ACCELERATING BLUE CARBON CLIMATE MITIGATION THROUGH ACTION-INFORMED SYNTHESIS OF GLOBAL DATA

OVERVIEW

The Coastal Carbon Network seeks to accelerate the pace of discovery in coastal wetland carbon science by providing access to data, analysis tools, and synthesis opportunities. This opportunity provides a fellow with access to the Coastal Carbon Atlas, containing over 6,000 Blue Carbon soil profiles globally, data libraries on coastal wetland plant biomass and methane emissions, and data from the MarineGEO network and its partners. Postdocs with research interests in natural climate solutions through the synthesis of knowledge and data to support the preservation, restoration, and management of coastal ecosystems are strongly encouraged to apply.

IMPORTANCE

Delegates at the 2021 Climate Change Conference (COP26) in Glasgow UK left with one clear message: ocean ecosystems are an important and generally overlooked element of climate mitigation, and much of the carbon buried each year in oceans occurs in a relatively small fraction of the coastal oceans that supports tidal marshes, mangroves, and seagrasses. These Blue Carbon ecosystems are now recognized as one of our most strategic opportunities for mitigating climate change. When preserved or restored, Blue Carbon ecosystems can remove substantial amounts of carbon from the atmosphere, but when destroyed they become a source of carbon emissions. In addition, Blue Carbon ecosystems provide critical cultural, economic, and biodiversity co-benefits to coastal communities globally.

Engaging Blue Carbon ecosystems in nature-based solutions to climate change requires that we first understand where these ecosystems exist and how they are changing, then how carbon cycles through them, and finally how to conserve them towards long-term carbon storage. A strong scientific understanding provides the foundation for unlocking financing for conservation and restoration through carbon markets and empowering states and localities to be recognized for the climate benefit of habitat restoration. On a larger scale, increasing understanding of carbon in coastal wetlands is essential to integrating these ecosystems in global climate models and greenhouse gas budgets across the land-sea interface, ensuring that their climate importance is fully recognized and effectively leveraged.

The Coastal Carbon Network (CCN) is a community-driven, centralized hub for global data on wetland Blue Carbon hosted at the Smithsonian Environmental Research Center. The goal of the CCN is to accelerate the pace of discovery in Blue Carbon science and science-informed actions by building
open-source data tools in collaboration with a diverse community of scientists, policy makers, and Blue Carbon ecosystem practitioners. We partner with organizations and programs such as MarineGEO, Conservation International, USGS, Pew Charitable Trusts, and Silvestrum Climate Associates.

POTENTIAL RESEARCH THEMES

The Coastal Carbon Network seek a Postdoctoral Fellow to advance natural climate solutions through the synthesis of knowledge and data to support the preservation, restoration, and management of coastal ecosystems. Our goal is to accelerate research and development that leads to discovery and lowers barriers to implementation of effective science-informed policy and actions that protect, restore, and sustainably manage coastal ecosystems. The Fellows will have access to the Coastal Carbon Atlas containing over 6,000 Blue Carbon soil profiles globally, data libraries on coastal wetland plant biomass and methane emissions, data from the MarineGEO network and its partners, and the expertise of recognized experts in coastal wetland ecology, biogeochemistry, management, and policy. Fellows will work with the Coastal Carbon Network, MarineGEO, Marine Conservation Program, and our global community of collaborators to develop novel lines of inquiry based on Blue Carbon. Fellows will have strong quantitative skills and a sincere interest in working with a diverse community of stakeholders to
understand the information, data, technology and policy barriers that currently limit the translation of Blue Carbon science into meaningful local and regional actions.

Assets to Support Action

Scientists, policy makers, and practitioners collaborated over the past decade to fill knowledge gaps and develop policy instruments that established Blue Carbon as a feasible and tractable option for investing in nature-based solutions to mitigate climate change. There is tremendous interest from investors and a growing pipeline of financial resources for Blue Carbon projects globally, but relatively few projects that can be implemented on the ground. This has created a situation where demand for Blue Carbon projects outweighs the supply. A primary reason for this disconnect is access to information about where coastal wetlands exist, how much carbon they contain, how restoration or management will change their carbon stocks or methane emissions, and the expense of collecting such data. We propose to lower the barriers to developing Blue Carbon projects by increasing the accessibility of Blue Carbon data and associated tools in formats that can directly support actions.

The majority of existing data and information on Blue Carbon ecosystems resides in publications and databases that are accessible to scientists but largely inaccessible to practitioners. Even where information on coastal wetlands is freely available it is rarely packaged in a way that is useful to actual projects, and even more rarely at the right spatial scale. These are barriers where strong collaborations between scientists and practitioners can have a major impact.

The **Coastal Carbon Atlas** is the most comprehensive publicly available database of coastal Blue Carbon data. The Atlas has carbon data on soil cores, plant biomass and other associated data on 6,333 sites, spanning 64 countries and 9 Blue Carbon habitats (Fig. 1). After just three years the Atlas has been used in high-impact papers in *Nature*, *Environmental Research Letters* and *Scientific Reports.* The data are being used by Smithsonian Institution scientists and collaborators to build models and data visualization tools showing where new investments will be most strategic for advancing restoration, mitigation, and carbon sequestration projects. The data informs the U.S. Greenhouse Gas Inventory as a resource for establishing regional ecosystem reference carbon stocks and emissions factors. One example of how the Atlas can be leveraged to advance Blue Carbon projects is the Blue Carbon Report Card for US States (Fig. 2), which helps funding organizations understand where and how to allocate resources for Blue Carbon projects. A global version of the Report Card is now underway. We are interested in fellows who can leverage and enhance these resources through climate synthesis, integration of additional Blue Carbon data and partners, and/or development of tools and indicators to further advance and bridge Blue Carbon science and action.

Advisors

Principal investigators and potential advisors include Pat Megonigal, Jim Holmquist, Emmett Duffy, Jon Lefcheck, Genevieve Noyce and Steve Crooks from the Smithsonian Environmental Research Center as well as Steve Canty, and Hannah Morrisette from the National Museum of Natural History.

Fig. 1: Density and distribution of soil samples available via the Coastal Carbon Atlas

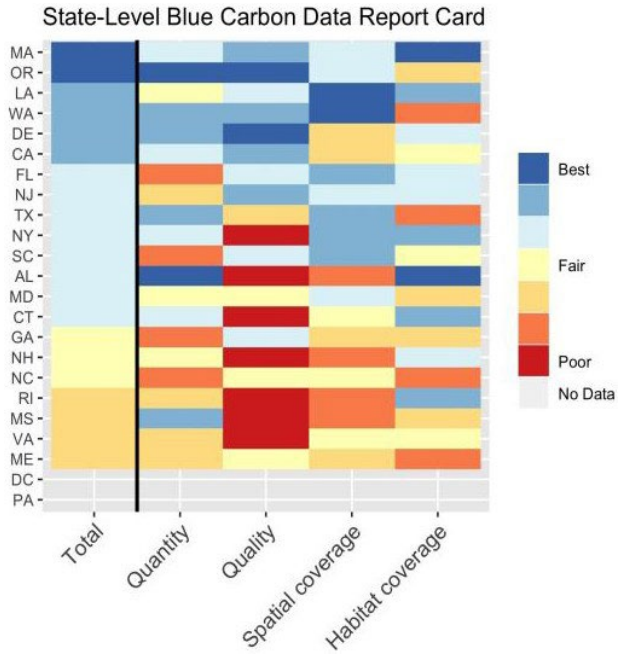

Fig. 2: The State Blue Carbon Report Card ranks states based on four key attributes. The total grade is an even composite of these four rankings.