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Sustainability initiatives in zoos and aquariums: looking in to reach out

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ABSTRACT

As leisure destinations, Association of Zoos and Aquariums (AZA) accredited institutions provide opportunities to interact and potentially inspire long-term sustainable behaviours of millions of annual visitors. This article identifies and explores the internal sustainability initiatives of these institutions and their efforts to influence visitor behaviour through sustainability-focused messaging and engagement in sustainability practices, while also identifying barriers hindering implementation. The majority of institutions reported the presence of a 'green team' for instigating and executing internal initiatives. Initiatives focused largely on operational metrics around water, energy, waste and transportation. Primary barriers to implementation or maintenance of internal initiatives and visitor engagement were time, money and institutional culture. These barriers will require pragmatic solutions as AZA institutions progressively broaden support of sustainability and embedded conservation messages. Increased sharing of sustainability practices as well as incorporating community-based social marketing techniques and emerging research from social and environmental psychology into engagement strategies will benefit the industry.

RÉSUMÉ

En tant que destinations de loisirs, les institutions accréditées de l'Association of Zoos and Aquariums (AZA) offrent des occasions d'interactions et de potentiellement inspirer des comportements durables à long terme chez leurs millions de visiteurs annuels. Cet article explore la présence des initiatives de développement durable internes des organisations membres et leurs efforts pour influencer le comportement des visiteurs avec des messages axés sur la développement durable et un engagement envers des pratiques durables, tout en identifiant les obstacles qui nuisent à la mise en œuvre de ces dernières. La majorité des institutions ont rapporté la présence d'une « équipe verte » dont l'objectif est d'instaurer et d'exécuter des initiatives internes. Les initiatives se concentraient grandement sur des indicateurs opérationnels relatifs à l'eau, l'énergie, les déchets et le transport. Les principaux obstacles à la mise en oeuvre ou au maintien des initiatives internes et de l'engagement des visiteurs étaient le temps, l'argent et la culture

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institutionnelle. Ces obstacles nécessiteront l'adoption de solutions pratiques alors que les institutions de l'AZA élargissent progressivement les messages de soutien au développement durable et de conservation intégrée. L'augmentation du partage des meilleures pratiques en matière de développement durable ainsi que l'intégration de techniques de commercialisation sociale basée sur la communauté et de recherches émergentes découlant de la psychologie sociale et environnementale dans les stratégies d'engagements sont avantageuses pour l'industrie.

Sustainability

Humans create change within the natural environment. Often that change is detrimental to non-human systems because of pollution, overconsumption of natural resources and urban sprawl. Paradoxically, human-constructed social and economic systems are supported by and reliant on robust and resilient ecological systems (Dyck, 1998, p. 30). Because they intertwine, neglect of the environment and connected ecological processes ultimately undermine the integrity and stability of human-centric social and economic systems (Rockström et al., 2009). The science and practice of sustainability aims to ensure longevity of these interconnected socioeconomic–ecological systems. The challenge in raising awareness of and encouraging sustainable behaviours in individuals may stem from both a lack of consensus on an established definition of sustainability (Grober, 2012, p. 20) and confusion on which personal actions to implement and if those actions will be effective (Luebke et al., 2012).

Sustainability is still an ambiguous term commonly misused and misunderstood. Most interpretations of sustainability emphasize future human needs and values (Childers, Pickett, Grove, Ogden, & Whitmer, 2014), and focus on socioeconomic–ecological systems integrity and intergenerational equity (Gibson, 2006). For example, the most commonly cited definition of sustainability is by the Brundtland Commission, defining sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (The Brundtland Report – 20 Years On, 2007, p. 1). Arguably a more descriptive definition, Costanza, Daly, and Bartholomew (1991) offered that 'Sustainability is a relationship between dynamic human economic systems and larger dynamic, but normally slower-changing ecological systems, in which: (1) human life can continue indefinitely, (2) human individuals can flourish, and (3) human cultures can develop; but in which effects of human activities remain within bounds, so as not to destroy the diversity, complexity, and function of the ecological life support system' (pp. 8–9).

Consensus on an established definition of sustainability likely would guide consistent and clear standards of practice for both individuals and

organizations. Until such time, though, different industries will continue to focus on those sustainable practices that make the most economic and social sense, and individuals will rely on personal research or assumed best practices adopted from their social networks. Social networks include leisure sites, which provide opportunities for broad audiences to understand sustainability, connect with resources, and learn how to adopt personally relevant sustainable practices.

Leisure sites

Nature-based tourism and leisure positively influences conservation-related knowledge, attitudes and behaviours (Ardoin, Wheaton, Bowers, Hunt, & Durham, 2015). A contributor to this influence is the implementation of conservation-based ethics by leisure and tourism sites to reduce harmful environmental impacts (Ballantyne & Packer, 2011).

Zoos and aquariums as leisure sites

As tourism sites, zoos and aquariums are destinations for not only leisure but more recently destinations for conservation education in relation to natural resources, ecosystems and biodiversity. According to the World Association of Zoos and Aquariums (2015), 'zoological facilities are able to leverage the special emotional connections between animals and visitors to provide formal and informal learning opportunities in conservation education and the broader environmental-education sciences that reinforce the missions of zoos and aquariums' (p. 45).

Association of zoos and aquariums accreditation

Nature-based institutions, mainly zoos and aquariums, in North America that meet or exceed professional standards of care and conservation education are eligible for Association of Zoos and Aquariums (AZA) accreditation. AZA-accredited institutions strive to inspire, educate and influence visitors' environmental connections, appreciation and behaviour; these leisure destinations often receive over a 180 million visits each year, which increases their potential influence (Association of Zoos and Aquariums, 2016; Ballantyne & Packer, 2011). This influence relies on 'animal encounters to engage, connect, provoke, and challenge visitors to action' (Packer & Ballantyne, 2010, p. 32).

AZA-accredited institution sustainability efforts

Internally, zoos and aquariums may use sustainability initiatives to guide business practices. The creation and continuation of an internal task force such as a 'green team' can bring together employees at all levels to discuss, propose and implement sustainable purchases and actions. The creation of two volumes of the AZA *Green Guide* 'help zoos and aquariums publicly demonstrate their

commitment to wildlife conservation… and model ways in which guests can learn how to be part of the solution for habitat and resource conservation' (Association of Zoos and Aquariums, 2014). Offering guidance in building and measuring sustainability plans, these documents encourage individual institutions to work toward achieving sustainability goals and actions to create more consistency within the industry. Capacity for institutional integration of sustainable practices depends on available resources, so the likelihood of an industry standard is low. Additionally, it is challenging to propose industry standards that account for available resources without a clear picture of the current sustainability initiatives among AZA-accredited institutions.

In an effort to 'increase awareness and support of the zoo or aquarium's Sustainability Mission, Vision, or Plan', AZA's *Green Guide* provides an itemized checklist for actions that internally and externally communicate an institution's sustainability practices (*AZA Green Guide*, 2013). Visitor engagement is a focus within the guide's 'external options' and recommendations step beyond design of messaging and signage to include the training of staff to ensure effective dissemination of information. AZA recognizes that member organizations not only have the potential to act as models of sustainability within their communities but also to directly connect with guests to encourage sustainable behaviours.

Zoos and aquariums as change agents

Receptiveness to understanding sustainability, connecting to resources and learning to adopt sustainable practices begins with value orientations; individuals' values can inspire action. Within the integrative theoretical model of environmental concern, three value orientations combine and guide human attitudes and behaviours toward the environment (Stern, Dietz, & Kalof, 1993). Through the lens of concern for the environment, emphasis on egoistic, social-altruistic or humanistic, or biospheric value orientations manifests in different ways. The benefit of protecting the environment must exceed the potential costs to the individual for the assumed predominant motivator of human behaviour, which are egoistic (self-focused) value orientations (Stern et al., 1993, pp. 324–326). Social-altruistic or humanistic value orientation emphasizes overall human welfare. Biospheric value orientation focuses on the biosphere and nonhuman species (Stern et al., 1993, p. 326). To take action, knowledge of adverse consequences must stimulate personal norms and a sense of responsibility or moral obligation, as shown in the linear progression in Figure 1 (Gärling, Fujii, Gärling, & Jakobsson, 2003, p. 1).

Personal norms and moral obligations interrelate with value orientations as well, leading to sensitivity to and receptiveness of information about outcomes regarding that which is valued, as seen in Figure 2 (Stern et al., 1993, p. 328). Value orientations lead to acceptance of information regarding consequences,

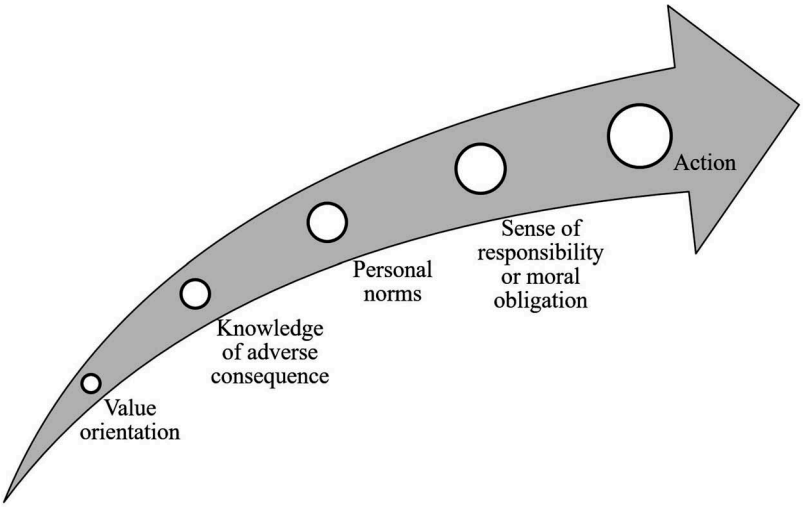

Figure 1. Stimulation to action from environmental concern value orientation.

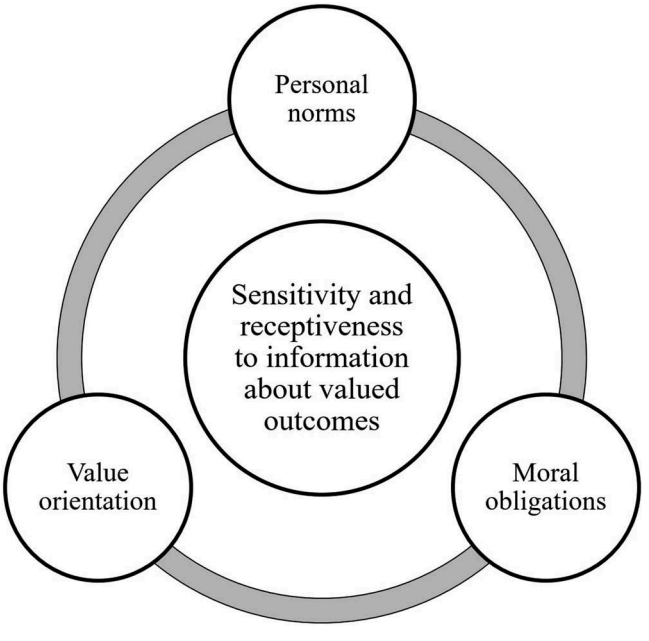

Figure 2. Interrelation of personal norms, moral obligations and value orientations, which lead to receptivity to information.

supporting beliefs and lead to action (Stern & Dietz, 1994, p. 68). Social norms as well as environmental awareness and knowledge are influenced and shaped by time spent at leisure sites (Stern, Dietz, & Guagnano, 1995, p. 726), therefore, zoos and aquariums as leisure sites can serve as change agents for sustainability- and conservation-based actions.

Sustainability and conservation messaging

Not all AZA-accredited institutions engage in sustainability practices. Regardless of the presence of internal sustainability initiatives, incorporating sustainability messaging within zoo and aquarium interpretative signage and programming can motivate visitors to future sustainable and conservation actions (Ardoin et al., 2015). Interpretive messaging, whether through written signage or formal and informal programs, aims to create positive connections between visitors and the resource, which, in this example, is animals and the environment. The likelihood of these positive connections leading to desired actions increases with effective interpretive messaging (Hughes, Packer, & Ballantyne, 2011). Through strategically planned educational opportunities and capitalizing on repeat visitation, AZA-accredited institutions can reinforce and build on patrons' previous engagement with educative material and experiences (Smith, 2013).

Considering that most learning occurs outside of school (Heimlich & Falk, 2009, p. 11), and people visiting zoos and aquariums are receptive to education in their leisure time (Lindemann-Matthies & Kamer, 2006), there is significant potential for zoos and aquariums to educate visitors on sustainability and set a positive example of best practices within their communities (Townsend, 2009, p. 54). Many zoos and aquariums already incorporate conservation education with intentions to influence human actions and reduce human impacts on the environment (Wyles et al., 2013). Conservation education messaging can also address perceived barriers to and the benefits of the promoted conservation, and possibly, sustainability actions. Aligning with community-based social marketing theory, these messages offer recipients examples of social norms, prompts to action and support of the implementation of conservation and sustainability behaviours (Hughes et al., 2011).

Community-based social marketing includes uncovering barriers to behaviours and designing programs for selected behaviours to overcome those barriers (McKenzie-Mohr & Smith, 1999). The intention to create a societal shift toward more conservation and sustainability behaviours is admirable, yet not altogether realistic. Each individual's values are different and will help determine whether that individual will exhibit pro-environmental attitudes and behaviours (Fransson & Gärling, 1999). Therefore, the task of successfully persuading behavioural changes is challenging (Ballantyne & Packer, 2011).

The first step to behavioural change is through knowledge. Knowledge of an issue, along with an understanding of how to address that issue through action, can influence attitudes and intentions (Ballantyne & Packer, 2011; Fransson & Gärling, 1999; Wyles et al., 2013). However, altered attitudes and self-reported intentions seldom lead unaided to changes in habituated behaviours (Heberlein, 2012a). Studies at leisure destinations, like wildlife tourism sites, historically did not address long-term conservation and

sustainability behaviour changes in visitors (Ballantyne & Packer, 2011). Yet, zoo and aquarium visit experiences that provide conservation and sustainability messaging initiate knowledge gain and influence attitudes (Adelman, Falk, & James, 2000; Visscher, Snider, & Vander Stoep, 2009). This, coupled with on-site structural fixes and post-visit resources encouraging continued conservation and sustainability actions, can lead to more potential to accept and integrate these actions within normal daily practices (Bueddefeld & Van Winkle, 2016; Heberlein, 2012b; Hughes et al., 2011), acting as a change agent for sustainability and conservation.

Purpose and design

The purpose of this research is to explore what internal sustainability initiatives exist at AZA-accredited zoos and aquariums and how they extend and message those efforts to engage and influence visitor behaviour and practices. In addition, this study will record successes and identify potential barriers to implementing sustainability initiatives and engaging visitors. The results of this study identify common practices within this industry. This exploratory study uses the design of a sequential and transformative mixed methods approach with electronic surveys followed by semi-structured interviews and is hypothesis generating rather than hypothesis testing.

The theoretical framework for this exploratory research is the theory of sustainability with a pragmatic paradigm. The framework of the theory of sustainability prioritizes environmental functions for present and future human generations (Upham, 2001, p. 238), which is the basis of this research focus. Pragmatism 'arises out of actions, situations, and consequences rather than antecedent conditions' (Creswell, 2009, p. 10) and 'refute[s] the idea that "truth" can be determined once and for all' (Pansiri, 2005, p. 197). Conducting research using a pragmatic worldview allows researchers to use multiple research methods, different worldviews and assumptions, as well as different forms of data collection and analysis (Creswell, 2009), demonstrated by the research design of this study. A subjective epistemology grounds this research in the value of the knowledge of research participants and the existence of reality beyond participant understanding.

Methods

The research design is explanatory sequential mixed methods focusing on the population of AZA-accredited institutions. Sequential explanatory includes a first phase with quantitative data collection and analysis followed by a second phase of qualitative data collection and analysis/interpretation that builds on the results of the first phase (Creswell, 2009). Phase one of the research included electronically distributed surveys. Survey questions asked how institutions

engage visitors using conservation education, if the institution has internal sustainability initiatives, how the institution facilitates initiatives, barriers to implementing, and if and how the institution engages visitors using sustainability-based activities and messaging or barriers to engaging visitors.

Phase two included semi-structured interviews of self-selected institution representatives and using constant comparison (Levers, 2013) and inter-coder agreement. Semi-structured interviews involved prompts for additional details on internal initiatives, activities and messaging, successes for internal initiatives and visitor engagement, and the influence of workplace culture on sustainability-based behaviours.

Data analysis

Survey data were entered into Excel for statistical analysis and interpretation. Interview data were entered into MAXQDA, a qualitative data analysis software. Approaches to analysis included the interpretation strategy using inductive coding with constant comparison. Inter-coder agreement ensured alignment of coded segments and themes. An outside researcher informed analysis of the data through review of coded segments. The use of thick description in analysing and presenting the data provided understanding and context.

Sample

Of the 228 AZA institutions, the authors had viable contact information available for representatives from 184. They were invited directly through email to participate in the electronic survey. Additional invitations for participation were sent through the AZA Education listserv and the Green SAG contact forum. Individuals from 58 institutions responded to the electronic survey. The number of representatives invited to participate in the semi-structured interview portion of the study depended on survey responses. From the 29 survey respondents who indicated interest in participating in phase two, nearly half of those (14) representatives from institutions that do have internal sustainability initiatives participated in semi-structured interviews. No institutions that reported an absence of internal sustainability initiatives were represented due to a lack of self-selection for participation, which was a limitation and potential source of bias. As expected, information shared through these interviews supported and expanded upon the data collected in the electronic survey.

Survey respondents were asked the region in which the institution is located. While not a required question, 48 respondents shared their institution's geographic region. Canada and each region across the United States were represented, with 16 institutions from the midwest United States, 13 from the southeast, 14 from the west, 7 in the northeast, and 5 in the southwest. The majority, 32, of respondents who shared the institution name were from zoos, 11 from aquariums, 3 from science centres and 2 from wildlife parks/nature centres (categorization for zoos includes institutions that also have an aquarium; science

Table 1. Institution size based on 2015 budget.

	Institution size				
Institution type	Small	Medium	Large	Extra large	No data
Zoo	10	6	9	5	2
Aquarium	1	2	4	4	0
Wildlife park/nature centre	1	1	0	0	0
Science centre	1	1	0	0	1
Total	13	10	13	9	3

centres and wildlife parks/nature centres are also accredited by AZA because they use animals as a resource to connect audiences with conservation messaging and meet strict criteria for excellence in animal husbandry, education and conservation). Using the 2015 annual budget report from AZA, the represented institutions whose representative shared the institution name, were labelled by the AZA size definition, as shown in Table 1.

Results

Sustainability initiatives

Of the respondents, 92% indicated the institution has one or more internal sustainability initiatives, as seen in Table 2. The majority of these, represented by 41 institutions, responded that a green team or other sustainability committee/task force facilitates these initiatives (see Table 2). The creation of a green team or other sustainability committee/task force is forthcoming at two institutions, while at another institution the green team 'has fallen off the "radar" as other needs have pushed it aside and without a budget and limited influence in decisions this has dropped down on the hierarchy of importance'. Of note are six institu-

Table 2. Facilitators of internal sustainability initiatives.

How initiatives are facilitated	
Green team or other committee/task force	41
Governmental/institutional policy	10
• Strategic sustainability plan	
• Mandated by city/metro/state	
Assigned teams or work groups	9
• Teen volunteers	
• Conservation team (different function than green team)	
Departmental practices	7
• Commissary composting	
• Purchasing department	
Staff position (either full- or part-time)	6
• Sustainability manager or coordinator	
Individual staff behaviours	6
• Water conservation	
• Public transportation/carpool	
• Individual staff green goals	

tions that have a staff position, either full- or part-time, dedicated to institution sustainability initiatives.

The types of sustainability initiatives in which institutions engage vary. Building on the information provided through the survey, institution representatives shared details during interviews. These include recycling (uniforms, light bulbs, batteries, cell phones, cartridges), water-saving measures (grey water, no flow, and low-flow toilets, rainwater cisterns), energy-saving measures (solar panels, lighting retrofits, powering down computers overnight), alternative transportation options (using bikes, electric cars and natural gas–powered carts on grounds) and material and waste stream reduction (composting, default double-sided printing, upcycling). Staff with alternative fuel vehicles benefit from specially designated parking spaces. Institutions also make environmentally preferable purchases intentionally, noting company Roundtable for Sustainable Palm Oil (RSPO) status or sustainable palm oil, and whether plates and cups are corn-based (for composting) or recyclable. While sometimes dependent on city or other governmental services availability, institutions provide recycling bins for staff and visitors.

Tracking successes

Collaborating with other organizations or institutions such as local waste management, department of transportation, power/electric companies or department of energy and environmental protection enables institutions to learn about and share sustainability and environmentally friendly actions and opportunities. Additionally, tracking the institution's environmental impact through these relationships helps the institution determine the success of internal sustainability initiatives. Other ways institutions track successes are by number of items recycled or money earned through these specific item-recycling programs, the number of employees enrolled in programs such as commute tracking, as well as energy and trash audits and tracking. As an example, Participant A's institution engages in specific staff actions through 'measuring trash to see who can reduce their amount of trash in the shortest period of time' and 'a paper contest to see who could minimize their output of paper; and that was interesting because every time you make a color copy you have to put in a code, so we had a way to track it'.

Identifying perceived barriers

Six representatives indicated their institutions do not currently have internal sustainability initiatives and five of those shared that time, money and/or staff resources, or any combination of these prevent implementation of internal sustainability initiatives. Similarly, institutions with internal sustainability initiatives also see time, money and/or staff as barriers to implementation,

Table 3. Identified barriers to implementing internal sustainability initiatives and representation in responses (percentage).

Barrier	With initiatives	Without initiatives
Money	32	20
• Sustainable building costs are higher		
• Funding/budgets		
Staff and culture	31	50
• Leadership support lacking		
• Staff habits – resistant to change		
• Potential negative effect on visitor experience		
Time	30	30
• Staff time dedicated to primary job functions		
Infrastructure	4	–
• Older buildings		
Other	2	–
• Visitor buy-in		

in addition to institution infrastructure and culture as shown in Table 3. Aligning with the barrier of staff resistance to change and buy in, one representative of an institution with a staff sustainability position indicated that a green team or other such committee is 'too much like police'.

Money

A main barrier to implementing sustainability initiatives identified through the survey and interviews is money, such as budget or funding. Participant A offered a unique consideration in that animal welfare at institutions is paramount, so 'at the end of the day, … if it comes to an animal is sick and needs tens of thousands of dollars' worth of medication but that money was meant to change out some pumps and filters to be greener it's going to go toward the animal'. Connected to this is the institution infrastructure, specifically the age of the institution. Many established institutions have older exhibits and buildings, which means retrofitting and upgrading presents new challenges. Costs associated with exhibit or building updates are more than one-time fees; budgets must also accommodate future maintenance or changes in the marketplace. Participant A encountered such a change regarding a battery-recycling program, saying,

> We've been able to recycle our batteries for free for a long time … and the company just switched, they want to charge us to recycle batteries now. That's a conversation I have to have … about whether or not we should pay for that and what are our next steps. Meanwhile we have batteries accruing and we're telling people we recycle batteries and that's something we care about, but now we have to make an argument for it.

In response, institutions are challenged to designate or develop additional funding. Grants were a specific source shared by five participants as having supported their ability to implement or maintain sustainability initiatives. Size and scope varied and included composting projects and complete site assessments. Participant B discussed the efforts of an external consultant that 'did a bunch of surveys on our water usage, our lighting and electricity and whether

or not we can do water rain barrels and upgrade our restrooms. … it was a really big thing for us in which the whole campus was assessed and then the company came in talked with the staff, the whole staff, multiple times'.

Workplace culture influences

For those institutions with a green team or other committee/taskforce, there is a need for a passionate and motivated leader. Participant C recognized that staff 'desire is there so it's just having somebody make it happen' especially with voluntary participation in the committee and other job duty demands on staff time. To alleviate the barrier of staff buy in or old habits, as seen through the survey responses, institutions implement reward systems for staff sustainability behaviours at work. Participant C shard that recognition and acknowledgement of staff that go above and beyond offers others 'an example of how other keepers can jump on board and reduce things they did not think of themselves'.

Participant B indicated that food or monetary rewards motivates staff behaviours, such as a pizza lunch for the department with the most points in a contest or getting paid to carpool or bike to work. Participants described that management or administrative -level backing of the internal initiatives and a sustainability/conservation-focused committee is present at 12 institutions, indicating the importance of such support for implementation and progress.

Staff resistance to change is not unique to zoos and aquaria, but, as mentioned previously, weighing sustainability practices with animal welfare is certainly distinctive of the industry. Participant M highlighted a common challenge by sharing,

> We want to take really excellent care of [the animals]. So, anything that might endanger that balance that we have with the wellbeing of our animals… we leave the flaps open even in the middle of winter. They stay inside in a 65-degree area, but the keepers want them to able to go outside if they want to into that 40-degree weather. So, that's kind of a unique barrier that we have at a zoo that I think most sustainability people don't have to consider.

While the culture of staff resistance to change and buy in to sustainability initiatives may be a barrier, the individuals who come to work at AZA-accredited institutions are likely already passionate about sustainability and conservation. Participant B said, 'our industry is obviously very unique and dependent on whether or not we are taking care of the environment. In that aspect, everyone has that, I would say not everyone, but a majority of us has that mindset'. Participant A added, 'so I know that they (staff) kind of live and breathe conservation just as much as I do'. This passion translates to bringing education to fellow staff, individually initiated and accountable sustainable actions at work and sharing new ideas for engaging in sustainability practices. Participant C noted that there are generational differences about a sustainability mindset, since

> we have a lot of younger keepers coming in now and they're right out of college or a couple of years out of college and I think they are actually helping to push us more because they are already involved and they are already thinking more sustainably… Our climate change station is also available for our volunteers to use and right now, our teen volunteers are using that more than our adult volunteers.

In these ways and more, the staff who work at these institutions influence the workplace culture, which, in turn, influences other staff. Participant A shared changes observed due to workplace culture, 'I can see a huge change in the way that individuals have been seeing themselves as more sustainable and trying to make their departments more sustainable without anybody asking them'. The institution can reinforce this culture through friendly competitions that earn rewards and serve to boost morale. One institution uses competitions that 'last about a month so it's small obtainable goals', as described by Participant A. Therefore, the actions remain fresh and fun, and the staff stay engaged.

Staff do not limit these sustainability actions and behaviours to work. Participant B explained how:

> We spend our days preaching about using sustainable palm oil and recycling for the animals we're taking care of. That carries over into our home life. I would say yea, it's just kind of a continual thing after we leave work. I can't speak for everybody, but those of us who try to practice what we preach if we're talking about it. For 8 hours a day.

Participant B explained further that 'the majority of people who work here have an understanding that what we're doing for the animals and for conservation is married to the fact that we have to be green, we have to be sustainable and do that'. Knowing, though, that the individuals working at these institutions are already likely passionate about sustainability and conservation, the workplace culture and individual passion reinforce each other.

Time

The third most frequently mentioned barrier was time. This particular barrier is quite broad, as available time applies to the institution staff as well as visitors. The main priorities for institutions, understandably, are animal welfare and daily operations. Participant G explained about the barrier of time by sharing that sustainability is not a high priority 'because we have so much to do and there's always something going on when you work with animals. It is sometimes hard to put [sustainability] at the forefront of your brain to think of that on a daily basis'. Participant M revealed that the green team acts in an advisory capacity without oversight to staff time management and that members:

> … don't necessarily go back with assignments and get a lot done. As far as sustainability, they have other jobs that are full-time jobs. I guess I would say our operations and facilities departments, their time is really valuable and sometimes

> they've got a lot of maintaining of things to do throughout the zoo grounds without adding on the things that the green team or I wished that they could do.

Generally, institutions maintain staff numbers appropriate to budgets and collection size, which often means staff members are responsible for numerous roles. Participant E shared that 'everybody at our facility just wears multiple hats', limiting the amount of time to dedicate to sustainable actions, especially when sustainability is not easy and accessible. This contributes also to lag in implementing sustainable actions, as described by Participant K, 'we are starting to incorporate sustainable lifestyles, making more examples of what we're doing, but we're slow. We're slow to that'. Participant F offered that changing behaviours takes time and 'that's not just our visitors, it's also staff internally. I think behavioural changes are probably one of the most challenging because you can do engineering controls and all sorts of other things much quicker'. Participant E added that, 'to make changes like this [sustainability], we've found that it's an extremely slow process but we figure if we don't start then we'll never get anywhere'.

Demand on time also affects the ability to develop extension activities for visitors and evaluation on either internal initiatives or visitor engagement. Participant L shared that evaluation is:

> … one thing that we're always wanting…, but we haven't done anything to follow up to see one week from now, one month from now, one year from now – did people change their behaviour based on their visit here? I think that we need to take a step back and look at how we design our programs and what the follow-up will be or if there's a way to engage. It's always the question of how do you extend the visit beyond when they leave.

Participant D supported these statements in relation to the lack of time availability by sharing that 'one of the things we really lack in is measuring. I think that's one of the things I'd say across the board, we don't have a lot of measurement on the success of what we do'. Relatedly, data collection in other ways linked to sustainability takes time and staff resources, such as getting baseline information; Participant D discussed needing to start with initial trash audits, and Participant G described the difficulty gathering electrical data for different areas of the institution. Barriers faced by institutions are often interconnected. As described by the participants, time relates to workplace culture, which relates to staff resources, which relates to budget. Even with these barriers, many institutions still engage visitors in sustainability, including conservation.

Engaging visitors

Respondents communicated their understanding of the relationship between conservation education and sustainability education. Of the 54 responses to this

prompt, 80% indicated that conservation education and sustainability education are connected or interrelated. Within all responses to this prompt, 33% of the responses included indication that conservation focuses on animals and habitats, and 41% of the responses included indication that sustainability focuses on human use of resources. Given the AZA accreditation requirements of including conservation education, the survey prompted respondents to share ways the institutions engage visitors using conservation education. The most common methods of engaging visitors with conservation are through formal programming, talks/activities/carts and exhibits and/or signage (see Table 4).

Institution representatives shared whether the institution engages visitors using sustainability-based activities and messaging, of which 53 do. There does not appear to be a clear relationship between institution size as determined by budget (Table 1) and a reported lack of either internal initiatives or visitor engagement, although this study did not pursue this connection in depth.

Institutions engage visitors with sustainability in a multitude of ways that include nationally recognized sustainability issues and campaigns (Seafood

Table 4. Ways institutions engage visitors using conservation education.

Conservation Education	Percentage (%)
Formal programming	52
• School programs	
• Guided tours	
• Camps	
• Shows/live animal presentation	
• Workshops	
Talks, activities, carts	41
• Keeper talks	
• Docent carts	
• Informal interactions	
Exhibits and/or signage	37
Media (including social media)	17
• Website	
• Institution map	
• Videos	
• Newsletters/publications	
Interactive displays and activities	10
• Touch tanks	
• Interactive exhibit interpretives	
• Conservation pledge stations	
Events	14
• Earth Day/Party for the Planet	
• Conservation awareness days	
• Special events	
Modelling behaviours	6
• Solar arrays	
• Research projects	
• On grounds gardens	
• Composting	
Quarters for conservation	6
Other	3
• Citizen science	
• Certified green business	

Watch, National Network of Climate Change Interpreters (NNOCCI), LEED certifications and green building, palm oil/RSPO) and offering information and resources for visitors to use at home. Participant B shared that the strategy of rewards encourages visitor behaviours, such as 'the students and classes get prizes according to how many phones they turn in' for schools participating in cellphone recycling initiative. Institutions also share specifically what it does that is sustainable, uses nature and animals as inspiration and education for sustainability, and asking visitors to make sustainability pledges. Both participants A and C noted that visitors are asking for more information from AZA institutions about sustainability.

Five of the 14 interview participants shared examples of visitor engagement using direct actions in sustainability, such as idle-free parking lots, composting in visitor areas with corresponding signage to empower visitors to continue at home, popular 'Quarters for Conservation' and cell phone recycling programs or working with local schools to have students create enrichment items for animals using appropriate recycled materials. Participant H's institution not only promotes composting at the institution but also offers compost for visitors to take and use in home gardens, which is an example of connecting visitors to the institution and sustainability in new ways. Additionally, three institutions engage visitors with sustainability through involvement in the community, such as beach clean ups, which, as Participant G described, 'will get well known within the town if people frequent those areas and that will help inspire people when they're not even at the [institution]'.

Offering visitors easy access to information about sustainability and items that remove barriers toward behaviour implementation have potential to increase sustainable behaviour choices (Budeanu, 2007; McKenzie-Mohr, 2000). Participant E shared an innovative tool for engaging visitors with sustainability, through:

> … a refurbished vending machine that has the little sliding doors and we're putting all kinds of green items in there like chopsticks for salamanders, little pots of chives and basil that they can take home and grow, reusable aluminum bottles, bags with our screen print on it like the grocery bags, bamboo utensils, and to go containers so when you go to the restaurant you can choose not to get a Styrofoam box, you can take one of these little reusable containers with you. Putting all those kind of items in there not only raises awareness with the visitors but also gives them an opportunity that they can purchase it.

Other institutions use such items as trifold brochures or workshops with resources to return home and do the sustainable action. Consistently, institution representatives shared during interviews how institutions include messaging throughout signage and programming related to sustainability, sometimes focusing on one or two topics or attempting to incorporate as many as possible.

Perceived barriers to visitor engagement

Those institutions that do not engage visitors using sustainability-based activities and messaging also shared barriers to visitor engagement, such as local culture causing the institution to be 'careful of how we approach discussing/promoting sustainability initiatives so they can be perceived in as positive light as possible'. Other barriers shared are governmental or organizational policy and the perceived redundancy of sustainability messaging in addition to conservation messaging. A significant barrier discussed in an interview is the visitor's expectations and perception of the institution as a place of leisure and fun. Participant B explained that, from the visitor's perspective, that:

> . . . we are an institution where people come for fun, they bring their families. . . That is a struggle in the sense. . . [that] we're an institution for fun and we're trying to have a fun day for them but also doing what we're supposed to be doing in being a conservation-based organization and telling them about what these animals are looking at and what is going on in the wild.

Additionally, the age of visitors creates a barrier to the more challenging or 'heavy' topics in sustainability. Younger children do not understand global concepts well and chaperones with young children likely do not want to dedicate the time to listen and then explain while enjoying the day at the institution. While embracing resources from capacity building entities like NNOCCI can assist institutions in training their staff to develop conversations and messaging in a more digestible format, they are still likely to experience challenges. Participant J explained, referencing all ages, 'I think one of the biggest challenges or barriers that we have is how to get that information across to somebody who's not necessarily opened to receiving it'; while Participant E lamented, 'I think that we can put signs up all day but [visitors] might not read them'.

Value and action. It is possible and likely to encounter value-action disconnect, though. Participant N explained that the culture of an area that includes a sustainability mindset 'doesn't mean that it's actually translated into daily behaviours either at work or outside of work or both'. Yet institutions promoting and embodying sustainability contribute to the culture of a community and influences actions of community members, including institution staff.

As noted previously, institutions do not yet evaluate the behaviours and actions of visitors once away from the zoo, aquarium, nature centre or other such site. Participant A said, 'We don't have actually any follow up that they are doing it once they go home', Participant C shared that 'we do not, unfortunately, have a measure. We would like to do more evaluation', and Participant B stated, 'but we could definitely be doing a better job of getting more concrete information back'. Participant G offered that it is 'a challenge of when it is it ok to interrupt a visitor and their day to take a survey [because]

they're coming here because they want to enjoy their day'. The participants recognized the potential of improvement, either as an institution or as an individual. Two participants shared that participating in the interview motivated them to do more, as Participant C stated, 'after this call, when I get to work, I will be looking to reinvigorate the conservation committee. You prompted me to make sure I carve out time for what's important'.

Discussion

This exploratory study examined internal sustainability initiatives at AZA institutions and methods for visitor engagement. Overwhelmingly, respondents shared that institutions incorporate sustainability initiatives in some way, with a majority having internal initiatives as well as visitor engagement. This aligns with *AZA Green Guide* recommendations to incorporate awareness efforts in an institution's sustainability plan. As mentioned previously, while no clear connection between institution size and the lack of internal initiatives and visitor engagement exists, institution representatives reported that other factors such as time and budget contribute.

The information gathered from this study offers the AZA community a clearer picture of the current practices for sustainability and visitor engagement, while highlighting opportunities for focusing efforts to reinforce value orientations of environmental concern and behaviours. From here, we recommend that AZA-accredited institutions find more efficient ways to communicate the innovative approaches to visitor engagement with sustainability as well as how institutions overcome barriers to be more effective. One device that currently attempts to address the need for coherency among sustainability concepts and dissemination of ideas within the AZA community is the Green Practices Database. The database is a collection of responses from an annual survey, distributed to document member organizations' sustainability practices. The breadth of the database is limited, however, as it does not capture information from institutions with sustainability initiatives that do not participate in the survey. Additionally, the available categories of sustainability practices can be vague and leave room for questions due to the lack of details and strategies institutions employ. This research generated greater understanding of institutional actions and strategies and gathered information from three institutions not present in the database.

Outside of the interview prompts, multiple respondents asked for the data from this study. This reinforces the deficiency of communication of initiatives and visitor engagement successes between and among institutions. Sharing strategies and successes strengthens the conservation and sustainability messaging for all AZA institutions, creating a cohesive community with a clear common goal. It is unreasonable to expect the development of specifically detailed standards of practice due to the multitude of factors that make each

institution unique, yet from this information we do recommend more tools and resources be made available on a consistent basis for institutions to successfully follow the *Green Guide* and its various components as a guiding standard.

One tool and theory we recommend organizations invest time exploring is community-based social marketing (CBSM). As discussed previously, CBSM offers a framework for uncovering perceived barriers and benefits to behaviours and designing programs to overcome those barriers and reinforce or emphasize the benefits (McKenzie-Mohr & Smith, 1999). CBSM recognizes that tools and techniques should be chosen and implemented based on what is most effective for specific scenarios, and offers a variety of options that allow institutions to tailor efforts toward their particular culture and structure. Becoming more familiar with the theory, as well as options for paired cognitive and structural fixes, allows organizations to better address challenges to both internal and external implementation of sustainability initiatives.

This research also reinforced the existence of a relatively recent shift in the AZA community of institutions accepting the interconnectivity and necessity of sustainability and conservation (Silver, 2015, p. 20), although the concepts as addressed in practice and language are still perceived as being distinct. For example, Participant I shared 'for us it's definitely separate; conservation was the newest thing. That was before sustainability that was added to the whole zoo mission. [Then] menagerie, now educational, now we're conservation, and now we're all going to be sustainable'. Institutions incorporate sustainability topics and invitations to take actions into formal education programming already (Heimlich, Searles, & Atkins, 2013). Of note to institutions developing engagement plans is that while visitors perceive volunteers/docents as valuable in delivering institutional messages (Mony & Heimlich, 2008), visitors consider those with job titles focusing on interpretation and education as experts and more trustworthy (Fraser, Taylor, Johnson, & Sickler, 2008).

The shift to a conservation education focus and its subsequent promotion encourages visitor expectations and agendas to shift as well, potentially influencing environmental value orientations, attitudes, knowledge and behaviours (Fransson & Gärling, 1999; Kruse & Card, 2004). Arguably, visitor motivations and intentions for visiting are likely not specifically for conservation education (Packer & Ballantyne, 2010). Yet, zoos and aquariums are inherently free choice informal learning environments. Lacking the structured elements of formal education, these institutions invite exploration of information relevant to the visitor's interest. The potential for connection with and acceptance of conservation education messages increases due to visitors' ability to choose freely to engage with the content (Carr & Cohen, 2011).

By leveraging the universal interest and capacity of AZA-accredited zoos and aquariums in promoting conservation behaviours, the industry can capitalize on being free choice learning environments to promote institutional or industry-wide sustainability initiatives. To reinforce the adoption of

behaviours long-term though, a variety of post-visit resources should also be provided and 'designed to encourage reflection' (Hughes, 2011, p. 76). Neglecting to incorporate post-visit resources into engagement strategies may ultimately undermine the effectiveness of external sustainability initiatives because intentions reported by exiting guests do not necessarily translate directly into long-term behaviour change (Hughes, 2013).

As evidenced here, AZA and its member institutions recognize the opportunity for influencing visitor sustainability behaviours. However, significant barriers exist that prevent or delay many institutions from implementing either internal efforts or external messaging through visitor engagement. Money was primarily cited, with zoos and aquariums experiencing the unique challenge of prioritizing animal welfare over other expenditures, occasionally at the expense of other, already established, budget items. Grants and external partnerships assisted multiple organizations in addressing money as a barrier to internal initiatives. Institutional culture was secondarily listed as a consistent challenge. Not unique to the industry, resistance to change was common when implementing initiatives. Establishing reward systems in support of initiatives was commonly mentioned as a successful mitigation tactic. Time was also frequently listed as a challenge due to many staff facilitating multiple roles within their institutions. The existence of staff dedicated to sustainability, either in part or whole, assisted in providing individual organizations the capacity to address this challenge.

While AZA provides a guiding framework that encourages organizations to embed sustainability practices in operations, there is still opportunity for improvement in the dissemination of successes and challenges that can ease the transition of institutions just starting to broach the topic of sustainability, as well as for institutions interested in examining already-established practices in an effort to innovate. AZA's Green Practices Database provides a list of sustainability categories in which a limited set of responding organizations participate. Potential users would benefit from clarification of the categories, as well as inclusion of detailed strategies peers used at partner institutions.

This paper suggests that conservation and sustainability education, community-based social marketing, interpretive messaging, structural fixes and post-visit action-based resources are integral to pro-environmental values, knowledge, attitude and behaviour change. This research also generates the hypothesis that stronger and more cohesive communication among and between institutions will create a support system necessary for innovative and resource-sensitive standards for internal sustainability initiatives and visitor engagement. By developing and implementing solutions to currently perceived barriers and focusing on current best practices and emerging research, AZA member organizations have the opportunity to reinforce their

positions as leaders of conservation in their local communities, as well as the emerging advancement of a standard of sustainability within the leisure field.

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