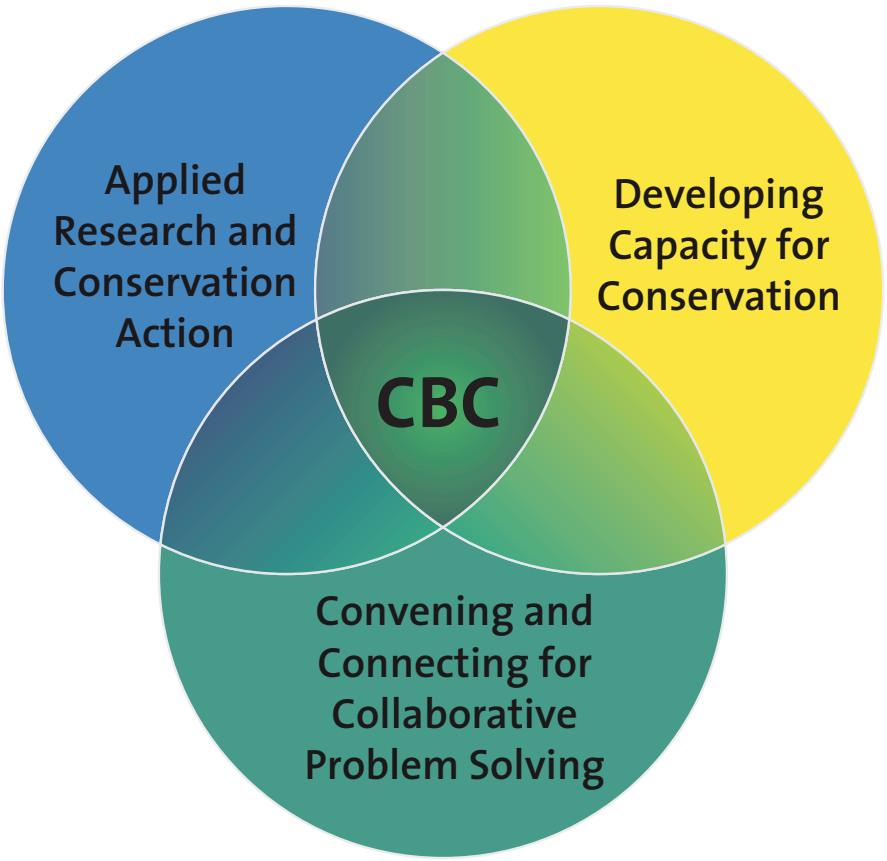
American Museum of Natural History
Center for Biodiversity and Conservation

Progress Report

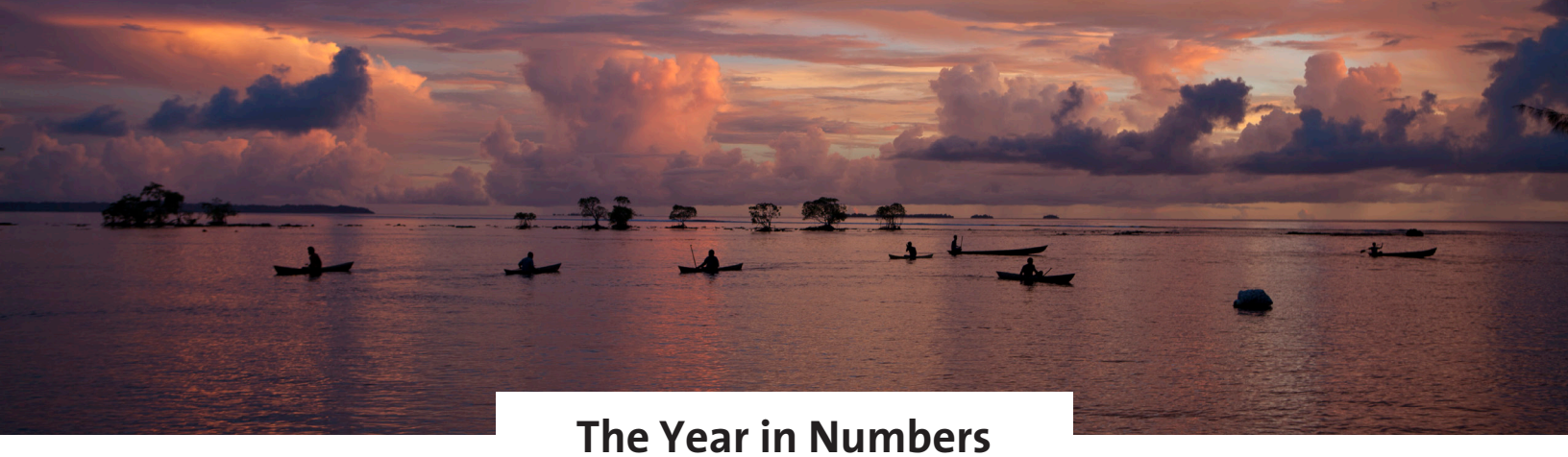
Spring 2017

What we do

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



Around the world, our programs and projects span the full cycle of conservation action—from identifying needs to action on the ground to adapting and broadcasting lessons learned—and serve as models for other organizations. This report presents highlights of our most recent accomplishments.



The Year in Numbers

18 Publications
- 14 peer-reviewed
- 9 open access
- 6 with local partners
- 5 with students, interns, and mentees

12 Awards and honors

46 Invited talks

27 Professional conference presentations

33 Funding proposals submitted
- 5 with AMNH
- 23 with external partners

4 New software tools, modules, other resources produced
- 3 open access

Including updated Maxent software for modeling species distributions:
- Ranked in the top 5% of all research outputs ever tracked by Altmetric for social media attention.
- Downloaded all over the world.

89-100% Average of positive reviews in evaluations of training events.

14+ Mentees in conservation science.

25+ Popular articles, media appearances, or media coverage items

50 Participated in the Museum's public outreach

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Research & Conservation

Resilient Biocultural Landscapes

The CBC is advancing our understanding of the fundamental connections between people, their culture, and their environment in the Solomon Islands, to foster more robust natural resource management in areas of high cultural and biological diversity. The research team led by *Jaffe Conservation Scientist* Dr. Eleanor Sterling, in collaboration with several partners—now in its third year—has generated valuable new data on the importance of biodiversity to food security and climate change adaptation, and designed new indicators that the communities can use to track progress in these areas.

The project targets four sites that differ in their level of cultural transformation and connection with global markets: Zaira on Vangunu Island; Biche on Gatokae Island; Vavanga on Kolombangara Island; and West Parara on Parara Island. Last fall, we reported on a series of workshops led in these communities to examine landscape change over time. Since then, the team has continued to collect data on areas ranging from the health of amphibian populations to changes in food garden pests. Insights from this work have now been captured in different formats, including interactive booklets created in a collaboration with artist Hara Woltz, and books on valued plants and recipes.

The “action research” nature of the program means that we are assisting communities to collaboratively address challenges to local resource management. Our products strengthen ongoing management planning discussions; for example, they assist with mapping terrestrial forest zones in Biche, introduce regional scientific experts to advise on the placement of resource use zones (areas where communities can extract or use resources from the environment), and monitor valued species in Zaira. The innovative approach and results of this project are being disseminated through important scientific publications, presentations, and university-level courses. Notably, we have also promoted knowledge exchange and facilitated participation by community leaders in resource management forums such as a National Protected Areas Act implementation workshop.

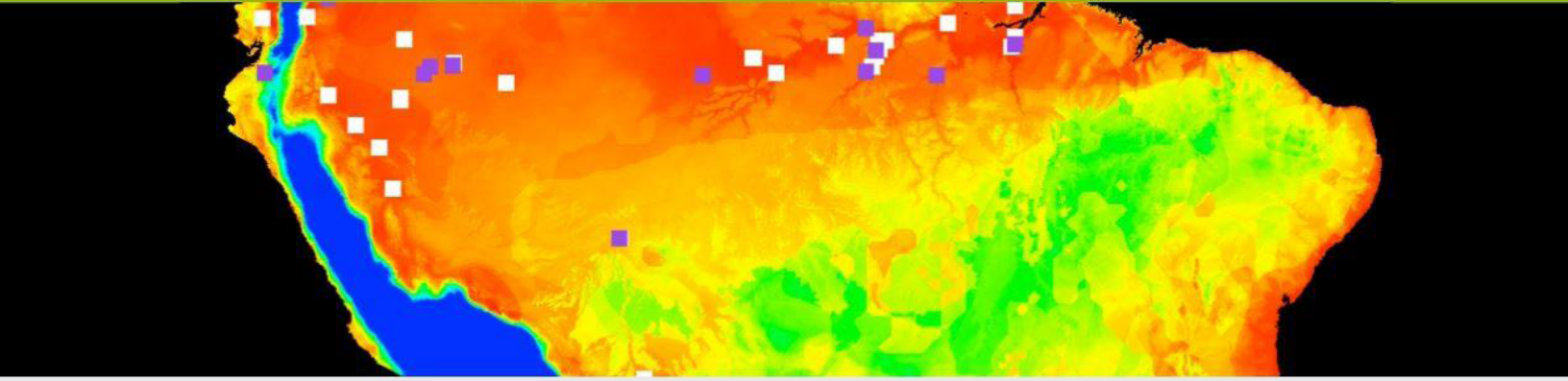
This project is funded by two grants from the National Science Foundation, as well as the Tiffany & Co. Foundation, the Gordon and Betty Moore Foundation, Lynnette and Richard Jaffe, the Jaffe Family Foundation Corporation, and SNAPP: Science for Nature and People Partnership.

Research & Conservation

Evolutionary Biogeography & Primates and Wildlife Trade in Southeast Asia

Director of Biodiversity Informatics Research Dr. Mary Blair continues to collaborate with partners in Southeast Asia on wildlife trade mitigation. They have recently completed an innovative model of trade dynamics that integrates economic and social factors to foster a better understanding of the drivers of the trade in the region. These approaches will be useful as the Conservation Action Plan for Primates in Vietnam, which was recently completed and launched with important contributions by Dr. Blair, is translated into management and enforcement. Dr. Blair will return to Vietnam in June to revisit Ben En National Park, an area that was last surveyed for lorises almost 20 years ago, and compare new findings to that previous baseline study. In other areas of Vietnam, her team has found slow loris encounter rates similar to those in baseline studies from many years ago—and in other areas, unfortunately, her team has documented crashes and local extinctions.

Dr. Blair has also continued to actively disseminate the results of her work, and was a featured speaker in the Museum's popular SciCafe lecture series this winter. Her talk highlighted why the wildlife trade is an important issue for human health, security, and well-being, and how a holistic understanding of the issue can advance more equitable and effective mitigation approaches.



Maxent is now open source!

Use this site to download Maxent software for modeling species niches and distributions by applying a machine-learning technique called maximum entropy modeling. From a set of environmental (e.g., climatic) grids and georeferenced occurrence localities, the model expresses a probability distribution where each grid cell has a predicted suitability of conditions for the species. Under particular assumptions about the input data and biological sampling efforts that led to occurrence records, the output can be interpreted as predicted probability of presence (cloglog transform), or as predicted local abundance (raw exponential output).

Here you can download the open-source release of Maxent (under an MIT license; suggested citation below). See below for key changes in the current version.

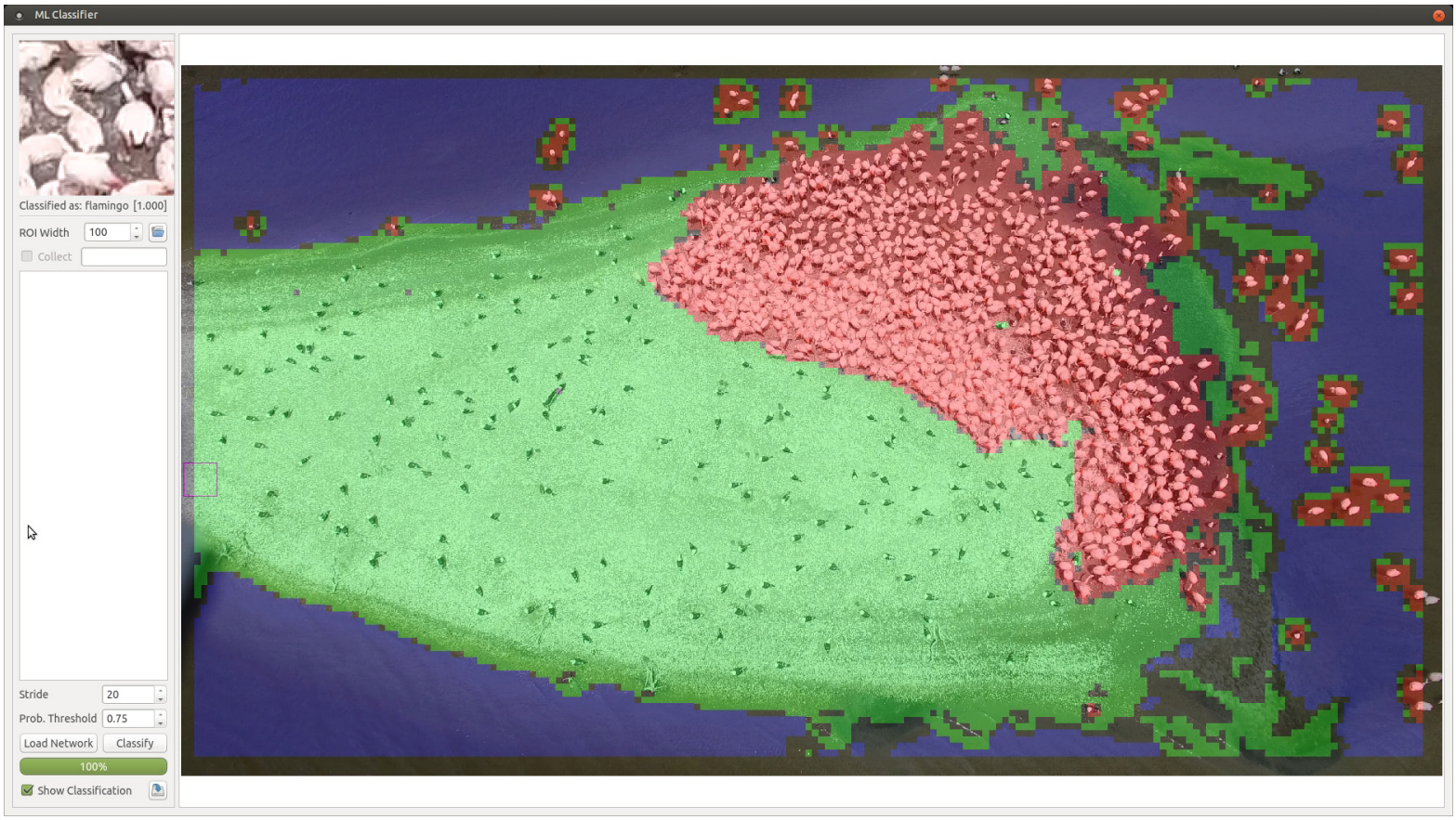
The idea for Maxent was first conceived of here at the Center for Biodiversity and Conservation at the American Museum of Natural History (AMNH) through a public-private partnership between the AMNH and AT&T-Research. Steven Phillips and the other developers of Maxent are still engaged in its development and maintenance, and the Google group will remain the main mechanism for user questions. Much additional information can be found in the Google group, software tutorials, and other resources listed below.

Research & Conservation

Tools for 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. All products are released with open-access licenses so students, educators, researchers, practitioners, and the general public can freely use them. This winter, the CBC became the proud host of the premier software for modeling species niches and distributions: Maxent. Maxent was first conceived at the CBC through a public-private partnership between the Museum and AT&T-Research in 2002. As the host of this valuable software, the CBC will provide training in its use, develop new partnerships and proposals, and continue to participate in software development.

Our latest R&D project focuses on image analysis. Recent years have seen remarkable advances and cost reduction of cameras used for conservation monitoring, commonly know as "camera traps." There has also been a rapid rise in the use of unmanned aerial vehicles such as drones for acquiring images of biodiversity targets. As a result, a large volume of images is being collected at a faster pace than it can be analyzed by conservation biologists and managers, even with the help of citizen scientists. Under the leadership of *Director of Applied Biodiversity Informatics* Ned Horning, a team of CBC experts is developing innovative software that can automate the detection and counting of features captured in digital photos and video. The team is collaborating with experts in the fields of machine learning, feature and pattern recognition, and remote sensing to leverage recent advances to develop a robust, modular toolkit. This research will generate open-access tools that are adaptable for a broad array of conservation applications—a potentially transformative resource for the field of conservation monitoring.



Software originally designed for landcover classification of high resolution images collected from UAVs, applied to another type of problem; detecting and counting flamingos.

Research & Conservation

Flamingos in the Americas

In early February, *Associate Director* Dr. Felicity Arengo co-led an expedition to the Lagunas Altoandinas y Puneñas de Catamarca (LAPCat) Ramsar site in the Andes of northwestern Argentina. In addition to monitoring flamingo and waterbird populations in 28 wetlands within the site, the team focused on capacity development components of the project focused on training local schoolteachers in nearby communities in science and environmental teaching methods that will allow them to effectively engage their students in wetland conservation education.

Additionally, we are training community members including mountain tour guides, teachers, business owners, and municipal employees in environmental monitoring. This training enables community members to report noteworthy information using basic observation and data recording skills.

We extended our expedition to include a visit to the remote site of Laguna Tres Quebradas, a salt flat and wetland within our long-term monitoring program where a new lithium mining operation is setting up exploration activities. The team did a rapid survey and took water samples to begin characterizing the biodiversity value of the site, and met with officials of the Ministry of Mining of Catamarca Province and the CEO of the mining company to learn about the site's operation.

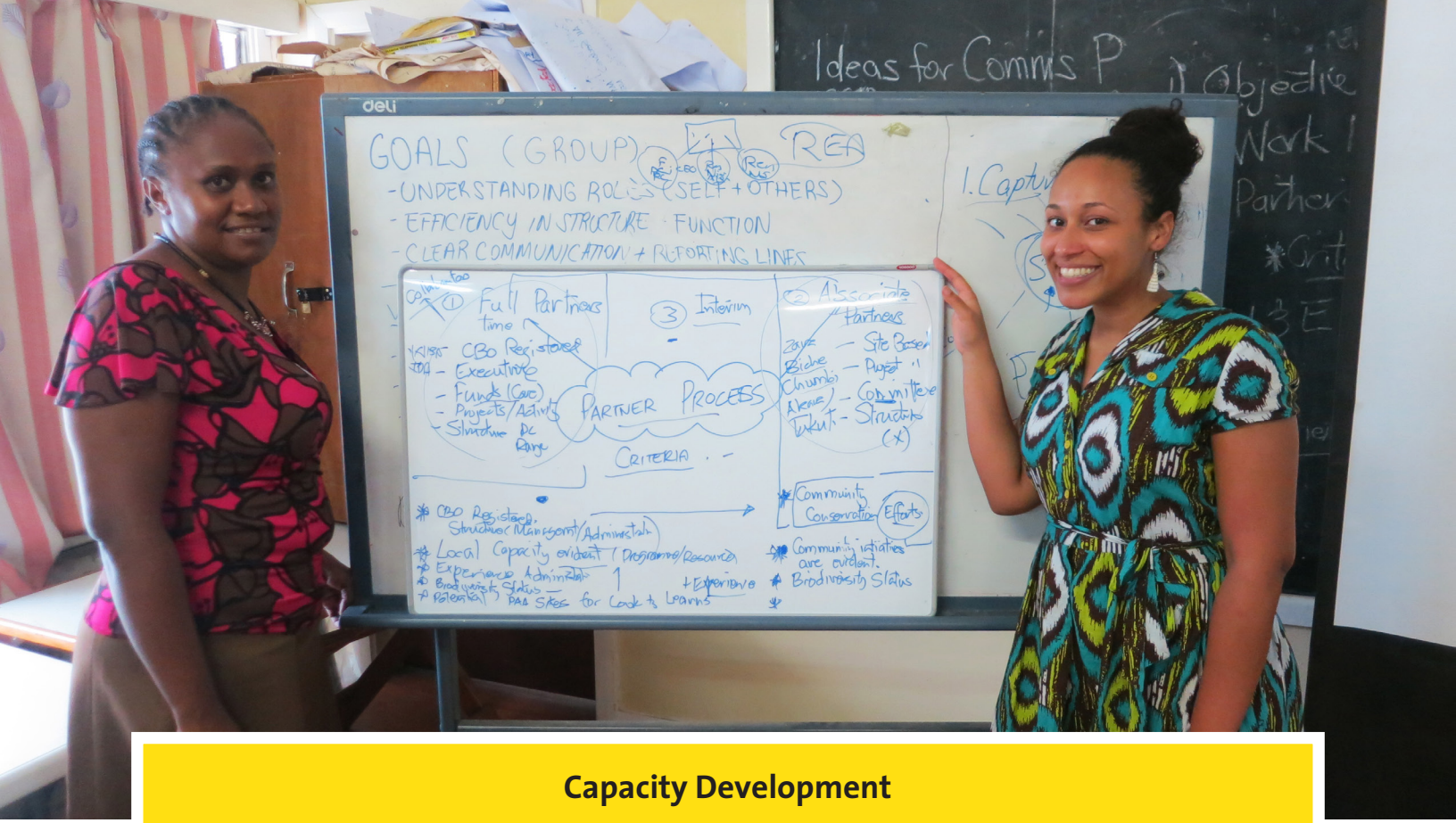
Dr. Arengo returned to Argentina in March to complete the environmental monitor training, and for a public information forum in the town closest to the lithium mining site, where concerned residents voiced their opinions about the mining developments. We are researching other emerging mining projects, and have identified at least six projects in prospecting and exploration phases. With input from economists and legal advisors, we are preparing a report on the situation to present to the local and national authorities as well as allies to open dialogue to a broad community of stakeholders regarding these emerging regional developments that can have far-reaching impacts on the high Andes wetlands.

Research & Conservation

Exploring the "Lost Rainforest" of Madagascar

Postdoctoral Fellow Dr. Rae Wynn-Grant, whose work on black bears was highlighted last spring, was recently invited to join a National Geographic Expedition to the unexplored Ivohivory Rainforest in southeastern Madagascar, known as the "Lost Rainforest." The expedition, from November 28-December 23, 2016, included a 50-member team led by researchers at the Madagascar Institut pour la Conservations des Ecosystèmes Tropicaux, the Centre Val Bio at Stonybrook University, the University of Florida, and the Missouri Botanical Garden. This was the first expedition to complete biodiversity surveys in this forest, which was previously unexplored by either Malagasy or international scientists.

Due to her experience trapping and tagging mammals, Dr. Wynn-Grant was invited to advise on ring-tailed lemur (*Lemur catta*) trapping and tagging for the expedition, to confirm population presence, estimate population size, and facilitate a future long-term behavioral ecology study of the population. This is the first ring-tailed lemur population to be found in a wet forest habitat—elsewhere in Madagascar they are only found in dry deciduous forests, or brush or scrub habitats, so future ecological studies of this population may change our understanding of ring-tailed lemur ecology, suitable habitat, and conservation status. Behavioral differences were noted between the population in Ivohivory Rainforest and other dry-forest populations, further adding to the substantive findings stemming from the expedition and the contributions to primate ecology. Preliminary evidence from the expedition suggests the presence of several new plant, reptile, amphibian, and mammal species soon to be described, including a new mouse lemur. Local community members participated in the expedition along with Malagasy and Western scientists, and part of the expedition team included social scientists who consulted with and interviewed additional community members to discuss interest in creating and maintaining a protected area at Ivohivory, supported by the biodiversity survey results.



Capacity Development

Supporting Local Conservation Leadership in the Pacific

Capacity development has become the primary focus of the CBC's Pacific Program in the Solomon Islands. We have been strengthening the capacity of the staff and board at the Solomon Islands Community Conservation Partnership (SICCP), to enhance their ability to continue to lead conservation efforts in a self-sufficient manner. The CBC, alongside the Wildlife Conservation Society (WCS), was awarded funding from the MacArthur Foundation under a grant led by the University of Queensland to support continued engagement with SICCP.

The CBC has convened multiple team-wide meetings with staff from Honiara, Munda, and Morovo lagoon, and supported meetings to assess the year's progress. Pacific Program Manager Cynthia Malone has helped SICCP finalize their strategic plan for 2017 through 2020, develop a strategy to address institutional and partner capacity gaps, enhance the efficiency of their operational management and partnership network communications, and plan for a national Environment Symposium in August 2017. Most recently, she has worked with communities in Morovo on supporting conservation committees that implement natural resource management plans, and gaining a stronger understanding of where the Ministry might be able to better support this process. Meanwhile, community-based monitoring and stewardship of terrestrial and marine diversity continues on Tetepare through the Tetepare Descendants Association (TDA) and on Kolombangara through Kolombangara Island Biodiversity Conservation Association (KIBCA), two local partners.

The Environment Symposium will bring together diverse stakeholders from community representatives to government officials, to highlight gaps in geographies, ecosystems, and policies in current conservation work in the Solomons and come to a collective solution for how different actors might address these gaps. By being part of the planning committee for the Symposium, SICCP is also strengthening important connections with the Ministry of Environment.

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American Museum of Natural History
Center for Biodiversity and Conservation
Network of Conservation Educators & Practitioners

LESSONS IN CONSERVATION

PEOPLE AND CONSERVATION

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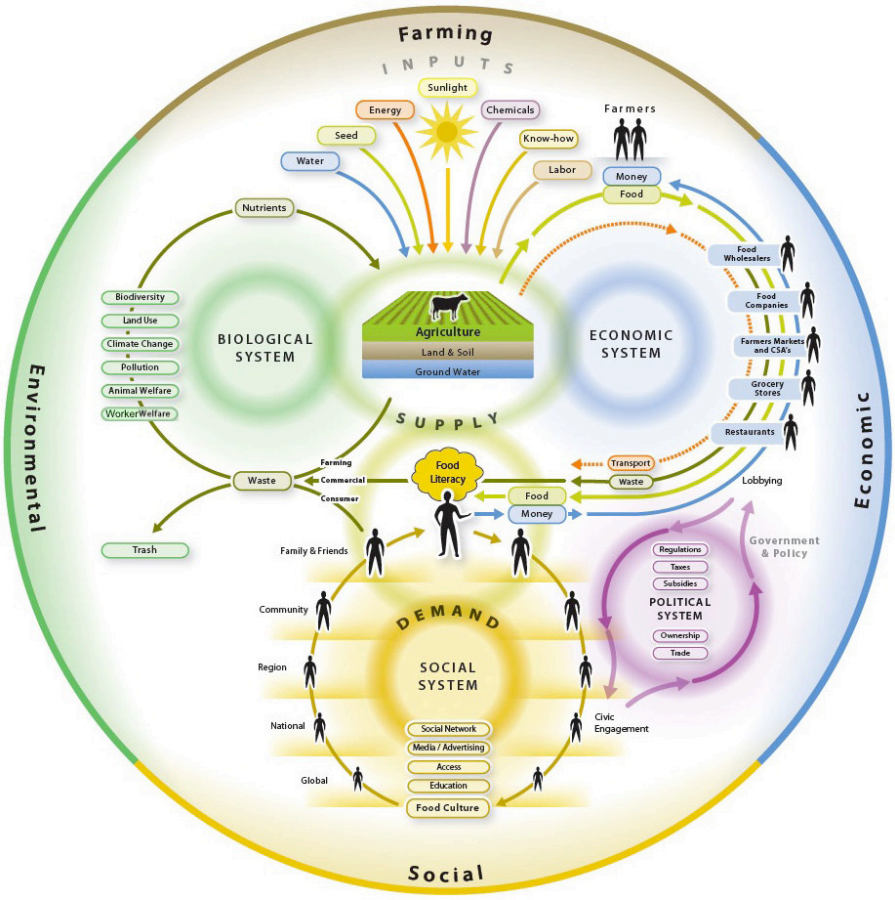
Capacity Development

Network of Conservation Educators and Practitioners

In January 2017, the Network of Conservation Educators and Practitioners published its latest issue of Lessons in Conservation, an open-access online journal. This "Stakeholders Issue" features case studies and exercises for university educators and practitioners in the field that reflect the dynamic, continually evolving, and interconnected nature of people and place. Across varying backdrops—from dam construction in rural India to conservation in New York City—each teaching module featured in the journal examines the diverse range of stakeholders and perspectives involved in negotiating environmental issues.



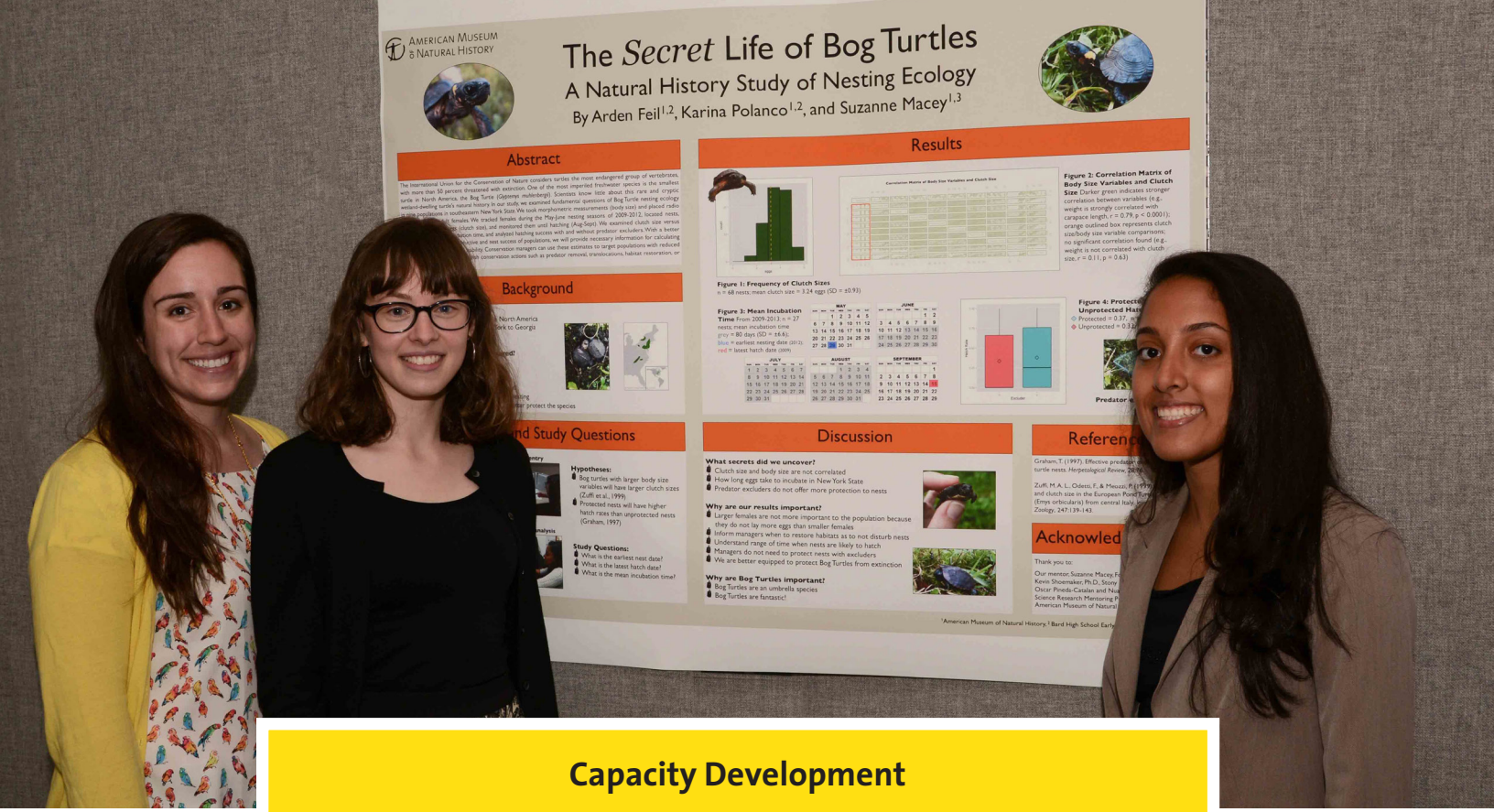
Capacity Development

Advancing Conservation Education: Thinking Big About Food

Last fall, we reported on work we have been leading in partnership with Columbia University to convene educators and researchers analyzing the intersections between food, our bodies, and our environment. That work continues, focused on developing a suite of teaching and learning materials that use food systems as the setting for practising critical thinking and inquiry.

Food is an ideal lens for teaching students how to apply systems thinking to complex problems. Our work from the Solomon Islands to Vietnam, and our daily experiences with food, show the centrality of food choices to human well-being, and the importance of healthy environments to support healthy food. Food systems—how humans grow, transport, share, eat, and celebrate food—also allow us to explore systems thinking, and the problems with decision-making based on simple cause-and-effect representations of the world.

The teaching and learning materials are currently in the design phase and are being piloted at Columbia University. They will use the lens of food as a way to better understand human impact on the environment, and emphasize students' abilities to assemble and evaluate evidence for assessing claims. Through this new set of teaching resources, we hope to help students better understand when, where, and how to act to make a difference when facing complex problems. A second Studio will convene food systems researchers and educators this summer to share materials using systems thinking frameworks in teaching about food systems, and to share and develop student assessment tools.



Capacity Development

Enhancing Diversity in Conservation Science

The CBC is devoted to promoting the recruitment, achievement, and success of students and early career professionals from groups historically underrepresented in conservation, to encourage excellence, diversity, and inclusion in the field. We lead a number of activities to advance these goals, under our Enhancing Diversity in Conservation Science Initiative.

We are pleased to report that we have received dedicated support for a combination of mentoring and connecting activities over the course of this year, including:

- Mentoring of nine undergraduate students, and two high school students over the summer.
- Mentoring of interns leading research on sea turtle monitoring data, marine conservation, and modeling.
- Promoting high school student participation at the Student Conference on Conservation Science—New York (SCCS-NY).
- Developing a guide to inclusive undergraduate and graduate programs in conservation biology , and a how-to guide for students applying to these programs. This will be led in collaboration with several other organizations to ensure synergy and avoid duplication of efforts.
- Creating and piloting media to raise the profile of conservation biology in underrepresented communities, in collaboration with the Society for Conservation Biology.

Drawing on our experience in convening and connecting, we are also connecting across a community of practice to better coordinate efforts, and facilitate the exchange of ideas, experiences, resources, and—most importantly—cross-experiential opportunities for students from one program to another. The Nature Conservancy's Leaders in Environmental Action for the Future (LEAF), The RAY Diversity fellowship program, Doris Duke Foundation-funded programs, federal agencies such as the National Park Service and the United States Fish and Wildlife Service, and our Diversity in Conservation Science Initiative are just a few of the programs that would benefit from stronger partnerships and more regular exchanges.

Convening & Connecting

Guiding Global Policy

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. Dr. Sterling has been leading these efforts, which recently included:

- Co-organizing an Expert Meeting on Evaluation of Capacity Development in Cambridge, England, this past November and in Pune, India in February. The meetings convened participants (18 in England and 80 in India) who are involved in capacity development and evaluation from a wide range of conservation-focused organizations, to compile and improve sharing of evaluation tools, case studies, and an annotated bibliography of key evidence for practitioners around the world. Once completed, these materials will be disseminated by the World Commission on Protected Areas, where Dr. Sterling and *Director* Dr. Ana Luz Porzecanski are invited leaders.
- Attending and presenting on CBC work at several events related to the 13th meeting of the United Nations Conference of the Parties to the Convention on Biological Diversity in Mexico, in December. Dr. Sterling presented on "Practical experiences with linking cultural and biological diversity at local and global scales."
- Convening a global team of experts at the National Center for Ecological Analysis and Synthesis in Santa Barbara, CA, in February, to work on global sustainability and development indicators. The team identified those that are and are not relevant and measurable at the local scale, offered modifications, and is now developing new indicators for monitoring features of resilient Pacific Island communities that are not currently being measured at the global scale.

Convening & Connecting

Partnerships for Linking Biological and Cultural Diversity

The countless interlinkages between biological and cultural diversity highlight the need for holistic, integrated approaches in research, policy, and management. However, there has been a persistent institutional disconnect between the concepts of nature and culture, where policies, tools, and frameworks that deal separately with biological and cultural diversity have often led to differing and sometimes conflicting agendas and approaches. Addressing complex environmental and social challenges will require interdisciplinary approaches and systems-level perspectives that recognize and build on vital feedbacks between humans and nature. In response, this spring we are excited to launch a new partnership with UNESCO and the Convention on Biological Diversity designed to strengthen dialogue, collaboration, and exchange across multiple knowledge systems, sectors, disciplines, and scales.

On April 28, together with these partners and the International Indigenous Forum on Biodiversity (IIFB), SwedBio at Stockholm Resilience Centre, and Indigenous Women Network on Biodiversity (IWNB), the CBC hosted an international panel of experts at the United Nations for a discussion of practical experiences with linking cultural and biological diversity and the contribution of indigenous traditional knowledge on biocultural diversity to monitoring and policy. In 2018, we plan to host the first North American Conference on Biocultural Diversity and the first Global Dialogue on Biocultural Diversity at the Museum, to explore the meaning and values of the links between biological and cultural diversity at regional and global scales. These will be co-organized by the CBC and the Joint Programme between UNESCO and the Secretariat of the Convention on Biological Diversity (SCBD). A conference planning committee comprised of experts and indigenous partners convened at the Museum on April 30 to launch planning activities.

Convening & Connecting

Exhibitions and Outreach

Shortly after our last report, *¡Cuba!*, the exhibition co-curated by Dr. Porzecanski, opened to the public to wide acclaim. *Science* magazine called it "*timely and ambitious*", concluding in its review that "*the visitor to ¡Cuba! leaves with a robust understanding of the critical importance of diversity for meeting the challenges of the future.*" The exhibition has been visited by more than 150,000 people as of the end of March.

While special exhibitions rotate at the Museum, both Dr. Porzecanski and Dr. Sterling continue to serve as experts in a wide range of initiatives related to the topics of exhibitions they have curated. Since the opening of ¡Cuba!, Dr. Porzecanski has been featured in numerous media interviews and was the moderator of Cuba: Threads of Change, featuring experts in foreign policy, environment and culture, a panel discussion held at the Museum this spring. Dr. Porzecanski also continues to lead Museum collaborations with Cuba, now focused on post-expeditionary work on materials collected during the Explore21 expedition to Cuba, as well as on developing new collaborations centered on conservation action.

Our Global Kitchen: Food, Nature, Culture continues to travel around the world and attract eager visitors and excellent reviews. It was most recently in Cleveland, where the *News Herald* reported: "*Anyone who is interested in food, where it comes from, how it's celebrated and how it has evolved around the world should visit "Our Global Kitchen," an amazing exhibit at the Cleveland Museum of Natural History.*" Dr. Sterling and *Biodiversity Specialist and Programs Coordinator* Erin Betley have published two invited book chapters regarding the exhibition and its themes, one in a book by former *Curator of Pacific Ethnography* Dr. Jenny Newell.


¡CUBA!