



AMERICAN MUSEUM OF NATURAL HISTORY
CENTER FOR BIODIVERSITY AND CONSERVATION

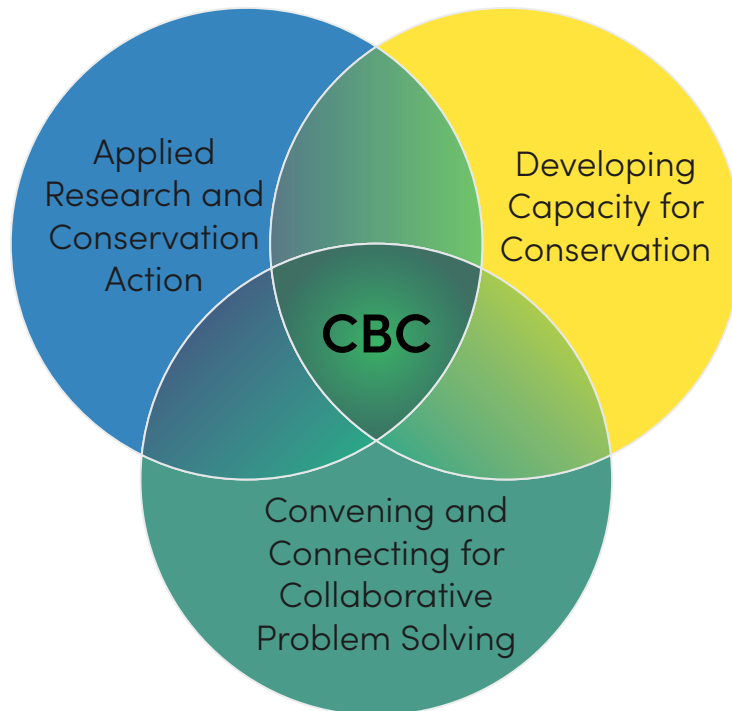
Progress Report

Spring 2020



What we do

The Center for Biodiversity and Conservation (CBC) transforms knowledge—from diverse sources and perspectives—into conservation action.



This season finds our societies under unprecedented strain from a global pandemic that has clear roots in how we interact with, and manage natural ecosystems and wildlife.

The pandemic has severely affected our field activities, training events, our staff, and is already impairing our ability to pursue external funding sources. Nevertheless, we continue our work remotely, and are redoubling our efforts to:

- advance our understanding of the interconnections between humans and the rest of biodiversity
- offer valuable and timely resources to the conservation community, and
- generate sound evidence for management and policy.

This report presents highlights of our most recent work, and our aspirations for the future.



The Year in Numbers

-
- 29** Publications 24 Peer-reviewed 23 Open access 8 With local partners 15 With students, interns, mentees
-
- 17** New software tools, modules and other resources produced (all open access)
-
- 17** Popular articles, media appearances, or media coverage items
-
- 50** Invited talks
-
- 22** Conference presentations
-
- 30** Funding proposals 7 With other Museum units 16 With external partners 13 With specific diversity and inclusion objectives
-
- 38** Average number of interns, mentees, and trainees per semester
-
- 29** Contributions to AMNH programs
-

Honors and Awards

Dr. Samantha Cheng helped launch a [dynamic map](#) of the evidence on the Coronavirus pandemic.

Dr. Eleanor Sterling was part of an influential study on what is needed to transform marine management considering a future ocean under climate change (Frontiers in Marine Science, 2020).

Dr. Mary Blair was awarded a new grant from the National Science Foundation to study galagos.

Dr. Alex Moore was awarded a prestigious National Science Foundation postdoctoral fellowship.



Table of Contents

Research & Conservation

- Strengthening the role of evidence in decision-making.....5
- Advancing conservation planning and monitoring.....6
- Supporting effective management of biocultural landscapes locally and globally.....7
- Wildlife conservation.....9

Capacity Development

- The Network of Conservation Educators and Practitioners.....11
- Strengthening the future of conservation science.....12

Convening & Connecting

- SCCS-NY.....13
- Indigenous-informed Indicators of Well-being.....14
- Guiding policy from local to global scales.....15
- Events, Exhibitions, and Outreach.....16



Research & Conservation

Strengthening the role of evidence in decision-making

We are excited to announce that this spring the CBC officially became an affiliated center of the [Collaboration for Environmental Evidence \(CEE\)](#), joining seven prestigious centers around the world. We are the first center from the United States to be invited to join this global collaboration, devoted to setting the standards for reliable and transparent synthesis of knowledge for evidence-informed decision-making. The CEE network asked the CBC to join based on our interdisciplinary focus, experience, and ground-breaking machine learning technology developed by CBC Biodiversity Scientist Dr. Samantha Cheng that can significantly speed up the synthesis process.

Most recently, Dr. Cheng helped launch a [dynamic map of the evidence](#) related to the novel Coronavirus pandemic, as part of a collaborative effort with other global synthesis centers from the Cochrane and Campbell Collaborations, as well as other CEE centers. During the fast-paced first weeks of the pandemic, the map helped scientists sift through the incomplete and rapidly evolving knowledge regarding the virus biology, the disease, its outcomes and potential treatment in order to identify collaborators and facilitate effective placement of resources where they were most needed. CBC scientists have also led comprehensive, policy-oriented evidence syntheses on the links between forest interventions and poverty alleviation, conservation and human well-being, stakeholder engagement, and wildlife trade, and how to best integrate community values in the design of development and natural resource management programs. **We see great demand and opportunity to train others on evidence synthesis and interpretation, and are currently seeking funds to provide such guidance, including from USAID.**



Research & Conservation

Advancing conservation planning and monitoring

The CBC's biodiversity informatics experts develop new methods, software programs, and training resources to help manage, analyze, and interpret biological and environmental data from expeditions, natural history collections, databases, and remote sensing instruments. We are advancing and promoting the use of **machine learning**—a type of artificial intelligence that allows computer systems to learn and improve from experience—to better understand and conserve biodiversity.

CBC programmer Peter Ersts continues to upgrade DotDotGoose, a tool to assist with manually counting objects in images. Mr. Ersts just created two new software packages to assist in the extraction and labeling of objects (such as animals) in imagery, including one that can help organizations rapidly label many years-worth of stored visual data, in days. Our tools are empowering conservationists around the country and world to do more:

I have used the DDG program to count the Fall Chinook run in the Eel River in Northern California. I am using a drone to film the fish from above and the DDG program makes it super easy to count and document the fish. We have had trouble in the past getting California Dept of Fish Wildlife to accept our data from volunteer counts, but they are willing to accept counts with this new photographic evidence, and DDG is what makes this possible. I can't thank you enough for making this open source program available...!

- David S., Sanctuary Forest Land and Water Trust & Eel River Recovery Project

CBC Director of Biodiversity Informatics Research Dr. Mary Blair and collaborators reached the half-way mark in their NASA-funded project to expand new software for biodiversity monitoring. The species distribution modeling applications platform Wallace, which is user-friendly and open to all, aims to facilitate biodiversity change calculations. The team is currently testing the software using a Colombian dataset for 25 species of primates, including the brown woolly monkey (*Lagothrix lagotrica*), extremely charismatic and vulnerable to extinction. After very successful bilingual Wallace training events last year in Vietnam and Ecuador, there is high demand among conservation researchers and practitioners for more training workshops, which can be offered virtually.

We are seeking funding to expand our training on all of these monitoring tools, including in collaboration with Museum curators and their field partners, and local organizations in NY State. We are also seeking to apply modeling tools closer to home, to predict coyote movements across New York City, to inform management of potential human-coyote conflicts.



Research & Conservation

Supporting effective management of biocultural landscapes locally and globally

The CBC continues to illuminate the fundamental connections between people, their culture, and their environment, fostering more robust natural resource management in areas of high cultural and biological diversity. Jaffe Chief Conservation Scientist Dr. Eleanor Sterling and collaborators, including Biodiversity Scientist and Biocultural Specialist Pua'ala Pascua and partners around the globe have produced valuable new data on the importance of biodiversity to human well-being, food security and climate change adaptation, and developed new indicators for communities to track progress in these areas.

As governments set strategies as part of national and global commitments on climate and biodiversity, it is important that metrics used to track progress be attuned to the varied viewpoints, aspirations, and cultures of the people of their nation. CBC is assisting various partners around the world in these endeavors. For example, Ms. Pascua, Dr. Sterling and collaborators advised the Government of Palau on recommendations for effectively implementing their Palau National Marine Sanctuary legislation that came into effect in January 2020. At a broader scale, CBC work in this area is informing the International Union for the Conservation of Nature as they consider how to better address the links between nature and culture across the entire organization.

In January, the biocultural team launched a series of guides for countries reporting on sustainable development. These guides focus on how to use metrics that are locally and culturally attuned. The guides walk users through a series of prompts that allow them to evaluate existing indicators for local/cultural relevance, and include guidance on making modifications or creating new indicators as necessary. They were primarily developed for national-level reporting agencies and international or regional funding bodies in the Pacific, however their components are likely to resonate across regions and groups and may also be useful for groups who are actively generating their own indicators. The guides were generated as part of our participation in the Science for Nature and People Partnership (SNAPP) Working Group on Assessing Biocultural Indicators of Resilience in the Pacific.

The guides were to be used to train decision-makers across the Pacific Islands region and at global conservation convenings in coming months, but many of these have been postponed pending evolving guidance on global travel and meetings amidst the pandemic. **We see great demand and opportunity to train others on culturally attuned approaches for reporting on sustainable development, and in the absence of opportunities to do so in person are currently seeking funds to provide such guidance through virtual channels.**

Implementing Culturally Attuned Monitoring and Reporting Indicators

Communities across the Pacific and around the world face unprecedented challenges in continuing to sustainably manage natural resources and promote well-being in the face of change.

Recognizing the interrelated social, economic, cultural, and environmental connections between people and nature is critical to improve and maintain the resilience of human and ecological communities.

climate change severe weather events demographic changes shifting cultural practices political shocks biodiversity loss

National governments are setting strategies and participating in global conventions that frame the future well-being of their people and the health of their natural resources. These strategies and conventions encompass national-level initiatives and international-level frameworks.

including

- Sustainable development plans
- Biodiversity strategies
- Adaptation strategies

including

- Sustainable Development Goals
- Convention on Biological Diversity-CBD Aichi Targets
- CBD post-2020 Biodiversity Framework

including

- goals, targets, and indicators

Within these processes, national-level reporting agencies should identify and implement metrics that are attuned to the varied viewpoints, aspirations, and cultures of the people of that nation.

Effective monitoring and reporting indicators cannot be developed prior to an agreed upon vision or strategic plan.

Once strategic goals and targets are set, indicators are a key component of resource management as they allow us to describe complex information in a concise manner, track change over time and space, and understand how patterns we observe are linked to drivers of change. However, the process of identifying which indicators to measure and how to measure them impacts management approaches, sustainability outcomes, and even how people view, value, and relate to human well-being.

For those reasons, culturally attuned, locally derived indicators are critical for designing, resourcing, and implementing projects and programs to improve human and environmental well-being, ultimately leading to sustainable development and nature conservation.

Indicators developed without attention to cultural context, or those omitting interactions between people and their environments, may overlook the factors and values that most support healthy communities and places.

What is Important for Developing Indicators?

and the groups with whom they work, frequently face a dizzying array of options on progress towards nationally or internationally driven social or economic goals that can be disconnected from local value systems. For instance, they may favor individualism rather than community collaboration, which is a key component of resilience that may promote faster progress.

Culturally appropriate indicators can support cross-scale sustainability initiatives and avoid situations where good intentions have negative impacts locally.

...that may not cover the full scope of a community or family's ability to provide resources (i.e., through sharing and exchange practices like providing for community elders who are no longer able to fish or farm, or through sharing with neighboring communities in times of need).

Some questions—e.g., those relating to "begging"—may cause discomfort that forces people to respond to surveys in ways that compromise the survey results.

How to Develop Culturally Attuned Indicators?

Indicators that are deeply grounded in local cultural contexts. They can be used to track interactions between people and place and provide a basis for self-defined resource management. The relationships between and across people and place, and the local knowledges, practices, and worldviews, are often critical to long term sustainability.

Questions about how vulnerable people are may be culturally inappropriate or offensive in some communities, and could severely impact how communities view themselves.

In some instances, indicators may not effectively support communities and, in worst case scenarios, may actively contradict efforts towards self-determined goals and visions.

For additional materials in this informational series, visit: <http://amnh.org/assessing-biocultural-indicators>

To browse an expanded directory of resources on this topic, visit: <http://resources.cbc.amnh.org/indicators>

Recommended citation: Assessing Biocultural Indicators Working Group. 2019. "Implementing Culturally Attuned Monitoring and Reporting Indicators". Available at: <http://amnh.org/assessing-biocultural-indicators>

To learn more about partners and products from the Assessing Biocultural Indicators Working Group supported in part by Science for Nature and People Partnership, visit: <https://snappartnership.net/teams/assessing-biocultural-indicators/>

Other indicators of resilience that track interactions between people and place include the ability of households and communities to move between different livelihoods and locations as necessary...
...or the availability of opportunities for people to develop and maintain a sense of place, belonging, rootedness or connectedness, associated with different entities of the living world (e.g., cultural, sacred and heritage landscapes, sounds, scents and sights associated with childhood experiences, iconic animals, trees or flowers).*

...that may be overlooked in a project, country, or region frequently overlook the connections between and across people and place.

Other examples of culturally attuned indicators may encompass indicators about knowledge, for instance the trend in knowledge and application of farming practices based on local knowledge of seasonal patterns and soil health. Identifying these trends keeps track of important community-based management techniques built over time regarding how to sustainably manage local food production systems. Tracking interactions between people and place may require indicators that focus on activities, such as those that measure Indigenous and local cultural practices that rely on the health of a resource base and vice versa.

Culturally attuned indicators may encompass a mix of quantitative metrics that allow for comparison within sites (and potentially across sites as needed), as well as qualitative information that allows for deeper understanding of what is happening and why, and in particular the feedbacks between human actions, environmental health, and human health.

*UNU-IAS et al. 2014, available at: <https://doi.org/10.1002/9781118711111.ch11>
**Diaz et al. 2018, available at: <https://doi.org/10.1126/science.1259856>

Wildlife conservation

At the same time as we foster more robust management and decision-making, we continue to work on protecting charismatic, strategically selected species that can act as ambassadors for ecosystem conservation.

Primate conservation and wildlife trade in Southeast Asia

Our long-term work in Southeast Asia, initiated in the 1990s by Jaffe Chief Conservation Scientist Dr. Eleanor Sterling, continues to bear fruit and steer conservation action. Our findings and recommendations on wildlife trade and climate change on Southeast Asian biodiversity have influenced new research and management in the region, including a new multidisciplinary study of wildlife trade in Myanmar, that found different patterns for local consumption versus international hunting and trade of wildlife.

In January, we welcomed a visitor from Vietnam, Tuan Anh Nguyen, as part of a project led by Dr. Blair and other Vietnamese and Chinese collaborators that is advancing the conservation of key endangered species in the Mekong region—encompassing Southern China, Vietnam, and Laos. The project is increasing our understanding of how to manage transboundary species under a changing climate. For example, new models for the critically endangered Francois' leaf monkey, *Trachypithecus francoisi*, show that including limestone karst geology along with climate information improves model performance. This shows the importance of conservation planning around karst landscapes across borders when taking into account ongoing and future climate change. **Next, we hope to lead fieldwork to improve and validate species distribution models for Vietnam's key threatened species under climate change, and to continue working with key teams in Vietnam, Laos, and China who are in need of capacity to enhance transboundary management planning.**



Understanding critical marine species

CBC Biodiversity Scientist Dr. Samantha Cheng has conducted an in-depth review of the natural history of the squid genus *Sepioteuthis*—a commercially important species throughout the Pacific Ocean, the Indian Ocean, and the Red Sea—that has a number of cryptic and undescribed species. This work generates essential evidence on species differences that is needed to effectively manage these important marine resources. Most recently, Dr. Cheng began collaborations to examine cephalopod fisheries and diversity in Kenya and the western Indian Ocean with the Kenya Marine Fisheries Research Institute and the National Museums of Kenya. In addition, fieldwork to examine coastal squid diversity in the Red Sea and Mediterranean was planned for spring 2020 in Israel, however, were canceled due to the pandemic.



Protecting flamingos in the Americas

In February 2020, CBC Associate Director Dr. Felicity Arengo co- led an expedition to the Andean wetlands of Argentina. The field expedition was part of the regional, simultaneous flamingo census that occurs every five years in Argentina, Bolivia, Chile and Peru, along the range of the Andean and Puna Flamingos. Results from the censuses will determine population trends that are necessary for any conservation or management actions. The multidisciplinary team lead by Dr. Arengo consisting of hydrologists, geochemists, limnologists, ecologists, and social scientists also collected data to integrate knowledge on the waterscapes in the Argentine Andes, an area where mining activity, especially for lithium, is increasing rapidly. The work was partly funded by a grant from the International Flamingo Foundation. **Next, given our new understanding of water connectivity in these landscapes, we hope to develop training and outreach materials that promote a holistic view of the Andean waterscapes, and empower local stakeholders with knowledge for decision-making.**

Over the past five years, flamingos have been observed in increasing numbers in central and southern Florida. There is evidence that the flamingo was more common in the past century but was extirpated due to hunting, human disturbance, and habitat changes. Dr. Arengo was invited by the Florida State Fish and Wildlife Conservation Commission to participate in a review of the status of the American Flamingo, and potentially upgrade the species from vagrant or occasional visitor to being considered a Florida resident. A status change for this species could result in targeted management actions aimed at species and habitat conservation.

Terrestrial and Freshwater Turtle Stewardship

The successful 2019 summer pilot project tracking of rare turtles at Black Rock Forest has not only led to the advancement of new, DIY technology for tracking small wildlife, but also advanced students' science careers through innovative theses projects. Additionally, the project was such a success that the team has received additional funding from Black Rock Forest's David Redden Conservation Research Small Grant Fund and the Disney Conservation Fund was interested in receiving a full proposal (still under review) to continue the field work, engage the community and expand student training. **We hope to continue to develop open-access technologies to improve the study of these turtles' habitat use, health, and population status, so we can provide meaningful management suggestions to Black Rock Forest and other nearby protected areas. We are also seeking funding to engage the local community on how we can work together to better steward turtles "in their backyard."**





Capacity Development

The Network of Conservation Educators and Practitioners

Our signature program dedicated to developing capacity for conservation, the Network of Conservation Educators and Practitioners (NCEP) continues to support teaching and lead training to improve conservation. In February 2020, NCEP published its 10th volume of Lessons in Conservation. The issue explores the intersection of technology and conservation through six student-facing educational resources, including four exercises, on topics ranging from acoustic monitoring of bats to spatial analysis. In addition to having students manipulate and analyze real data, the exercises also foster reflection and critical thinking on the remarkable potential and realistic limitations of these technologies.

Given the COVID-19 outbreak, we are redesigning our summer Conservation Teaching and Learning Studio, typically held in June at the Museum, to be a rich virtual experience - and an opportunity to reach an even broader audience.

The CBC also continues its partnership with Columbia University to convene educators and researchers analyzing the intersections between food, our bodies, and our environment, and to develop teaching and learning materials that use food systems as the setting for critical thinking and inquiry. The project encompasses development of three undergraduate courses: Food and the Body; Food, Ecology, and Globalization; and Food, Public Health, Policy, and Economics. We are building on results of our pilot use of innovative software and classroom instruction to investigate how students can best learn systems thinking and systems modeling, particularly in the context of food systems learning, as part of our NSF-funded collaboration with Michigan State University and other institutions. The team published findings on how to assess systems thinking, and on the competencies that food systems professionals need, and is developing exercises and class materials to be published in the NCEP open-access module collection and in the 2021 issue of Lessons in Conservation.



Capacity Development

Strengthening the future of conservation science

To encourage excellence, diversity, and inclusion in conservation, the CBC is devoted to promoting the recruitment, achievement, and success of students and early-career professionals from groups historically underrepresented in the field. We lead a number of activities to advance these goals, under our Inclusive Conservation Community Initiative (ICON).

We host interns from a diversity of programs, including the Museum's Science Research and Mentoring Program, the Research Experiences for Undergraduates, as well as external undergraduate and graduate study programs. Since our last report we have trained or mentored 28 youth and early-career conservationists through our activities!

Our mentoring efforts continue to inspire success in current and former trainees: Former ICON mentee Christian Rivera published a peer reviewed article with his PhD supervisor entitled, "A Synthesis of Opportunities for Applying the Telecoupling Framework to Marine Protected Areas." And, a former REU student mentored by Dr. Blair in 2016, Daniel Veronese, is pursuing doctoral studies in molecular biology. He is also volunteering for two mentoring projects himself, supporting at risk adolescents in the St. Louis area, and teaching school students about careers in STEM. Danny was also just awarded a prestigious fellowship from the National Science Foundation to support his studies.



Convening & Connecting SCCS-NY

Since November, the planning team has been organizing SCCS 2020. We have selected two highly relevant plenary speakers: Dr. Kevin Olival, from EcoHealth Alliance will present on the critical links between wildlife and human health, and Daniel Canham, a leadership development expert with over 20 years of experience will share lessons from working with Federal, state, NGO, and international conservation agencies, and strategies for building the collective leadership capacity to take on the most difficult challenges the conservation community faces.

We have received more than 100 presentation applications so far, and are planning to hold the conference either at AMNH or through virtual conferencing.



Convening & Connecting
Indigenous-informed Indicators of Well-being

As the current health and biodiversity crises clearly demonstrate, understanding the links between humans and the environment is critical to respond to global change. Social, cultural, and environmental factors play an essential role in shaping human well-being. The CBC is working to support communities, particularly in Pacific Island Nations and in Hawai'i, in advancing resource management and community plans and actions that take this holistic approach and address the fundamental interconnections between environmental health and human well-being. In the international policy arena, staff work on how to understand, plan, measure, and evaluate integrated programs aimed at achieving benefits for nature and people.

In October 2019, the CBC hosted the inaugural webinar in our biannual series on Indicators of Well-being in, with, by, and for Indigenous Peoples and local communities. The webinars featured high-level Indigenous experts and provide a virtual platform for learning and exchange among practitioners working on metrics that bridge social and ecological dimensions, nature and culture, people and place. These activities have been supported by The Christensen Fund, which recently renewed their support of this work.

Most recently, in February 2020, Ms. Pascua and Dr. Sterling met with representatives from the Aotearoa New Zealand Treasury to explore pathways for future collaborations on biocultural approaches to indicators of well-being. We hope to continue to expand such opportunities to exchange and provide practical guidance on locally and culturally attuned monitoring.

Building on this work, the CBC and partners were prepared to host the 2020 Indigenous Exchange in April, with Indigenous Peoples and local community representatives from Russia, Central Asia, and the Shinnecock Tribal Nation of North America. In light of the evolving COVID-19 outbreak, the exchange has been postponed pending further guidance on global travel and large in-person convenings.



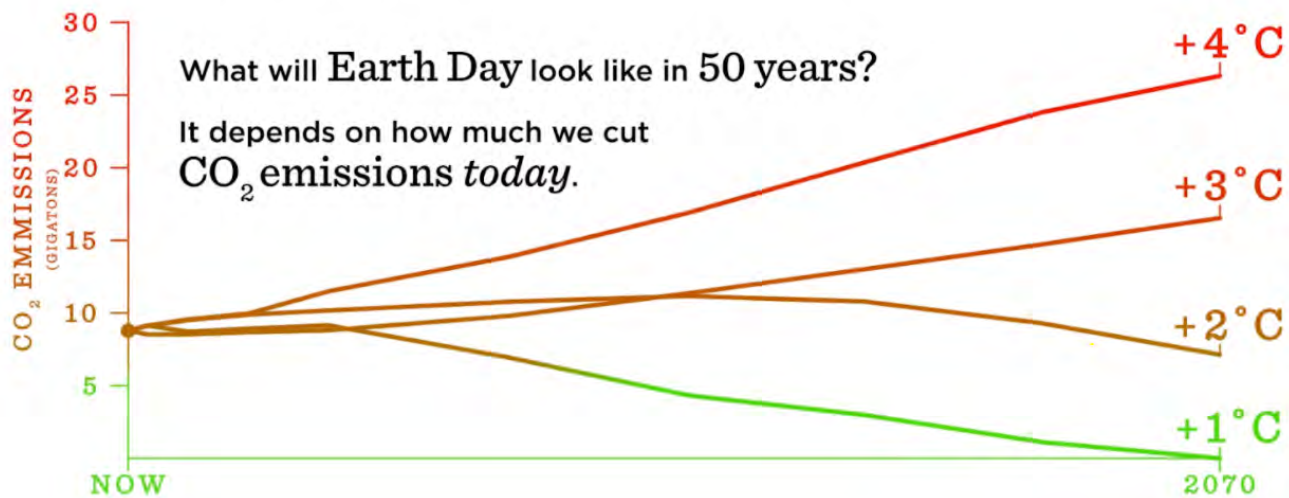
Convening & Connecting
Guiding policy from local to global scales

As we work to advance conservation action and bridge local and global scales in conservation, we continue to connect with the international arena and share lessons from our work with global initiatives. CBC experts have been invited as authors of influential policy reports and briefs, including the influential Sustainable Use Assessment of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, where Ms. Pascua will be contributing expertise on the sustainable use of wild species. In November 2019, Dr. Sterling was invited to present at the UN Convention on Biological Diversity (CBD) meetings, and shared lessons learned on biocultural indicators and nature culture connections. Our contributions are feeding into the development of an international alliance on Nature and Culture.

CBC staff Pua'ala Pascua was nominated and approved as a new lead author on the IPBES Sustainable Use Assessment, specifically contributing to Chapter 2. Conceptualizing the sustainable use of wild species. Pascua will co-lead the chapter's sections on Indigenous and local knowledge, worldviews, and wild harvest practices and will collaborate with the Sustainable Use Assessment ILK Liaison Group and broader IPBES ILK Task Force. Also Dr. Sterling is also working with multidisciplinary teams on a series of manuscripts related to the IPBES program of work. One paper, in review by the journal *Ecosystems and People*, examines the role of stakeholder participation in IPBES, and a second has been submitted to the journal *Nature Sustainability* that focuses on transforming knowledge systems for life on Earth.

Earth Day 1970 - 2020

50TH ANNIVERSARY | TIME WILL TELL



SOURCE: Global Carbon Project

SCENARIOS: To stay under 2°C warming, models show we must reduce CO₂ emissions dramatically and quickly.

Convening & Connecting Events, Exhibitions, and Outreach

CBC Director, Dr. Ana Porzecanski, was the scientific advisor for the Museum's fourth annual [Earth Day Video](#), which premiered online on the 50th Earth Day, April 22. The short film examines what has changed since the first Earth Day in 1970, after 50 years of human impact on the planet. Decades of careful observation have given us a detailed picture of how Earth is responding to our habits yet also shown that change is possible, emphasizing the critical importance of the choices we make today. The video was viewed more than 130,000 times on its first day.

This past December, the CBC and the Museum's Education department partnered with Black Rock Forest to present a public lecture and panel discussion, on coyotes featuring Dr. Roland Kays from the NC Museum of Natural Sciences as the keynote speaker, and a panel of NY-based experts and youth working on urban coyotes. Dr. Kays also hosted a pre-lecture youth event. The youth event was an informal discussion with the researchers, attended by around 30 people. The public event on this timely topic proved very popular, with a full house in the Kaufman theater, and lively engagement by the public during the Q&A.

As they travel around the United States, special exhibitions curated by CBC experts continue to reach new audiences. Our *Global Kitchen: Food, Nature, Culture* is currently on display at The Health Museum in Houston, Texas, and opened to positive reviews: the Houston Press did an in depth review, noting "The solutions proposed in the exhibit are thought provoking". A panel installation at the Mennonite Heritage Center in Lancaster PA closed in January 2020. *¡Cuba!* was scheduled to open at COSI in Columbus, Ohio in March.