

PARALLELS BETWEEN BIODIVERSITY AND HUMAN DIVERSITY: A MANDATE TO IMPROVE ECOLOGICAL AND ORGANIZATIONAL HEALTH AND VITALITY

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PERSPECTIVE

**PARALLELS BETWEEN BIODIVERSITY AND HUMAN DIVERSITY:
A MANDATE TO IMPROVE ECOLOGICAL AND
ORGANIZATIONAL HEALTH AND VITALITY****Rustin M. Moore, DVM, PhD, Diplomate ACVS**

Abstract: The veterinary medical profession—including in marine biology and oceanography, ecology, conservation science, and zoo, wildlife, aquatic, and exotic animal medicine—suffers from a well-known lack of diversity. It is the author's view that in order to ensure that animals (and plants) have the environment they need to thrive, and to address urgent ecosystem health and conservation issues in our global interconnected communities, our wildlife, zoo, and conservation science organizations must embrace diversity, equity, inclusion, and belonging (DEIB). Just as biodiversity is critical for the health and vitality of our ecosystem, the diversity of the people who care for those ecosystems will protect the health and vibrancy of our professions and organizations. Though research may not yet have established a direct link between the diversification of such organizations and the advancement of biodiversity, that does not mean there is no such effect or impact. With myriad evidence that diverse organizations are better at solving complex problems, why would there be an expectation that these professions would fare differently? A call to action is for such organizations to conduct and publish research regarding the impact of increased human diversity on their missions of enhancing biodiversity. The challenges to biodiversity are great, and our organizations must use every tool in the toolkit to find solutions—including enhancing DEIB. This article elaborates on the many benefits that come with prioritizing DEIB in our organizations—similar to those benefits arising from healthy, biodiverse ecosystems. Potential action steps are shared that organizations and associations may consider in promoting DEIB and igniting progress.

INTRODUCTION

Mother Earth is our first teacher. She has informed us that oneness does not equal sameness. She shows us this through the harmonious balance that is held in the rich biodiversity that exists within our world. To achieve oneness, we must transcend our differences and embrace the integration of every individual aspect of humanity into the whole, knowing that all healthy systems are comprised of complexity and an abundance of diversity.

—Sherri Mitchell Weh'na Ha'mu Kwasset,
Native American attorney, indigenous rights
activist, environmental justice advocate, and
spiritual change leader

The veterinary medical profession has a well-known lack of diversity. Nearly a decade ago, the profession topped *The Atlantic's* list of the “33 Whitest Professions,”⁴² and since then, little improvement has been made—including in marine biology and oceanography, ecology, conservation science, and zoo, wildlife, aquatic, and exotic animal medicine. When it comes to zoos

and aquariums, for example, only 26% are led by women; and while there is a lack of available data regarding people of color (POC) in leadership positions, a 2021 Zoo Advisors article estimated that only seven POC lead the 238 Association of Zoos and Aquariums member institutions.⁵³ A 2016 study reported 70% of academic fisheries science faculty are men and 88% white.⁵ A 2019 study found that 96% of environmental organizations do not release information about the gender, race, and LGBTQ makeups of their staff.⁴⁵

The dearth of diversity extends beyond the United States to the international community of animal and conservation professionals. Depending on where in the world readers are located, diversity takes on different dimensions. Although this article is written from a United States (US) perspective, the importance of diversity is critical worldwide, and the general themes and approaches to enhance diversity are similar. To ensure animals (and plants) have the environment they need to thrive and to address urgent ecosystem health and conservation issues in our global interconnected communities, it is the author's view that our organizations must embrace diversity, equity, inclusion, and belonging (DEIB). Although there may be no specific documented evidence that diversification of our organizations leads to preservation of greater biodiversity, there has been substantial, consistent, and repeated

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evidence that more diverse organizations perform better and are better at solving complex problems.^{33,46} With the many barriers and contributing factors to loss of biodiversity—from climate change to disease, habitat destruction, and more—it stands to reason that greater diversity within our organizations would likely improve our chances of identifying and implementing meaningful and enduring solutions to promote biodiversity and conservation.

The goal of DEIB is to remove barriers and “level the playing field” to make our organizations more inclusive and equitable, thereby creating an environment where everyone feels welcome, comfortable, safe, respected, valued, and that they belong and can thrive. Many professional organizations have taken notice and are championing DEIB for their members, including the Wildlife Disease Association, the Association of Zoos & Aquariums, the Wildlife Society, the American Association of Zoo Veterinarians, and the Association of Minority Zoo & Aquarium Professionals, founded in 2018 to increase minority representation throughout the zoo industry.⁷

It is important to provide definitions to help promote a shared dialogue around DEIB.⁹ Diversity can be understood as “respect for and appreciation of differences and a state of being valued, respected, and supported. It is the recognition and understanding of individual difference and uniqueness.”² Equity acknowledges that fairness regarding unbalanced conditions is needed to promote equality in the provision of effective opportunities for all.⁴⁴ It is also important to distinguish between “equality” and “equity.” Equality aims to give everyone the same opportunities in order to be successful whether they need it or not, whereas equity gives people what they need to be successful (Fig. 1).³ Inclusion is defined as the practice of nurturing and creating an environment where people feel welcomed, comfortable, respected, supported, and valued to participate fully.²⁰ Belonging is what happens when an organization’s diversity, equity, and inclusion goals are met, and everyone feels welcome exactly as they are—without consciously or unconsciously leaving a part of themselves behind.³⁸ Ultimately, we are working toward justice, which the Monterey Bay Aquarium Research Institute says “Dismantl[es] barriers to resources and opportunities in society, especially in STEM fields, so that all individuals and communities can live a full and dignified life.”²⁶ Organizational DEIB and justice are illustrated pictorially in Figure 2. It has been said that

“Diversity is a fact, Equity is a choice, Inclusion is an action, Belonging is an outcome, and Justice is the goal!”²⁴

WHY IS DIVERSITY SO IMPORTANT? NATURE HOLDS THE ANSWERS

Animal and conservation professionals are on the front lines of some of the most important, time-sensitive efforts to safeguard and promote biodiversity. When contemplating the importance of diversity in our organizations, we need look no further than nature for answers to why DEIB is so critical to our work.

Just as biodiversity—which the World Health Organization says “underpins all life on Earth, and refers to biological variety in all its forms, from the genetic makeup of plants and animals to cultural diversity”⁴⁹—is critical for the health and vitality of our ecosystem, the diversity of the people who care for those ecosystems is important to help promote the health and vibrancy of our professions and organizations.

Biodiversity includes the varieties and aspects of all living things on earth and the ecosystems in which they live.^{27,28,48} Increasingly, we understand the interconnectedness of animal, human, and environmental health through the lens of “One Health,” defined as “an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems. It recognizes that the health of humans, domestic and wild animals, plants, and the broader environment are closely linked and interdependent.”⁴³ This results in real and serious consequences. Approximately 60% of known infectious diseases in people and 75% of all (re)emerging infectious diseases start in animals and spill over into people.³⁷ These zoonotic diseases are often precipitated by some imbalance in a given ecosystem, allowing them to spread more rapidly throughout other animal species.

Imagine removal of opossums from the ecosystem, and the immediate and far-reaching impact of the increase in ticks and resulting homeostatic imbalance. This could lead to an increase in tickborne diseases that impact animal and human health (Fig. 3A).²³ Or consider the critical role of pollinators, which pollinate 180,000 different plant species and are fundamental for human food production and keeping our ecosystems healthy (Fig. 3B).³¹

Decomposition of animal carcasses (carrion) is critical to recycling of nutrients and maintaining biodiversity. This occurs mainly through invertebrates like flies and beetles and large vertebrate

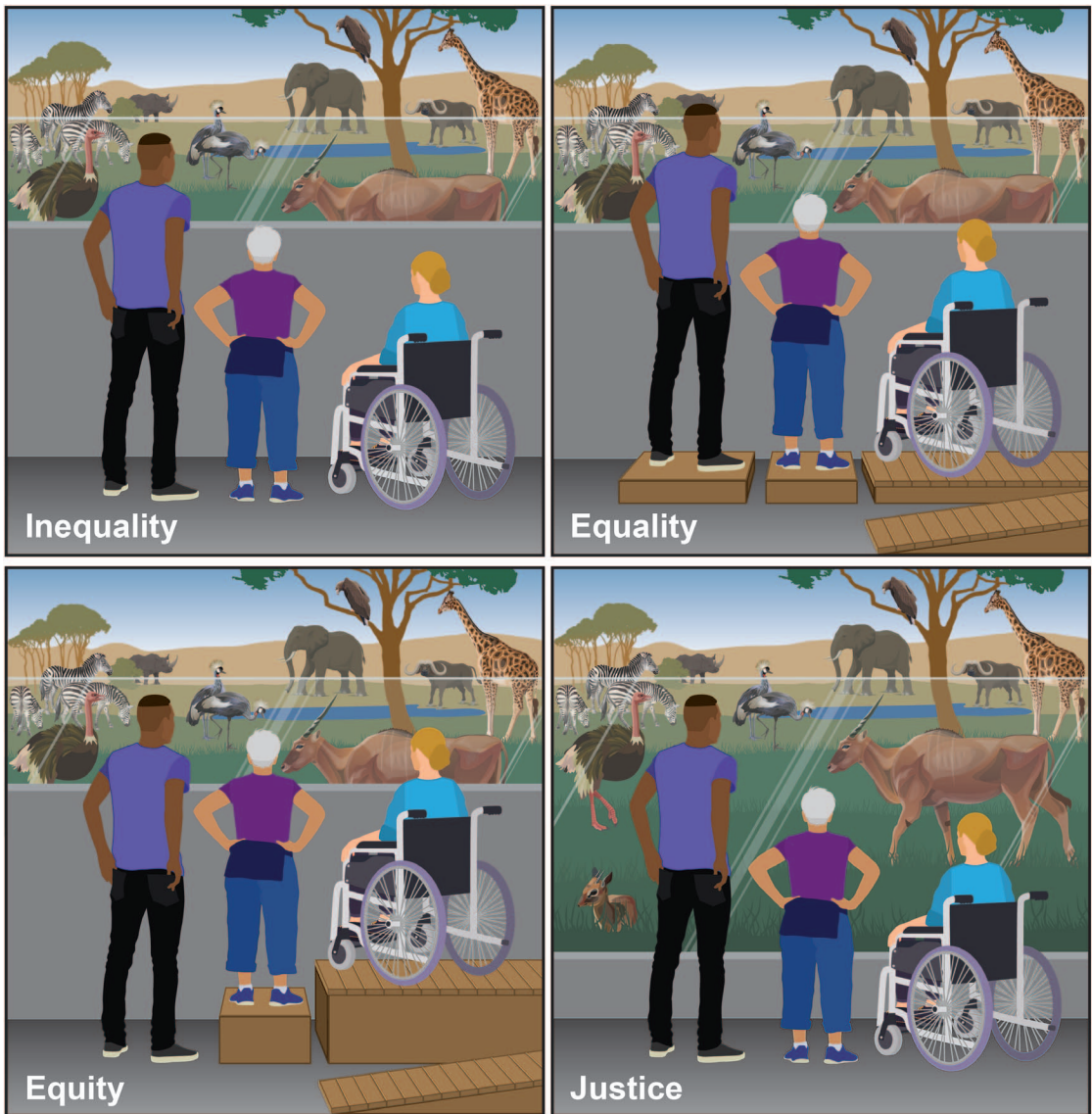


Figure 1. Illustrations depicting the difference between inequality, equality, equity, and justice. **A.** With inequality, people do not get what they need to be able to access and see the zoo exhibit. **B.** With equality, each person gets the same thing (same height of box or ramp) regardless of whether they need it or not to access and see the zoo exhibit. **C.** With equity, each person gets what they individually need, including a different height box or ramp to access and see the zoo exhibit. **D.** With justice, barriers are removed, which in this case means the wall is transparent so that all individuals can access and see the exhibit without needing a box or ramp.

scavengers such as opossums, raccoons, and vultures, as well as microbes such as bacteria and fungi.²⁵ Loss of biodiversity or the loss of one or more of the many organisms that play an important role in carrion decay and decomposition can contribute to further loss of biodiversity. Similarly, birds play a critical role in ecosystems, serving as predators, pollinators, scavengers, seed

dispersers, seed predators, and ecosystem engineers—all of which benefit humans.⁴⁷

Any changes that disrupt the delicate balance of our ecosystem, whether natural or impacted by people, puts us all at risk, including loss of biodiversity.^{17,18,21,22,29,30,39,49–52} There has been an average of a 69% decline in the relative abundance of monitored wildlife populations around the world between 1970 and 2018, whether due to

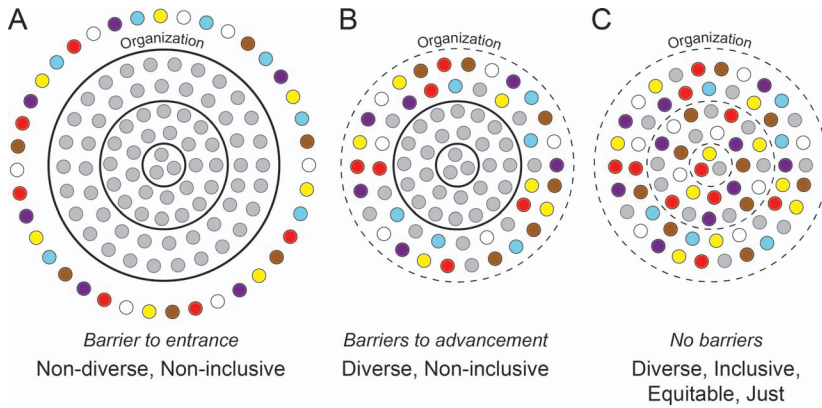


Figure 2. These figures depict the various levels of diversity, equity, inclusion, belonging and justice in organizations. **A.** This figure represents a nondiverse, noninclusive, and inequitable organization because everyone (gray circles) inside the organization (inside the bold solid line) is similar and those outside the line (colored circles) are not included. **B.** This figure represents a diverse yet not inclusive or equitable situation where there is diversity within the organization (represented by colored circles inside the organization and a dashed line) but not distributed equally or equitably throughout the organization (in other words the diverse members remain marginalized based upon the lack of concentric circles or lines inside the circle, a dotted line on the outer portion of the circle, and the uniformly distributed colored circles throughout the organization). **C.** This figure illustrates a diverse, equitable, inclusive organization that represents belonging and justice because barriers to access and equity are removed.

natural causes or human-induced factors, especially the six key threat areas of agriculture, hunting, logging, pollution, invasive species, and climate change.⁵⁰ Biodiversity, especially genetic diversity, is important to allow ecosystems to adjust to disturbances like natural disasters or human-impacted ones. It increases resistance to disease, prevents disease, and fosters species adaptability to changes in their environment; and when genetic diversity decreases, there is greater likelihood that disease transmission and negative health consequences will occur (Fig. 3C).

This author ascribes to the notion that biodiversity also includes human diversity, and the better we understand how biodiversity helps maintain healthy ecosystems, the more we can see the benefits of human diversity within our organizations. In doing so, it is important to embrace the broadest definition and spectrum of diversity,⁹ which includes more than those attributes that might be measurable such as gender, race-ethnicity, age, and others. This also includes geographic, educational, and cultural diversity; diversity of people's backgrounds, perspectives, and lived experiences; and anything else that contributes to individuals' unique and whole selves. Although we can measure some attributes that are collected through membership surveys, employee data, or visually observable characteristics, these simply serve as a metric or proxy for

an organization's diversity of its employees, volunteers, and/or other stakeholders, not an exact representation of its overall diversity. When organizations fail to embrace the fullest spectrum of diversity in our own "habitats," we are missing important perspectives that will contribute to better solutions for organizational vibrancy and species' survival.

Corina Newsome, Georgia Audubon's Community Engagement Manager and a co-founder of Black Birders Week, as a 2020 Association of Zoos and Aquariums panelist, described the situation: "The reason why populations with higher genetic diversity are more likely to survive a stressor is because somebody in that population has the answer in their genes. The same concept can be applied to people. When a problem is encountered, and there is a group of people working on it, the more heterogeneous the people at the table, the more likely the best solution will be found."³⁵

Just as nature thrives with biodiversity, so do organizations with human diversity. McKinsey & Company reported that "companies in the top quartile for gender or racial and ethnic diversity are more likely to have financial returns above their national industry medians," while those in the bottom quartile "are statistically less likely to achieve above-average returns."¹⁶ Diverse teams consistently perform at a higher level and find

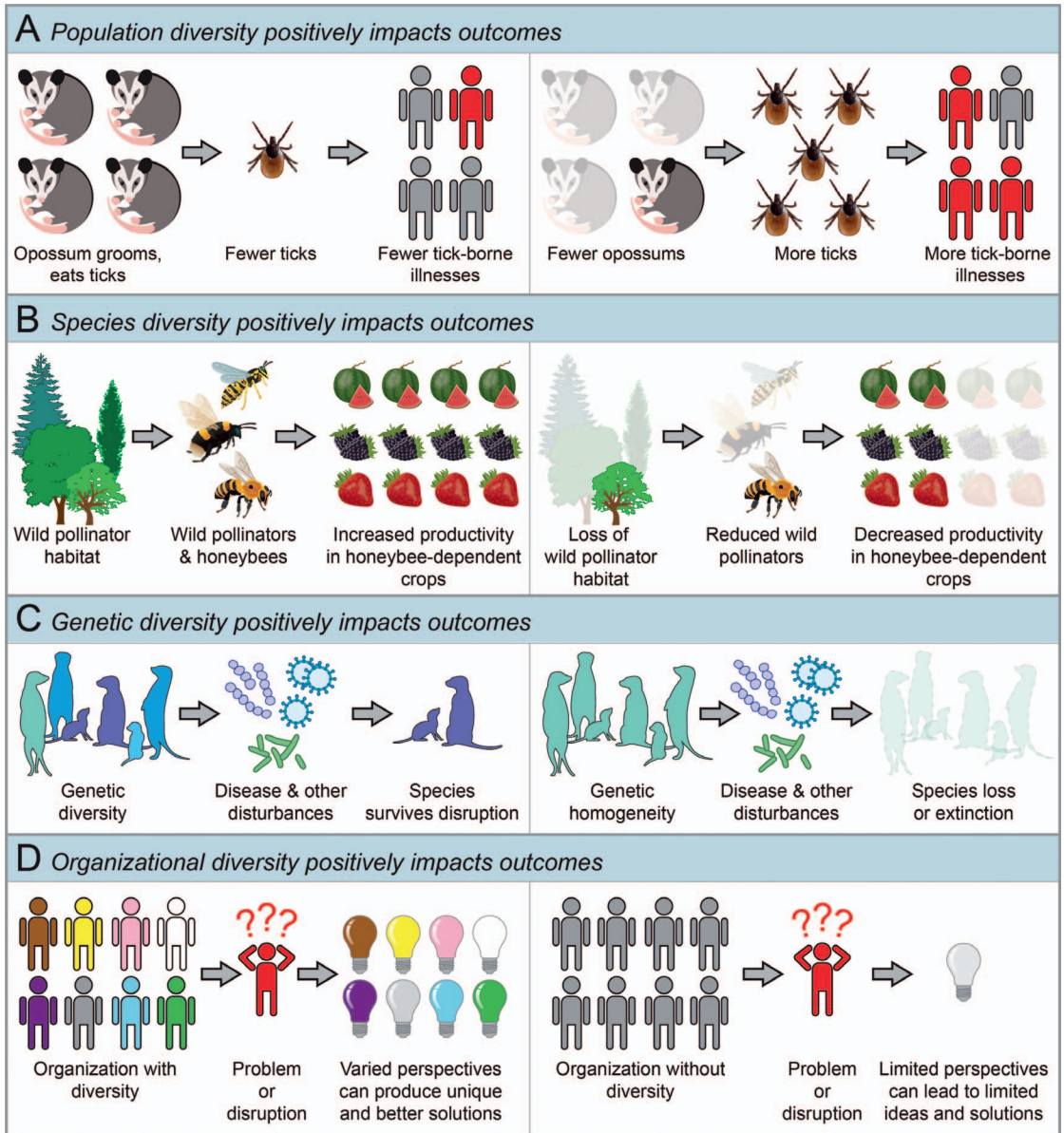


Figure 3. Pictorial illustrations of the importance of biodiversity and organizational diversity to healthy ecosystems and positive outcomes. **A.** Healthy and biodiverse populations can positively affect outcomes. Maintaining healthy ecosystems is dependent upon maintaining biodiversity. When disrupted—perhaps with the loss or decrease in opossums—tick populations would increase, potentially leading to more tick-borne infectious diseases in people and animals. **B.** Genetic diversity can positively affect outcomes. Genetic diversity is important to maintaining the health and wellbeing of ecosystems because this heterogeneity helps protect species through increased resistance to disease and thus extinction. Genetic homogeneity predisposes and increases the risk of a disturbance or disruption by decreasing resistance. **C.** Species diversity can positively affect outcomes. Maintaining biodiversity among pollinators is important because native bees are critically important to pollinating many plants that produce food for animals and people. Loss of species diversity among pollinators has a detrimental effect on plant-derived foods. **D.** Organizational diversity can positively affect outcomes. Fostering diversity in an organization will help protect against disruptions or disturbances and identify better solutions to complex problems and grand challenges. Lack of organizational diversity contributes to lower performance, less innovation, lower profits, and other negative impacts.

more innovative solutions to complex problems.^{33,46} This is critical in our collective work regarding ecosystem health and conservation medicine. An essay in *Zookeeper Gear* notes that “failing to enhance zookeeper diversity puts our teams at an operational disadvantage. This means we’re potentially losing out on ways to better care for our animals and better engage the next generation of potential conservationists walking through our gates each day.”⁵⁴

As zoos, aquariums, wildlife parks and refuges, and other conservation organizations increase human diversity, we will benefit by exposing more people to the proven benefits of nature.¹ Traditionally in the United States, POC have long been physically segregated from or made to feel unsafe or unwelcome in nature.³⁴ Making our organizations more welcoming to everyone will connect visitors to the benefits of nature while role modeling careers in animal and conservation professions for future generations.

Like the species and ecosystems we care for and seek to protect, our organizations must be resilient in the face of challenges, which means adapting to embrace DEIB (Fig. 3D). In nature, diversity helps to restore healthy ecosystems.⁶ It will take scientists, researchers, conservationists, and others representing the full breadth of our world’s diversity to solve grand challenges, propel our organizations to restore ecosystem biodiversity, and prevent the next pandemic.¹⁵ Indeed, past experiences may not be helpful in predicting and identifying effective strategies and solutions for today and our future. As Albert Einstein said, “We cannot solve problems with the same thinking we used when we created them.”⁴⁰

POTENTIAL ACTION STEPS TO MOVE ORGANIZATIONS TOWARD DEIB

Like many organizations, The Ohio State University College of Veterinary Medicine has taken several deliberate steps to increase DEIB.⁹ In the past seven years, with a commitment to creating a more welcoming and inclusive campus combined with removing barriers to the admissions process, they have achieved notable increases in diversity among incoming veterinary students.

There is much more work ahead but based on the experiences and ideas from others who engage in this work, steps are offered that organizations might consider in making DEIB a priority with lasting positive impact. This is not an exhaustive list with steps that are the “right” path forward for every organization. Rather, these suggestions are offered in an effort to spark ideas and inspire each

organization’s own progress in DEIB as it relates to their capacity and goals. There are a variety of ways to create an environment where employees, volunteers, and patrons or visitors are respected and able to thrive (Fig. 4).

Develop an ethos of DEIB permeating every aspect of the organization

- Create a culture where everyone feels welcome, comfortable, safe, respected, valued, and in a place they feel they belong and can thrive. Seek input and feedback and listen to learn from those with different life experiences and celebrate differences.
- Incorporate DEIB as a foundational principle and value throughout all areas of the organization and all aspects of its strategic plan, including actionable, measurable steps.
- Create a committee comprised of board members, employees, and community members that keeps DEIB at the forefront of the organization’s mission and actions.
- Conduct an organization-wide DEIB assessment of the culture or climate for employees, volunteers, and patrons or visitors on a regular basis to assess baselines and progress with respect to how they feel regarding being welcome and having a sense of belonging.
- Recruit people representing diverse backgrounds to the organization’s board to ensure leadership decisions are made considering multiple viewpoints and experiences.
- Make sure the premises are welcoming and friendly to those with disabilities (physical, including mobility, visual, and hearing; mental; cognitive; and sensory). For example, the Columbus Zoo and Aquarium (CZA) offers sensory-friendly events¹¹ with smaller crowds where music is turned off; strobing, flashing, and blinking light effects are reduced; and sensory kits with noise-canceling headphones, sunglasses, and fidget devices are provided for a refundable deposit.
- Provide gender-neutral restrooms and those that are family friendly with both baby and adult changing tables as well as mothers’ or lactation rooms.
- Build relationships with diverse suppliers and vendors in the community and make sure all vendors have accessible and equitable opportunities.
- Bring diverse audiences into exhibitions, programs, and experiences to build a pipeline to the profession, including socioeconomic



Figure 4. Fostering and maintaining an environment where employees and patrons feel welcome, comfortable, safe, respected, valued, and in a place they feel they belong and can thrive can start with some rather simple steps. These involve using inclusive imagery; using pronouns (opt-in) on employee nametags; posting signage with more than one language, particularly in areas of caution or danger; ensuring accessibility for all people regardless of physical, emotional, or cognitive abilities; providing accessible, welcoming, and convenient facilities such as gender-neutral restrooms and those with baby and adult changing tables as well as mother's or lactation rooms; and hiring and maintaining a diverse staff throughout all levels of the organization; and more.

diversity. For example, in the US, just 33% of zoo and aquarium visitors are from households with an income of less than \$100,000.⁸ As TJ Lowery, Vice President of Human Resources at OdySea Aquarium, comments in the Zoo Logic podcast *A Conversation about Race and Zoos*, “These are the experiences that impact a child’s view on the world and that age-old question, ‘Who do I want to be when I grow up?’ How do they become exposed to this type of work if they don’t see it?”⁴¹ The CZA has a variety of programming in place to take the Zoo into communities as well as bring communities to the Zoo. For example, the Family Access Membership is a discounted membership category for families who live in Ohio and qualify for government assistance.¹² In collaboration with the Columbus Metropolitan Library (CML), the CZA became part of the Culture Pass Program at select CML locations, where library cardholders can check out a culture pass that grants free admission to the CZA.¹⁰

Integrate DEIB into the fabric of talent recruitment, leadership development, and pipeline efforts

- Require implicit bias and diversity training for managers, supervisors, and others, especially in personnel hiring and performance review or management. For example, CZA board members, supervisors, and managers underwent implicit bias and diversity training in 2021.
- Integrate DEIB throughout all policies, including developing equal pay policies that result in more fair and equitable hiring and compensation practices, and review and update these regularly.
- Advertise positions in areas that are accessible and where diverse populations might seek employment, and recruit from places like Historically Black Colleges and Universities (in the United States). As Leia Cook, Early Childhood Programs Coordinator at the Houston Zoo commented in a Reid Park Zoo “Black in Nature” article, “I think that more organizations need to change how they

share their stories and recruit. For example, if you've always gone to the same PWI [Primarily White Institution] job board for program/staffing opportunities, maybe it's time to start looking in other places like HBCUs [Historically Black Colleges and Universities]."³²

- Provide leadership development opportunities that ensure diverse employees are in the pipeline to assume leadership roles.
- Listen to the experiences and voices of individuals who contribute every day by working in the trenches and on the front lines.
- Create internship opportunities for those who might not otherwise have access to gain experience and pay interns for their work so that people from all economic backgrounds are able to gain these valuable experiences. The Tennessee Aquarium created a fellowship for minority college students that "offers opportunities in education, conservation, and husbandry—and includes housing."³⁶ The CZA recently announced the Respect, Include, Succeed and Educate (RISE) Scholarship Program that will provide twenty \$5,000 scholarships annually to connect underrepresented college students to internship opportunities.¹³ The Aquarium of the Pacific announced an African American Scholars Program that provides eleven participants with \$10,000, as well as opportunities to participate in conservation projects, meetings, and other activities at the aquarium.⁴
- Establish structured mentoring opportunities to foster new talent, listen to underrepresented voices, and create a leadership pipeline. A 2016 *Oceanography* article called for "active and appropriate mentoring to support [underrepresented students'] successful engagement in the academic and professional ocean science community" and highlighted examples of such programs affiliated with universities and professional organizations.¹⁹
- Offer robust access initiatives in partnership with local schools and other organizations to help build a pipeline of people who would enjoy working in a variety of roles for zoo, wildlife, conservation medicine, and other fields. The CZA offers thousands of complimentary tickets annually to deserving organizations across central Ohio, and provides Learning is Wild Scholarships to help cover admission and transportation fees for field trips for schools with 30% or more of students receiving free or reduced lunches, as well as a variety of other outreach and blended learn-

ing programs.¹⁴ These efforts are important for showcasing role models to whom students can relate, and be inspired and encouraged by to pursue higher education and other opportunities that will lead to meaningful careers.

Communicate your commitment to DEIB internally and externally

- Be mindful of noninclusive imagery on websites and/or on the premises (signage) and be intentional about incorporating inclusive imagery across all forms of diversity.
- Offer signage in multiple languages in public facilities, particularly for danger and/or caution areas, along with universal symbols.
- Include pronouns on nametags (opt-in) and use gender-neutral language in organizational communications.
- Enact open door policies, hold town halls, and consider establishing affinity groups so that everyone has the opportunity to express themselves in safe, supportive spaces.
- Incorporate information about DEIB policies, programs, and expectations in employee and volunteer trainings and handbooks.
- Share stories about the organization's DEIB efforts with broad audiences to normalize talking about DEIB and let potential hires and constituents know your organization is actively working to promote DEIB and will not tolerate behaviors that impede progress. Consider showcasing diverse employees, interns, volunteers, and others to inspire and serve as role models.

The time for action is now

DEIB is not a destination rather a continual journey that all organizations must travel in order to realize the full benefits of diversity within animal and conservation professions and in advancing our ecosystem health and conservation efforts and outcomes. Rather than becoming overwhelmed by the work ahead, start by taking manageable actions steps now to begin achieving small goals that will add up to meaningful change and impact. Lean on the knowledge of others who have experienced success in these areas, borrowing ideas and sharing resources. And in doing so, be careful not to place the burden of DEIB work on underrepresented or marginalized groups; though they absolutely need to be included and engaged in the process, don't rely upon them to educate others or carry the weight of these efforts.

A commitment to DEIB must come from the “top” of organizations, with all people—but particularly those in leadership positions—“walking the talk” through their words and actions. Leadership must address in real time any issues that arise, to let everyone know the organization will not tolerate discrimination or bias in any form. One sign of progress, beyond the quantifiable increases in diversity, may be when an organization receives pushback. This can happen when people become uncomfortable with forward momentum. It is important to be prepared for such pushback and embrace it, because it can indicate that progress is being made. However, a fundamental sign of success will be when the organizational composition reflects the population demographics, and no one even thinks about it—and ultimately when notable change and impact are observed on ecosystem health and biodiversity.

Together, we can help to change the long history of exclusion of certain populations from marine biology and oceanography, ecology, conservation science, and zoo, wildlife, aquatic, and exotic animal medicine professions and empower a more diverse range of thoughts, experiences, and ideas. A coordinated and integrated effort of such diverse people and organizations is critical to help identify and implement workable, achievable, and successful solutions to the many complex issues and problems related to biodiversity loss and conservation. By enacting principles of inclusion, we can help to clarify and rebuke the often-misrepresented beliefs and distorted images of tokenism and quotas. Instead, we can create organizations that take advantage of and use the talents of the entirety of our population, including in achieving our critical conservation goals, goals that need the knowledge of everyone. For we all will fail if the current environmental crisis and decreasing biodiversity are not addressed with all of our collective knowledge and abilities. The author believes that through intentional focus and deliberate steps to enhance DEIB, we can make a difference to organizational health and vibrancy and thus to ecosystem health and vitality. These prioritized efforts are critical for people and nature to coexist and thrive and to ensure a sustainable future.

Lastly, there is an important call to action for our organizations to address this topic by conducting and publishing research regarding the impact of increasing human diversity of our organizations on our collective mission of enhancing biodiversity and conservation. Evidence-

based evaluation of this principle is crucial to a more thorough understanding and appreciation of the benefits of diversity within our organizations.

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