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October 18, 2019

The Honorable Kathy Castor
Chairman, Select Committee on the Climate Crisis
U.S. House of Representatives
H2-359 Ford Building
Washington, D.C. 20515

The Honorable Garret Graves
Ranking Member, Select Committee on the Climate Crisis
U.S. House of Representatives
H2-361 Ford Building
Washington, D.C. 20515

Re: Select Committee on the Climate Crisis hearing on "Solving the Climate Crisis: Natural Solutions to Cutting Pollution and Building Resilience"

Dear Chairman Castor and Ranking Member Graves,

Thank you for the opportunity to provide input to the Committee's hearing: "Solving the Climate Crisis: Natural Solutions to Cutting Pollution and Building Resilience."

The ocean is the dominant feature of our plant, covering 70 percent of its surface and driving its climate and biosphere. It used to be assumed that the ocean was so large that climate change impacts on the ocean would be minimal but we now know this is not the case. The Intergovernmental Panel on Climate Change (IPCC) Ocean and Cryosphere report[1] describes these changes in no uncertain terms. Today's ocean is warmer, more stratified, and more acidic. Ocean heatwaves are killing our corals and rising sea surface temperatures are increasing storm severity resulting in the multitude of extreme weather events we have observed over recent years. As the ocean warms and ice melts, sea level is rising at an accelerating rate. However, while much of the

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

recent attention is focused on the problems that the ocean faces, the ocean is also a source of potential solutions and innovation.

The world needs to move rapidly and systematically to reduce emissions of greenhouse gases (GHGs) to the atmosphere if it is to avoid irreversible climate impacts.[2,3] Greater efforts are essential to accelerate and scale decarbonization of the economy and pursue a pathway to net-zero emissions by the middle of the century. Following the findings of the IPCC Special Report on the implications of 1.5C warming above the preindustrial period, it is now abundantly clear that stronger action to mitigate GHG emissions is a global imperative that will require an inclusive approach across the whole of the global economy.[2]

To date, much of the attention paid to nature based solutions to climate change has been directed to the role of terrestrial sources of emissions and sinks, such as the impact of tropical deforestation as a source of greenhouse gas emissions. However, oceans and coasts have recently taken center stage in the discussion of climate impacts and solutions; so much so that the upcoming global negotiations on climate action under the United Nations (COP25) to be held in Chile in December 2019 has been dubbed the "Blue COP". This is fitting, as ocean-based mitigation and adaptation options offer significant potential to contribute to global efforts to limit global warming as well as achieve the targets of the Paris Agreement and the Sustainable Development Goals.

The ocean is on the front lines of the battle against climate change. Not only has the ocean absorbed 93 percent of the heat trapped by rising anthropogenic carbon dioxide (CO_2), it also absorbs approximately 25 to 30 percent of anthropogenic CO_2 emissions that would otherwise remain in the atmosphere and increase global warming. Mangroves, salt marshes, and seagrass beds are highly productive vegetated coastal ecosystems and are hotspots for carbon storage, with soil carbon sequestration rates per hectare up to 10 times larger than those of terrestrial ecosystems.[4] When these ecosystems are degraded and converted, carbon in the vegetation and soils, which may have accumulated over hundreds or thousands of years, is oxidized and emitted back to the atmosphere in a matter of decades, leading to increased emissions. Thus, protection of these "Blue Carbon" ecosystems offers an efficient pathway to avoid CO_2 emissions, particularly for nations with large areas of coastal vegetation and high rates of loss. Similarly, utilizing these ocean related nature based solutions yields important co-benefits to local communities via other ecosystems services, such as providing habitat for commercially important fish species, food security,

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[2] IPCC. 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Edited by R.K. Pachauri and L.A. Meyer. Geneva: IPCC. www.ipcc.com.

[3] IPCC. 2018. Global Warming of 1.5ÅãC: An IPCC Special Report on the Impacts of Global Warming of 1.5ÅãC above Pre-Industrial Levels and Related Global GHG Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, edited by J. B. R. Matthews. Geneva: World Meteorological Organization.

[4] Mcleod, E., et al. 2011. "A Blueprint for Blue Carbon: Toward an Improved Understanding of the Role of Vegetated Coastal Habitats in Sequestering CO2." Frontiers in Ecology and the Environment 9 (10): 552–60.

livelihoods, and reducing the impact of storms during extreme weather events as seen in hurricane Sandy where coastal wetlands prevented more than US$625 million in direct property damages by buffering coasts against its storm surge.[5]

Protection and restoration of ocean and coasts for climate mitigation and adaptation provides "no-regret" strategies, and thus Conservation International would recommend the Committee take into account the following four areas of ocean-based natural solutions to climate change in their formal recommendations. These key topics for oceans and coasts are Blue Carbon, Green-Gray Infrastructure, Sustainable Fisheries, and Large Scale Marine Protection.

Blue Carbon for Climate Mitigation

Coastal blue carbon ecosystems – mangroves, tidal marshes, and seagrasses – are now an established key component of nature-based climate change mitigation strategies. Found at the interface between sea and land, these habitats sequester and store up to ten times more carbon, per unit area, than terrestrial forests.[6,7,8] There is growing awareness that the loss of coastal wetlands is contributing to global warming and that conservation and restoration of these wetlands may help to reduce or possibly reverse some of these impacts. In a global synthesis, it was estimated that converted and degraded coastal wetlands emit 450 million tons (Mt) of CO_2.[6] Such emissions are equivalent to 3 to 19% of those from deforestation globally and result in economic damages of USD $6 to 42 billion, annually. However, restoration of coastal ecosystems could result in potential climate mitigation benefits of 0.89 Gigatons (Gt) of CO_2 removals each year by 2030 and up to 1.38 Gt by 2050[9] – roughly the annual emissions of all the cars in California, Texas, New York and Louisiana combined.

Growing interest in coastal carbon sinks and sequestration – both in terms of scientific understanding and the climate change policy implications thereof – is driving rapid expansion of carbon dynamics research in coastal blue carbon ecosystems. In turn, this science has driven formal recognition of the importance of conservation and restoration of these ecosystems for climate change mitigation within international climate policy, finance and related management. Over the last seven years, Conservation International has been central to catalyzing this progress by facilitating and focusing research on priority policy-relevant topics and working

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[5] Narayan, Siddharth, et al. "The value of coastal wetlands for flood damage reduction in the northeastern USA." *Scientific reports* 7.1 (2017): 9463.
[6] Pendleton, Linwood, et al. "Estimating global "blue carbon" emissions from conversion and degradation of vegetated coastal ecosystems." *PloS one* 7.9 (2012): e43542.
[7] Howard, Jennifer, et al. "Clarifying the role of coastal and marine systems in climate mitigation." *Frontiers in Ecology and the Environment* 15.1 (2017): 42-50.
[8] Simard, Marc, et al. "Mangrove canopy height globally related to precipitation, temperature and cyclone frequency." *Nature Geoscience* 12.1 (2019): 40.
[9] Hough-Guldberg, O., et al. 2019. "The Oceans as a Solution to Climate Change: Five Opportunities for Action." Report. Washington, DC: World Resources Institute. Available online at http://www.oceanpanel.org/climate

to integrate that science into policy and management, leading to conservation, restoration and sustainable management of blue carbon ecosystems all over the world.

However, addressing the destruction of wetlands requires changing economic incentives that drive the destruction. Here, too, blue carbon can provide a solution. Governments should recognize the significant carbon impact from these ecosystems, and that protecting and effectively restoring wetlands is a key, but mostly forgotten, tool in the fight against climate change. Conservation International and our partners are building the conditions needed on the ground for large-scale application of blue carbon approaches – specifically the development of blue carbon credits that can be sold on the voluntary carbon market to provide start-up funding for conservation and restoration activities or that can be used to meet countries emissions targets. These sources of financing and associated policies represent a new avenue for protecting wetlands at a scale never achieved before. Blue carbon finance and policy aims to foster conditions where the full carbon value in these rich ecosystems, not just in the trees, but in the soil, is recognized and the financial remuneration available to conserve these areas is maximized.

In the U.S., federal agencies have established an interagency team to support blue carbon efforts. These include integrating blue carbon science and policy into the National Ocean Policy and activities to develop tools and methodologies for blue carbon management. The National Assessment of Ecosystem Carbon Sequestration and Greenhouse Gas Fluxes recognizes that national estimates of GHG fluxes are lacking and that filling this data gap is a priority. Whether to support national climate change goals, e.g. under a carbon finance framework, or to encourage less formal adoption of best practices, there is a need for refined quantification of GHG emissions and removals due to wetlands management at the national scale. Moreover, wetland climate change mitigation activities should be embedded within climate change adaptation strategies to avoid future negative outcomes related to coastal land-use planning.

Green-gray Infrastructure and Coastal Protection for Climate Adaptation

Extreme weather events brought about by climate change are one of the most dangerous risks facing humanity.[10] Reducing this threat to vulnerable communities is a critical challenge of our time. These events have already caused devastating impacts on communities in many parts of the world, affecting people's lives and infrastructure in an unprecedented manner. In 2019 (as of October 8), there have been 10 weather and climate disaster events in the U.S., with financial damages exceeding $1 billion – for each event. Half of those were severe storm events, and two were tropical cyclone events. Overall, the extreme weather events this year resulted in the deaths of 39 people and had significant economic effects on the areas impacted. This year, 2019, is the

[10] World Meteorological Organization (WMO) Statement on the State of the Global Climate in 2017, https://library.wmo.int/doc_num.php?explnum_id=4453

fifth consecutive year (2015-2019) in which 10 or more billion-dollar weather and climate disaster events have impacted the U.S.[11]

Approximately $100 trillion of global infrastructure is estimated to be at risk due to inadequate insurance and risk management[12], while almost 1.9 million homes worth a combined $882 billion are at risk of being underwater due to sea level rise by 2100.[13] Across all future climate scenarios, no matter the degree of intervention, predicted impacts on coastal communities and assets are projected to be substantial and will cost up to 4% of annual world GDP by 2100.[14] That same modeling indicates that adaptation strategies can reduce these impacts by 2 to 3 orders of magnitude but will require an investment of USD $70 billion annually by 2100. Green-gray infrastructure – a new approach to climate adaptation – provides cost effective approaches that can and should be a key adaptation solution for the U.S.

Green-gray infrastructure combines the conservation and/or restoration of ecosystems with the selective use of conventional engineering approaches to provide people with solutions that deliver climate change resilience and adaptation benefits. Green-gray approaches draw upon the best of society's engineering achievements to innovate the next generation of climate resilient infrastructure. By blending "green" conservation with "gray" engineering techniques, communities can incorporate the benefits of both solutions while minimizing the limitations of using either green or gray infrastructure individually. For example, a combination of wetland restoration with limited geoengineering approaches, such as breakwaters, combines the wave attenuation and flood control value of wetlands with the benefits of engineered structures to stabilize the coastal zone and attenuate waves through beach accretion. The combined solution can be more comprehensive, robust and cost-effective than either solution alone. And these blended solutions can provide a host of multi-benefits:

- Habitat for fish and other aquatic species
- Employment opportunities for example, through enhanced fisheries
- Coastal protection to absorb and buffer wave energy and storm surge
- Carbon Capture, by conserving or restoring wetlands that capture and store five times more carbon than tropical rainforests, and

[11] https://www.ncdc.noaa.gov/billions/
[12] Jupiter. (2018, February 12). Jupiter Launches Climate Data, Analytics and Technology Platform to Predict and Manage Weather and Climate Change Risks. Retrieved from https://www.globenewswire.com/newsrelease/2018/02/12/1339285/0/en/Jupiter-Launches-Climate-Data-Analytics-and-Technology-Platform-to-Predictand-Manage-Weather-and-Climate-Change-Risks.html
[13] Zillow Research. (2017, June 2). Climate Change and Housing: Will a Rising Tide Sink All Homes? Retrieved from https://www.zillow.com/research/climate-change-underwater-homes-12890/
[14] OECD (2019), *Responding to Rising Seas: OECD Country Approaches to Tackling Coastal Risks*, OECD Publishing, Paris https://doi.org/10.1787/9789264312487-en.

- Improving water quality by capturing, storing and filtering rainwater or stormwater.

These benefits are additional to the fact that green-gray infrastructure is often a highly cost effective alternative to traditional engineering only solutions, especially when considering the environmental and social co-benefits. For example, the installation of breakwaters that mimic the natural environment providing coastal marine habitat, increase sediment trapping to combat erosion and build up the beach, while at the same time reducing wave energy and protecting coastal communities and assets from storm surges.

For all these reasons, Conservation International has launched a green-gray infrastructure program to support communities around the world cope with the impacts of climate change, and we encourage U.S. decision makers to include green-gray options in their coastal protection and budget plans.

Sustainable Fisheries for Climate Adaptation

The ocean is the world's largest source of food. Seafood is the most traded food commodity globally and is the last global food commodity we hunt. Three billion people – three out of every seven on the planet – rely on seafood as a primary source of animal protein.[15] Fisheries support the economies of developing countries worldwide, including over 260 million livelihoods.[16]

Half of the world's wild-caught fisheries are overexploited or depleted, due to overfishing, pollution, climate change and other threats.[17] Overfishing, increased illegal, unreported, and unregulated (IUU) fishing, and use of indiscriminate and damaging fishing gears have resulted in stock declines and collapses – impacting food security, livelihoods, and economies of coastal communities.

Aquaculture – fish farming – is one of the fastest growing food production sectors globally, accounting for half of the worldwide total seafood production. Intensive aquaculture has resulted in widespread degradation of coastal ecosystems from pollution, waste, and habitat destruction.[18]

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[15] Source: UNFAO 2014. Fish now accounts for almost 17% of the global population's intake of protein – in some coastal and island countries it can top 70%.

[16] Teh, L.C. and U. Sumaila. 2013. Contribution of marine fisheries to worldwide employment. Fish and Fisheries 14:77-88.

[17] UN FAO. 2014. The State of the World Fisheries and Aquaculture. [online] http://www.fao.org/3/a-i3720e/index.html

[18] Hall, SJ., et al. 2011. Blue Frontiers: Managing the environmental costs of aquaculture. The WorldFish Center, Penang, Malaysia.; Troell, M., R. L. Naylor, M. Metian, M. Beveridge, P. H. Tyedmers, C. Folke, K. J. Arrow, S. Barrett, A.-S. Crépin, and P. R. Ehrlich. 2014. Does aquaculture add resilience to the global food system? Proceedings of the National Academy of Sciences 111:13257-13263.; Klinger, D., and R. L. Naylor. 2012. Searching for solutions in aquaculture: charting a sustainable course. Annual Review of Environment and Resources 37:247-276.

Sustainable aquaculture approaches with minimal or no net impact of coastal ecosystems are not widely used due to lack of capacity or economic incentives.

The problems of overfishing and unsustainable aquaculture are fueled by several factors. Demand for seafood is rising due to population growth, rising affluence, and globalization, and demand for fish as food for livestock and aquaculture operations is growing.[19] New technologies have multiplied harvesting capacity, and pollution and habitat degradation are reducing the productive capacity of fisheries ecosystems. These problems are magnified by ineffective policy and governance systems.

The benefits of investing in improved management of fisheries and aquaculture outweigh the costs on average 10:1, and effective conservation can produce positive outcomes for biodiversity and communities. One study concludes that under sustainable management, global fish production could increase by 14%, and economic profits can increase by 168%, reaching $74 billion a year.[20]

Dramatic changes to fishery management has the potential to adapt and compensate for the coming climate change impacts to produce a seafood future that is more bountiful and profitable than it is today - thus securing a healthy source of protein in a world where climate change threatens future food security. However, just because fishery management *can* improve, doesn't mean it *will*. Over the last two decades, CI has implemented successful initiatives to improve the environmental sustainability and social benefits of fisheries and aquaculture. We recommend the committee promote effective fisheries and aquaculture management which provide adaptive capacity for communities to successfully navigate the impacts of climate change.

Large Scale Marine Protection for Climate Adaptation

By reducing other threats to ocean ecosystems, such as destructive fishing, habitat loss, and pollution, Marine Protected Areas (MPAs) build ecological resilience and increase the ability of ecosystems, species, and communities dependent on the ocean for their livelihoods to adapt to climate change. When local communities and stakeholders are directly involved in the design, management, and benefit sharing, we see more successful outcomes. MPAs can also help build social resilience and adaptive capacity to climate change.

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[19] Naylor, RL., et al. 2000. Effect of aquaculture on world fish supplies. Nature 405:1017-1024.

[20] CEA, editor. 2015. Ocean Prosperity Roadmap: Fisheries and Beyond. California Environmental Associates (CEA). [online] http://www.oceanprosperityroadmap.org/wp-content/uploads/2015/05/Synthesis-Report-6.14.15.pdf.

The IPCC Ocean and Cryosphere report[21] explicitly mentions the value of MPA's to increase societies' capacity to respond to climate change risks. To protect our ocean and ensure it can provide the resources we need for 7 – 11 billion people, we must imagine and act at a scale larger than we ever have before. Effective place-based conservation and management safeguards biodiversity, replenishes fisheries, provides for the safety and security of people, and enables ecosystems to function as they should. A study conducted by Conservation International directly links marine managed areas with increased local incomes, food stability, and quality of life.[22] Areas with adequate capacity and funding are found to deliver almost three times the ecological benefits.[23] And a well-managed area reduces stress from unsustainable human activities, making the ocean system more resilient and better able to cope with climate impacts.[24] Because this approach works, the International Union for Conservation of Nature (IUCN) has called for 30 percent of the ocean to be placed in marine protected areas.[25]

Governments need to protect, conserve and sustainably manage vast stretches of ocean area, recognizing the tremendous benefits such actions yields both for nature and their citizenry who depend on the ocean culturally, socially and economically. Noting that there are many categories of MPA's from no-take zones to multiple use areas where protection and sustainable use are in balance. People—from local communities to heads of state—are now recognizing and prioritizing area-based strategies to protect and sustainably manage the ocean. However, the community of ocean conservation organizations and funders has not kept pace with this historic shift in attitudes toward and growing interest in protecting the ocean. A 2017 report commissioned by the Packard Foundation[26] found that only a small number of foundations give to placed-based ocean conservation, totaling $40 million annually. A significant increase in funding and support is needed to maintain momentum for ocean conservation globally.

Conservation International has prioritized catalyzing the creation and improvement of 18,000 km^2 of ocean conservation areas and we recommend that the U.S. supports the creation and sustainable management of ocean conservation areas as a climate adaptation strategy, specifically aid going to large ocean states.

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

[22] Kaufman, Orbach. 2010. Marine Managed Area Science Project Synthesis: Report to the Gordon and Betty Moore Foundation. Conservation International.

[23] Gill et al. 2017. Capacity shortfalls hinder the performance of marine protected areas globally. Nature 543: 665-679.

[24] Roberts et al. 2017. Marine Reserves can mitigate and promote adaptation to climate change. National Academy of Sciences 114: 6167-6175.

[25] IUCN World Conservation Congress. 2016. Increasing marine protected area coverage for effective marine biodiversity conservation. WCC-2016-Res-053-EN.

[26] California Environmental Associates. 2017. Our Shared Seas: A 2017 Overview of Ocean Threats and Conservation Funding. Prepared with support of the David and Lucile Packard Foundation

Applications for Policy

Each of these ocean-based natural solutions to climate mitigation and adaptation play a significant role in preserving wildlife, coastal communities and the sustainable marine based economies upon which they depend. Blue Carbon, Green-Gray Infrastructure, Sustainable Fisheries, and Marine Protected Areas can help us build resilience to the impacts of climate change that are being felt across our country and in every region on Earth.

There is a small, but important window of opportunity within which the emissions trajectory based on "Current Policy" can be directed towards a pathway that is consistent with limiting global temperature rise to the 1.5C and 2.0C goals determined through the Paris Agreement. While much of the required emission reductions must come from deep cuts within terrestrial-based activities, including decreasing the use of fossil fuel, ocean-based opportunities can also play a critical role in the transition to a low-carbon future and safer climate.

However, achieving the mitigation potential of ocean and coastal systems will not be possible without significant investment in research and development. It will also be necessary to provide strong incentives to align financial flows with the needs of the mitigation and adaptation opportunities available. Governments must send policy signals that these innovative, nature based solutions are a priority for combining climate adaptation and mitigation.

One of the first opportunities that governments will have to comprehensively integrate ocean-based mitigation options into national plans and strategies for climate change is the updating of national climate action plans in 2020. This is an extremely important moment, as emphasized by the IPCC (2018): the chances of "failing to reach 1.5 degrees Celsius [will be] significantly increased if near-term ambition is not strengthened beyond the level implied by current NDCs." Given the consequences of failing to limit global average temperature rise to 1.5C, or at least to "well below" 2.0C, it is of great importance that actions begin immediately.

Ultimately, the ocean, its coastal regions, and the economic activities they support should be a source of inspiration and hope in the fight against climate change. With the backdrop of a growing climate catastrophe, the timing of this Committee Hearing is critical, and there could not be a more compelling case for urgent action.

Thank you for your leadership in holding this important hearing. Conservation International values the role our natural environment plays in mitigating and adapting to the worst impacts of climate change. We look forward to working together to continue to develop policies that can help to accelerate action on climate change.

Sincerely,

Jennifer Howard, Ph.D.
Director, Oceans and Climate
Conservation International