CENTER FOR BIODIVERSITY OUTCOMES

ARIZONA STATE UNIVERSITY

STRATEGIC PLAN 1.0

The Problem:

Global biodiversity loss has been estimated to be occurring at unprecedented rates (100 to 1000 times) compared to pre-human levels (Pimm et al. 2005). Consistent with wicked problems, the biodiversity crisis defies definition. The details of biodiversity loss, the constraints on possible solutions and the resources needed to solve the problem vary in time and space and with scale (Sharman 2009). Habitat modification, invasive species, pollution, overexploitation, and increasing CO_2 concentrations are important determinants of biodiversity change at the global scale (Sala et al 2000). Each of these stressors is complicated because any potential resolution generates further issues. Therefore biodiversity can be seen as an overarching problem that encapsulates many pressing environmental problems of our time. Without intervention, the population declines will continue to the point of extinction for many species, leading to a global loss of biodiversity. Many argue that biodiversity must be preserved because all species have intrinsic value. Strong justifications can also be made in terms of ecosystem services that biodiversity provides in terms of provisioning, regulating, supporting, and cultural services. In a complex and changing world, promoting the intrinsic value of biodiversity cannot be the only way forward, and it would be similarly naïve to suggest that relying only on the economic benefits of nature will lead to a reversal of the loss of biodiversity.

Environmental Scan:

Meeting today's biodiversity challenges requires innovative research, education, communication, and policy strategies capable of responding to a rapidly changing biophysical, institutional, and cultural landscape. CBO establishes the capacity to coordinate and build upon a broad platform of expertise across ASU, particularly from the School of Sustainability and School of Life Sciences, to strengthen ASU's research capacity in conservation science and biodiversity. The CBO goal is for ASU to become a world leader in biodiversity research, policy and practice, as well as to develop innovative undergraduate and graduate training programs. CBO will establish ASU as a leader in biodiversity conservation decision-making by fostering research partnerships that embrace complex social and environmental challenges in the pursuit of pragmatic biodiversity outcomes.

Strengths, weaknesses, opportunities, threats analysis

Strengths (Internal)

1. We are solution-oriented: The Center for Biodiversity Outcomes is designed to integrate research from many disciplines and bring researchers, policy makers and community members together to identify viable solutions to biodiversity problems.
2. We focus on action: The CBO employs systematic and strategic approaches to achieve desired outcomes, working to operationalize these solutions in the form of resource management, policy change and process change.
3. We are interdisciplinary: The resources available to CBO at Arizona State University are deep and wide, as are CBO connections to global conservation organizations and public agencies.
4. We embrace an accelerated approach: CBO seeks to accelerate the success of biodiversity

management and sustainable biodiversity outcomes by fostering productive relationships among academics and practitioners.

5. We are team-oriented: CBO possesses the capacity to integrate interdisciplinary resources in creative, impactful ways, thereby achieving the ability to react quickly to pressing issues in biodiversity conservation.
6. Four ASU faculty members either contribute to or lead IUCN/Species Survival Commission biodiversity assessments.
7. ASU faculty have played a major role in the activities of DIVERSITAS (former vice-chair) and its affiliated ecoServices project (co-chair). ASU has particular strengths in human-focused aspects of sustainability, although biodiversity has not been incorporated in this larger sustainability discussion.
8. SOLS has traditionally been the fulcrum of biology, ecology and biodiversity studies on campus.
9. GIOS has buttressed the portfolio of sustainability science across campus.
10. CSPO represents a successful model for a boundary organization.
11. ASU has more than 100 sustainability scholars with expertise that overlaps biodiversity science.
12. Many individual faculty at ASU are currently engaged in successful projects (Appendix A, Table 2) and other research in the realm of biodiversity (Appendix B, Table 1).

Weaknesses (Internal)

1. Although we have biodiversity expertise spread across different campuses and units of ASU, it has yet to be consolidated and is currently not effectively encompassed by any one unit.
2. At ASU we have yet to fold biodiversity into the larger sustainability discussion led by GIOS and the School of Sustainability.
3. Recent departures from the School of Life Sciences at ASU have weakened our strength in biodiversity related basic science.
4. We rely on grant money from external sources

Opportunity (External)

1. Global recognition of the importance of addressing biodiversity loss is indicated by the 193 countries that have supported the Convention on Biological Diversity.
2. We have a great opportunity at ASU to integrate over 40 years of conservation biology research into the modern discussion of sustainability science.
3. CBO will provide a platform for world-class training and research experiences for undergraduate and graduate students and postdoctoral scholars (Appendix C.2).
4. CBO will rely on the *collective impact* of multiple disciplines, values, and approaches to *elevate the system* that we use to address complex coupled human and natural system biodiversity challenges.

Threats (External)

1. While ASU had the first Conservation Biology program in the nation, the current list of competitors is long and prestigious (Appendix A, Table 3).
2. Many other universities offer similar programs with unique approaches to training students in science, management and policy.

3. Funding cuts in the sciences have reduced funding rates in biodiversity science. There is a great deal of competition for these funds (Appendix A, Table 3 & 4).

Figure 1. Strengths, weaknesses, opportunities, threats (SWOT) analysis.

Mission:

The mission of the Center for Biodiversity Outcomes is to enable the discoveries and solutions needed to conserve and sustainably manage the Earth's biodiversity in a time of rapid biophysical, institutional, and cultural change.

Vision:

The Center for Biodiversity Outcomes strives to accelerate the success of biodiversity management and sustainable biodiversity outcomes by fostering relationships amongst academics and decision makers. By galvanizing Arizona State University's longstanding leadership in biodiversity in creative, impactful ways, the Center facilitates co-production of solutions required to realize biodiversity outcomes.

Imperatives:

Research Partnerships - CBO must operate in an institutional capacity to serve as a boundary/bridging organization to more effectively engage stakeholders and communicate with policy makers. CBO will provide the support to enable faculty members to excel in co-

production of knowledge with partners, creating novel, use-inspired research outcomes. CBO will help to integrate policy and management at both regional and global scales on specific biodiversity conservation issues.

Education – CBO must educate future generations in biodiversity change, conservation, policy, and science communication. CBO will harness ASU's strength in conservation biology and continue to strengthen the ASU program in biodiversity through increasing opportunities for student research and professional experience.

CBO-wide programs – CBO must become a self-sustaining Center in 5 years and must become respected and trusted bridging organization supporting education, collaboration and policy change in biodiversity conservation.

Goals:

- Develop solutions to Biodiversity Problems
- Elevate ASU's profile in biodiversity-related research expertise and grant award
- Educate the next generation of conservation leaders
- Engage stakeholders not previously engaged in sustained biodiversity conservation collaborations
- Become a self sustaining center

Objectives:

- Establish 2-4 Research focal areas and engage stakeholders in the co-production of knowledge
- Develop biodiversity fellowships program
- Establish undergraduate internships and research opportunities
- Create an ASU Biodiversity Web Portal
- Establish new certificate in environmental communication and leadership
- Develop a Professional Science Master's degree
- Highlight biodiversity research and partnerships through seminars and public events.
- Foster new partnerships by hosting scholars and partners at ASU
- Develop an ASU biodiversity hiring plan
- Secure space for CBO
- Secure external funding for operations and programs

OPERATING PLAN 1.0

Approach

This center will be a "soft" center that provides an organizational structure to engage faculty, improve and develop new programs, and launch innovative collaborative research initiatives. The center will be transparent in terms of operations and decision-making and will share credit with other centers and ASU units. Every five years, an external committee will evaluate the CBO, assess progress and submit appropriate management suggestions.

Roles and Responsibilities

The Executive Committee will be comprised of 3 members, one each from GIOS, CLAS, and SoLS and will meet with the director on a regular basis. The Executive Committee will guide the governance, objectives, and will provide an annual performance review of the CBO Director.

The CBO Director will lead the Center's development, including creating a mission, vision and strategic plan; building programs; hiring; and budgeting. The Director's primary responsibilities include: 1) Provide leadership and support for CBO research, education, and outreach programs, and promote collaborative efforts among faculty and between ASU and the broader community; 2) Articulate a strategic plan for the Center's future growth and development and take a primary role in fundraising and development to build a strong base of philanthropic and extramural research support; 3) Work to guide new faculty hires who will play a leadership role in biodiversity and sustainability initiatives at ASU; 4) Support alignment of activities by securing, coordinating, and configuring resources, capacity, and projects to address the most critical science questions, threats and strategies; 5) Serve as the primary spokesperson for CBO to internal and external audiences to cultivate support and promote CBO's mission and vision; 6) Oversee the development of promotional materials on the Center including but not limited to visual presentations explaining its goals and function; 7) Prepare summative, annual reports on the accomplishments of the Center and progress of the CBO toward its stated goals; 8) Direct and oversee CBP program staff (e.g., program manager); 9) Identify and recruit institutional partners external to ASU.

The Partnerships Lead will provide "incubation support" to ASU teams and will assist with developing partnerships and resources necessary to pursue co-production of knowledge on proposed research themes. This may include identifying and communicating with stakeholders, conducting meetings or workshops, and securing funding. The Partnerships Lead will play a key role in facilitating the development of proposals to support research partnerships, and will also track and report on key partnerships program metrics. The Partnerships Lead will also develop Biodiversity Fellowships and research opportunities with stakeholders that will contribute to the research activities.

The Program Manager will work closely with the CBO director and leadership team to plan, direct, organize, and execute goals and to coordinate efforts by all parties to ensure timely delivery of project outcomes in accordance with CBO objectives.

The Advisory Board: will provide guidance on the conceptual framework of CBO, short to long-term goal setting, budget guidance and approval, developing programs and engaging faculty

across ASU. The AB serves as critical leaders in promoting CBO work to accelerate the achievement of CBO milestones.

The Operations Committee: will be comprised of GIOS staff and CBO staff (Director, Leads, project manager). This committee will ensure that the programs of the center align with GIOS activities in terms of scheduling, website presence, program planning, and other logistical matters.

Appendix A: Assets, Funded Research, Threats

Asset	Funding	Key Faculty	Activities
INSPIRE: A Digital HPS Infrastructure for Understanding Biodiversity (SOLS)	National Science Foundation	Manfred Laubichler, Jane Maienschein (PI), James Collins	This large scale computational project will establish a repository and a research system based on computational tools and digital sources, and it will develop education and training modules. The repository will link to existing large and widely-used databases such as the Biodiversity Heritage Library and the Encyclopedia of Life and the modules will be widely available for other projects in the full range of STEM disciplines.
Biodiversity and Ecosystem Services Training Network (BESTNet) (GIOS)	National Science Foundation	Charles Perrings (director), Ann Kinzig (Steering Committee)	BESTNet aims to bring the benefits of this new international, interdisciplinary research on biodiversity, ecosystem services and human well-being to research students in US universities, through a set of networked research and research training activities. It coordinates the work of ecologists, evolutionary biologists (systematics, pale biologists, bio geographers, and population geneticists), conservation biologists, economists and anthropologists among others.
Natural History Collections, SOLS, International Institute for Species Exploration	ASU, Ullman Foundation	Nico Franz, Leslie Landrum, Elizabeth Makings, Kathleen Pigg	The Natural History Collections are comprised of 9 collections that directly support ASU's teaching, research, and public outreach functions. Our holdings emphasize flora and fauna from the arid southwest of North America, especially Arizona and Sonora, MX. Collectively, our holdings rank among the largest collections of Sonoran desert biota in the world. The collections are organized into 4 units: fossil plant collections, lichen herbarium, vascular plant herbarium, and zoological collections.
ASU Center for Biology and Society			CBS promotes exploration of conceptual foundations and historical development of the biosciences & their diverse interactions with society. We engage in activities across multiple disciplines that allow opportunities for intellectual ferment & increased impact by creating research & educational collaborations, and communication.
Consortium for Science, Policy and Outcomes		Michael Crow (Founder and Chair), Daniel Sarewitz (co-director)	CSPO is an intellectual network aimed at enhancing the contribution of science and technology to society's pursuit of equality, justice, freedom, and overall quality of life. The Consortium creates knowledge and methods, cultivates public discourse, and fosters policies to help decision makers and institutions grapple with the immense power and importance of science and technology as society charts a course for the future.
Central Arizona-Phoenix Long Term Ecological	National Science Foundation	Nancy Grimm, Dan Childers, B.L. Turner II,	CAP LTER is one of 26 long-term sites funded by NSF. The CAP LTER site provides a unique addition to the LTER research by focusing on

Research (CAP LTER)		Chris Boone, Chuck Redman, Sharon Harlan	an arid-land ecosystem profoundly influenced, even defined, by the presence and activities of humans and is one of only two sites that specifically studies the ecology of urban systems.
Decision Theater, OKED		Benjamin Freakley, Kevin Desouza, Robert Pahle	The Decision Theater provides continuously improving capabilities to address the ever-changing needs of the communities it works with. Decision-support tools and practices developed at Decision Theater help stakeholders communicate within and across disciplines. Decision Theater enables decision makers to see things differently, develop consensus and make knowledge-based decisions.
Center for Integrated Solutions for Climate Challenges, GIOS	Walton Sustainability Solutions Initiatives	Libby Wentz	The Center for Integrated Solutions to Climate Challenges works with practitioners and stakeholders to understand how climate variability and uncertainty impact the decisions they make, including how they plan for the associated risks to their communities and to themselves. CISCC's goal is two-fold: first, to engage urban decision makers and understand their needs in order to produce timely and relevant information as well as real-world adaptation scenarios; second, to make the climate science and research easy to understand and accessible for all users.

Table 2: Funded Research Projects

Project title	PIs	Description
Determinants of Grassland Dynamics in Tibetan Highlands: Livestock, Wildlife, and the Culture and Political Economy of Pastoralism (NSF-CNH)	Andrew Smith, Marty Anderies	This project will deepen basic understanding of the complex interactions involving geophysical, biological, social, and policy factors and feedback systems that affect grassland status
Feedbacks between Human Community Dynamics and Sociological Vulnerability in a Biodiversity Hotspot	Sharon Hall, Abigail York, Scott Yabiku (PI)	This interdisciplinary research project will focus on how collective governance of common lands affects ecosystem services, quality of life, biodiversity conservation and resilience of rural societies.
Long-Term Dynamics and Resilience of Terrestrial Plant and Animal Communities in the Bahamas	Patricia Fall and Janet Franklin (PI)	This research project will examine long-term ecological change on the islands of Abaco and Eleuthera in order to assess how prehistoric and contemporary plant and animal communities responded to long-term environmental fluctuations.
Predicting, Measuring, and Monitoring Aquatic Invertebrate Biodiversity on Dryland Military Bases	Rachata Muneepeerakul	This project integrates mathematical modeling, invertebrate sampling, and statistical estimation to develop robust methodologies for tracking biodiversity of aquatic invertebrates on dryland military bases.
The Complexities of Ecological and Social Diversity: A Long-Term Perspective	David Abbott, Margaret Nelson (PI), Marty Anderies, Michelle Hegmon, Ann Kinzig	This research project will examine how social and ecological diversity interact to influence the resilience of societies facing major changes in their social or environmental circumstances.

Table 3: Competitive Programs

Program	Institution	Description
Department of Ecology, Evolution, and Environmental Biology (E3B)	Columbia University	Focus on theory and methods of ecology, evolution, and population biology and to conduct multidisciplinary research on emerging environmental problems associated with the decline of ecosystems and the loss of biological diversity.
Bren School of Environmental Science & Management	UC Santa Barbara	It is among a handful of schools in the United States — and the only one in the West — that integrate science, management, law, economics, and policy as part of an interdisciplinary approach to environmental problem-solving.
Center for Conservation Biology (CCB)	Stanford University	Research to evaluate factors that are leading to declining environmental security and increasing inequity, and to find practical solutions to that predicament.
Department of Natural Resources	Cornell University	Explore issues related to maximizing biodiversity, enhancing and sustaining ecosystems, mitigating climate change, and managing natural resources in partnership with local groups, state agencies, and national and international environmental organizations.
Integrative Conservation	University of Georgia	Students gain disciplinary depth in one of four fields – Anthropology, Geography, Ecology or Forestry – while also collaborating across disciplines and fields of practice to seek integrative solutions to complex conservation challenges.
Sustainable Development and Conservation Biology	University of Maryland	Provide broad, multidisciplinary training in the core areas of biological conservation, resource economics, and policy analysis. Explicitly link the conflicting topics of sound conservation of natural resources with sustainable development to meet human needs.
Nicholas School of the Environment	Duke University	Creating knowledge and global leaders for a sustainable future. We strive for a new paradigm, one that views and attempts to understand the earth and the environment including humans as an integrated whole.
Environment & Natural Resources Program	Harvard	Conduct policy-relevant research at the regional, national, international, and global level, and through its outreach initiatives to make its products available to decision-makers, scholars, and interested citizens.
SPEA	Indiana University	SPEA addresses the issues of the day with both outstanding research and practical applications in a way that prepares students for the world of tomorrow. Consistently in top rankings.
Maxwell School	Syracuse University	Recognized as one of the world's best graduate schools of public affairs, its strength derives in large part from its diversity - the unmatched variety of educational missions that co-exist and sometimes mix under its roof.
Applied Biodiversity Sciences (ABS) program	Texas A & M	Integrates biodiversity research and conservation, through: 1) integrated research in social and biological sciences; 2) cross-disciplinary research and collaboration with conservation institutions and actors in the field; and 3) application of conservation theory to practice.

Table 4: Competitive Centers

Center	Affiliated Institution	Mission statement
Natural Capital Project	Stanford	To integrate the values of nature into all major decisions affecting the environment and human well-being.
Senator George J. Mitchell Center & Maine's Sustainability Solutions Initiative	U of Maine	To connect knowledge with action in ways that promote strong economies, vibrant communities and healthy ecosystems in and beyond Maine.
Earth Institute - Center for Environmental Sustainability	Columbia University	To make environmental sustainability a way of thinking, a way of doing business, a way of promoting economic development without incurring environmental damage, in essence, a way of life that insures our well-being and that of all the generations to come.
Earth Institute - Earth Clinic	Columbia University	To apply research-based practical solutions to real world problems related to sustainable development
Nicholas Institute	Duke University	To help decision makers create timely, effective, and economically practical solutions to the world's critical environmental challenges.
Harvard Center for the Environment	Harvard	To provide the next generation of Harvard-educated researchers, policymakers and corporate leaders with a comprehensive interdisciplinary environmental education, while fostering linkages and partnerships amongst the University and the outside world.
Princeton University Institute	Princeton	To advance knowledge and to develop the next generation of leadership by providing outstanding academic programs and opportunities for advanced scholarship, research, and civic engagement.
The Centre for Evidence-Based Conservation (CEBC)	Bangor University	Promotes evidence-based practice through the production and dissemination of systematic reviews on both the effectiveness of management and policy interventions and on the impact of human activities on the natural environment.
Conservation Evidence	University of Cambridge, UK	To support decisions about how to maintain and restore global biodiversity.
Quebec Center for Biodiversity Science	McGill University	To foster and promote a world-class research and training program in biodiversity science; facilitate cross-disciplinary scientific cooperation and learning; and assume a lead role on biodiversity related issues and to contribute to the debate on biodiversity loss.
Center for Environmental Research, Education & Outreach	Washington State University	To catalyze and facilitate system-wide, interdisciplinary activities to transform environmental research, education and outreach at WSU, in the Pacific Northwest, nationally and globally.
Luc Hoffman Institute	World Wildlife Fund	To respond to the most important questions facing conservation and sustainable development.
Cambridge conservation center	University of Cambridge	To secure a sustainable future for biodiversity and society through an effective partnership of leaders in research, education, policy and practice.

Appendix B: Affiliated Faculty and Staff and Faculty with related expertise

Table 1: ASU Faculty with expertise relevant to CBO (*Advisory board member, ** Operations committee member, *** Executive Committee member, ◆CBO Faculty Affiliate)

First name	Last name	Unit
Kenneth	Abbott◆	School of Politics & Global Studies
Joshua	Abbott◆	School of Sustainability
Joni	Adamson◆	School of Letters and Sciences
John (Marty)	Anderies	School of Human Evolution and Social Change
Michael	Angilletta◆	School of Life Sciences
Rebecca	Ball◆	School of Mathematical and Natural Sciences
Heather	Bateman	Human and Environmental Systems
Daniel	Bodansky	Law School
Christopher	Boone	School of Human Evolution and Social Change
Ron	Broglio◆	Department of English
Nicholas	Brown	University Sustainability Practices, Global Institute of Sustainability
Shauna	BurnSilver◆	School of Sustainability, School of Human Evolution and Social Change
Candice	Carr Kellman**	School of Sustainability
Matt	Chew	School of Life Sciences
Netra	Chhetri	School of Geographical Sciences and Urban Planning
Daniel	Childers	School of Sustainability
Dan	Collins◆	Herberger Institute for Design and the Arts
James	Collins*	School of Life Sciences
Maria	Cruz-Torres◆	School of Transborder Studies
Thomas (Tad)	Day◆	School of Life Sciences
Dale	DeNardo◆	School of Life Sciences
Pierre	Deviche◆	School of Life Sciences
Gary	Dirks***	Global Institute of Sustainability
Hallie	Eakin	School of Sustainability
James	Eder	School of Human Evolution and Social Change
James	Elser◆	School of Life Sciences
Walter	Fertig◆	School of Life Sciences
Janet	Franklin	School of Geographical Sciences and Urban Planning
Nico	Franz◆	School of Life Sciences
Matthew	Fraser	School of Sustainable Engineering and the Built Environment
Juergen	Gadau◆	School of Life Sciences
Ferran	Garcia-Pichel***	College of Liberal Arts and Sciences
Matei	Georgescu	School of Geographical Sciences and Urban Planning
Leah	Gerber* **	School of Life Sciences
Nancy	Grimm◆	School of Life Sciences
Kevin	Gurney	School of Life Sciences
David	Guston◆	School of Politics and Global Studies
Rolf	Halden◆	School of Sustainable Engineering and the Built Environment
Sharon	Hall*	School of Life Sciences
Sharon	Harlan	School of Human Evolution and Social Change
Hilairy	Hartnett◆	School of Earth and Space Exploration
Arjun	Heimsath	School of Earth and Space Exploration
Berthold	Hoelldobler	School of Life Sciences
Ana	Hurtado	School of Human Evolution and Social Change
Marcus	Janssen	School of Human Evolution and Social Change

Ann	Kinzig◆	School of Life Sciences
Yang	Kuang◆	School of Mathematics and Statistical Sciences
Leslie	Landrum◆	School of Life Sciences
Alex	Mahalov	School of Mathematics and Statistical Sciences
Jane	Maienschein◆	School of Life Sciences
David	Manuel-Navarette◆	School of Sustainability
Chris	Martin	School of Letters and Sciences
Kevin	McGraw◆	School of Life Sciences
Clark	Miller◆	School of Politics & Global Studies
Ben	Minteer	School of Life Sciences
Tom	Moore◆	Department of Chemistry and Biochemistry
Rachata	Muneepeerakul◆	School of Sustainability
Alan	Murray	School of Geographical Sciences and Urban Planning
Marcia	Nation**	Global Institute of Sustainability
Susanne	Neuer	School of Life Sciences
Gyan	Nyaupane◆	School of Community Resources and Development
Kiona	Ogle◆	School of Life Sciences
Miles	Orchinik◆	School of Life Sciences
David	Pearson◆	School of Life Sciences
Garth	Paine	Herberger Institute for Design and the Arts
Charles	Perrings*	School of Life Sciences
Kathleen	Pigg	School of Life Sciences
Beth	Polidoro*	School of Mathematical and Natural Sciences
Stephen	Pyne◆	School of Life Sciences
Charles	Redman◆	School of Sustainability
Kevin	Reinhart**	Knowledge Enterprise Development
Helen	Rowe* **	School of Life Sciences
John	Sabo◆	School of Life Sciences
Osvaldo	Sala*	School of Life Sciences
Daniel	Sarewitz*	Consortium for Science, Policy, and Outcomes
Jan	Schipper◆	School of Life Sciences
Michael	Schoon*	School of Sustainability
Matthew	Scotch	Department of Biomedical Informatics
Shade	Shutters◆	Global Institute of Sustainability
Meredith	Simpson**	Global Institute of Sustainability
Kerry	Smith	W. P. Carey School of Business
Andrew	Smith*	School of Life Sciences
Brian	Smith***	School of Life Sciences
Julie	Stromberg◆	School of Life Sciences
Billie	Turner	School of Geographical Sciences and Urban Planning
Sander	Van Der Leeuw◆	School of Human Evolution and Social Change
Douglas	Van Schoik	North American Center for Transborder Studies
Elizabeth	Wentz◆	School of Geographical Sciences and Urban Planning
Dave	White◆	School of Community Resources and Development

Martin	Wojciechowski	School of Life Sciences
Jianguo	Wu◆	School of Life Sciences
Abigail	York*	School of Human Evolution and Social Change

Appendix C: Imperative Detail

1. Innovation Partnerships in Policy and Practice

Summary: Our overall goal is to foster basic understanding of the social and ecological phenomena of and develop solutions to tackle major biodiversity challenges of the 21st century. In collaboration with CSPO, CBO will improve ASU's institutional capacity to engage with stakeholders and communicate with policy makers within each of our Research Focal Areas. Research focal areas will be focused on biodiversity outcomes to pursue cutting edge multi-disciplinary, multi-investigator research projects.

Objectives: We will develop relationships with key policy makers, non-profit, and agency leaders to facilitate the co-production of knowledge on both longstanding and emerging biodiversity challenges of scientific and ethical, and public concern. CBO will build capacity to support large-scale collaborative teams to address the major challenges in conservation science and successfully access large research funding opportunities. Research focal areas will build strength in a few areas for high impact. CBO will support these activities by CBO incubation and supporting travel and workshop costs.

Programs:
The initial step for each focal area project will be to identify promising partners and ways to engage the partners. Once engaged, CBO researchers will work with partners to identify research, policy and management questions and develop proposals for external funding. Consumers and producers of knowledge will engage with ASU scholars using different methods of analysis, workshops, and assessments to identify scope and research questions that will lead to use inspired research and action.

Focal areas were identified through surveys, discussion and feedback from CBO affiliated faculty. The CBO Advisory Board helps to refine research focal areas and projects based on an assessment of ASU capacity, potential partner links, leadership and likelihood of success. New focal areas will emerge based on faculty interests and partnership opportunities.

Organizational structure: Within each focal area, there will be more than one project and associated project leader(s). The **focal area project leader(s)** will be responsible for engaging other faculty members and creating a partnership project. Project leaders within a focal area will meet periodically to maximize synergies.

Support: CBO will support focal area projects within 2-3 focal areas each year. Support will come in the form of seed funding for workshops and meetings with partners (up to $5,000 per application) and access to CBO staff for "incubation support". As part of this "incubation support", CBO will assist in developing partnerships (match – making), non-traditional fund

raising (private, partnership support), and meeting organization. To apply for support, project leaders will fill out an application package, which will be reviewed and decided by the Advisory Board proposal sub-committee.

2. Education

Undergraduate programs
Summary: ASU had the first dedicated undergraduate major in Conservation Biology in the US and remains one of a small number of institutions with this concentration, thus we have a rich tradition of success. We will harness our strength in conservation biology and continue to strengthen this by introducing different modes of discovery, thereby enabling a more advanced and useable understanding of conservation challenges.

Objectives: Increase the number and quality of students that are engaged in our undergraduate curriculum through enhancing access to hands on research and conservation training.

Programs:
CBO web portal -- A course portal will be created to help students navigate biodiversity courses offered across units and link these classes and majors to career choices.

Research and internship programs **-** Enhance existing research and internship programs to include more undergraduate opportunities within the Research Focal Areas. These opportunities will be a parallel track with the Biodiversity Fellows program and will similarly contribute to progress in the Research Focal Areas.

2.2 Graduate programs
Summary: We will develop an innovative and nationally competitive professional MS program in Conservation Science and new fellowship opportunities for students working on the social, political dimensions of the conservation and sustainable management of biodiversity.

Objectives: Train students in biodiversity science in light of environmental and societal values and needs to work in Research Focal Areas with researchers and managers/policy makers.

Programs: There is a national need to provide students with applied biology skills that can translate into a new generation trained to tackle our greatest biodiversity challenges in a manner that simultaneously promotes biodiversity, economic growth, and societal values. We will build on recent success with new programs such as our new *Plant Biology and Conservation M.S. program.* This program represents a partnership between the Desert Botanical Garden and SOLS with the purpose of promoting collaborative research and graduate training between the two institutions. Our *Fellowship Program* will provide valuable experiential training and context for students in this program.

Biodiversity Fellows Program - Develop new fellowships for CBO graduate students working on biodiversity research within the Research Focal Areas. These fellowships will be useful in attracting and supporting students, connect them with a thesis topic, and provide valuable experiential training and connections. For partnership organizations, these fellowships will

leverage high quality research and publications. Research activity by the fellows will facilitate progress in the Research Focal Areas by building expertise, capacity, and outcomes.

Professional Development
Summary: We will develop and engage students and young scholars in professional development, science communication and leadership. These programs will be designed to enhance the ability of ASU to recruit and train the best students and researchers in cutting-edge ecology and biodiversity inquiry and problem solving.

Objectives: Build capacity for sustainability leadership; Promote the societal salience and practical effectiveness of biodiversity research; and expand the reach of scientific work to targeted stakeholder, policy, public, and professional audiences.

Programs:
Certificate in Scientific Communication and Leadership: The certificate program will provide training in how to make science relevant to society. The cornerstone course of this certificate will provide leadership and communication training as a foundation for young scientists to make a greater impact in their career. A workshop that will be offered for credit under this certificate demystifies the world of the media, explains why the cultures of science and journalism often clash, and provides the basic tools to identify and clarify the main message. This workshop will also focus on how to improve broader impacts sections of proposals, with a focus on engaging with the public from the proposal writing stage.

A Professional Science Master's degree will be developed to prepare graduate students in science and technology with enhanced training in business and management skills. The PSM is a new degree model, affirmed by the National Science Foundation, in response to the urgent need to better and more efficiently prepare scientists for industry, non-profit, and government sector related careers. In building this program, we will study programs such as the CSPO professional science master's program and the programs at Yale and Michigan that offer a joint MBA.

General Education
Summary: We will provide opportunities to discuss and engage with leading biodiversity scholars through seminars, roundtables, and a visiting scholar program.

Objectives: Support focal area groups by bringing in relevant leaders in the professional and academic biodiversity community. Expand the biodiversity dialogue at ASU for increased awareness of faculty and students.

Programs:
Seminars and roundtables– CBO biodiversity seminars will enhance communication among ecologists, conservation biologists, sustainability scientists and scholars, social scientists and economists and share novel research and teaching knowledge amongst graduate students and faculty members. Research focal area project leaders will invite individuals to campus as part of their research partnership activity. As appropriate, these visitors will give a public or on-campus CBO seminar.

Appendix D: Year One - Action Plan, Objectives and Milestones

Objective 1: Establish 2-4 Research Focal Areas
Milestone 1a. Research Focal Areas Topics and Project Leaders are identified
Milestone 1b. Hold Advisory Board retreat
Milestone 1c. Research Focal Area activity
Objective 2: Each Research Focal Area identifies and engages stakeholders in the co-production of knowledge
Milestone 2a. Identify existing and potential partnerships related to biodiversity and possible synergies and leveraging with CBO
Milestone 2b. Prioritize and engage with partners within Research Focal Areas
Milestone 2c. Identify partner needs, research project ideas, and sources of external funding
Milestone 2d. Each Research Focal Area submits at least one proposal for external funding.
Objective 3: Develop student opportunities within research Focal Area areas
Milestone 3a. Develop 2 new Biodiversity Fellowships with stakeholders that will contribute to the research Focal Area activity
Milestone 3b. Develop internship and research opportunities for undergraduate students with stakeholders that will contribute to the Research Focal Area activity.
Objective 4: Establish new certificate program
Milestone 4a: Develop list of courses to include, complete proposal
Milestone 4b: Gather required letters of support
Milestone 4c: Submit proposal in Fall 2014
Objective 5: Seminars and Workshops
Milestone 6a. Research focal area project leaders invite individuals to campus as part of their research partnership activity.
Milestone 6b. CBO will develop events around these visits.
Objective 6: Develop Research Focal Area hiring plan for CBO
Milestone 7a. Advisory Board develops vision for a CBO hiring plan
Milestone 7b. CBO will facilitate developing the cluster hire plan by identifying the hiring committee, schedule committee members, and facilitate progress towards goals
Milestone 7e. Hiring plan is compiled and submitted.
Objective 7: Identify space needs and opportunities for CBO
Milestone 8a. Identify number of offices, conference rooms needed.
Objective 8: Secure external funding for long-term operations
Milestones 8a. Identify potential funding sources (e.g. foundations, corporations)
Milestone 8b. Assess which CBO programs and focal areas may fit with various RFPs
Milestone 8c. Submit research proposals

Appendix E: Logic Model; Activities, Outputs and Outcomes – Years 1 and 2

	Activities Years 1 & 2	Outputs	Short-term Outcomes Years 1 & 2	Medium-term Outcomes Years 3 & 4	Impacts Years 5+
Research	• Invite ASU researchers to affiliate with CBO • Engage CBO community through meetings, coffee hours, and seminars with biodiversity thought leaders • Promote biodiversity research at ASU through listing existing projects on CBO website • Map ASU biodiversity research community • Support 3-4 projects within 2-4 multi-disciplinary focal areas • Respond to external funding RFPs related to biodiversity research –at least 1 per focal area • Create collaborative research projects with non-academic partners (non-profits, government entities, private sector) • Initiate "research to policy/decision-making" dialogues with CBO community • Support research focal areas by funding travel for visiting speakers	• Number of projects supported by CBO • Number of researchers affiliated with CBO • Number of meetings hosted with partners • Attendance at seminars • Number of collaborating projects on CBO website • Number and $ amount of external grant proposals facilitated through CBO • Number of non-academic collaborators • Number of meetings and projects that promote research to policy dialogue	• Creation of a visible multidisciplinary biodiversity research community at ASU • Broader dialogue at ASU on biodiversity and sustainability • New multidisciplinary and multi-field research collaborations • Co-creation of knowledge with non-academic collaborators toward biodiversity outcomes • Increased resources for selected biodiversity research at ASU • CBO affiliated biodiversity projects articulate implications for decision-making and public policy	• Increased capacity at ASU for societal engagement and biodiversity solutions • CBO becomes the go-to entity in Arizona for information on biodiversity and decision-making • Partner organizations begin to incorporate sustainability perspectives into biodiversity plans • Major grants fund biodiversity research and initiatives that link research to decision-making • Publications establish ASU's growing prominence in developing new approaches to biodiversity	• Funding for CBO affiliated efforts exceeds $5 million • CBO becomes self sustaining within 5 years • CBO informs biodiversity management at local, national, and global scales • CBO is nationally known for multidisciplinary biodiversity research and bridging different groups to work on biodiversity issues • CBO improves scientific support for international agreements • CBO forwards new approaches to conservation and an appreciation of governance in biodiversity management
Education	• Work with partners to develop internship and other learning opportunities for	• Number of interns • % of interns from under-represented	• Interns and fellows demonstrate putting biodiversity	• Increase in number of undergraduate and graduate students	• Students engaged in biodiversity-related courses & internships

	undergraduate students with a focus on underrepresented groups • Develop biodiversity graduate fellowships • Establish certificate in Science Communication and Leadership • Develop new professional MS degree • Work with CBO affiliated faculty to strengthen the delivery of undergraduate courses with biodiversity content • Promote biodiversity-related courses for students at ASU • Include faculty teaching biodiversity-related courses as CBO affiliates • Promote integration and knowledge sharing among faculty teaching biodiversity-related courses • Facilitate development of cluster hire plan by identifying the hiring committee, scheduling committee meetings and facilitating progress toward goals	groups • Number of fellowship recipients • Enrollment nos. in certificate program • Enrollment nos. in professional MS degree • New courses, enrollment in new courses (including ASU online) • Number of courses with enhanced content • Number of students reached with information about biodiversity courses • Number of faculty involved in CBO • Number of faculty hires	knowledge into practice • Students express interest in biodiversity –related careers • Increase in number of graduate students pursuing biodiversity research with CBO partners • Undergraduate courses include active learning and project/problem-based learning • Students increase knowledge about science communication and leadership • Increased visibility for biodiversity-related courses at ASU • Improved communication among faculty teaching biodiversity-related courses • Faculty hired for biodiversity-related positions have research and teaching foci relevant to CBO	taking courses with biodiversity content • Graduates from biodiversity-related programs at ASU continue education on biodiversity-related topics or enter biodiversity-related careers • Biodiversity-related courses coordinated across disciplines • Multidisciplinary education on biodiversity issues emerges as a strength at ASU	have higher rates of graduation than ASU as a whole • New ways to increase student retention in biodiversity science • Competency in science communication seen as critical for students pursuing biodiversity-related degrees • ASU becomes nationally known for multidisciplinary biodiversity education programs • Graduates from biodiversity-related programs at ASU enter workforce and connect CBO to more partners
Engagement	• Engage high school students in learning about biodiversity-related courses at ASU through	• Number of high school students reached through	• Increased awareness about opportunities to take courses on	• Increase in number of undergraduate students taking	• Number of students graduating with majors, certificates,

	science festivals and STEM public events • Involve graduate students affiliated with CBO to talk to high school students (i.e. in environmental education clubs) about biodiversity education at ASU • Identify and invite biodiversity and conservation oriented organizations to affiliate as partners with CBO • Involve partners in CBO events • Create collaborative research projects with non-academic partners (non-profits, government entities, private sector) • Identify partnership opportunities for public engagement in biodiversity	events and communication • Number of organizations affiliated with CBO • Number of partners at events • Number of partners involved in projects • Number of partners offering internships and learning opportunities	biodiversity at ASU • Increase in number of CBO partners • Partners value student involvement in their programs • Partners contribute to shaping CBO research agenda • CBO faculty increase understanding about linkages between research and decision-making	courses with biodiversity content • Partners increase engagement in CBO activities, including internships, research projects, and policy efforts • CBO partners with more national and international organizations • Partner organizations begin to incorporate sustainability perspectives into biodiversity plans • CBO becomes the go-to entity in Arizona for information on biodiversity and decision-making	minors, and emphases in biodiversity-related programs hits all-time high • CBOs work with partners results in selected changes in planning and decision-making on biodiversity issues • CBO establishes reputation locally, nationally, and internationally for multidisciplinary approaches to conservation and biodiversity that include sustainability • CBO improves environmental literacy in underserved communities.
Operations	• Secure external funding for long –term operations • Engage donors through fundraising events with visiting speakers • Develop portfolio of opportunities at CBO • Identify space needs and renovate space for CBO	• Number of Donors engaged • Money raised • Donor network reach • ASU funding commitment renewed each year	• CBO has established relationship with key donors and development team members at ASU Foundation • CBO locates money internally at ASU for center space renovation	• CBO raises money to support research through private donations • CBO raises money to support CBO operations through private donations	• Become a self-sustaining center • CBO raises money to support capital needs through private donations