PIANC
The World Association for Waterborne Transport Infrastructure

Environmental Commission and Permanent Task Group on Climate Change EnviCom-PTGCC WG 256

UNDERSTANDING BLUE CARBON: A PRACTICAL GUIDE

PROPOSED TECHNICAL WORKING GROUP

TERMS OF REFERENCE

1. Historical Background Definition of the problem

According to the Intergovernmental Panel on Climate Change, the term 'blue carbon' refers to carbon that is captured and stored by coastal and marine ecosystems, including all fluxes and stores that are biologically driven and responsive to management.

Sediment is an integral part of aquatic ecosystems, serving as the building block for natural habitats and an inherent component of many ecosystem services. Sediment—and habitat associated with sediment—also plays a vital role in sequestering and storing carbon and is, as such, a key component of the carbon mass balance in aquatic environments.

Many ports and harbours operate in and around coastal and marine habitats such as mangroves, salt marshes, and seagrasses. Managing and coherently expanding these habitats can help reduce the risks and the impacts of climate change, also providing co-benefits through habitat enrichment and biodiversity.

Previous EnviCom and PTGCC[1] technical Working Groups (see examples in Section 3 below) have illustrated how effectively managing coastal, marine, and freshwater ecosystems is relevant to port and waterway assets and operations. Coastal-, estuarine- and riverine flood protections, beneficial use of dredged materials, and the development of new sustainable infrastructure are a few examples of the interface where navigational interests and opportunities for effective blue carbon management coincide.

In November 2022, EnviCom and PTGCC hosted a webinar entitled *A Market Approach to Blue Carbon and Opportunities for Waterborne Transport Infrastructure*. This webinar explored market-based opportunities associated with managing blue carbon resources. It also highlighted the limited existing understanding of blue carbon concepts and their relevance to the waterborne navigation infrastructure sector. Therefore, a technical Working Group on this topic is timely.

2. Objectives

A main objective of this Working Group report will be to define the concept including describing why and how blue carbon is relevant to waterborne navigation infrastructure. In particular, the Working Group will explore the following navigational infrastructure elements and their relationship to and impacts on blue carbon:

[1] PTGCC is the Permanent Task Group on Climate Change (Permanent Task Group on Climate Change - Pianc)

- Ports and navigation infrastructure and operations, including recreational infrastructure and operations, supported by MarCom and RecCom contributions
- Coastal, estuarine, and riverine flood protection measures
- Sediment dredging, disposal, and beneficial use opportunities
- Habitat restoration and enhancement and ecosystem service approaches in the context of mitigation, compensation, or biodiversity offsetting for new development
- Achieving net zero emissions of greenhouse gases from existing activities and operations or from new development projects
- Climate change adaptation, strengthening the resilience of both navigation and nature
- Applying working with nature (WwN) and nature-based solutions (NbS) in operating or managing waterborne navigation infrastructure
- Creation of and support for local livelihood activities within blue carbon habitats

Whilst blue carbon often refers to marine ecosystems, the Working Group will explore the relevance of blue carbon to freshwater habitats and, thus, to the management of inland waterways and infrastructure, supported by InCom contributors.

The report will present a broad 'state of knowledge' overview of blue carbon in the context of navigation and associated infrastructure, operations, and activities internationally. More specifically, the report will address the following elements:

- Explain the relevance of blue carbon as an integral part of port and navigational infrastructure
- Present tools to measure and quantify blue carbon; to measure and quantify blue carbon impacts (e.g., carbon dioxide emissions or capture) associated with operations; and to support blue carbon evaluation and decision-making
- Address some of the unknowns and uncertainties, including providing guidance on understanding how much carbon, where and how it is stored, and rates of capture and release
- Identify and discuss potential applications, barriers, and opportunities
- Explore the practical challenges associated with the delivery of blue carbon projects, including scaling up projects
- Highlight case studies, including where WwN or NbS have successfully incorporated blue carbon objectives
- Introduce the evolving concepts of blue carbon standards, carbon credits, and the development of carbon markets as components of new policies/regulations and incentive programmes
- Provide an overview of the status of such activities in different countries
- Consider what guidance can be provided to blue carbon policy makers on applying top-down frameworks to the actual circumstances of the sector

3. Earlier reports to be reviewed

Relevant PIANC EnviCom and PTGCC reports include:

- Working with Nature applied to recreational navigation infrastructure (WG 148)
- Working with Nature (WG 176)
- Climate change adaptation (WG 178)
- Carbon management (WG 188)
- Ecosystem services (WG 195)
- Beneficial use of dredged material (WG 214)
- Green funding (WG 230, forthcoming)

Third-party reports and other published or unpublished sources of information include:

- EuDA conference papers WODCON XX (2012/3), WODCON XXI (2016)
- Coastal Blue Carbon: methods for assessing carbon stocks and emissions factors in mangroves, tidal salt marshes, and seagrass meadows. The Blue Carbon initiative.
- Blue carbon: The role of healthy oceans in binding carbon (2009)
- State of the science on coastal blue carbon: A summary for policy makers (2011)
- Blue carbon as a natural climate solution (2021)
- Reducing the ecosystem-based carbon footprint of coastal engineering, Wetlands International (2022)

4. Scope of work

The Working Group will collate and review information about blue carbon initiatives internationally, both in relation to waterborne navigation and, where relevant, other marine and coastal sectors, including nature protection. This review will cover relevant academic literature (where much of the early work on the blue carbon concept has been documented) and, practicable, will identify and review examples that translate theory into practical guidance.

The Working Group will agree on a Blue Carbon definition that is comprehensible and applicable to the operational management of waterborne navigation infrastructure.

Collecting and reviewing good practice case studies will be an essential aspect of this latter work: case studies will cover not only designed and delivered blue carbon projects but also examples illustrating evolving standards and markets.

The blue carbon WG report will complement and support but will not duplicate the work of the currently proposed EnviCom-PTGCC Working Group on *Opportunities for WwN to Contribute to Decarbonisation and Strengthened Resilience*.

5. Intended product

The WG report will introduce the concept and provide technical and conceptual good practice guidance to those interested in exploring or embarking on such initiatives. It will provide a broad' state of knowledge' overview of blue carbon in the context of navigation and associated infrastructure operations and activities.

6. Working Group membership

Desirable disciplines and experience amongst WG membership will include:

- Ecologists/biologists
- Scientists/academics
- Economists, green financiers (business case)
- Coastal, water, and wetland engineers/geomorphologists
- Port and waterway planners and engineers (as users)
- Project owners (public and private)
- Representatives from MarCom, RecCom, and possibly InCom

The WG will likely benefit from the presence of representatives from third-party organisations across many of these disciplines.

7. Target audience

- Port and waterway authorities
- Port and waterway scientists and engineers
- Investors
- Government and regulators

8. Relevance

8.1. Relevance to countries in transition, etc.

Blue carbon is a potentially important (economic) co-benefit of nature-based solutions (WwN) to coastal engineering challenges, particularly in developing countries.

Blue carbon is relevant to the setting and achievement of some countries' nationally determined contributions, i.e., meeting countries' obligations under the UNFCCC process implementing the 2015 Paris Agreement.

Blue carbon potentially offers an economic/financial opportunity as voluntary and regulated carbon markets develop (i.e., countries may be able to sell carbon credits internationally).

8.2. Climate Change and Adaptation

Understanding Blue Carbon can help identify climate change mitigation and decarbonisation opportunities. This topic therefore provides an important contribution to meeting the objectives set out in the PIANC Declaration on Climate Change (https://www.pianc.org/uploads/files/COP/PIANC-Declaration-on-Climate-Change.pdf)

8.3. Working with Nature

Blue Carbon is a key aspect of many WwN initiatives, notably in terms of the ecosystem service function it provides, and hence offers important co-benefits.

8.4. UN Sustainable Development Goals

The WG report would contribute to the achievement of multiple UN Sustainable Development Goals, notably:

- 13 (Climate action)
- 14 (Life below water)
- 15 (Life on land)

whilst also supporting

- 9 (Infrastructure, innovation, industry)
- 3 (Good health and wellbeing)