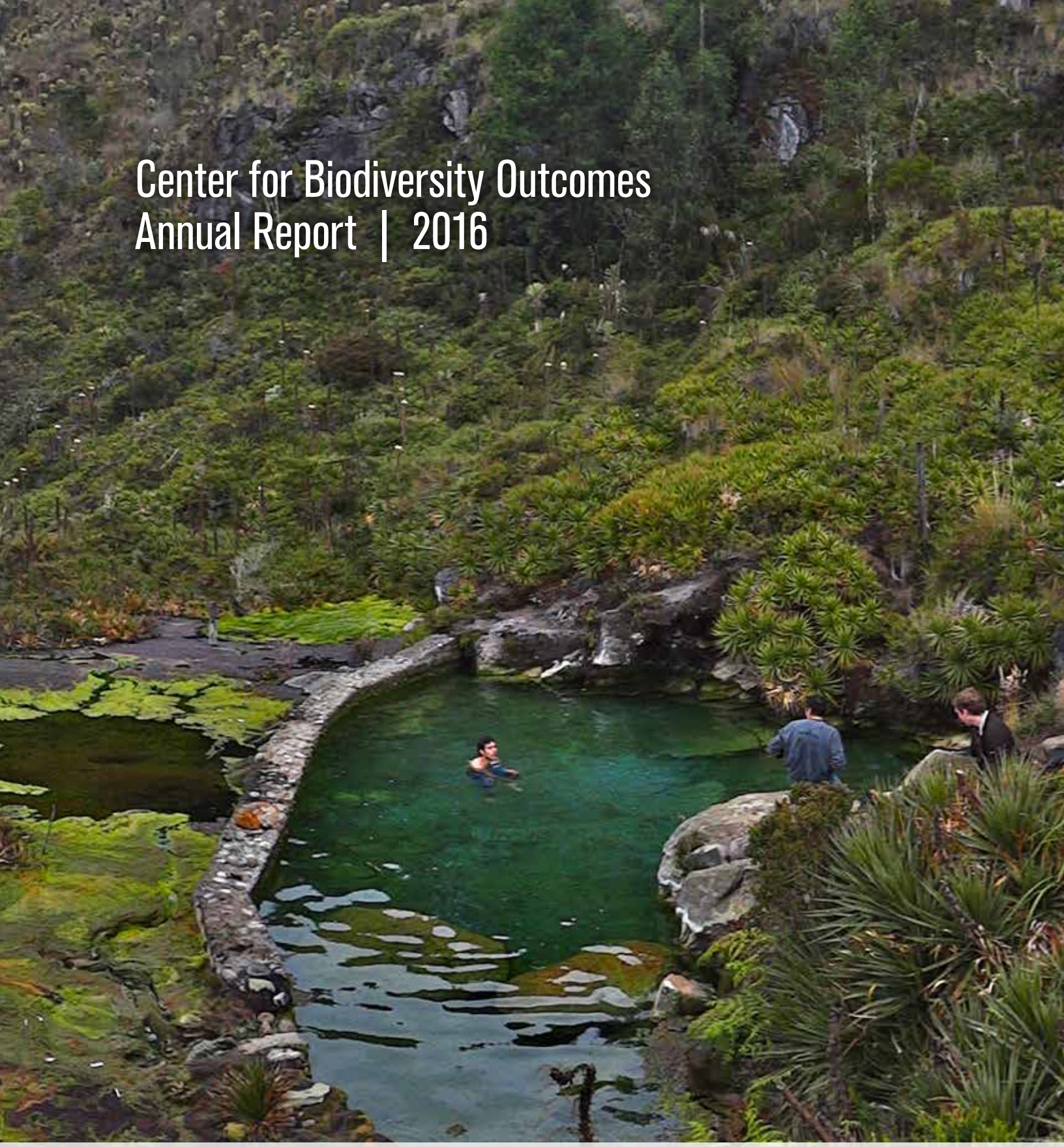


Center for Biodiversity Outcomes Annual Report | 2016

Center for Biodiversity Outcomes
Arizona State University

Contents

OUR MISSION AND VISION

Our mission is to enable the discoveries and

solutions needed to sustain Earth's biodiversity

in a time of rapid biophysical, institutional and cultural change.

We envision a world where the diversity of life on Earth

is valued and sustained for the benefit of all.

ASU Center for Biodiversity Outcomes
Arizona State University

Letter from the Director

Novel climates, ecosystems, and landscape configurations require both scientists and decision-makers to think outside the conventional envelopes of past experience, historical states, and resource-management practices. In an increasingly global environment, where sustainable management of biological resources is fundamental to long-term survival, we must seek creative solutions for the conservation of biodiversity. Yet, we face a persistently wide gap between the practice of ecological research and the application of ecological knowledge to policy and decision-making.

Arizona State University's Center for Biodiversity Outcomes (CBO) was established in 2014 to advance interdisciplinary education and research on nature's assets and to facilitate smart, impactful decision-making. CBO provides the world-class research, training, and institutional capacity to tackle the many ways in which biodiversity change impacts human wellbeing.

To achieve biodiversity outcomes, practical change must come—at least in part—from academic institutions. While many scholars who engage in policy-relevant research yearn to make results, knowledge and ideas useful to decision-makers, academics traditionally face institutional, linguistic, and cultural barriers. By mediating the flow of information among scientists, decision-makers, and other stakeholders, CBO represents a new model to cultivate practical outcomes in sustainability. Grounded in an "actionable science" model that leverages the knowledge and expertise of scholars and practitioners, CBO harnesses capacity at ASU and beyond to address complex environmental challenges of the 21st century.

Biodiversity is central to sustainability writ large. Global recognition of the importance of addressing biodiversity loss is indicated by the 193 countries that have supported the Convention on Biological Diversity. This convention recognized the critical role of biodiversity in sustaining human populations in terms of food security, medicine, clean water and air, shelter, and a clean and healthy environment in which to live. Through our global, first-of-their-kind partnerships, CBO has established ASU as a leader in biodiversity conservation decision-making. Nowhere else in the nation does a university culture recognize the imperative to seek sustainable solutions through use-inspired research, and to increase access to higher education without compromising quality, while insisting on community engagement.

- Leah Gerber
Founding Director, Center for Biodiversity Outcomes

Executive Summary

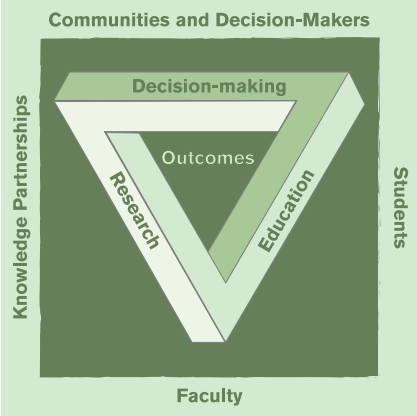
Last year was an important year for CBO. We cemented ourselves as a growing center within the larger Arizona State University (ASU) community and forged relationships with leading global conservation partners including Conservation International (CI), The International Union for Conservation of Nature (IUCN), The Nature Conservancy (TNC), and The World Business Council for Sustainable Development (WBCSD). These partnerships were formalized with official Memorandums of Understanding (MOU) in the first quarter of FY17. We continued to enhance partnerships established in 2014-2015, including those with the Earth Genome and the McDowell Sonoran Conservancy. We also signed a MOU with the Central Arizona Conservation Alliance (CAZCA) to promote conservation education, and we established a working group with the White Tank Mountains Conservancy to explore sustainable urban development.

In our second year of operation, we launched our first water-decision tool (GIST) through our partnership with the Earth Genome, and established new models for faculty engagement which included expanding our network of affiliated faculty and hiring our first NatureNet fellow with TNC. We made plans to hire staff in the first quarter of FY17 who are dedicated to the mission of the center and will advance our strategic goals. This included two Associate Directors, a Business Operations Specialist, and an Administrative Assistant. We also secured a permanent center headquarters. We are currently fully staffed and continue to strengthen our strategic and operational plans to ensure effective management. As CBO grows, we look forward to engaging with new partners, implementing new programs and projects, and working to advance our mission of conserving biodiversity worldwide.

CBO's Actionable Science Model

CBO has three dynamically integrated areas of operation: education, research and decision-making. Our research and programs fall in at the intersections of these spheres. We call this approach of bridging science producers with decision-makers our actionable science model. This model differentiates us and is at the heart of our operations.

In more detail, faculty and graduate students work in collaboration with other academic institutions to frame problems into workable scientific research questions, to build teams of researchers, and to apply existing scientific knowledge to the problems identified by practitioners. The research team works closely with practitioners in CBO partner organizations to identify



local stakeholders, and to expand the collaborative teams which co-produce knowledge to address biodiversity problems. CBO works with partners to train graduate students and provide additional training.

Figure 1. CBO Actionable Science Model

Our Values

CBO's values are aligned with those of ASU as A New American University:

Access

- Inclusivity and diversity
- Engagement of stakeholders and decision-makers

Biodiversity conservation solutions require diversity of knowledge. To elevate biodiversity knowledge and its applicability, we champion educational inclusion and diversity at ASU. We collaborate with stakeholders and decision-makers from multiple knowledge bases including business, government, management, academia, community and non-profit sectors.

Impact

- Focus on human and ecosystem wellbeing
- Solution-oriented

We conduct solution-oriented research that can be applied in the real world for measurable and positive biodiversity outcomes. We work towards both localized change and global transformation in biodiversity thought and action.

Excellence

- Innovation
- Transdisciplinary

Successful biodiversity outcomes require change in the solutions we apply and in the way we collectively approach conservation. CBO's novel approach to collaborative conservation inspires creative biodiversity solutions and collaborative processes. It has the potential to transform the way different sectors work together to drive biodiversity outcomes. Our reflective processes ensure that we continue to improve the way that we do conservation.

Table 1: FY16 (year two) research projects

Project Title	Principle Investigators	External Collaborator(s)
Biodiversity Assessment and Decision Tools		
Big Data Hub	Drs. Beth Polidoro, Leah Gerber, Selçuck Candan, Nico Franz, Paolo Papotti	WBCSD, IUCN
Biodiversity Assessment	Drs. Beth Polidoro, Leah Gerber, Penny Langhammer, Andrew Smith	IUCN, National Marine Fisheries Service (NMFS), The Nature Conservancy (TNC), Wildlife Conservation Society (WCS)
Building Effective Fishery Ecosystem Taskforce	Dr. Leah Gerber	Pew Charitable Trusts, Lenfest Fishery Ecosystems Task Force
Key Biodiversity Areas (KBA) Assessment	Drs. Penny Langhammer and Leah Gerber	IUCN, WCS
Sonoran Desert Plants Assessment	Drs. Beth Polidoro, Nico Franz	Desert Botanical Garden, Phoenix Zoo
Species Red List Partnership	Dr. Beth Polidoro	IUCN
Structured Decision Making and the Endangered Species Act	Dr. Leah Gerber	United States Fish and Wildlife Service, National Socio-Environmental Synthesis Center (SESYNC)
Natural Capital and the Sustainable Development Goals	Drs. Leah Gerber, Beth Polidoro, Abigail York	Conservation International
Advancing Corporate Sustainability		
A Data-Driven Support Tool for Corporate Decision Making in Water Use (GIST)	Drs. John Sabo, Hongkai Gao, Leah Gerber	Glen Low and Steve McCormick (Earth Genome), Dow Chemical
A Blueprint for Measuring, Valuing and Reporting Biodiversity in the Business Sector	Dr. Leah Gerber, Micah Harp	WBCSD
Mainstreaming Biodiversity in the Business Sector	Dr. Beth Polidoro, Dr. Leah Gerber, Dr. Hongkai Gao	WBCSD, IUCN
Governance and Biodiversity		
Actionable Science, boundary organizing and co-production of biodiversity outcomes	Drs. Leah Gerber and Derrick Anderson	SESYNC, SNAPP, USGS, Pew Charitable Trusts
Renewable Energy and Biodiversity Planning	Dr. Abigail York, Dr. Clark Miller	TNC, Bureau of Land Management (BLM)
Public Health and Biodiversity		
Environmental and human health effects of contaminants in wastewater dominated streams	Drs. Rolf Halden and Dr. Matthew Scotch	EPA and the United States Geological Survey
Impact of microplastics on human health and the environment	Drs. Beth Polidoro, Dr. Rolf Halden	Secretariat of the Pacific Regional Environmental Programme (SPREP), Environmental Protection Agency (EPA)
Infectious diseases, synthetic biology and the two faces of extinction	Dr. James Collins	IUCN, World Health Organization (WHO), The U.S. Center for Disease Control (CDC), the World Organization for Animal Health (WOAH), Intergovernmental Panel on Climate Change (IPCC)
Urban Biodiversity		
Sustainable urban design for development and wildlands conservation in the White Tank Mountains Region	Drs. Darren Petrucci, Paul Coseo, Leah Gerber	White Tank Mountains Conservancy (WTMC), City of Buckeye, Maricopa County, AZ Dept Fish and Game

Research Projects & Publications

In FY2016, CBO advanced our research to meet pressing conservation challenges, engaged with leading agencies within the field to develop partnerships designed to produce new research, and applied this research to meet our mission. These partnerships were officially established in the first quarter of FY2017. As operational leader, we at CBO will work to implement and manage the initiatives developed between each partnership. A summary of research projects initiated, advanced or completed during our second year is on the next page.

Selected Research Highlights

Actionable Science, Boundary Organizations and Co-Production of Biodiversity Outcomes (Dr. Leah Gerber, Dr. Derrick Mason Anderson, Dr. Clark Miller)

In collaboration with affiliate faculty from the School of Public Affairs and the School for the Future of Innovation in Society, we are developing several research projects that examine the qualities of multi-stakeholder collaborations that lead to successful application of good science and solution implementation to achieve positive biodiversity outcomes. This work includes: a project that looks at the efficacy of boundary organizations as information and relationship mediators between multiple intellectual and practice spheres, such as business, academic, non-profit and policy; a qualitative analysis to identify the determinants of public value outcomes (i.e. contributions to society) in biodiversity knowledge partnerships; a mapping and analysis of CBO's information and collaboration network; a reflective analysis on the efficacy of CBO's actionable science model; and workshops and panel discussions to share actionable science research and practices.

Key Biodiversity Areas (KBAs) and Ecosystem Services SNAPP Project (Penny Langhamer and Leah Gerber)

The Science for the Nature and People Partnership (SNAPP) working group in Ecosystem Services and KBAs aims to identify sites that significantly contribute to global biodiversity. In November 2015, CBO was awarded $125,000 by SNAPP in support of this project, in addition to a CBO seed grant of $7,500.

Sonoran Desert Biodiversity Assessment (Drs. Beth Polidoro and Nico Franz)

CBO funded a Sonoran Desert Plants Assessment, which started and ended in Year 2. Experts vetted the final checklist with more than 4,000 species based on the Sonoran Desert Eco-Region.

Structured Decision Making in Endangered Species Prioritization (Drs. Leah Gerber and Mike Runge)

In collaboration with the US Fish and Wildlife Service, CBO is in final stages of a project on Endangered Species Act decision-making that is being supported by SESYNC. We are developing an approach to help the USFWS efficiently (and transparently) allocate resources to threatened species budgets at a national level. We have worked closely with key staff from USFWS, and the key audience is senior managers within their headquarters in Washington, D.C. The aim is to provide senior decision-makers in USFWS with guidance about which pool of projects are favored for immediate action and which could or should be delayed under various budget allocations and some nominated constraints. We look forward to advancing this work, including partnering with ASU Decision Theater in the next fiscal year.

Sustainable urban design for development and wildlands conservation in the White Tanks Mountains region (Drs. Darren Petrucci and Paul Coseo)

CBO facilitated a collaboration between the White Tank Mountains Conservancy and CBO affiliate faculty in the ASU Herberger Institute for Design and the Arts to design a sustainable urban development solution for the rapidly growing City of Buckeye, AZ. The work has involved close collaboration with numerous municipalities, wildlife and recreation agencies, and multiple conservation organizations. CBO supports an RA to facilitate this partnership and to examine the actionable science model at work in the collaborative process of design, development and implementation of a comprehensive sustainable development plan for the White Tank Mountains region that addresses business and development needs of the city while maintaining critical wildlife corridors. CBO also co-supports a graduate fellow with the Central Arizona Conservation Alliance to work directly with Herberger faculty to advance the sustainable design. This work will continue into the next fiscal year and will also inform our research on actionable science and multi-stakeholder conservation decision-making.

Selected Publications

Gerber, L.R. 2016. *Conservation triage or injurious neglect in endangered species recovery.* Proceedings of the National Academy of Sciences of the United States of America.

Gerber L. 2015. *A deal with Japan on whaling?* Frontiers in Ecology and the Environment 13: 347–347.

Building Effective Fishery Ecosystem Plans. Lenfest Ocean Program. November 2016.

Polidoro B. et al. 2016. *Status of Marine Bony Fishes of the Eastern Central Atlantic.* Gland, Switzerland, IUCN.

Troyer, C. M. and L. R. Gerber. 2015. *Assessing the impact of the U.S. Endangered Species Act recovery planning guidelines on managing threats for endangered species*. Conservation Biology. 29: 1423-1433.

Partnerships

The Earth Genome

This year, we continued to develop our existing partnership with the Earth Genome. The Earth Genome aims to create inexpensive, easy-to use tools that enable corporations to make sustainable decisions that protect biodiversity. We worked with the Earth Genome to provide the necessary scientific expertise to develop a credible decision-support tool that corporations need to make informed decisions about water. This web-based, data-driven tool will help water-intensive corporations make better decisions about how much and where to invest in green infrastructure in order to deliver better storage, higher quality water and flood control. The pilot application helped Dow Chemical screen potential sites in a Texas river basin where the company can restore river-floodplain connectivity and wetlands to enhance upstream storage and offset the need for more expensive gray alternatives.

IUCN Red List Partnership

The IUCN Red List of Threatened Species (or the Red List) is the world's standard for quantifying species extinction risk and is used to inform global policy, planning and conservation action. As a Red List partner, ASU joins a group of global leaders charged with devising strategies for species conservation and biodiversity decision-making — becoming one of only three universities in the world to partner with IUCN Red List to help guide the scope and application of scientific data. Beth Polidoro, CBO Associate Director of Research and ASU New College Assistant Professor, spearheaded this initiative. "We are honored to join the Red List Partnership, which will provide extensive regional and global opportunities for ASU students and faculty to participate in applied biodiversity research and interdisciplinary educational opportunities while highlighting ASU-CBO as a global leader in species conservation and biodiversity decision-making," she said.

From 2014-2016, CBO faculty affiliates completed Red List assessments for more than 1,800 species, in addition to reassessments for more than 200 mammals. They also completed the first comprehensive list of Sonoran Desert plants (more than 4,500 species). These accomplishments were

possible thanks to the support of other partner organizations, such as the Desert Botanical Garden and the Phoenix Zoo. In addition, more than 20 undergraduate and graduate students have been trained in IUCN Red List assessment methodology and species information service data-entry protocols via a software that underpins the IUCN Red List and its biodiversity assessments. This information is reviewed by an independent scientific review team and then made available to the public. As an IUCN Red List Partner, ASU will take a leadership role in the global assessment and management of threatened and endangered species. This work is crucial in ensuring effective conservation of biodiversity.

WBCSD Knowledge Partnership

WBCSD is a global, CEO-led organization of more than 200 leading businesses and partners working together to accelerate the transition to a sustainable world. Member companies come from all business sectors and all major economies, representing a combined revenue of more than $8.5 trillion and 19 million employees. This year, we engaged with core leaders within WBCSD in the development of a future knowledge partnership between ASU and WBCSD – a partnership built on the exchange of information to scale sustainability solutions within the corporate sector. As WBCSD's second global Knowledge Partner, ASU has the opportunity to bring scholarship, analytics and decision-making tools to the world's largest companies.

This partnership was signed in September 2016 and represents a culmination of work completed by ASU, CBO and WBCSD throughout 2015-2016. This includes working with IUCN and WBCSD on a new project, Accounting for Biodiversity, which seeks to define what the business community needs to meet biodiversity targets. CBO attended a joint conference on the project in Bonn in June 2016 and we look forward to engaging further with WBCSD in Year Two. "We're excited about this new partnership with ASU because of our common goal to move the dial on sustainability," said Peter Bakker, WBCSD's president and CEO. "ASU's broad range of interdisciplinary knowledge is a good match for forward-thinking companies who understand that the world is changing. Together, we can continue to encourage the global community to deliver sustainable science-backed solutions that enhance and strengthen development."

Conservation International Knowledge Partnership

CI works in more than 30 countries across six continents to create solutions that protect the nature people rely on for food, fresh water and livelihoods through an innovative blend of science, policy and partnerships. This year, we worked closely and thoughtfully with CI to propose and develop a partnership plan designed to leverage the strengths of both our organizations to protect biodiversity and sustainable outcomes. Our ASU-CI Knowledge Partnership

represents the first of its kind between a large American public university and a U.S.-based international conservation nonprofit. “To ensure a sustainable future, we need to maintain biodiversity and natural capital, which requires transforming the way we do conservation,” said Daniela Raik, Senior Vice President and Managing Director, the Betty and Gordon Moore Center for Science at CI. “The novel ASU and CI knowledge partnership does that by expanding scientific knowledge about complex social-ecological systems, applying this knowledge on-the-ground and training our next generation of conservation leaders.”

This partnership will work across three main areas – the protection of natural capital, creating a more sustainable food production system and training the next generation of conservation leaders. To fulfill these goals, six scientists from CI’s Moore Center for Science will serve as Professors of Practice at ASU, conducting research and teaching in a pilot initiative designed to share practical expertise to conservation students and scholars. Abigail York, CBO Associate Director of Education and Diversity and an ASU associate professor, has brought the professors-of-practice concept to fruition, offering ASU students an opportunity to engage with CI scientists in the classroom and at CI field sites. A product of the work completed in Year Two, we will work closely with CI in the coming year to operationalize the partnership and meet mutual outcomes through research.

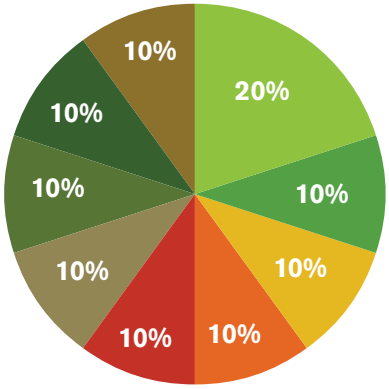
The White Tank Mountains Conservancy

In December 2016, we established a White Tank Mountains working group to explore the sustainable development of the Buckeye urban region with consideration to wildlife corridors. As part of this work group, CBO conducted a workshop in collaboration with Herberger Institute for Design and the Arts, Arizona Game and Fish, The Central Arizona Conservation Alliance and White Tank Mountains Conservancy. We hosted Dr. Paul Beier to consult with the working group on corridors in the Buckeye region and will continue engaging on this work into Year Three. This design is titled “Sustainable Urban Design for Development and Wildlands Conservation in the White Tank Mountains Region.”

Education

Innovative solutions require diverse perspectives. Thus, CBO partners with faculty across ASU to conduct research that sheds light in biodiversity conservation issues. Engagement of ASU faculty affiliates increased by 34% from year one. In FY2016, we also continued to cultivate and meet outcomes across existing partnerships, as well as worked to establish new initiatives to train the next generation of conservation leaders.

Capacity



- School of Life Sciences
- School of Sustainable Engineering and the Built Environment
- School of Sustainability
- School of Human Evolution and Social Change
- School of Politics and Global Studies
- School of Community Resources and Development
- Department of Engineering and Computer Sciences
- School of Mathematics and Natural Sciences

Outcomes

1. Advancing corporate sustainability
2. Biodiversity assessment and decision tools
3. Governance and biodiversity
4. Public health and biodiversity
5. Urban biodiversity
6. Public engagement in biodiversity

Central Arizona Conservation Alliance (CAZCA) Fellowship

In April 2015, we signed an MOU with CAZCA to establish an educational fellowship designed to provide financial support and expose graduate students to new networks and resources external to ASU. Fellowship recipients will be affiliated with the Center for Biodiversity Outcomes (CBO) and will benefit from engagement in the CBO community. For partnering organizations, these fellowships will leverage high quality research and publications through the graduate program and academic mentorship at ASU. The award is available to one graduate student in the amount of $12,000. The award recipient will conduct high-priority research topics, which will support the vision of CAZCA to promote the study and restoration of our regional desert mountain preserve system.

In addition, we also attended frequent CAZCA meetings to add insight and work alongside other conservation, municipal and development agencies to collaborate on the Sonoran Regional Development Plan and additional urban development work within Maricopa County and the Central Arizona region. This will continue to develop in the next fiscal year. Members of CAZCA include the White Tanks Mountains Conservancy and the McDowell Sonoran Conservancy, who are also partners with CBO.

Broadening Diversity in Biodiversity Science

As part of our commitment to increasing diversity in biodiversity science, Drs. Abigail York, Leah Gerber, and Kim Scott (CGEST) collaborated together to create a network of ASU programs to work together on issues of diversity and inclusion. An annual meeting was held to gather ideas for collaboration and pursue joint funding opportunities. This work will be continued into the next fiscal year.

Building biodiversity into ASU online curricula

As part of our commitment to training the next generation of conservation leaders, CBO developed a fully online, accelerated, three-credit course to introduce students to the range of topics in the interdisciplinary field of Conservation Biology. This course was offered in Summer 2016 and had 26 enrolled students.

ASU Nature Alliance

We engaged with an ASU undergraduate student conservation advocacy group to develop a high-school outreach program designed to increase enrollment of students in undergraduate level conservation courses.

Graduate Certificate in Environmental Communication and Leadership (ECL)

This year, we continued with the approval process for a graduate certificate in Environmental Communication and Leadership, which was approved in Year Three. This graduate certificate is designed to train graduate students in science-based fields to communicate their findings to public audiences and decision makers. We anticipate enrollment for this certificate to be available Spring 2017, following pending approval.

The Nature Conservancy (NatureNet) Fellowship

This year, we partnered with TNC NatureNet Fellowship – a unique research and training fellowship that advances qualified candidates in cutting-edge research across a range of conservation science issues by leveraging the strengths of TNC and the partner university. In June 2016, we selected our first NatureNet fellow to investigate how food production areas can assist in climate mitigation.

McDowell Sonoran Conservancy Fellowship

We also partnered with McDowell Sonoran Conservancy in the joint-funding of a graduate student for the 2016-2017 year to address high-priority, natural resource management questions in the area. The graduate student will receive $12,000 in funding. We look forward to renewing this joint fellowship for the next academic year.

News, Events & Social Media

News

Scientists Aim to Identify Key Biodiversity Areas. In June 2016, the SNAP group met to develop recommendations and guidelines for documenting ecosystem services in Key Biodiversity Areas to identify sites that significantly contribute to global biodiversity. This group is a collaboration of scientists from CBO, IUCN and the Wildlife Conservation Society.

Solving Wicked Conservation Problems. In June 2016, CBO presented a brownbag event featuring guests from University of Queensland, Australia, Dr. Matthew Holden and Dr. Katrina Davis. This brownbag examined current research on cost-effective conservation management and incorporating non-market valuation into marine spatial optimization.

Hosted Emerging Trends in Conservation. In May 2016, CBO was proud to host leading experts from Conservation International in a sold-out event, to discuss emerging trends in conservation from a variety of perspectives including oceans, wildlife, protected areas, agriculture, and ecosystem services measurement, valuation and accounting.

Maximizing Species Recovery with Limited Resources. In March 2016, we hosted decision scientists Richard Maloney, New Zealand Department of Conservation; Gwen Iacona, University of Queensland, Australia and Stephanie Avery-Gomm, University of Queensland, Australia as part of a five-part conservation series. In conjunction with the featured scientists, we are collaborating with the U.S. Fish and Wildlife Service to address resource challenges regarding protection and recovery of endangered species.

Night of the Open Door. In Feb 2016, CBO reached out to younger audiences through the annual Night of the Open Door event. We welcomed participants of all ages to learn about the ecology of different environments through a fun game of biosphere constructions.

Center for Biodiversity Outcomes to Lead Events at 2016 World Conservation Caucus. In Feb 2016, the selection of three CBO-Affiliated Faculty to lead events at the September 2016 was announced – their proposals were among those selected from a competitive pool of 1,500 submitted for consideration.

Events

"Resilience or Resourcefulness – Which Makes Sense in the Anthropocene?" *Peter Kareiva, the Director of the Institute of Environment and Sustainability at University of California Los Angeles.* Presented an alternative way of thinking about the problem of climate change and resilience policy through promoting resourcefulness and directed change.

"Achieving Biodiversity Outcomes Through the Identification and Safeguard of Key Biodiversity Areas." *Penny Langhammer, Adjunct Professor of Biology, Arizona State University.* Provided an introduction to KBAs and the new IUCN Standard, and discussed how they are being used to achieve biodiversity outcomes globally.

"Twenty-Five Years of Designing and Implementing Wildlife Corridors." *Paul Beier, Regents Professor of Conservation Biology, Northern Arizona University.* Examined how regional maps of wildlife corridors documented for California, Arizona and Bhutan over the past 15 years helped put the topic of wildlife crossings on the agendas of transportation agencies, counties, developers and conservation advocates. Beier highlighted how detailed corridor designs in California and Arizona led to projects like the Catalina-Tortolita corridor north of Tucson.

"Map of Life: Advancing and Using Global Species Distribution Information for Research and Conservation." *Walter Jetz, Director Yale Program in Spatial Biodiversity Science and Conservation.* Reviewed recent advances in capturing global species distributions in a more integrated way, based on a combination of different data types and remote sensing information, and introduced the Map of Life project, which aims to support this integration and the development of a more representative and sound species distribution for use in research, monitoring, and conservation.

Social Media

As part of our commitment to advancing our social media presence in our second year, we strengthened our Twitter account to raise public awareness of our work on conservation issues. By year's end, we had a total of 168 Twitter followers and over 100,000 impressions. While social media has not been a large part of our strategy in Year Two, we will increase our online presence in Year Three to amplify the growth of our center.

Operations & Funding

Funding

Table 2: Submitted requests for external funding (not awarded)

Grantor	Description	Amount
ASU Foundation - Women in Philanthropy	STEM diversity program at ASU	$100,000
Natural Science Foundation (NSF) – Big Data Spoke	Developing an Investment-Grade Biodiversity Data Spoke and Decision Support Tool	$100,000
Google – Earth Engine	Biodiversity big data hub and tool	$43,222
Adventure for Conservation	Marine plastics	$84,000
US Agency for International Development (USAID)	Sustainable water partnerships	$65,000,000
	TOTAL	**$65,327,222**

Table 3: Awarded requests for external funding

Grantor	Description	Amount
Science for the Nature and People Partnership (SNAPP)	Key Biodiversity Areas and ecosystem services (Penny Langhammer)	$125,000
The Earth Genome (EG)	Biodiversity in GIST	$10,000
Central Arizona Conservation Alliance (CAZCA) Partnership	Funds to support research student (CBO to match amount).	$6,000
The Nature Conservancy (TNC) Partnership	Funding to support postdoctoral research associate (Kelly Gravuer)	$43,700
	TOTAL	**$184,700**

Staffing

In the final quarter, plans were made to hire the below staff – who were officially hired in the first quarter of FY3:

- New Associate Director of Research – Beth Polidoro
- New Associate Director of Education and Diversity – Abigail York
- Business Operations Specialist – Anahi Astudillo
- Administrative Assistant – Linda David

Location / Space

This year, we continued to operate out of a temporary office in Life Sciences Building A. However, we are planning for a permanent move to a larger office in late 2016.

Future Direction

Strategic Planning

We will continue to collaborate together to develop a comprehensive strategic plan that aligns with our mission, vision and values – and accommodates our exciting growth thoughtfully and realistically. We met with our Board of Advisors in 2015, who advised us on strategic planning looking forward to continuing to implement their insights as we develop further. In the first quarter of FY3, we attended the World Conservation Caucus Congress in Hawaii in September 2016. During this event, we engaged directly with key prospective partners – including CI, WBCSD and IUCN to officially sign MOUs to set parameters for future engagement. Finally, we are looking forward to participating at Green Biz 2017 as part of an overall contingent at ASU. This event will bring together a variety of leading sustainability and conservation organizations and represents an opportunity for the center to enhance existing partnerships while also forming new relationships to meet future goals.

Research & Partnerships

Conservation International: Resulting from the strong relationship formed with Conservation International this year, we signed an official MOU in September 2016. This MOU will build on the efforts made to cultivate this relationship this year – including the planning of the Professors of Practice program, to be implemented in January 2017.

WBCSD: We officially signed a MOU with WBCSD in September 2016 and we look forward to working with them to meet mutual programmatic goals in the next fiscal year(s).

IUCN Red List: In the coming year, we will continue to focus on marine species and Sonoran Desert plants, and will establish a satellite Red List Training Center in the latter part of FY3. We will continue to build on our work with IUCN Red List and signed an official MOU in September 2016.

The Nature Conservancy: We will continue to identify research synergies with The Nature Conservancy, both at the national and state level. This includes hosting Hugh Possingham, the newly hired Chief Scientist during Green Biz 2017 and working with local TNC efforts as part of our ongoing work with the Central Arizona Conservation Alliance (CAZCA).

Education & Partnerships

CBO worked closely with the Center for Gender Equity in Science and Technology (CGEST) to develop a new program designed to increase access for “at risk” girls to advance degree programs and career opportunities in science by promoting early preparedness for college and career. Incoming high school girls will be selected to participate in a two-week intensive

summer program and develop relationships with peers and faculty. CBO applied in the first quarter for FY17 for funding, but was not successful. We will continue to search for funding sources for this program.

Funding

CBO's goal is to become financially self-sustained by the start of FY20. Our team and affiliated faulty have been working diligently to submit grant proposals for external funding.

Table 4: Funding awarded in FY17 (as of January 13, 2017)

Grantor	Description	Amount
National Science Foundation (NSF) Science of Science and Science and Innovation Policy (SciSIP)	Recommended for funding on 1/3/17. Award pending. CI, WBCSD, IUCN. Building an actionable science framework for cross-sector biodiversity knowledge partnerships.	$386,104
National Science Foundation (NSF)	**CBO receives partial RID:** Service Access in Premodern Cities	$404,674
National Science Foundation (NSF)	**CBO receives partial RID:** Urban Sustainability in the Dynamic Environment of Central Arizona	$5,999,969

Staffing

We anticipate hiring additional postdoctoral students to help engage in critical research areas and advance the objectives of our impending knowledge partnership. This includes three postdoctoral students to work on projects relevant to our partnership with Conservation International, in the areas of sustainable coffee supply chains, natural capital and the Sustainable Development Goals (SDGs) and on sustainable fisheries in a joint project with CI, CBO and the Nereus Program in Hawaii. We will also hire an additional NatureNet fellow to work on mainstreaming biodiversity and big data questions.

We are currently fully staffed and do not anticipate needing additional staff in the next fiscal year.

Operations

As we grow, we anticipate also investing in the space and staff required to manage this change. In the first quarter of FY17, we moved into permanent space to accommodate our growth, which will be used to house staff and host external partners for meetings and events. We will continue to streamline our operating structure, including developing our administrative, budgetary, and articulating center-specific protocols to ensure efficient management of work streams and increased productivity.

Table 5: Submitted requests for external funding (pending response)

Grantor	Description	Amount
Marisla Foundation	Supporting one year of salary/tuition for grad student to work on microplastics in American Samoa/Hawaii	$97,000
National Science Foundation (NSF)	Re-applied: Transnational long-term analysis of local effects of climate change	$4,000,000
National Science Foundation (NSF)	SAP SE (software to manage business operations and customer relations) –Improve data cleaning protocols to maximize users' time and increase potential for meaningful scientific data processing.	$500,000
MacArthur Foundation	Market-based approach to sustaining natural capital	$100,000,000
National Science Foundation (NSF)	Macrosystems	$4,500,000
National Science Foundation (NSF)	Red List for Philippines combined with historical genetic evidence of extinction	$4,800,000
National Oceanic and Atmospheric Administration (NOAA)	Re-applied: Gulf of Mexico Marine Biodiversity Decision Tool	$200,000
V. Kann Rasmussen Foundation - LOI	Developing an Investment-Grade Biodiversity Data Spoke and Decision Support Tool	$300,000
Natural Science Foundation (NSF) - Pacific Institute for Research and Evaluation (PIRE)	Transnational long-term analysis of local effects of climate change	$4,000,000
	TOTAL	**$114,397,000**

We will also increase our media presence and continue to develop our brand as a center, with a focus on consistent language, graphic design and a marketing plan to raise our profile within the larger ASU community and beyond. We also plan to develop and disseminate a quarterly newsletter to inform readers on biodiversity conservation issues and amplify our own work within the space.

Board of Advisors

We would like to thank our 2014-2015 Board of Advisors for their continued support and mentorship during our second year of operation.

Dr. Betsy Cantwell, Vice President for Research Development, Office of Knowledge Enterprise Development

Dr. Rolf Halden, Director, Center for Environmental Security, Biodesign Institute

Dr. Rob Melnick, Executive Director, Julie Ann Wrigley Global Institute of Sustainability/School of Sustainability

Dr. Charles Perrings, Co-Director, Ecoservices Group, School of Life Sciences

Dr. Dan Sarewitz, Co-Director, Consortium for Science, Policy & Outcomes, School for the Future of Innovation in Society

Dr. Andrew Smith, Professor, School of Life Science

Dr. Osvaldo Sala, Professor, School of Life Sciences

Dr. Billie Turner, Professor, School of Geographical Sciences and Urban Planning

Dr. Minu Ipe, Clinical Associate Professor, Department of Management, W. P. Carey School of Business

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Arizona State University

The Center for Biodiversity Outcomes is a partnership between the Julie Ann Wrigley Global Institute of Sustainability and the School of Life Sciences.

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