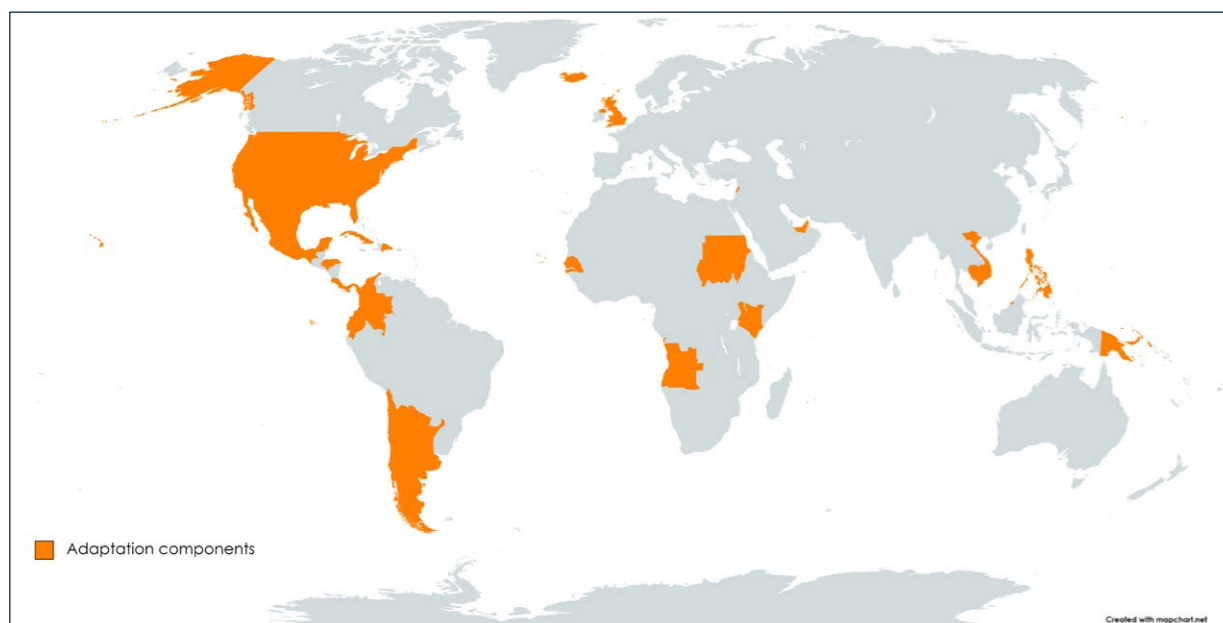


Fig. 5: Countries including coastal and marine NbS as adaptation components in their new or updated NDCs [temporary: out of 63 NDCs received to date, 8 June 2021]

Countries (30): Angola, Argentina, Brunei Darussalam*, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador*, Fiji, Honduras, Iceland, Kenya, Lebanon, Maldives, Mexico, Panama, Papua New Guinea, Philippines*, Saint Lucia, Senegal*, Singapore, Sudan, Tonga, United Arab Emirates, United Kingdom, United States, Vietnam

Source: Ocean and Climate Platform via <https://mapchart.net/>

| Types | Countries (out of 63 submissions) |
|---|---|
| I. Nature-based solutions for adaptation Countries that included coastal and marine NbS as adaptation components of their new or updated NDCs (i.e., protecting and restoring coastal and marine ecosystems, coastal zone management and protected areas, and sustainable fisheries) | 30 countries: Angola, Argentina, Brunei Darussalam*, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador*, Fiji, Honduras, Iceland, Kenya, Lebanon, Maldives, Mexico, Panama, Papua New Guinea, Philippines*, Saint Lucia, Senegal*, Singapore, Sudan, Tonga, United Arab Emirates, United Kingdom, United States, Vietnam |
| a. Protecting and restoring coastal and marine ecosystems Countries that included the protection, restoration and/or sustainable management of coastal wetlands as adaptation components of their new or updated NDCs | 25 countries: Argentina, Brunei Darussalam*, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Fiji, Iceland, Kenya, Lebanon, Maldives, Mexico, Panama, Papua New Guinea, Philippines*, Saint Lucia, Senegal*, Singapore, Sudan, United Arab Emirates, United Kingdom, Vietnam |
| b. Coastal zone management and marine protected areas Countries that included coastal zone management, marine spatial planning (MSP), marine protected areas (MPA) and/or other effective area-based conservation measures (OECM) as adaptation components of their new or updated NDCs | 25 countries: Angola, Argentina, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador*, Fiji, Honduras, Kenya, Lebanon, Maldives, Panama, Papua New Guinea, Saint Lucia, Senegal*, Singapore, Sudan, Tonga, United Arab Emirates, United Kingdom, United States, Vietnam |
| c. Climate-ready fisheries and aquaculture Countries that included climate-ready management of fisheries and aquaculture, and/or small-scale, artisanal or local fisheries as adaptation components of their new or updated NDCs | 15 countries: Angola, Argentina, Cape Verde, Cambodia, Costa Rica, Cuba, Fiji, Lebanon, Maldives, Panama, Senegal*, Sudan, United Arab Emirates, United Kingdom, Vietnam |
| II. Acknowledging vulnerabilities without committing to the implementation of related NbS Countries that referred to the vulnerabilities facing coastal and marine ecosystems, as well as coastal communities, without including coastal and marine NbS for adaptation in their new or updated NDCs | 7 countries: Georgia, Grenada, Jamaica, Marshall Islands, Nicaragua, the Republic of Korea and Vanuatu |

Countries marked with an asterisk in this analysis refer to countries that submitted a new NDC (i.e., Brunei Darussalam, Ecuador*, Philippines* and Senegal*)

Table 3. Coastal and marine NbS as adaptation components of new or updated NDCs



(a) Protecting and restoring coastal and marine ecosystems

Many Parties included the protection and restoration of coastal and marine ecosystems as part of their adaptation strategy in their new or updated NDC. 25 countries included coastal wetlands as adaptation measures in their NDC (Table 3.1.a.). This type of action received more attention than the two others.

- **Argentina** recognized the importance of ecosystem-based management, and promoted its use to protect and restore coastal and marine ecosystems such as marshes and peatlands. It also aims to adopt an ecosystem approach to ensure the conservation and sustainable use of marine biodiversity, and strengthen applied research on adaptive management and protection of ecosystems.
- **Colombia** developed ecosystem-based plans for adaptation to conserve, protect and restore mangroves, seagrasses and other coastal ecosystems. It chose to focus on “strategic ecosystems”, namely mangroves, wetlands, coral reefs and oceans to adapt to the effects of climate change.
- **Dominican Republic** committed to protect and restore coastal and marine ecosystems, including mangroves, corals and dunes, to reduce vulnerability and increase resilience in the face of climate change. It involves, for example, managing a fund for ecosystem restoration.

(b) Coastal zone management and protected areas

The competition for ocean space and resources requires the effective and coherent management of Parties’ Exclusive Economic Zones (EEZ), and

related activities, to ensure the sustainable and compatible use of such space and resources⁵¹. Coastal Zone Management and Marine Spatial Planning (MSP) are effective area-based tools to sustainably manage coastal and marine ecosystems, while maintaining a number of economic activities. To date, 25 countries have included coastal zone management and MSP measures in their new or updated NDCs (Table 3.1.b.). Additionally, 2 countries (Costa Rica and the Dominican Republic) mentioned the Sendai Framework for Disaster Risk Reduction directly in relation to their coastal management and MSP policies.

- **Kenya** aims to develop MSP to boost sustainable management approaches. Local communities will be further involved in the process, thereby strengthening the governance of community structures in participatory resource management of coastal ecosystems. **Kenya** also recalled the need to integrate the use of NbS into local and national development plans.
- **Vietnam** plans to reduce disaster risks and minimise damage by increasing preparedness to respond to climate-induced hazards. To that end, it will develop community-based and ecosystem-based adaptation strategies and measures (e.g., to cope with saltwater intrusion). Vietnam’s NDC also states that it will prevent erosion for coastal areas, and develop a system of coastal protection (e.g., bamboo forests).

Coastal management measures and tools also include Marine Protected Areas (MPA) and Other Effective area-based Conservation Measures (OECM). In these areas, uses and activities can be even further limited and regulated to protect ecosystems. A restricted number of activities (e.g., small-scale fishing practices and ecotourism) may be authorized to enhance local livelihoods and sustainable development of coastal communities, while enabling healthy ecosystems for coastal resilience. So far, 14 countries have included MPAs or OECMs in their new or updated NDCs⁵² and

all but Lebanon, have also committed to coastal zone management and MSP measures. But the converse is less evident, some countries have an MSP strategy but have not designated MPAs or OECMs in their EEZ.

- **Chile** indicates that all MPAs created up to 2020 will develop a management or administration plan that considers climate adaptation components. **Chile** plans on deploying new MPAs in underrepresented marine ecoregions, which will be identified taking into consideration criteria related to the effects of climate change, among others. **Chile** aims to create a representative network of MPAs, that will include coastal wetlands.

(c) Climate-ready fisheries and fishing communities

Climate-ready fisheries and aquaculture aim to reduce the vulnerability and increase the resilience of the aquatic food sector to the impacts of climate change⁵³. Such practices include institutional adaptation (e.g., public policies, legal frameworks, management and planning), livelihoods adaptation, risk reduction and management for resilience (e.g., early warning, preparedness and responses). Climate-ready approaches in fisheries and aquaculture are very much connected to major cross-cutting global issues (e.g., food security, poverty reduction, decent work), and play a key role in sustainable development, as millions of people rely on productive fisheries as a source of protein and livelihoods⁵⁴. Further, many of the activities listed in the above sections for coastal protection and restoration of coastal wetlands, including blue carbon ecosystems, are also vital for climate-ready fisheries as those ecosystems provide critical fish habitat.

Only 15 countries included sustainable management of fisheries (including small-scale, artisanal and local fisheries) in their new or updated NDCs as a

climate adaptation strategy (Table 3.1.c). In addition, most of these countries also committed to increase their aquaculture and seaweed farming capacities, thereby potentially providing other benefits (e.g., food security, livelihoods, climate mitigation). Climate-ready fisheries management is the least used of all three types of coastal and marine NbS for adaptation.

- **The Maldives** aims to diversify the fishery sector to better respond to emerging climate-induced challenges and uncertainties (e.g., extreme events). **The Maldives** aims to strengthen insurance schemes to enhance resilience of small-scale fisheries to cover against losses due to extreme events and anomalies. Both measures will support local fishermen and secure their livelihoods.

- **Cambodia** promotes the sustainable use of fisheries resources, and highlights the need to increase the adaptation and resilience of this sector. For instance, **Cambodia** plans to reduce pressures on fishing resources, and to develop aquatic habitats, as well as climate-smart aquaculture production systems and practices. To achieve these objectives, **Cambodia** aims to involve the private sector, especially in capacity development, input supplies, technologies and marketing.

51/ Jouffray, J.-B., et al. (2020). The Blue Acceleration: The Trajectory of Human Expansion into the Ocean. One Earth. Volume 2, Issue 1, 24 January 2020, Pages 43-54.

52/ Argentina, Cape Verde, Chile, Colombia, Costa Rica, Fiji, Lebanon, Panama, Papua New Guinea, Senegal, Tonga, United Arab Emirates, United Kingdom

53/ FAO (2020a). FAO’s work on Climate Change, Fisheries & aquaculture.

54/ FAO (2020b). The State of World Fisheries and Aquaculture.



MITIGATION AND ADAPTATION CO-BENEFITS IN COASTAL AND MARINE NATURE-BASED SOLUTIONS

The notion of co-benefits implies a win-win situation, addressing multiple goals with a single policy measure, to maximize synergies and reduce trade-offs between socioeconomic and environmental issues. The IPCC defines co-benefits as “the positive effects that a policy or measure aimed at one objective might have on other objectives, irrespective of the net effect on overall social welfare⁵⁵.” Co-benefits are intrinsic to NbS, which aim to address societal challenges and provide human well-being and biodiversity benefits.

Given the cross-cutting nature of coastal and marine NbS, mitigation and adaptation measures can be implemented in an integrated approach. NbS have the potential to create positive and cost-effective outcomes^{56,57}, for both people and nature (i.e., relatively low-cost considering high benefits). For example, they can provide mitigation co-benefits from adaptation measures (e.g., protecting coastal and marine ecosystems to support a sustainable and productive small-scale fisheries sector – as an adaptation approach – while also enhancing the natural carbon sinks and reservoirs), as well as adaptation co-benefits from mitigation measures (e.g., protecting and accounting for the carbon storage in blue carbon ecosystems – as a mitigation approach – while also protecting coastal communities using natural infrastructures⁵⁸). Mitigation co-benefits also have an additional reporting expectation in the Enhanced Transparency Framework, akin to the mitigation reporting requirements for the NDC’s mitigation section⁵⁹.

The present section focuses on the 23 countries that mentioned the co-benefits of their mitigation and/or adaptation measures, in relation to the coastal and marine NbS included in their new or updated NDC. Table 4 outlines the co-benefits mentioned by these countries. From this analysis, 13 countries have mentioned both mitigation and adaptation co-benefits of coastal and marine NbS in their new or updated NDCs (Table 4. I).

- **Cape Verde** indicated that its «mitigation and adaptation commitments do not stand in isolation from each other and that they transcend the boundaries of climate change policymaking.» More specifically, **Cape Verde** notes that its «mitigation commitments directly yield a range of significant adaptation and resilience benefits», and that «many adaptation measures directly yield mitigation co-benefits.» It further states that the national «coastal wetlands are important carbon stocks», as they «also maintain and improve the country’s carbon sink capabilities». →

55/ IPCC (2014b). Fifth Assessment Report (AR5). p. 14.

56/ Narayan, S. et al. (2016)

57/ Seddon N, et al. (2020). Understanding the value and limits of nature-based solutions to climate change and other global challenges. *Phil. Trans. R. Soc. B* 375: 20190120.

58/ Thiele, T, et al. (2020). Blue Infrastructure Finance: A new approach. integrating Nature-based Solutions for coastal resilience.

59/ UNDP (2017). A guide to transparency under the UNFCCC and the Paris Agreement. Reporting and review: obligations and opportunities.

| Types | Countries (out of 63 submissions) |
|--|--|
| I. Recognition of mitigation and/or adaptation co-benefits Countries that mentioned co-benefits of their mitigation and/or adaptation measures in relation to their coastal and marine NbS in their new or updated NDCs | 23 countries: Argentina, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Fiji, Kenya, Lebanon, Maldives, Mexico, Panama, Papua New Guinea, Philippines*, Saint Lucia, Senegal*, Singapore, Tonga, United Arab Emirates, United Kingdom, Vietnam |
| a. Recognition of both mitigation and adaptation co-benefits Countries that mentioned co-benefits of both their mitigation and adaptation measures in relation to their coastal and marine NbS in their new or updated NDCs | 13 countries: Argentina, Cape Verde, Cambodia, Chile, Colombia, Fiji, Kenya, Lebanon, Mexico, Panama, Papua New Guinea, Saint Lucia, Vietnam |
| b. Recognition of mitigation co-benefits only Countries that mentioned only mitigation co-benefits of their adaptation measures in relation to their coastal and marine NbS in their new or updated NDCs (e.g., enhancing carbon sinks and reservoirs) | 4 countries: Costa Rica, Philippines*, United Arab Emirates, United Kingdom |
| c. Recognition of adaptation co-benefits only Countries that mentioned only adaptation co-benefits of their mitigation measures in relation to their coastal and marine NbS in their new or updated NDCs (i.e., countries that include one or several co-benefits related to coastal and marine ecosystem-based mitigation strategies) | 6 countries: Cuba, Dominican Republic, Maldives, Senegal*, Singapore, Tonga |
| II. Recognition of other socioeconomic benefits to local populations Countries that mentioned socioeconomic benefits to local populations resulting from mitigation and adaptation measures of coastal and marine NbS in their new or updated NDCs (e.g., economic opportunities, food and water security) | 14 countries: Argentina, Cape Verde, Cambodia, Chile, Cuba, Fiji, Kenya, Lebanon, Maldives, Mexico, Panama, Papua New Guinea, Senegal*, Singapore |

Countries marked with an asterisk in this analysis refer to countries that submitted a new NDC (i.e., Brunei Darussalam, Ecuador*, Philippines* and Senegal*)

Table 4. Co-benefits in coastal and marine NbS as part of new or updated NDCs

(a) Mitigation co-benefits of adaptation measures: Enhancing carbon sinks and reservoirs

Adopting an Ecosystem-based Adaptation (EbA) approach can generate key mitigation co-benefits (i.e., enhancing carbon sink and reservoir capabilities). Out of the 23 countries that mentioned co-benefits⁶⁰, 17 explicitly recognized mitigation co-benefits from adaptation measures in coastal and marine NbS (Table 4 I.a). Boosting carbon sink and reservoir

capabilities was the main co-benefit mentioned by Parties in new or updated contributions. Notable observations include:

- **Fiji** notes “the need to sustainably manage and protect marine and coastal ecosystems, strengthen their resilience, and restore them when they are degraded. This includes conserving ocean reservoirs as carbon sinks through supporting the restoration, enhancement and conservation of coastal ecosystems such as mangroves, seagrasses and coral reefs⁶¹.”
- **Argentina** recognized the mitigation co-benefits potential from the management and extension of

protected areas (e.g., MPAs). It aims to sequester additional carbon by developing ecosystem conservation strategies, including coastal and marine ecosystems.

- **Saint Lucia** expressed its intention to solve the “die-back of the largest mangrove” in its national territory to “strengthen the country’s climate resilience⁶²”, specifying that this policy measure has expected mitigation co-benefits from such coastal wetlands.

(b) Adaptation co-benefits of mitigation measures: Protecting coastal communities and infrastructure

Enhancement of coastal and marine carbon sinks also has critical adaptation co-benefits such as reducing storm surges and coastal flooding from sea level rise, and providing defense against salination resulting from sea water intrusion. Healthy and intact marine and coastal ecosystems represent effective natural buffers against climate change impacts. It is estimated that mangroves reduce risk to more than 15 million people across 59 countries, and prevent more than \$65 billion in property damages every year, by blocking storm surges and dampening waves⁶³. In many places, protecting mangrove forests can therefore be an “extremely economically effective strategy for protecting coasts from tropical storm damages⁶⁴.” 19 countries acknowledged adaptation co-benefits from mitigation measures in coastal and marine NbS. As outlined in Table 4, 15 countries specifically mentioned the protection of coastal communities and infrastructure (see I.b.).

62/ Saint Lucia’s updated NDC (p15)

63/ Beck, M., & Menendez, P. (2020). Protecting mangroves can prevent billions of dollars in global flooding damage every year.

64/ ibid

65/ Singapore’s updated NDC (p22)

66/ Chausson, A., et al. (2020). Mapping the effectiveness of nature-based solutions for climate change adaptation. Global Change Biology. Volume 26, Issue 11.

67/ DESA. (2021). System of Environmental Economic Accounting (SEEA).

• **Papua New Guinea’s** updated NDC included some mangrove and seagrass planting and management measures, as well as coral reef rehabilitation plans, in order to benefit from other services that these natural habitats provide to communities and ecosystems. In particular, these actions will support **Papua New Guinea’s** effort in addressing the issue of coral degradation, coastal flooding and sea level rise. Concretely, **Papua New Guinea** will establish MPAs, including Locally Managed Marine Areas (LMMA).

- In relation to its strategy to manage water and minimise floods, **Singapore** stated that the country will conserve and restore its mangrove forest, as «mangroves help to dissipate waves and trap sediment, potentially serving as a flexible form of coastal defense while reducing erosion⁶⁵.»

(c) Providing other socioeconomic benefits to local populations

Co-benefits from coastal and marine NbS are multiple and diverse, including cultural, aesthetic and socioeconomic values⁶⁶, and are therefore not restricted to mitigation and adaptation advantages. Coastal and marine NbS provide a wide range of other socioeconomic benefits - although quantifying the positive externalities generated can be challenging⁶⁷. NbS can be highly beneficial to local biodiversity and ecosystems by enhancing fisheries productivity, improving water quality, and acting as nurseries for species. They are also profitable and welfare-enhancing for humans, as coastal and marine NbS support livelihoods, health, well-being, food systems, and the creation of jobs among others. As a result, coastal and marine NbS can greatly contribute to achieving Sustainable Development Goals (SDGs),

60/ Scarano, F., (2017). Ecosystem-based adaptation to climate change: concept, scalability and a role for conservation science. Perspectives in Ecology and Conservation, Volume 15, Issue 2. Pages 65-73.

61/ Fiji’s updated NDC (p6)

especially SDG 1 - No Poverty, SDG 2 - Zero Hunger, SDG 3 - Good Health, SDG 6 - Clean Water, SDG 8 - Decent Work, SDG 13 - Climate Change, and of course SDG 14 - Life below Water. As outlined in Table 4, 14 new or updated NDCs refer to co-benefits related to other socioeconomic benefits provided to local populations (Section II). Notable observations from this include:

- **The Maldives** planned for mangrove conservation and restoration actions in its updated NDC, since it has acknowledged the numerous services that mangroves provide “to people and nature including livelihood of communities and its role as natural buffers or barriers for flood mitigation⁶⁸.”
- **Cuba’s** updated NDC has integrated some preservation measures for mangroves and coral reefs, in order to maintain their role in enhancing soil and water quality, and the protection of beaches for recreational purposes, such as tourism.

68/ [Maldives’ updated NDC \(p14\)](#)





CREATING THE CONDITIONS TO EFFECTIVELY IMPLEMENT COASTAL AND MARINE NATURE-BASED SOLUTIONS

Multiple opportunities exist to effectively boost climate action by raising ambition and implementing robust NDCs. For example, although it is not compulsory, considering other relevant international or UN governance frameworks in their NDCs can be a useful lever for countries to enhance climate action and build synergies to ensure coherence across national strategies⁶⁹. The 2030 Agenda for Sustainable Development and SDG 14 - Life Below Water were acknowledged in 11 submissions that included coastal and marine NbS. Additionally, 7 countries made a reference to other ocean-related frameworks and conventions, including the Convention on Biological Diversity or the Sendai Framework on Disaster Risk Reduction⁷⁰. It is worth pointing out that the UN Decade of Ocean Science for Sustainable Development, for instance, was not included in any new or updated NDCs, and the UN Decade of Ecosystem Restoration was not mentioned in the context of coastal and marine NbS. When included, governance frameworks were mostly acknowledged outside the scope of coastal and marine NbS.

Meanwhile, three specific dimensions were identified as essential to implement ambitious and robust strategies: feasibility, societal engagement and transparency.

First, feasibility is key to move forward and effectively implement any aspect of the NDC, including for coastal and marine NbS. In that regard, 17 Parties expressed their intention to further create enabling conditions (e.g., research and development, technology transfer, capacity-building and finance mobilization) to translate their NDCs into concrete action regarding coastal and marine NbS (Table 5.I).

Second, in the process of enhancing capacity and inclusive participation, countries also noted the need and importance to engage society in the decision-making process of climate strategies and priorities, to create ownership and durability of outcomes. In addition to country ownership and inclusiveness,

the vulnerability and role played by specific groups (e.g., Afro-descendants, youth, women, Indigenous communities) in implementing climate policies was also mentioned, including for coastal and marine NbS. Environmental rights (i.e., access to the unspoiled natural resources that enable survival) were also mentioned. In that regard, 16 countries explicitly referred to either/or the importance of knowledge from Indigenous People and Local Communities (IPLC) and horizontal governance approaches in relation to coastal and marine NbS (Table 5.II).

Third, the value of clarity, transparency, understanding and enhancement of key targets and measures was also outlined. 20 countries included a mention to either/or specific tracking or transparency measures and specific quantitative targets and indicators in relation to coastal and marine NbS (Table 5.III).

Countries are required to provide information on how mitigation (and co-mitigation) targets were developed and quantified through agreed reporting requirements under the Paris Agreement on the Information to facilitate clarity, transparency, and understanding (ICTU). The ICTU will promote comparability and common understanding of progress towards the goals of the Paris Agreement, and is required no later than the 2nd NDC. Many countries demonstrated their political commitment to addressing climate change and data comprehensiveness by including ICTU information in their updated first NDCs.

Additionally, countries can support each other in raising ambition and implementing robust NDCs. In that regard, some developed countries committed to support developing countries as part of their NDCs through international financial support. All Parties, and developing country parties in particular, can commit to the highest ambition for climate action based on their national context and need for flexibility while acknowledging the need for additional financing through the use of conditionality in their target setting. Conditional targets indicate where additional financial needs are required to

69/ Picourt, L., et al. (2021), *Swimming the talk: How to strengthen collaboration and synergies between the Climate and Biodiversity Conventions?*, Policy brief, May 2021, OCEAN & CLIMATE PLATFORM, p.1-14.

70/ Other ocean-related frameworks and processes referenced included in the analysis: Sendai Framework on Disaster Risk Reduction, Convention on Biological Diversity (CBD) and Post-2020 Global Biodiversity Framework, Food and Agriculture Organization (FAO), Ramsar Convention

| Type | Countries (out of 63 submissions) |
|---|---|
| I. Feasibility: strengthening support for action Countries that explicitly committed to create enabling conditions for coastal and marine NbS in their new or updated NDCs | 17 countries: Angola, Argentina, Australia, Cambodia, Cape Verde, Chile, Colombia, Costa Rica, Dominican Republic, Fiji, Honduras, Maldives, Panama, Papua New Guinea, Senegal*, Singapore, Vietnam |
| a. Research & development Countries that explicitly committed to increase research and development (R&D) for coastal and marine NbS in their new or updated NDCs | 13 countries: Angola, Argentina, Cape Verde, Chile, Costa Rica, Dominican Republic, Honduras, Maldives, Panama, Papua New Guinea, Senegal*, Singapore, Vietnam |
| b. Capacity-building Countries that explicitly committed to increase capacity-building for coastal and marine NbS in their new or updated NDCs | 9 countries: Argentina, Cape Verde, Chile, Colombia, Dominican Republic, Fiji, Maldives, Panama, Papua New Guinea |
| c. Resource mobilization Countries that explicitly committed to increase the financial resources allocated to coastal and marine NbS in their new or updated NDCs | 11 countries: Argentina, Australia, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Dominican Republic, Panama, Papua New Guinea, Vietnam |
| II. Societal engagement: inclusiveness and participation Countries that explicitly referred to the importance of knowledge from Indigenous People and Local Communities (IPLC) and/or horizontal governance approaches in relation to coastal and marine NbS in their new or updated NDCs | 16 countries: Argentina, Cambodia, Chile, Colombia, Costa Rica, Fiji, Honduras, Maldives, Nicaragua, Panama, Papua New Guinea, Philippines*, Saint Lucia, Senegal*, United States, Vietnam |
| a. Recognition of IPLC knowledge Countries that referred to the importance of knowledge from Indigenous People and Local Communities (IPLC) in relation to coastal and marine NbS in their new or updated NDCs | 9 countries: Cambodia, Chile, Colombia, Costa Rica, Fiji, Honduras, Nicaragua, Panama, Papua New Guinea |
| b. Local level governance Countries that referred to the importance of a horizontal governance approach (i.e. wide participation of the society in policy-making) in relation to coastal and marine NbS in their new or updated NDCs | 15 countries: Argentina, Cambodia, Chile, Colombia, Fiji, Honduras, Maldives, Nicaragua, Panama, Papua New Guinea, Philippines*, Saint Lucia, Senegal*, United States, Vietnam |
| III. Reporting, monitoring and transparency Countries that included a mention to specific tracking or transparency measures and/or specific quantitative targets and indicators in relation to coastal and marine NbS in their new or updated NDCs | 20 countries: Angola, Australia, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Dominican Republic, Fiji, Honduras, Kenya, Lebanon, Maldives, Nicaragua, Panama, Papua New Guinea, Senegal*, Tonga, United Arab Emirates, Vietnam |
| a. Tracking process and transparency framework Countries that included a mention to specific tracking or transparency measures in their coastal and marine NbS in their new or updated NDCs | 15 countries: Australia, Cape Verde, Cambodia, Chile, Colombia, Costa Rica, Dominican Republic, Fiji, Honduras, Kenya, Maldives, Panama, Papua New Guinea, United Arab Emirates, Vietnam |
| b. Quantitative targets and indicators Countries that included specific quantitative targets and indicators in relation to their coastal and marine NbS in their new or updated NDCs | 14 countries: Angola, Cape Verde, Cambodia, Costa Rica, Fiji, Lebanon, Maldives, Nicaragua, Panama, Papua New Guinea, Senegal*, Tonga, United Arab Emirates, Vietnam |

Countries marked with an asterisk in this analysis refer to countries that submitted a new NDC (i.e., Brunei Darussalam, Ecuador*, Philippines* and Senegal*)

Table 5. Creating the conditions to effectively implement coastal and marine NbS

achieve the level of climate ambition desired^{71,72}. Some developing countries have therefore identified their resource needs for increasing their capacity on coastal and marine NbS. For instance, Panama indicated in its updated NDC that 8% of its total needs for capacity-building should be allocated to coastal and marine policies and measures (e.g., coastal management, protected areas, blue economy programs).

While all new or updated NDCs outline countries' plans to raise ambition and boost climate action, a review of these submissions does not give a clear indication of how it applies to coastal and marine NbS, unless a country clearly specifies it. Only those countries specifically referring to action measures in their coastal and marine NbS were considered in the discussion below.

(a) Feasibility: strengthening support for action

RESEARCH & DEVELOPMENT:

27 countries featuring one or more coastal and marine NbS explicitly highlighted the vulnerability of coastal and marine ecosystems. It was specified in the updated NDCs that implementing coastal and marine NbS required science-based policy-making, and therefore robust research, including IPCC reports and assessments. In that regard, 2 countries (Maldives and Fiji) referred to the IPCC SROCC. It was also noted in the new or updated NDCs that policies and measures were based on the best available science, and declared that updates would be made considering new scientific knowledge. 13 countries included an R&D component related to coastal and marine NbS.

- In the context of national sea level rise protection plans (accompanying information on adaptation

efforts), **Singapore** stated that it will continue researching coastal protection approaches. It clarified that the Centre for Climate Research Singapore will develop a National Sea Level Rise Programme to create better projections and improve understanding of long-term sea level rise.

- **The United Arab Emirates** plans to undertake "further field research to determine mangrove soil carbon sequestration rates using radiometric dating techniques⁷³" to further inform coastal management.

- After noting the impacts of climate change on fisheries and fishermen (e.g., changing fish stock distribution), the **Maldives** committed to facilitate fisheries research and development initiatives to further study fish stock migration patterns and to adopt more efficient technologies.

CAPACITY-BUILDING:

Countries expressed their intention to fulfill their goals by developing and strengthening the skills, abilities, processes and resources mobilized. Several countries, for example, specified how commitments will be translated into national policies and legal frameworks. In particular, 9 countries undertook capacity-building with regard to coastal and marine NbS, including the role of local communities, especially for coastal management.

- **Colombia** committed to strengthening the institutional capacity of local environmental authorities to facilitate the implantation of ecosystem-based adaptation in the Unidades Ambientales Costeras (Coastal Environment Units). It also aims to develop local capacities through co-management, co-ownership and behavior change approaches for agriculture, as well as in blue carbon and ecosystem-based adaptation with legal frameworks related to coastal zones.

71/ Beasley, E. et al. (2019) Guide to Including Nature in Nationally Determined Contributions: A Checklist of information and accounting approaches for natural climate solutions.

72/ Pickering, J., Pauw, P., Bhasin, S., Castro, P., (2019). Conditions (and risks) attached: unpacking developing countries' conditional contributions to the Paris Agreement.

73/ United Arab Emirates Second NDC (p12)

- **Cape Verde** expressed its intention from 2023 onwards to roll out specific training programmes and to create job opportunities for individuals and entrepreneurs interested in several fields in nature-based solutions, marine protection and technology, and sustainable aquaculture.

RESOURCE MOBILIZATION:

Coastal and marine NbS require increased mobilization of finance to be implemented and scaled-up, as there is a significant ambition gap between actions needed and available financing for coastal and marine NbS⁷⁴. Innovative financial mechanisms and tools can be developed and implemented to increase funds for coastal and marine NbS (e.g., blue bonds, carbon market) and existing financial products and tools can be tailored so they can be used when implementing NbS. Conversely, they can also be used to mobilize financial resources from public and private sources, as well as public-private partnerships. In other words, coastal and marine NbS provide key opportunities for finance mobilization, and therefore require a specific resource mobilization strategy. Yet, only 11 countries expressed their intention to increase funding for coastal and marine NbS.

- **Costa Rica** committed to develop innovative finance mechanisms for marine conservation and, more specifically, to protect blue carbon ecosystems. Costa Rica also plans to explore the potential of public-private investments to further conserve and restore mangroves, supporting the implementation of blue carbon strategies (e.g., expanding terrestrial models for the payment of ecosystem services).

(b) Societal engagement: inclusiveness and participation

Traditional practices and local knowledge from IPLCs have long been overlooked by political, economic and technological innovation and advances. However, Parties are increasingly

recognizing the importance of these ancestral techniques and specific local knowledge for climate ambition and for sustaining the communities that hold this knowledge. Recognising and unlocking their potential for climate action plans can provide multiple opportunities. Some coastal and marine NbS included in the new or updated NDCs already reflect or integrate traditional and Indigenous knowledge and practices, especially in relation to coastal management and conservation.

Among countries that referred to specific knowledge or practices of IPLCs, the focus was largely on involvement in agriculture and forestry policies. For example, Colombia stated in its NDC that Indigenous peoples and afro-Colombians are key actors to achieve the country's objectives to reduce deforestation. Coastal communities were sometimes acknowledged, but often in terms of vulnerability and threats. 9 countries recognized the importance of IPLC knowledge and practices in the context of coastal and marine NbS.

- **Costa Rica** expressed its intention to effectively manage and monitor coastal wetlands, advancing strategies for the sustainable use and management of vital mangrove areas. In this context, **Costa Rica** indicated that the sustainable use and management of mangroves will be implemented by communities whose livelihoods depend on them. It explicitly referred to Afro-Costa Rican communities and indigenous people, by acknowledging their vulnerability and valuing their contribution in the implementation of coastal and marine NbS.

- **Panama** recognized the role of women in developing sustainable fishing practices in its updated NDC and related National Action Plan for Sustainable Fisheries.

Restating traditional practices and local knowledge involves moving to a more horizontal governance approach. Bottom-up governance is a key feature of effective coastal management and planning, as it informs policies and enhances participation in their implementation. To date, 15 countries mentioned the need for a bottom-up governance in the implementation of their coastal and marine NbS.

74/ Sumaila, UR et al. (2021). Financing a sustainable ocean economy. Nature Comms 2021.

- **The Maldives** mentioned the importance of community resource-management and considering the livelihoods of local resource-users before establishing conservation programs among strategies to promote the conservation of marine and coastal biodiversity.

(c) Reporting, monitoring and transparency

“Robustness” of NDCs is evaluated based on the clarity and transparency of information communicated in relation to tracing mechanisms⁷⁵. Countries are encouraged to strengthen their reporting and monitoring frameworks, as well as to include specific and measurable targets in their NDCs (e.g., quantity of carbon sequestered by coastal ecosystems, hectares of mangrove forests planted, percentage of EEZ included in MPAs).

- **Tonga** committed to the target of Special Management Areas (SMAs) to 30% of Tonga's EEZ to maintain the existing fish stocks.

- **Angola** mentioned different targets that can be used for coastal management in the context of sea level rise, including the percentage of coastline under marine protection.

While the NDCs are flexible in nature, the reporting requirements to the Paris Agreement represent some of the legally binding elements. For example, countries are required to submit their ICTU in the 2nd NDC, information on NDC progress in the first Biennial Transparency Report (BTR) for developed country Parties by the end of 2024, as well as continued reporting on carbon sinks, sources, and reservoirs in the national greenhouse gas inventory reporting, and progress made in implementing and achieving NDCs⁷⁶. 15 countries have chosen to strengthen reporting and monitoring capacities in relation to coastal and marine NbS (e.g., commitments to further observe and record activities related to coastal and marine ecosystems,

and/or to further integrate the gathered information in policy-making). Additionally, 14 countries used specific quantitative targets and indicators (e.g., hectares of mangrove forests under protection).

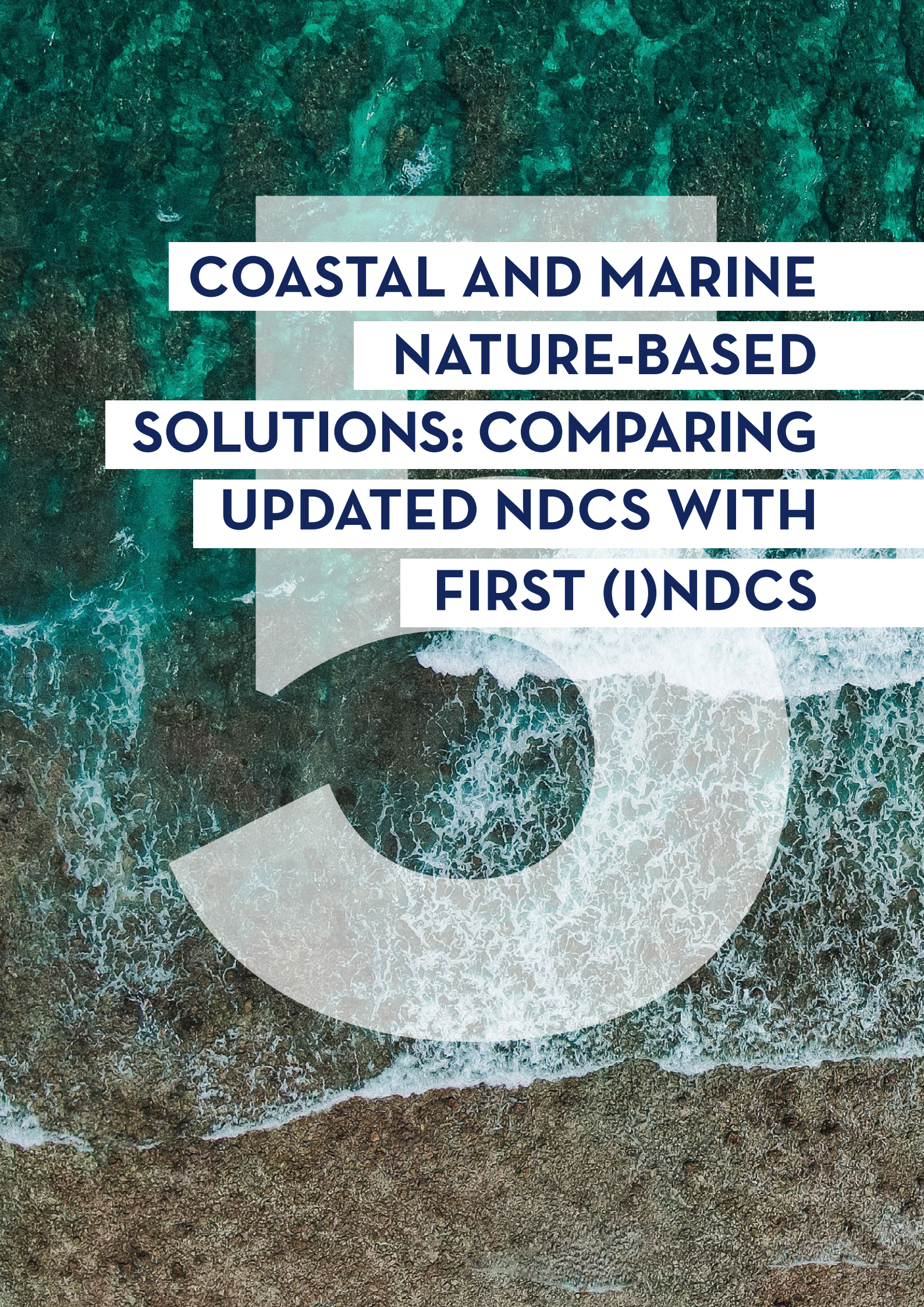
- **Chile** has expressed its intention for three MPAs to have standardized metrics to evaluate mitigation and adaptation capacities by 2025. Chile also committed to develop and implement management or administration plans for 100% of the MPAs created up to 2020, through monitoring, control, community links and threat control programs by 2030.

- While adopting national policies to develop MPAs, **Cape Verde** committed to implement monitoring mechanisms. It specifically aims to “Incorporate a mechanism for monitoring and reviewing marine protected areas management plans involving local populations⁷⁷.”

75/ UNDP (2020). Climate Promise Quality Assurance Checklist. For Revising Nationally Determined Contributions

76/ The Nature Conservancy (2020b). Practical Implications of the Katowice Climate Package for Developing Country Parties and Land Sector Reporting.

77/ Cape Verde's updated NDC (p39)



COASTAL AND MARINE NATURE-BASED SOLUTIONS: COMPARING UPDATED NDCs WITH FIRST (I)NDCs

Disclaimer

This comparison between first (I)NDCs and updated NDCs will be updated to reflect new submissions (i.e., past 8 June 2021) and be published ahead of UNFCCC COP 26, 1-12 November 2021. Countries' level of ambition will be further assessed in the final version of this brief, including to broaden the definition of ambition presently used.

The Paris Agreement requests that Parties' submissions reflect increased ambition compared to the previous NDC (Article 4.3). The following section will look at how countries have included coastal and marine NbS in their updated NDCs, compared to the (I)NDCs submitted ahead and during COP21, in 2015 (Table 6)⁷⁸. This section therefore focuses on the 29 countries that have included coastal and marine NbS in their updated NDCs as part of mitigation and/or adaptation measures.

NDCs are national planning documents and the presence or absence of certain language, such as reference to coastal and marine NbS, can act as an indicator (both domestically and internationally) that a country is ready to implement a certain type of actions and adopt policies that could ultimately help various sectors (e.g., forestry, coasts, agriculture) increase their cross-sectoral coordination over time for better management of coastal and marine ecosystems⁷⁹.

Therefore, for the purpose of this analysis, a country's level of ambition is solely based on the inclusion of coastal and marine NbS in updated NDCs compared to INDCs or first NDCs, and it is not based on quantitative CO₂ targets, as follows:

- **Increased level of ambition (↑):** coastal and marine NbS included as mitigation and/or adaptation measures in updated NDCs, and not included in INDC or first NDC.
- **Decreased level of ambition (↓):** coastal and marine NbS not included as mitigation and/or adaptation measures in updated NDCs, but included in INDC or first NDC.
- **Equal level of ambition (-):** coastal and marine NbS included/not included as mitigation and/or adaptation measures in both updated NDCs and first NDCs/INDCs.

^{78/} Countries that submitted a new NDC (i.e. Brunei Darussalam*, Ecuador*, Philippines* and Senegal*) were therefore marked as "Not Applicable" in the ambition column of Table 6.

^{79/} The Blue Carbon Initiative (2021). Guidelines for Blue Carbon and Nationally Determined Contributions.

| Country | INDC or First NDC | | Updated NDC | | Ambition |
|--------------------------|-------------------|------------|-------------|------------|----------------|
| | Mitigation | Adaptation | Mitigation | Adaptation | |
| Angola | YES | YES | NO | YES | ↓ |
| Argentina | NO | NO | YES | YES | ↑ |
| Australia | YES | NO | YES | NO | - |
| Brunei Darussalam* | X | X | YES | YES | not applicable |
| Cape Verde | YES | NO | YES | NO | - |
| Cambodia | YES | NO | YES | YES | ↑ |
| Chile | NO | NO | YES | YES | ↑ |
| Colombia | NO | NO | YES | YES | ↑ |
| Costa Rica | YES | NO | YES | YES | ↑ |
| Cuba | YES | NO | YES | YES | ↑ |
| Dominican Republic | YES | NO | YES | YES | ↑ |
| Ecuador* | X | X | NO | YES | not applicable |
| Fiji | NO | YES | YES | YES | ↑ |
| Honduras | NO | YES | YES | YES | ↑ |
| Iceland | NO | NO | YES | YES | ↑ |
| Kenya | NO | NO | YES | YES | ↑ |
| Lebanon | NO | NO | NO | YES | ↑ |
| Maldives | NO | NO | YES | YES | ↑ |
| Mexico | YES | YES | YES | YES | ↑ |
| Nicaragua | NO | NO | YES | NO | ↑ |
| Panama | NO | NO | YES | YES | ↑ |
| Papua New Guinea | NO | NO | YES | YES | ↑ |
| Philippines* | X | X | NO | YES | not applicable |
| Republic of Korea | NO | NO | YES | NO | ↑ |
| Saint Lucia | YES | NO | YES | YES | ↑ |
| Senegal* | X | X | NO | YES | not applicable |
| Singapore | YES | NO | YES | YES | ↑ |
| Sudan | NO | YES | YES | YES | ↑ |
| Tonga | NO | NO | YES | YES | ↑ |
| United Arab Emirates | YES | NO | YES | YES | ↑ |
| United Kingdom | NO | NO | NO | YES | ↑ |
| United States of America | YES | NO | YES | YES | ↑ |
| Vietnam | NO | YES | YES | YES | ↑ |

Table 6. Comparing first and updated NDCs to assess their level of ambition on the inclusion of coastal and marine NbS for mitigation and/or adaptation measures

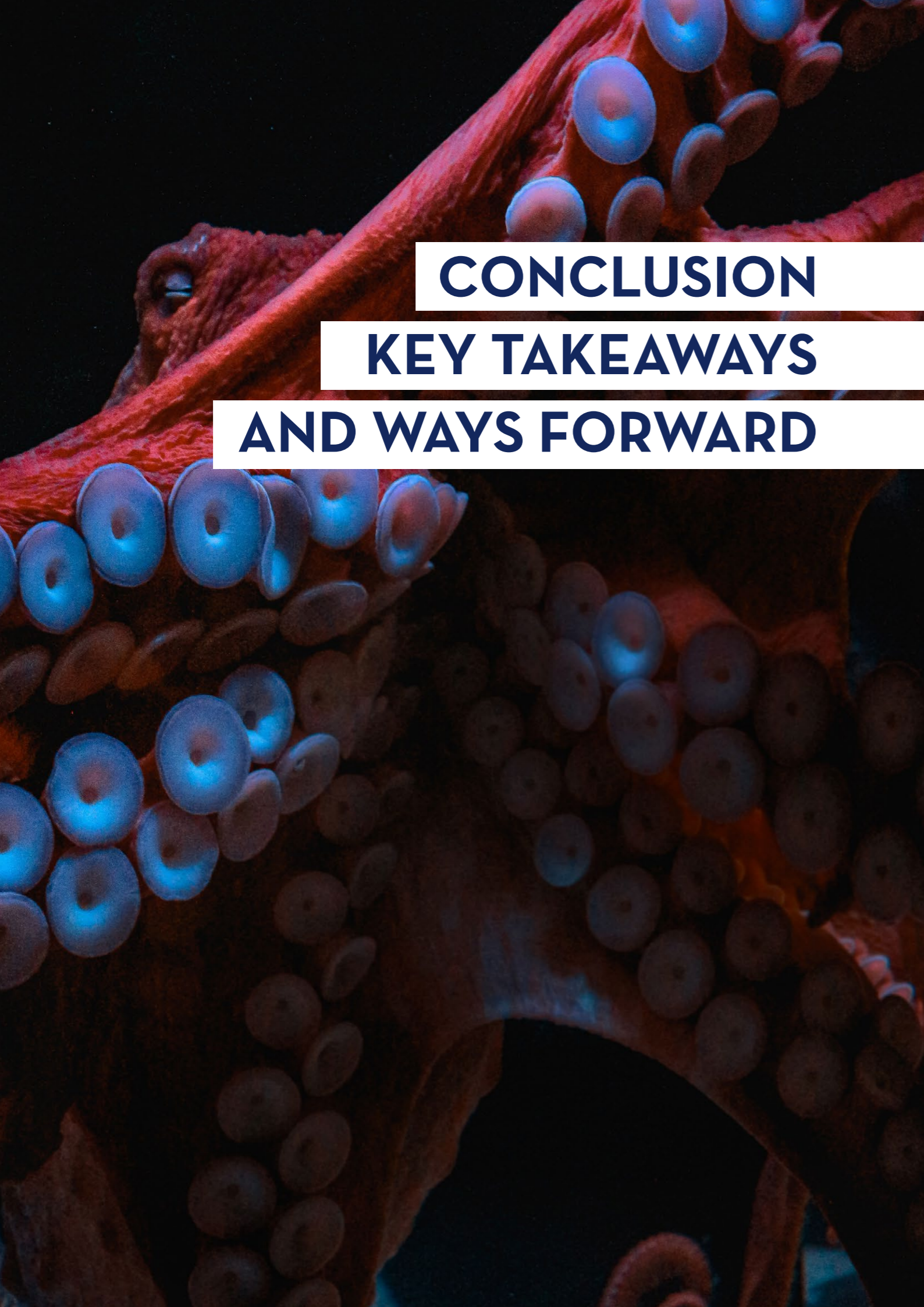
Based on the submissions of 29 updated NDCs, 25 countries have positively embraced coastal and marine NbS for climate mitigation and/or adaptation, and have included them in their most recent NDC. The vast majority of countries show a relative increase in their ambition, having explicitly included coastal and marine NbS in their NDCs, with 9 countries including them on both their mitigation and adaptation components in their update from no mention of coastal and marine NbS at all previously⁸⁰. 15 NDCs now include coastal and marine NbS in the mitigation part where before there were none (13 countries referred to coastal blue carbon ecosystems, i.e. mangroves, saltmarshes, seagrasses), and 19 did so for adaptation.

These preliminary observations suggest an increased awareness among governments that healthy coastal wetlands can contribute to achieving the GHG emissions reduction target of the Paris Agreement and that there is also a better understanding and a greater appreciation of the role played by coastal blue carbon ecosystems, when sustainably managed, in climate strategies.

Although their primary focus is on mitigation, most countries included an adaptation component in their NDCs, and this trend has only increased with new submissions of NDCs. There is therefore growing awareness among governments that managed coastal and marine ecosystems have strong adaptation potential when they are healthy and sustainably managed, and this was further reflected in updated NDCs.

Despite these encouraging preliminary results, further analysis will need to be carried out to broaden the definition of ambition presently used, to include and compare enabling conditions, such as commitments to increase financial resources allocated to coastal and marine NbS in updated NDCs, or to increase R&D related to coastal and marine NbS.

80/ Argentina, Chile, Colombia, Iceland, Kenya, the Maldives, Panama, Papua New Guinea, Tonga



CONCLUSION

KEY TAKEAWAYS

AND WAYS FORWARD

Disclaimer

The conclusion will be updated to reflect anticipated integrated data provided by the additional new and updated NDCs submitted past 8 June 2021 and expected to become available ahead of UNFCCC COP 26, 1 - 12 November 2021

This analysis has looked into the inclusion of coastal and marine ecosystems as Nature-based Solutions in new or updated Nationally Determined Contributions, submitted as part of the first NDC revision cycle between 29 March 2019 and 8 June 2021⁸¹:

- 63 countries submitted new or updated NDCs
- 33 countries included coastal and marine NbS in their new or updated NDCs

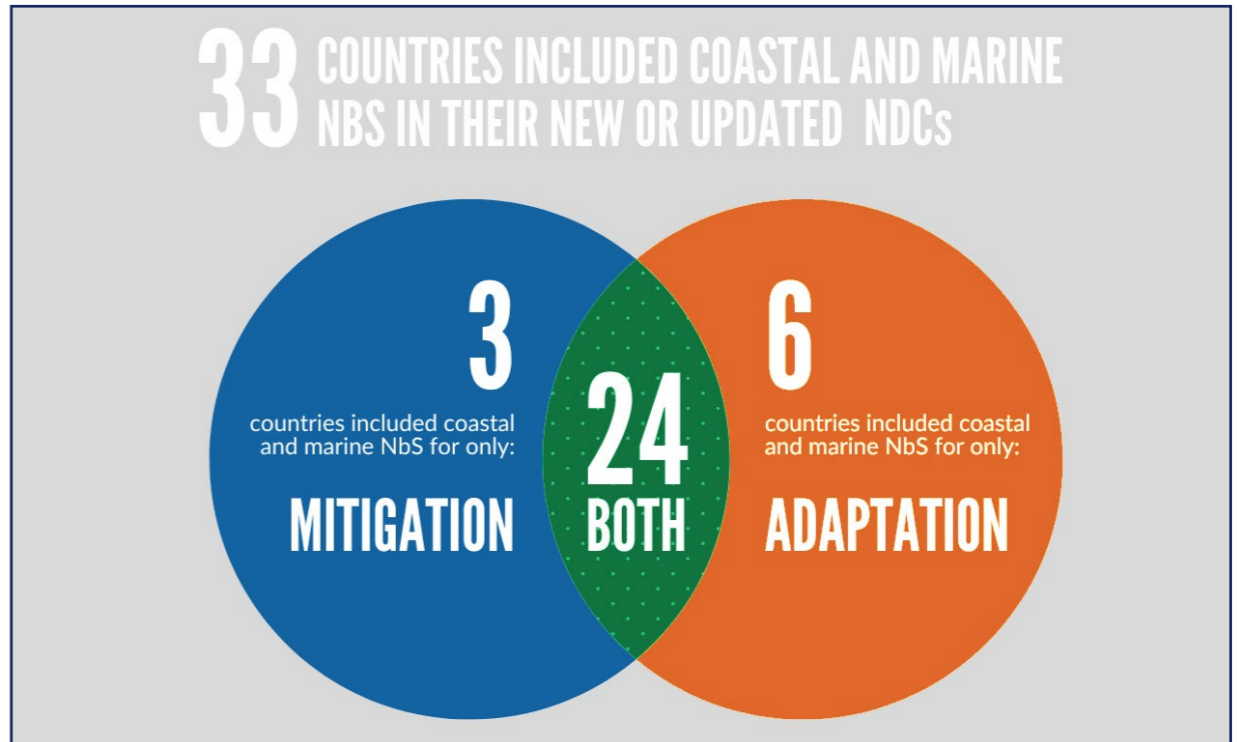


Fig.6: Overview of coastal and marine NbS as mitigation and/or adaptation measures in new or updated NDCs

81/ NDCs submitted past this date will be included in a revised version of this brief, which will be published ahead of UNFCCC - COP26, 1-12 November 2021.

Additionally, this analysis has looked into the recognition of mitigation and adaptation co-benefits linked to the inclusion of coastal and marine NbS in new or updated NDCs:

- 23 countries mentioned the co-benefits of their mitigation and/or adaptation measures, including co-benefits from ecosystem-based mitigation (e.g., protecting coastal communities and infrastructure) or ecosystem-based adaptation (e.g., enhancing carbon sinks and reservoirs);
- 14 countries highlighted the resultant socioeconomic benefits for local populations from mitigation and adaptation measures (e.g., work opportunities, food security and water quality).

Moreover, the analysis has reviewed how countries intend to effectively boost climate action by raising ambition and implementing robust NDCs in relation to coastal and marine NbS. It focused on three specific dimensions to create the enabling conditions for action, namely feasibility, societal engagement and transparency, each of which is essential to implement ambitious and robust coastal and marine NbS:

- 17 countries are explicitly committed to create enabling conditions such as research and development, technology transfer, capacity-building and finance mobilization;
- 16 countries explicitly refer to the importance of knowledge from Indigenous People and Local Communities (IPLC) and/or horizontal governance approaches;
- 20 countries include a mention of specific tracking or transparency measures and/or specific quantitative targets and indicators.

This analysis suggests that there is a greater recognition and appreciation of the role played by coastal and marine NbS in achieving climate objectives in line with the Paris Agreement,

compared to INDCs or first NDCs:

- 29 countries have submitted an updated NDC considering coastal and marine NbS;
- 25 countries have added coastal and marine NbS for climate mitigation and/or adaptation in their most recent NDC compared to their (I)NDCs ;
- Among these, 15 countries now include coastal and marine NbS in the mitigation part where before there were none; and 19 did so for adaptation.

Through conservation, restoration and sustainable management of coastal and marine ecosystems, countries have the opportunity to increase ambition towards achieving the Paris Agreement long-term goals, build resilience along their coastlines, and secure a future for coastal biodiversity, food security, and livelihoods, thereby also meeting global sustainable development and biodiversity goals.

While the trend seems to move upwards, with an increasing number of countries including coastal and marine NbS in their NDCs, countries have also recognized the challenges they face in order to implement their commitments, especially in light of the current situation with the COVID-19 pandemic and resulting economic crisis. There are however, viable and immediate opportunities for all blue carbon countries to act and include coastal wetlands in their NDCs, even those countries with limited technical knowledge of the ecosystems scale or carbon value². Furthermore, the Group of Seven (G7) recently committed “to further enhance synergies between finance for climate and biodiversity and to promote funding that has co-benefits for climate and nature and are working intensively towards increasing the quantity of finance to nature and nature-based solutions³”.

Protecting and restoring coastal and marine ecosystems appears to be the most popular coastal and marine NbS for mitigation and adaptation purposes in updated NDCs. For mitigation, blue

carbon ecosystems such as mangroves, seagrasses and saltmarshes are clearly favored as 25 countries included them in their strategies, whereas only 5 countries have integrated other marine ecosystems for mitigation purposes in their updated NDCs. This suggests that more in-depth understanding of the sequestration potential of other blue carbon ecosystems is needed to ensure adequate policy guidance is developed, while at the same time accounting windfalls are avoided.

CONTACT INFORMATION

For further information and clarification, please do not hesitate to contact one of the authors below:

Loreley Picourt,
Secretary General,
Ocean and Climate Platform:
lpicourt@ocean-climate.org

Marine Lecerf,
International Policy Support,
Ocean and Climate Platform:
policy@ocean-climate.org

1/ The Blue Carbon Initiative (2021). Guidelines for Blue Carbon and Nationally Determined Contributions.

2/ Information regarding the management of coastal and marine ecosystems for adaptation can be found [here](#).

3/ G7 SUMMIT COMMUNIQUÉ (2021). Our Shared Agenda for Global Action to Build Back Better.

REFERENCES

Beasley, E. et al. (2019). Guide to Including Nature in Nationally Determined Contributions: A Checklist of information and accounting approaches for natural climate solutions. available at: https://www.nature.org/content/dam/tnc/nature/en/documents/Guide_to_Including_Nature_in_NDCs.pdf

Because the Ocean (2016), Second Because the Ocean Declaration, available at: <https://www.becausetheocean.org/second-because-the-ocean-declaration/>

Because the Ocean (2019), Ocean for Climate: Ocean-Related Measures in Climate Strategies, available at: https://www.becausetheocean.org/wp-content/uploads/2019/10/Ocean_for_Climate_Because_the_Ocean.pdf

Beck, M., & Menendez, P. (2020). Protecting mangroves can prevent billions of dollars in global flooding damage every year. available at: <https://theconversation.com/protecting-mangroves-can-prevent-billions-of-dollars-in-global-flooding-damage-every-year-132424>

Chausson, A., et al. (2020). Mapping the effectiveness of nature-based solutions for climate change adaptation. *Global Change Biology*. Volume 26, Issue 11. available at: <https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.15310>

Deprez, A. et al. (2021). Aligning high climate and biodiversity ambitions in 2021 and beyond: why, what, and how? *IDDRI, Study N°05/21*. available at: <https://www.iddri.org/en/publications-and-events/study/aligning-high-climate-and-biodiversity-ambitions-and-action-2021-and>

DESA. (2021). System of Environmental Economic Accounting (SEEA). available at: https://unstats.un.org/unsd/statcom/52nd-session/documents/BG-3f-SEEA-EA_Final_draft-E.pdf

Diz, D. et al. (2021). Blueprint for a Living Planet: Four Principles for Integrated Ocean-Climate Strategies. available at: <https://wwfeu.awsassets>

panda.org/downloads/wwf_blueprint_for_a_living_planet_2021.pdf

FAO (2020a) FAO's work on Climate Change, Fisheries & aquaculture, available at: <http://www.fao.org/policy-support/tools-and-publications/resources-details/fr/c/1401162/>

FAO (2020b). The State of World Fisheries and Aquaculture, available at: <http://www.fao.org/3/ca9229en/online/ca9229en.html>

Ferrario, F. et al. (2014). The effectiveness of coral reefs for coastal hazard risk reduction and adaptation. *Nature communications*. 5. 3794. 10.1038/ncomms4794. available at: <https://www.nature.com/articles/ncomms4794>

Fransen, T., et al. (2019), Enhancing NDCs: A Guide to Strengthening National Climate Plans by 2020, Washington, DC: World Resources Institute. available at: <https://www.ndcs.undp.org/content/ndc-support-programme/en/home/impact-and-learning/library/ndc-enhancement-guide0.html>

Gallo, N., Victor, D., & Levin, L. (2017). Ocean commitments under the Paris Agreement. *Nature Climate Change*. 7. nclimate3422. 10.1038/nclimate3422. available at: <https://escholarship.org/content/qt5255342w/qt5255342w.pdf>

G7 SUMMIT COMMUNIQUÉ (2021). Our Shared Agenda for Global Action to Build Back Better. available at: <https://www.consilium.europa.eu/media/50361/carbis-bay-g7-summit-communicue.pdf>

Herr, D. & Landis, E. (2016). Coastal blue carbon ecosystems. Opportunities for Nationally Determined Contributions. Policy Brief. Gland, Switzerland: IUCN and Washington, DC, USA: TNC. available at: https://www.nature.org/content/dam/tnc/nature/en/documents/BC_NDCs_FINAL.pdf

IPBES-IPCC. (2021). IPBES-IPCC Co-Sponsored Workshop Report on Biodiversity and Climate Change. available at: <https://www.ipbes.net/events/launch-ipbes-ipcc-co-sponsored-workshop-report-biodiversity-and-climate>

[change](#)

IPCC. (2014a). 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands, Hiraishi T, Krug T, Tanabe K, Srivastava N, Baasansuren J, Fukuda M, and Troxler TG. (eds). Published: IPCC, Switzerland. available at: https://www.ipcc.ch/site/assets/uploads/2018/03/Wetlands_Supplement_Entire_Report.pdf

IPCC (2014b). Fifth Assessment Report (AR5). p. 14. available at: <https://www.ipcc.ch/report/ar5/wg2/>

IPCC (2019). Summary for Policymakers. In: Special Report on the Ocean and Cryosphere in a Changing Climate (H.-O.P rtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegr a, M. Nicolai, A. Okem, J. Petzold, B. Rama, N. M. Weyer (eds.)). available at: <https://www.ipcc.ch/srocc/>

IUCN (2020a). Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS. available at: <https://portals.iucn.org/library/sites/library/files/documents/2020-020-En.pdf>

IUCN (2020b). Defining Nature-based Solutions. available at: <https://www.iucn.org/theme/nature-based-solutions/about>

Jouffray, J.-B., et al. (2020). The Blue Acceleration: The Trajectory of Human Expansion into the Ocean. *One Earth*. Volume 2, Issue 1, 24 January 2020, Pages 43-54. available at: <https://www.sciencedirect.com/science/article/pii/S2590332219302751>

Magnan, A.K. et al. (2018). Ocean-based measures for climate action. *IDDRI, Policy Brief N°06/18*. available at: https://www.iddri.org/sites/default/files/PDF/Publications/Catalogue%20Iddri/Propositions/201810-PBO618-oceans%20solutions_0.pdf

Narayan, S. et al. (2016). The Effectiveness, Costs and Coastal Protection Benefits of Natural and Nature-Based Defences. *PLoS ONE* 11(5): e0154735.

<https://doi.org/10.1371/journal.pone.0154735>

Nichols, C., Zinnert, J., Young, D., (2019). Degradation of Coastal Ecosystems: Causes, Impacts and Mitigation Efforts. 10.1007/978-3-319-75453-6_8.

Northrop, E., et al. (2020). *Enhancing Nationally Determined Contributions: Opportunities for Ocean-Based Climate Action* Working Paper. Washington, DC: World Resources Institute. available at: https://www.researchgate.net/publication/348703916_Enhancing_Nationally_Determined_Contributions_Opportunities_for_Ocean-Based_Climate_Action/fulltext/600be34a92851c13fe2dfabd/Enhancing-Nationally-Determined-Contributions-Opportunities-for-Ocean-Based-Climate-Action.pdf

OCEAN AND CLIMATE (2015). Ecosystem Services and Marine Conservation, Ocean and Climate Platform. available at: https://ocean-climate.org/wp-content/uploads/2017/03/ecosystem-marine-services_07-11.pdf

OCEAN AND CLIMATE (2019a), Scientific Fact Sheets, Ocean and Climate Platform, p.1-130, available at: https://ocean-climate.org/wp-content/uploads/2020/01/200114_FichesScientifiques_EN_ppp.pdf

OCEAN AND CLIMATE (2019b). Policy Recommendations: A healthy ocean, a protected climate. available at: <https://ocean-climate.org/en/policy-recommendations-a-healthy-ocean-a-protected-climate/>

Pickering, J., Pauw, P., Bhasin, S., Castro, P., (2019). Conditions (and risks) attached: unpacking developing countries' conditional contributions to the Paris Agreement. available at: <https://reliefweb.int/report/world/conditions-and-risks-attached-unpacking-developing-countries-conditional-contributions>

Picourt, L., et al. (2021), Swimming the talk: How to strengthen collaboration and synergies between the Climate and Biodiversity Conventions?, Policy brief, May 2021, OCEAN & CLIMATE PLATFORM,

p.1-14. available at:

https://ocean-climate.org/wp-content/uploads/2021/05/Policy-brief_CBD_UNFCCC-VF.pdf

Scarano, F., (2017). Ecosystem-based adaptation to climate change: concept, scalability and a role for conservation science. *Perspectives in Ecology and Conservation*, Volume 15, Issue 2. Pages 65-73. available at: <https://www.sciencedirect.com/science/article/pii/S1679007316301621>

Seddon N, et al. (2020). Understanding the value and limits of nature-based solutions to climate change and other global challenges. *Phil. Trans. R. Soc. B* 375: 20190120. available at: <https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2019.0120>

Solan M, et al. (2020). Benthic-based contributions to climate change mitigation and adaptation. *Phil. Trans. R. Soc. B* 375: 20190107. <http://dx.doi.org/10.1098/rstb.2019.010>

Sumaila, UR et al. (2021). Financing a sustainable ocean economy. *Nature Comms* 2021. available at: <https://www.nature.com/articles/s41467-021-23168-y.pdf>

Taillardat et al., (2018). Mangrove blue carbon strategies for climate change mitigation are most effective at the national scale, *Biol. Lett.* 14: 20180251, available at: <https://royalsocietypublishing.org/doi/10.1098/rsbl.2018.0251>

Taillardat P. et al. (2020). Climate change mitigation potential of wetlands and the cost-effectiveness of their restoration *Interface Focus* 10:20190129. <http://doi.org/10.1098/rsfs.2019.0129>

The Blue Carbon Initiative (2021). Guidelines for Blue Carbon and Nationally Determined Contributions, available at: <https://www.thebluecarboninitiative.org/policy-guidance>

The Blue Carbon Initiative (2021). Mitigating Climate Change through Coastal Ecosystem Management. available at: <https://www.thebluecarboninitiative.org/>

The Nature Conservancy (2020a). The carbon sequestration power of coastal wetlands, *Mapping Ocean Wealth*, available at: <https://oceanwealth.org/ecosystem-services/carbon/>

The Nature Conservancy (2020b). Practical Implications of the Katowice Climate Package for Developing Country Parties and Land Sector Reporting. available at: https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_Transparency_LandUseReport.pdf

Thiele, T, et al. (2020). Blue Infrastructure Finance: A new approach. integrating Nature-based Solutions for coastal resilience. available at: https://www.conservation.org/docs/default-source/publication-pdfs/blue-infrastructure-finance.pdf?Status=Master&sfvrsn=6edObda1_2

UNDP (2017). A guide to transparency under the UNFCCC and the Paris Agreement. Reporting and review: obligations and opportunities. available at: <https://www.adaptation-undp.org/sites/default/files/resources/10190iied.pdf>

UNDP (2020). Climate Promise Quality Assurance Checklist. For Revising Nationally Determined Contributions, available at: [https://www.ndcs.undp.org/content/ndc-support-programme/en/home/impact-and-learning/library/climate-promise-quality-assurance-checklist.html#:~:text=The%20quality%20assurance%20checklist%20is,Nationally%20Determined%20Contributions%20\(NDCs\).&text=This%20checklist%20outlines%20three%20dimensions,for%20ambitious%20and%20robust%20NDCs.](https://www.ndcs.undp.org/content/ndc-support-programme/en/home/impact-and-learning/library/climate-promise-quality-assurance-checklist.html#:~:text=The%20quality%20assurance%20checklist%20is,Nationally%20Determined%20Contributions%20(NDCs).&text=This%20checklist%20outlines%20three%20dimensions,for%20ambitious%20and%20robust%20NDCs.)

UNEP (2018). Emissions Gap Report. United Nations Environment Programme, Nairobi. available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/26895/EGR2018_FullReport_EN.pdf?sequence=1&isAllowed=y

UNFCCC (2021). Nationally determined contributions under the Paris Agreement. Addendum to the Synthesis report by the secretariat. UNFCCC. /PA/CMA/2021/2/Add.2. available at: <https://unfccc.int/>

sites/default/files/resource/cma2021_02a02.pdf
UNFCCC (2021). Interim NDC Registry. available at: <https://www4.unfccc.int/sites/NDCStaging/Pages/Home.aspx>

UNFCCC. (2015). Report of the Conference of the Parties on its twentieth session, held in Lima from 1 to 14 December 2014. available at: <https://unfccc.int/sites/default/files/resource/docs/2014/cop20/eng/10a01.pdf>

United Nations Environment Programme (2021). State of Finance for Nature 2021. Nairobi. available at: <https://reliefweb.int/sites/reliefweb.int/files/resources/State%20of%20finance%20for%20nature%20-%20Tripling%20investments%20in%20nature-based%20solutions%20by%202030%20%28Executive%20Summary%29.pdf>

United Nations Human Settlements Programme. (2011). Global report on human settlement. Cities and Climate Change. Table 1.2. available at: <https://unhabitat.org/global-report-on-human-settlements-2011-cities-and-climate-change>
Von Unger, Moritz; Herr, Dorothee; Seneviratne, Thilanka; Castillo, Gabriela (2020): Blue NbS in NDCs. A booklet for successful implementation (GIZ 2020). available at: <https://ndcpartnership.org/toolbox/blue-nature-based-solutions-nationally-determined-contributions-0>

World Resources Institute (2021). 4 Ocean-based Solutions to Advance Climate Action Through NDCs. available at: <https://www.wri.org/insights/4-ocean-based-solutions-advance-climate-action-through-ndcs>