MISSION

At IZE, we are dedicated to expanding the educational impact of zoos and aquariums worldwide. Our mission is to engage our members around the world to achieve biodiversity conservation by encouraging sustainable behaviors in people who visit zoos and aquariums.

We provide resources to help our members improve their education programs; offer access to the latest thinking, techniques, and information in conservation education; and support excellence in animal care and welfare.

VISION

Conserve global biodiversity through effective zoo and aquarium programs.
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When I agreed to edit the IZE Journal I had no idea how time-consuming it would be, how tricky it would be to edit articles from such a wide range of authors, or how difficult it would be to select the articles to print. But, I also had no idea how rewarding it would be. Seeing the hard work of the authors, many of whom were writing in their second or third language; recognising their pride in their work; and sensing the depth of commitment to people and the environment was humbling.

As I read each article I felt increasing pride in the IZE and the incredible hard work that takes place every day of the year in hundreds of zoos and aquariums around the world. Each article captures something different and the articles we have selected for this edition are from almost every region. As you read about the amazing work that IZE members around the world are doing to inspire people to care for nature I am sure that you will feel the same pride in our work and our unique ability to connect people to nature. And I hope that each of you will feel motivated to continue to raise the standards of our work, inspire more people to care for nature and focus increasingly on helping people to make lifestyle choices that help the environment.

I would like to thank the regional IZE representatives for sourcing articles and Rachel Bergren for her editorial eye. A huge big thank-you goes to Akane Hatai for her hard work in bringing this journal to life. She is responsible for the crisp new look and feel of our journal. A final thank you to all the authors – without you there would be no journal.
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Introduction

The Jerusalem Biblical Zoo is a well-known and beloved institution established in 1940 and relocated 25 years ago. As part of the zoo’s expansion plan, an additional 14 hectares was added to the existing 25. The zoo’s master plan selected a public aquarium as the anchor project for the expansion.

This decision coincided with the recommendation of the Ministry of Environmental Protection’s National Biodiversity Plan published in 2010 which identified Israel’s aquatic habitats as the most critical environmental issue facing the country. The plan recommended the establishment of a national aquarium to raise public awareness of these challenges. Although Israel has two shorelines - the Red Sea and the Mediterranean Sea – until now the closest thing to a public aquarium was the underwater observatory in Eilat.

The aquarium’s design and construction was funded by the Ruth L. and David S. Gottesman Family Fund of New York and included consultation with both local nature conservation experts and international experts in the design and operation of aquariums. These discussions conceived the storyline – an aquarium representing the four seas of Israel: the Red Sea, the Mediterranean Sea, the Sea of Galilee (a freshwater lake) and the Dead Sea (a hypersaline lake). Within this storyline, the main focus would be marine habitats to differentiate the aquarium from an existing aquatic exhibit at the Biblical Zoo, which focuses on local and global freshwater habitats and relevant conservation issues.

The construction process began in 2012 and lasted about 5 years. In tandem, a team was formed to create the education plan and educational in three languages – Hebrew, Arabic and English. This multi-disciplinary team consisted of the Aquarium’s Director of Education, the Director of Development for the Zoo and Aquarium, and the Zoo and Aquarium’s General Curator who together were able to create relevant, scientifically accurate and interesting content that added a further dimension to the visitor experience.

The starting point was an in-depth document – the “Education Program Content Outline” - divided into three columns: the first with the name of the exhibit and a conceptual image of what it would look like; the middle column providing an overview of the information and content to convey; and the third column setting out any special considerations and recommendations. During the process of writing the document we succeeded in distilling the themes and messages we wished to impart at each exhibit, while at the same time preparing a comprehensive educational story to complement the animal collection.

The education plan deals with scientific, behavioral, biological, conservation, cultural and geographical issues. We will outline some of these topics in more detail below – particularly those that touch on Israel’s unique habitats: “What is a fish?”: as a starting point, we provide visitors with a diagram and explanation of basic fish anatomy; as well as basic concepts in fish classification.

Marine mammals: as marine mammals can no longer be kept in captivity in Israel, we explain why we do not have marine mammals in the aquarium while at the same time emphasizing their importance in the ecosystem. We describe the diversity of marine mammals living in the Mediterranean and Red Seas, and tell visitors the extraordinary story of the Mediterranean monk seal that became extinct from Israeli waters about 80 years ago and has again been sighted since 2010. In addition, we provide visitors with the number to call if they encounter a marine mammal in distress.

Dugongs: we inform visitors about these Red Sea marine mammals which are mentioned in the Bible and connect the Biblical theme by explaining the historical use of dugong skins in the construction of the Tabernacle, as well as in the manufacture of sandals in those times.

Fishing and over-fishing: an overview of the important role of fishing in human culture and the various commercial fishing methods is provided. We actively encourage visitors to make informed choices regarding the species they consume and warn them about local species of groupers, most of which are threatened due to overfishing.

Maritime history: we provide information about the significance of the Mediterranean and Red Seas as important routes for ancient merchants and travelers that allowed for trade and cultural exchange between emergent peoples of the region. This history is crucial to understanding the origins and development of many modern societies. We touch on this theme at various places, for example the ancient trade in the Hexaplus trunculus sea snail for its dye, which was used for clothing.

Lessepian Migration: visitors are introduced to this unique local phenomenon where mainly Red Sea species have invaded the
Mediterranean Sea via the Suez Canal. These invasive species have a significant impact on the ecology of the eastern Mediterranean.

Kashrut: between the lobster and eel exhibits (two non-kosher animals) we placed a sign dealing with the requirements of Jewish dietary laws relating to aquatic animals. The idea behind this sign is two-fold - to give Jewish religious visitors the ability to connect to the educational content; and to interest visitors and tourists from other communities and religions (Jerusalem is a multi-cultural city).

Successes in nature conservation: this signage wraps up the aquarium visit with information on the important role of aquariums in marine conservation through examples of successes and ongoing zoo- and aquarium-led conservation projects from all over the world.

In addition, we cover topics such as schooling, Israeli coastal habitats, ecosystem services, seahorse breeding biology, camouflage, local deep sea sponge gardens and coral reefs, food webs, shark, ray and sea turtle biology and conservation, the importance of algae, corals and coral reefs including threats, jellyfish, plastic in the ocean, the breeding and quarantine area, filtration systems, shells, and the inter-connectedness of the seas and oceans.

Selecting a design language and adapting the education plan outline to education materials

The next stage of the process included the selection of a graphic design company which was given a brief about the philosophy of the desired design concept – appropriate for a family experience, simple and clean design language, very subdued lighting, font size complying with Israeli accessibility laws, and the use of infographics to reduce the amount of text.

We also began the process of crafting signs with content from the Education Program Content Outline document. This included refining each idea and related content to short, accurate texts - not an easy process as it entails prioritizing certain messages over others and setting aside some topics because of lack of space and other issues. Refining and clarifying the issues is also important to ensure the designers are able to prepare accurate illustrations. Gathering a collection of reference materials is essential.

The process also includes testing materials. The initial concept of signage printed on wallpaper was tested and found to be wanting both in terms of visibility and durability. Accordingly, we decided to change the concept and to utilize signage affixed to the wall. A design change at this stage in the process forced us to change the length of texts and the number and size of illustrations.

As our aquarium is indoors and completely dark, we had to find a solution to properly illuminate the species identification signage. We decided to shorten texts as much as possible, by using a variety of icons to represent for example, size, habitat, etc. We also settled on using hyper-realistic illustrations, because it is not always possible to find good quality images of aquatic species. Because of the number and variety of species in the aquarium, not all species are represented by individual signs and it was a further challenge to select which species to identify in this way.

Use of technology

We decided to use technology to supplement static “classic” signage but made a conscious decision to limit it, so as not to compromise the family-oriented experience of the visit (eg. we chose not to use QR codes and limited the cell phone and internet reception within the building).

We decided to utilize the last gallery in the visitor path as a call to action for visitors. Here we created an interactive “Commitment Wall” comprised of five touchscreen tablets with specially-developed software that invites the visitor to commit to being guardians of the seas and oceans. Visitors insert their personal information together with an email address (and age) and then commit to a list of behaviors that serve to protect marine habitats. At the same time their picture is taken and this appears on a large screen with a counter of how many people have made the commitment. The visitor receives an email with the list of commitments. Furthermore, by providing an email address, the visitor joins our community to receive updates on various conservation issues and events.

To explain concisely to visitors the conservation issues created by the Suez Canal – given that it is not possible to exhibit the phenomenon of Lessepsian migration - as well as to create some variance in the visitor experience, we created a 4
minute film highlighting the economic role of the Suez Canal as well as the resulting invasive species. The film is screened in Hebrew with Arabic and English sub-titles.

Close to the start of the visitor path, a dynamic map runs in an infinite loop displaying the world’s hot and cold ocean currents, and the location of tropical reefs around the globe.

**Multi-lingual signage**

All signs were produced in three languages - Hebrew, Arabic and English. This decision reflects the multi-cultural society of Israel in general and Jerusalem in particular and the commitment of the Biblical Zoo to reach all sectors of society, regardless of religion, ethnicity, or political background. Unlike other aquariums where signage is produced in three languages (for example Denmark’s national aquarium), in our case there were several unusual challenges: direction of writing (Hebrew and Arabic are written from right to left); English text is usually 30% longer than both the Hebrew and the Arabic text (because vowels are not used in Hebrew and Arabic); and different alphabets for each language. These challenges required creative solutions for text arrangement and choice of fonts to avoid a heavy text burden and a discordant look.

Installing touch screens near the large exhibits helped solve both the problem of signage in multiple languages and multiple species signs next to each exhibit. In order to prevent text density, each language can be accessed separately in the application. The application can be updated easily as the zoological collection changes. For interest, we also added a film showing the aquarium construction process.

Another challenge was not being able to find accurate translations of certain scientific concepts in Arabic. For example, the word “spawning” does not exist in Arabic. Moreover, finding official fish names in Arabic was particularly challenging because fish names differ from town to town not to mention from country to country. Sometimes we had to use the transliteration of the scientific name or a name that we judged to be clear and understandable to most Arabic speakers.

**Conclusion**

After a long and complicated process involving staff members, contractors, consultants and donors, the Israel Aquarium opened its doors to the public in June 2017. Initial observations of visitors show that they are engaged by the signage – we know this from questions put to our staff based on signage content. The graphic design and colorful pictures succeed in drawing people in; and they are then likely to read at least some of the text. Children are drawn to the touch screen; and most people are very interested to find out what species of fish they are looking at, and to learn more.
Sharks play a vital role in the health and well being of our ocean environment. As top predators, sharks help maintain a healthy balance in prey populations by removing sick and weak individuals (Griffin, Miller, Freitas, & Hirshfield, 2008). Despite this important role, sharks are still considered controversial and often feared by the general public due to sensationalized stories and stereotypes. Since a quarter of the world’s species of sharks are threatened with extinction, the continuation of these misunderstandings is of growing concern (Dulvy et al., 2014). Although sharks receive a lot of media coverage, their future is uncertain as controversial animals are often overlooked for protection and conservation. As such, it is essential not only to address misconceptions, but also inspire appreciation for sharks.

Children’s perceptions of animals are often carried with them into adulthood, shaping their ability to learn about and empathize with generally unfavored animals (Sorin & Gordon, 2016). Children receive information about animals and the natural world from many different sources, including books. As such, children’s literature can be used to promote learning and interest in environmental issues, even from a young age (Kellert & Westervelt, 1983). Wildlife themed storybooks allow youth the chance to generate an emotional connection with the natural world. Similarly, these types of books have been found to improve attitudes, dispel myths, encourage discussion about conservation, and alter unfavorable viewpoints (Burke & Cutter-Mackenzie, 2010). While it is well understood that the media can influence the public’s perception of unfavored animals (Muter, Gore, Gledhill, Lamont, & Huveneers, 2013), studies on how storybooks influence children’s perceptions of these same animals are less prevalent. In an attempt to shed light on the complexities of children’s understandings of sharks, our study explored whether books with personal connection texts and questions address negative stereotypes and misconceptions.

In storybooks, anthropomorphism, attributing human characteristics and emotions to animals, is a long-standing technique used by authors to encourage young readers to identify with animals. Previous research suggests that after reading storybooks with anthropomorphic animal characters, children are more likely to give factual and biological explanations of real animals if the animal characters are presented in a more realistic manner portraying limited human social and psychological abilities (Geerdts, Van de Walle & LoBue, 2016). Similar to realistic anthropomorphism, we investigated whether personal connection text and questions that connected children’s everyday actions with that of sharks could change children’s perceptions of sharks when compared to the same storybook that included only facts about sharks. Personal connection text and questions included examples such as, “Sand tiger sharks gather together in large groups where they find food. Do you like to eat lunch with your friends?”

**Methods**

**Study Approach and Participants.**

Informal education centers such as zoos and aquariums receive more than 700 million visitors annually (Gusset & Dick, 2011). Consequently, zoos and aquariums have an opportunity to impact attitudes about animals and their conservation which can have lasting benefits (Gusset & Dick, 2011; Seraphin, 2010). To aid in this venture, the North Carolina Aquariums, in conjunction with Unite For Literacy, designed a book that highlights common facts about sharks that are often exaggerated by stereotypes. We used this book to investigate children’s attitudes about sharks in a formal educational setting. The book contains personal connection texts and questions for the reader. These questions and texts were designed to encourage a link between the everyday actions of children and sharks (for example, a child using a fork and a sand tiger shark using its teeth like a fork). A modified book, which focused on facts, without the personal connection text and questions, was also written.

Children (ages 9-10) from two fourth grade classes (N=37) participated in the study. The students were divided into two groups (n=19 and n=18) based on their existing fourth grade class. The students in Group A were read the original book, while students in Group B were read the modified version. Specific information on ethnicity, gender, and socioeconomic status was not collected as part of this study. However, general demographic information about the county indicates that this population of students may represent a range of ethnic and socioeconomic diversity. Miami University’s Institutional Review Board approved all procedures in the study and parents gave
written consent for their children’s participation. Students also gave verbal assent to participate in the study. Upon completion of the study, students received a copy of the Sand Tiger Sharks book.

Data Collection and Attitude Assessment
Before and after reading the book, Sand Tiger Sharks, students were asked to create a drawing with labels and share verbally their ideas, opinions and beliefs about sharks through open-ended conversations. Each student was also asked to “List the first three words that come to mind when thinking of the word shark.” The use of “first-word” impressions allowed children the opportunity to express ideas that they may not have been able to draw (Seraphin, 2010). Other prompts included “Tell me about your drawing” and “How do you feel about sharks?” In the questioning, positive and negative descriptive wordings were avoided to minimize bias.

Using word themes developed by Seraphin (2010), we created a flowchart to separate shark words into emotional and non-emotional categories. Within the emotional word group, words were further divided into negative and positive. Likewise within the non-emotional group, words were divided into science content and stereotypes. Words which could not be placed into the above categories were considered unclassified (Figure 1).

Analysis of Drawings
Hughes’ (2013) study on investigating youth’s perceptions of cheetahs through storytelling and Fawcett’s (2002) study on Children’s Wild Animal Stories inspired our methodological analysis. We used Chambers’ (1983) Draw-a-Scientist-Test as a tool to assess students’ perceptions of sharks through drawing. In an unobtrusive manner, drawing can also give students the opportunity to reflect and articulate their ideas and perceptions in a way that could be more comfortable and interesting to them (Hughes, 2013; Fawcett, 2002).

Chambers (1983) used seven standard image indicators (eg. lab coat and eye glasses) to analyze the extent to which a drawing presented the standard image of a scientist. In an attempt to remove subjectivity, we did not choose any indicators of the stereotypical image of a shark. Instead, we used interpretative phenomenological analysis (IPA), similar to that used by Hughes (2013). We examined the students’ drawings for details “within [the] experience that may be taken for granted” with the objective of achieving a sense of understanding (Laverty, 2003; Titscher et al., 2000). IPA is a particular method of qualitative analysis of data that “aims to offer insights into how a given person, in a given context, makes sense of a given phenomenon” (Orford, 2008).

Pre-drawings and post-drawings of Group A and Group B were separated and each drawing was analyzed for central characteristics that appeared to represent how students perceived sharks. We identified major themes through the use of conceptual and nonlinear emergent processes and discuss a selection of those themes here.

Results

Children’s Word Choices
Before reading Sand Tiger Sharks, many students used negative (Group A - 45%:, Group B - 41%) and stereotypical (19% and 28%, respectively) words to describe sharks (see Table 1). After being read the book with personal connection text, students most frequently used positive words (36%) to describe sharks. For those who were read the modified book, many students used stereotypical words (32%). Although paired pre to post comparisons revealed no significant change in the use of stereotypical words, after reading the original book with personal connection text there was a significant increase in positive words (p = 0.04) and a significant decrease in negative words when reading the modified shark facts only book (p = 0.05).

Perceptions of Sharks Based on their Role as a Predator and Drawing Analysis
In over half of the pre-reading drawings (57%), sharks were shown chasing or eating prey. First impression words that accompanied these pictures often included “meat-eater,” “blood,” or “predator.” Drawings in this theme appeared to demonstrate students’ understanding that sharks were top predators in the ocean. After the reading, this theme was still apparent in both groups of students. However, the language and words accompanying the drawings changed. More than half of the drawings (63%) now included words such as “helpers” and “boss of the ocean,” especially in post-drawings from students who read the book with personal connection text. (Figure 2).

Although post reading drawings still demonstrated sharks as predators that could attack and kill prey, students did not appear to depict as much fear or hostility towards sharks in their work. Interestingly, drawings by the group that read the facts only book revolved around human and shark interactions. Before the reading, only 3 drawings included humans, all of which illustrated humans either being eaten by sharks or running away from sharks while on the beach. After the reading, all 3 drawings by the same students included humans swimming or boating alongside the sharks. In fact, 2 out of the 3 drawings included the human characters smiling. Additionally, 2 of these drawings now showed sharks pursuing the correct prey (i.e., fish) instead of people.

After reading both versions of the book, Sand Tiger Sharks, students appeared to represent sharks in a more positive manner, demonstrating less malice and fear. For example, a student prior to reading stated, “all good sharks are dead sharks” and drew a de-finned shark. After reading, this student depicted an intact shark and said, “I guess sharks are more interesting than I thought” (Figure 3).

Beyond the perception of sharks as predators in the pre- and post-reading drawings, other emergent themes included the anatomical presentation of the sharks, colors used, and type of shark. Of the 51 total colored shark drawings, the majority (96%) represented sharks as blue, black, or gray. Out of a total of 74 drawings from both
groups, all showed a caudal fin, 91% showed a dorsal fin and/or pectoral fin, 84% showed teeth, and over half (59%) included gills. Of the 74 total drawings only 8 drew a distinctly differently shaped shark (such as a hammerhead shark or a thresher shark with a long tail). Overall, most students created a visually similar shark before and after reading both version of the Sand Tiger Sharks book. Although student’s drawings were similar pre- and post- reading, a difference in descriptive language was observed.

From this study, we find several indicators for potential differences between the book with personal connection text and the book with shark facts only. We observed an increase in phrases such as “like me” or “like humans” or, for example, an illustration showing sharks going out to eat in groups (an example used in the personal connection book; see Figure 4). As such, we hypothesize that books with personal connection text and questions may be useful for the intended purpose of this activity, which was creating a meaningful connection between the reader and sharks.

Table 1: Words used to describe sharks

<table>
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<th>Shark Words</th>
<th>Total Pre A</th>
<th>Total Post A</th>
<th>t-test</th>
<th>p Value</th>
<th>Total Pre B</th>
<th>Total Post B</th>
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<td>Positive</td>
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* Asterisk represents statistical significance after paired t-test analysis of paired pre and post samples.

Discussion and Conclusions

A growing number of educators, both informal and formal, have embraced the value and impact that storybooks can have on young children’s interest in learning about wildlife. In many ways, children’s literature allows for connections to be made between classroom learning and the outside natural world. At an important developmental stage, storybooks may influence a child’s environmental behaviors in the future. Books with added personal text and questions can connect young readers with scientific information in an age-appropriate and familiar format. This format can enhance young reader’s understanding of the relationship animals have with humans and their habitats. In general, books can be a catalyst for observation and a path to informed dialogue that is crucial to critical thinking. As such, zoos and aquariums are uniquely positioned to capitalize on using storybooks to inspire learning experiences and help address children’s misconceptions about environmental topics, including endangered large predators. Storybooks with added personal text and questions may be a useful educational tool in increasing children’s knowledge of a particular animal species, while also addressing possible negative perceptions.

Aquariums and zoos have the opportunity to use storybooks as a technique to engage visitors in shark conservation and alter children’s perceptions. Overall, it is important to note that this study represents only a small fraction of children’s experiences with sharks, the media, and books. It is unknown how exposure to this type of storybook over an extended period of time relates to a shift in attitude of children long-term. However, we hope that our work will inspire group reading and conservation education learning experiences at other zoos and aquariums.
Acknowledgements
Special thanks to Amy Harpe, Debbie Garris, and Jamie Bercaw Anzano for their endless support and help with implementation. This work was conducted as a part of a graduate study through Project Dragonfly at Miami University in Oxford, Ohio.

References


Methodology

Site and school selection

The program took place in the Cuc Phuong National Park (Ninh Binh Province), the first national park in Vietnam, and at the Carnivore and Pangolin Education Centre of SVW. A total of 14 kindergartens located in the buffer zone of the park were selected to be the first beneficiaries.

Program design

Understanding the crucial roles of families and schools in children’s development and education, SVW strategically organized two workshops for 177 representatives including education leaders, teachers and parents to inspire them to get involved in the program (the first workshop), and to evaluate its effectiveness prior to expanding the program (the second workshop).

A total of 50 trips with approximately 25 children per trip enabled 1,173 preschoolers to participate. Two SVW’s educators supervised each trip, with support from one parent and three teachers.

Children’s activities were designed to meet three domains of learning: Cognitive, Affective and Psychomotor (Leslie Owen Wilson, 2016). The storytelling method, which has a powerful effect in teaching about values, beliefs, love and appreciation was used with other hand-on activities. The arts, like singing and dancing, were also integrated in the program. Children enjoyed open-air activities in the morning and outdoor-indoor lessons in the afternoon.

After arriving at the forest, children were warmed up with music and dance to remove the fear of the wilderness and raise their enthusiasm. Then, all their senses were awakened by the sounds, signs, smells and feelings of the forest during an exciting exercise. Next, they listened and reacted to a story of the journey of a young boy and girl exploring the forest. After that, they were introduced to the concept of becoming junior explorers and equipped with basic knowledge and magnifying glasses to find hidden tracks of animals. Once the children completed their discovery, educators introduced litter issues through a fun and friendly competition on how rubbish affects wildlife and what children can do to protect nature.

In the afternoon, children moved to the education centre, housing seven large animal enclosures and an interactive education house with an interpretation exhibit, fun game and a kids’ room. After learning to recognize some carnivores and pangolins, understanding their threats and seeing what SVW has been doing to protect wildlife, children met some long-term animal residents, watched them being fed and listened to their real life stories. Lastly, they were given the animal story books and animal drawings to take home and share with their families.

Project Evaluation

204 students were randomly picked for assessment. On each trip, two educators and two trained teachers interviewed four children by questionnaire before and after the trip. An additional survey was conducted with 177 parents and teachers for their feedback on the program. The data were then analyzed.

Communication and Fund Raising
It is important for SVW’s team to focus on communication and fund raising to develop future phases for the program. Various magazines and film crews were invited to publicise the program. The team captured photos and videos of each trip to send to schools and families to record memorable moments. These resources contributed greatly to communicating and fundraising.

Results
The results from interviewing 204 children show positive changes in children’s understanding (Figure 1) and attitude (Figure 2) toward wildlife and nature protection.

Identifying the endangered species
Five endangered species were listed in the questionnaire including Sunda pangolin (*Manis javanica*), Binturong (*Arctictis binturong*), Leopard cat (*Prionailurus bengalensis*), Owston’s civet (*Chrotogale owstoni*) and Smooth-coated otter (*Lutrogale perspicillata*).

Before the trip, only 7% could recognize all five animals, which were separated into two groups: less well known and more easily identified. The first group was not well recognised—only 13% of respondents could recognise an otter, followed by binturong (16%) and Owston’s civet 21%. The second group had a higher percentage of correct responses as 46% could recognise a pangolin and 77% a leopard cat.

The post-survey results indicated a dramatic increase in the animal recognition of all five animals from 7% to 34%. Impressively, 98% of respondents could now recognise a leopard cat. For binturong recognition increased from 16% to 79%, while the rate for pangolin doubled from 45% to 93%.

Attitude changes to wildlife
Children were asked how to respond to behaviours in particular situations (e.g. eating wildlife, breeding wildlife, wildlife possession, etc.).

The survey demonstrated that students who had participated in the program showed increases in conservation-positive attitudes (Figure 2). Overall, there was a positive change from 41% in the pre-visit survey to 81% post-visit survey. This shows that the education content was effectively delivered, helping to enhance participants’ positive mindset towards nature and wildlife.

Feedback from parents and teachers
Teachers and parents responded positively to most questions about the program. All feel satisfied and want to join similar programs, 99% find the educators caring and active, 99% showed their desire to continue such programs in the future, demonstrating their appreciation for the program and interest in wildlife conservation. Only 0.5 % thought that the activities are too difficult for the children. The results have helped the team to revise the activities for future phases.

Discussion
Appropriate education work for 5-year-old children.

When evaluating the activity design and the survey results, it was noticeable that the correct identification rates aligned with how frequently the animals appeared in the stories and activities. Short films and moving stories also had a positive impact on children’s love for animals, helping them to remember the species quite well. Lastly, observing real animals helps to increase the children’s ability to remember and identify the animals.

Cooperating with families and schools: a right approach
Cooperation amongst conservation organisations, families and schools can shape positive behaviors and increase children’s understanding of wildlife protection. In Vietnam, binturong and owston’s civet are uncommon endangered species, resulting in the lower recognition rate. While the pangolin and leopard cat are also rare species, they were
recognised more readily. This can be explained as the parents and teachers who participated in the first workshop may have told their children about these two species before the trip, helping them to more easily recognize the species, leading to this higher rate.

**Expanding the program to more children:**

*a promised plan*

SVW covered 100% of the costs of the pilot program, because of the disadvantaged status of the beneficiaries. As a result of the program’s success, it was expanded to preschoolers at 28 kindergartens in 2017 – 2018. More 1,713 preschoolers attended, adding up to total 2,886 children over 115 trips till March 2018. The schools and families have also agreed to share one third of the trip expenses, showing the communities’ concern and involvement in the conservation activity and children’s education programs.

Furthermore, Vingroup Joint Stock Company (Vingroup JSC) donated a 29 seated bus for the program to help expand the opportunity to more children in Vietnam.

**Continuing to develop the program for primary and secondary students**

Our donors continue to support the program, as well as its expansion to primary and secondary students between 2017 and 2019. In 2017 – 2018 about 896 students at three primary schools near Van Long Wetland Nature Reserve, Gia Vien district, Ninh Binh province will participate in a similar program.

**Attracting positive media attention: key for more successes to come**

There has been great attention from three national television channels, six major daily Vietnamese newspapers, one film crew from ARTE in Germany, one from the broadcasting ABC (Australia) and the BBC (UK). We will continue to work with the media to spread the message in the future.
Conclusion

This was the first successful conservation program for kindergarten children in Vietnam, helping to build the relationship amongst SVW, local authorities and many other stakeholders. It provides our education team with an opportunity to reach our mission and allows local children a unique first-hand opportunity that otherwise would not have been afforded. Our goal is to continue to expand the program for preschoolers across of Vietnam, as well as to develop the project for higher ages to create long-term education programs towards nature and wildlife conservation for the youth of Vietnam.

Acknowledgements

The authors would like to acknowledge the work of the Education Outreach Team at SVW. Special thanks to Huong Dao Thi Thu and Linh Vu Thuy for joining the team to expand the program. Big thanks to Thai Van Nguyen, Gillian Fuller, Thao Dang Thi Phuong and Phap Nguyen Cong, all from SVW, for supporting in communication and fund raising. We would also like to thank all SVW staff, staff of Cuc Phuong National Park, local authorities, children’s schools and families.

We appreciate the support from Welttierschutzgesellschaft.e.V, our key sponsor, the Alice C Tyler Perpetual Trust, Vingroup JSC and all contributed individuals and organizations. Also, we thank educators from IZE, especially Stephanie Christine Pace, for reviewing activity design and evaluation. Finally, thanks to communication agencies and people for spreading the word about the program.

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Leslie Owen Wilson, Three Domains of Learning – Cognitive, Affective, Psychomotor. Available at https://thesecondprinciple.com/instructional-design/threedomainsoflearning/
The increasing pressure human activities place on the natural world is pushing many of the species that live in our UK communities to the brink of extinction. Public awareness and appreciation of the species that share our urban and suburban spaces is decreasing rapidly, which puts the future of UK wildlife in ever-greater jeopardy. While direct field conservation is vital for the protection of threatened species, zoos have a unique opportunity to play a key role in conservation by encouraging people to reconnect with wildlife and engage in conservation activities (WAZA, 2015). The Discovery and Learning department at Chester Zoo developed the Wildlife Champions project, aimed at developing connections between people and wildlife, connections between people living and working locally to each other and connections across the landscape, for the benefit of wildlife. As an organisation with conservation and education expertise, as well as strong community links, Chester Zoo is well placed to train group leaders from a diverse range of community groups and provide them with knowledge, skills and resources related to wildlife conservation. Using their new knowledge and skills, alongside digital resources and specialized equipment provided by the project, trained group leaders become ‘Wildlife Champions’ and cascade this knowledge and these ideas to their community groups, enabling them to take action.

These actions include wildlife recording, and creating and enhancing habitats to support UK wildlife. The engagement and actions for wildlife are then digitally collated and mapped, allowing Chester Zoo to support the development of a landscape of connected habitats. The project utilises a range of engagement opportunities in addition to the training to provide opportunities for group leaders and their groups to learn more and maintain their enthusiasm for conserving natural heritage. The ultimate aim of the project is to leave a legacy of places for wildlife to thrive and communities and individuals skilled and motivated to maintain and record it.

This study considers the success of the project through tracking the extent of the information cascade, and evaluates the impact that participation has had on people’s attitudes and conservation actions.

The programme content
The Wildlife Champions training course was initiated in January 2016 consisting of 8 workshops, each lasting approximately 2 hours. Workshop themes were: Recording wildlife; Planting for wildlife; Birds; Hedgehogs and toads; Introducing invertebrates; Nocturnal wildlife; Water for wildlife; Access and interpretation. The workshops all involve a practical element so that participants can gain first-hand experience of activities such as recording wildlife or bird box building. In addition to the training a wide range of free digital resources were developed and made available through the Chester Zoo website.

A variety of relevant engagement activities are also available for the Wildlife Champions to extend their learning and develop a community conservation network. These include; Masterclasses – one day specialist workshops, Networking Events – bringing together community groups and conservation organisations, and Celebratory Events – providing opportunities for the Champions to share their progress and inspire others.
Materials and methods

A total of 100 community group leaders from 46 different groups were trained over the two-year period (2016-2017). In addition to the training, community group leaders also attended Masterclasses and Networking events. A total of 7 Masterclasses were held engaging 148 participants. Masterclass themes were; bee identification, hedgehogs, swifts, nature art, wildlife recording, amphibian and reptiles, moths and butterflies. Three Networking Events were organised to bring together community group leaders and conservation organisations.

The wider public were encouraged to get involved in the campaign through the project website and promotion, people were invited to sign-up to an e-newsletter and all of the resources available to the Wildlife Champions were made available to download. A total of 709 people/groups signed up to the e-newsletter and during 2016-2017, the Wildlife Connections area of the Chester Zoo website had 96,665 hits.

Chester Zoo also delivered a number of public engagement activities in the zoo to support the Wildlife Champions project goals. Activities demonstrated a number of ways in which the public could act to support UK species and demonstration sites around the zoo were used to show visitors some of the simple pro-conservation changes they could make at home. Over 7,000 people were engaged in Wildlife Connection activities within the zoo during 2016-2017.

Evaluation

The impact of the Wildlife Champions project on participants’ attitudes and behaviours was evaluated using a mixed qualitative and quantitative approach. A series of surveys and in-depth interviews were conducted before, during and after participation. Qualitative data were primarily analysed using a structured thematic approach, and quantitative data using standard descriptive and inferential statistics. The study found that over 70% of the participants attending the course were employed by the group/organisation that they were representing and over 60% of the groups represented met at least once a month. While the highest proportion of groups had 50 members or less, 18 groups that responded to the survey had groups ranging between 50 and 500+ participants. The fact that the 100 trained Wildlife Champions had a potential audience of over 8,000 powerfully demonstrates the potential reach and impact of training community group leaders in this way.

Wildlife Champions were asked to complete a follow up questionnaire between six months and one year after taking part in the training. All respondents confirmed that they had taken action for UK wildlife since the training with a wide range of activities being completed; the most popular being building bug hotels, creating log piles, and putting up bird feeders (Figure 1).

There was a significant increase in participant rating of the attitude statement ‘wildlife and people can happily live alongside each other’ and a significant decrease in participant rating of the statements ‘conservation is something that is done by organisations with lots of money’ and ‘economic growth is a higher priority than saving animal species’ (Figure 2).

Course participants also self-reported an increase in all of the following statements after taking part in the training course; my knowledge about how to protect UK wildlife, my knowledge of UK wildlife in general, the sense that the actions I take to help UK wildlife are meaningful, the feeling that I am making a positive difference...
for UK wildlife, the feeling that my personal relationship with nature is positive (Fig 3).

Qualitative results indicated the participants now express a greater sense of responsibility for conservation, an increase in knowledge and self-efficacy. Some cases also showed an increase in community involvement to achieve aims and create a sustainable way of working by collaborating with other conservation groups in the local area. This was demonstrated through the number of community members directly engaged in conservation action by Champions (estimated to be approximately 2,000 people), and also through an increase of Champions engaging with other conservation organisations.

**Conclusion**

The aim of the Wildlife Champions project was to create a regional network of habitats managed by skilled people to reverse and prevent the declines in native UK species. This study reveals that upskilling people, and facilitating the creation of new networks of people who can work together to make changes in their community is an effective way of bringing positive behavioural and attitudinal change to combat loss of connection with the natural world and loss of habitat for urban/suburban wildlife. Additionally, training community group leaders that had a potential audience of over 8,000 powerfully demonstrates the potential reach and impact of training community group leaders in this way.

**Acknowledgements**

We would like to thank the conservation organisations whose collaborative contributions were vital to the successful delivery of this project. Amphibian and Reptile Conservation; Canals and Rivers Trust; Cheshire Wildlife Trust; Friends of the Earth; North East Wales Wildlife; North Wales Wildlife Trust; RECORD/COFNOD; RSPB Chester Local Group & World Museum were all involved in a variety of ways including: attending networking events to meet the Community Groups and reach new audiences, delivering Masterclasses, hosting events at which Wildlife Connections have run activities, and providing support and advice to Community Groups. Wildlife Champions was delivered with the support of funding from Heritage Lottery (2016-2017).

**References**

The Lake Titicaca frog (*Telmatobius culeus*) is biologically unique; it is the world’s largest entirely aquatic frog. As the top endemic predator in Lake Titicaca, it is ecologically important. It is an indicator species that provides an important measure of ecosystem health for people and wildlife. *T. culeus* is recognized as critically endangered by IUCN. As with many amphibian populations in crisis around the world, the Lake Titicaca frog is imperiled by social and environmental threats, is declining at an unprecedented rate and could face extinction in the wild in the near future (IUCN, 2017; Angulo, 2008). The rapid decline of the population can be attributed to three known and challenging threats: overharvesting by people for human consumption, habitat degradation linked to water pollution and climate change, and disease such as chytridiomycosis; a disease caused by *Batrachochytrium dendrobatidis*, the chytrid fungus (Berenguel et al., 2016; Watson et al., 2017).

Denver Zoo in Colorado USA, Huachipa Zoo (Parque Zoológico Huachipa) and Titicaca National Reserve/National Service of Protected Natural Areas (Reserva Nacional de Titicaca/Servicio Nacional de Áreas Naturales Protegidas [SERNANP]) in Perú are committed to saving this unique endemic species through a comprehensive conservation program that includes biological research, captive breeding, capacity building, public awareness, conservation education initiatives, and working with local residents of the lake area to develop alternative sources of income. Bringing together their skill sets, knowledge and resources, the organizations work together to engage local communities in both Perú and Colorado, USA in efforts to protect the Lake Titicaca frog. This article focuses on the program’s community engagement approaches.

Denver Zoo

Denver Zoo, a conservation organization whose mission is to secure a better world for animals through human understanding, conducts wildlife conservation programs around the world. In 2008, as part of the globally coordinated awareness campaign Year of the Frog, Denver Zoo started the Lake Titicaca Frog Conservation Program. The program’s creation was based on recommendations from an amphibian conservation workshop hosted at Huachipa Zoo in Perú, and needs expressed by Association of Zoos and Aquariums (AZA) Amphibian Taxon Advisory Group (ATAG), the World Conservation Union/Species Survival Commission’s (IUCN/SSC) Amphibian Specialist Group (ASG), and the Conservation Planning Specialist Group (CPSG) Mesoamerica.

Huachipa Zoo (Parque Zoológico Huachipa)

Huachipa Zoo maintains a high standard of animal care, education programs, and conservation projects. Since 2009, Huachipa Zoo has participated in the Lake Titicaca Conservation Program. They are home to a Lake Titicaca frog exhibit and manage a captive population. In 2011 Huachipa Zoo successfully bred Lake Titicaca frogs, and are believed to be first zoo in the southern hemisphere to do so.

Titicaca National Reserve/National Service of Natural Protected Areas (Reserva Nacional de Titicaca [RNT]/Servicio Nacional de Áreas Naturales Protegidas)

Titicaca National Reserve, a program partner since 2012, is the only protected area within the Lake Titicaca frog’s range in Perú. The Reserve is a unit managed by SERNANP, Perú’s protected area management agency. It functions to preserve biological diversity and ecological processes of Lake Titicaca. Located in Perú and Bolivia, Lake Titicaca is the second largest lake in South America and at over 3,800 meters above sea level is the highest lake of its size in the world. It is the only home to the Lake Titicaca frog (*Telmatobius culeus*).

The Program

Together, the organizations have come together to address one goal – the sustainable conservation of the Lake Titicaca frog and its habitat. A stable,
viable and resilient population of the Lake Titicaca frog is achieved through various strategies, including biological research, protected area management support, and community engagement. Successful biodiversity protection projects must acknowledge the dynamic interplay between society and biodiversity (Bennett et al., 2017; Lauber et al., 2011). Community engagement is a key component in the pursuit to save Lake Titicaca frogs. The program has five approaches to community engagement:

1. Capacity Building
Sound conservation projects must address both the social and economic needs of a community, providing skills that empower and build local capacity (Cooney et al., 2017). In 2010, Denver Zoo and CPSG Mesoamerica co-facilitated the first Conservation Strategy Planning Workshop in Peru for the Lake Titicaca Frog – bringing together and empowering key stakeholders (including Huachipa Zoo and Titicaca National Reserve) to create a strategy for addressing the growing decline of the Lake Titicaca frog. Since the first workshop, Denver Zoo has supported undergraduate and graduate research at Cayetano Heredia Peruvian University, ranger training for Titicaca National Reserve staff, education and interpretation training for Huachipa Zoo and the Reserve, and provided for professional exchanges between the Reserve, Huachipa Zoo and Denver Zoo.

In addition, the partners helped establish a local women’s collective in Puno, on the shores of Lake Titicaca, Perú – Ccori Ampara, “Hands of Gold,” in Aymara, the women’s native language. The collective, made up of 30 women, make a variety of frog-related handicrafts that they sell to community members and tourists; by incorporating frog-themes into their handicrafts, the women help spread the awareness to their communities on the importance of the Lake Titicaca frog while gaining supplemental income.

2. Social Marketing
Public outreach is a critical component for successful conservation of the Lake Titicaca frog; in 2012, Denver Zoo partnered with Rare, a global leader in using behavior change to achieve long-lasting conservation results, to develop a social marketing campaign. The campaign consisted of posters, stickers, mass media promotions, and community events. The goal was to change social norms and catalyze pro-conservation behaviors to save the Lake Titicaca frog in target communities around Lake Titicaca, Perú by measuring their knowledge, attitudes, and behaviors towards the frog. Impacts of the campaign included a large increase in the knowledge of, positive attitudes toward and conservation action for the Lake Titicaca frog (from 33% to 76%) and the number of those who were “very inclined” to support efforts help the frog almost doubled (from 20% to 40%).

As a result of the social marketing campaign, the species has received attention in local, national and international mass media, including a short-documentary viewable on the Internet. In addition, two frog mascots were created, Telma and Tobias. Together their name forms Telmatobius, the genus name of the frog. At Huachipa Zoo, the mascot Telma has her own fan club. In addition, the Zoo has created a children’s book series and is the featured character in the Zoo’s “Guardians of Nature” wildlife show to promote social change. Telma has a house made of recycled materials and a garden on Huachipa Zoo grounds that allow visitors to take conservation action by tending a garden and bringing recyclables to the zoo. Titicaca National Reserve uses a second frog costume, Telma’s counterpart Tobias, to spread important conservation messaging to lakeside communities and visitors to the protected area of Titicaca National Reserve.

Thanks to the positioning of Telma and Tobias by partners, they have become the recognizable images of Lake Titicaca frog conservation in Perú and a tool for sustaining the social marketing campaign and instilling a sense of pride in the Lake Titicaca frog. The Lake Titicaca frog was adopted by the Reserve as its second official animal symbol; the first being a critically endangered grebe also endemic to the lake. To further awareness raising efforts, in 2012 the Regional Government of Puno issued an ordinance “Declaring the Regional Interest and Public Necessity: Declaration of the Lake Titicaca Frog as a tourist attraction in the Puno Region.”

3. Species Celebration Days
Conservation education paired with community action can result in a powerful partnership (Jacobson et al., 2006). Both Huachipa Zoo and Titicaca National Reserve facilitate annual Species Celebration Days to achieve this.

In Lima, Huachipa Zoo hosts an annual Frog Day where school children participate in hands-on education activities to promote knowledge of, positive attitudes toward and conservation action for the Lake Titicaca frog. Results from a questionnaire administered to 62 student participants revealed a high level of knowledge about the frog; students were able to select the image of an amphibian from a set of other animals, correctly name the characteristics of an amphibian, and identify the threats to the frog and the frog’s habitat. However, findings showed students struggled to identify actions to take in their own life to help the frog. This
is likely due to the age of the children (more than half were 6 years or younger) and their geographic separation from and lack of connectedness to Lake Titicaca (Lima is 1,000km from the lake.) These evaluation results will be used to refine situationally-appropriate and age-appropriate conservation messages for this audience.

To reach audiences directly connected to the lake ecosystem, Titicaca National Reserve hosts an annual Symbolic Species Day celebrating its two animal symbols, one of which is the frog. An average of 2,000 community members, teachers, and parents from the nine administrative districts surrounding the Reserve attend each year.

These Species Celebration Days have grown beyond a focus on amphibian awareness and conservation to general environmental education and have attracted the participation of non-governmental conservation groups who work with other taxa as well as Peruvian governmental wildlife authority representatives.

4. School Ecological Brigades at Lake Titicaca
In cooperation with the Titicaca National Reserve, Denver Zoo and Huachipa Zoo have supported the Ecological Brigades (Eco-Brigades). Eco-Brigades are an initiative of Lake Titicaca National Reserve, made up of 325 high school volunteer students and teachers who are focused on protecting the environment, and in particular the Lake Titicaca. When youth have opportunities for collaborative decision-making, this experience enables youth to exercise control of their environment and build confidence (Chawla and Cushing, 2007). Teachers located in twelve schools near Puno are trained in environmental education to implement a series of eight lessons throughout the year with their respective Eco-Brigade. Youth are more likely to participate in conservation action if they have supportive role models, with teachers serving an important role to facilitate and encourage youth (Chawla and Cushing, 2009).

To celebrate their impact, each November the “The School Eco-Brigade Convocation,” is held to promote the exchange of their yearly environmental activities, discuss environmental issues facing Lake Titicaca and reflect on how to protect the Lake Titicaca frog. A post-participation survey of Eco-Brigade participants demonstrated an understanding of the importance of the frog, the lake and the threats faced by both, a sense of empowerment (97% of respondents agreed they were able to positively impact Lake Titicaca), and concrete actions they can take to protect the frog. The evaluation results suggest a need for program providers to focus more on the concept of endemism; when asked if they understood what endemic meant, 39% of Eco-Brigade participants said “yes”, 28% said “no”, and 33% did not respond. From a conservation education standpoint, that Lake Titicaca is the only home to the species is an important concept to instill local pride and needs to be emphasized.

5. Zoo Exhibitory and Education
Denver Zoo and Huachipa Zoo collaborate on captive breeding of these ambassador animals. Denver Zoo provided technical assistance, equipment and financial support to Huachipa Zoo for an amphibian exhibit that opened in 2010, making it the only zoo in the southern hemisphere to exhibit the frogs. Huachipa Zoo’s exhibit contains educational amphibian messaging and includes information about the importance and ecology of the Lake Titicaca frog; Huachipa Zoo hosts almost 1 million visitors annually.

Frogs bred successfully at Huachipa Zoo were transferred to Denver Zoo in November of 2015, making Denver Zoo the first zoo in the northern hemisphere to exhibit the species in approximately 30 years. In 2018, successful breeding of those frogs...
at Denver Zoo has allowed animal transactions so that other zoos in the USA can exhibit this critically endangered species. Interpretive graphics at Denver Zoo highlight the biological uniqueness of the species and the important role of zoos as conservation organizations. Education programs including kits with interactive hands-on materials were created to help staff and volunteers engage with the over 2 million annual visitors to Denver Zoo.

Recently, Denver Zoo added an innovative component to the education and research objectives of the program by collaborating with a local high school in Colorado, USA to provide real-world application of STEM (Science, Technology, Engineering and Math) learning and design-thinking to a holistic biodiversity conservation project. The students created an underwater remotely operated vehicle (ROV), a research tool that staff in Titicaca National Reserve can use to improve their understanding of the Lake Titicaca frog habitat.

The Future of Collaboration for Conservation of Amphibians in Perú

Collaboration on Lake Titicaca frog conservation has led to the expansion of Denver Zoo’s and Huachipa Zoo’s field conservation efforts in Perú, particularly with respect to community engagement. In collaboration with US Peace Corps Perú, Junín National Reserve/SERNANP, and the Grupo RANA, Denver Zoo has supported efforts to conserve two other amphibian species of high Andes: the Junin frog (*Telmatobius macrostomus*) and the Junin riparian frog (*Telmatobius brachydactylus*). Huachipa Zoo recently received a 2017 Amphibian Ark Seed Grant for the Junin frog (*Telmatobius macrostomus*); Huachipa Zoo is expanding its conservation efforts to include a rescue center for this species. Denver Zoo, Huachipa Zoo and SERNANP will leverage the success of collaborations for Lake Titicaca Frog conservation in our efforts in the Junin region.

Acknowledgements

Conservation cannot be done alone, and it is important to acknowledge and appreciate the partners that have made our work possible: Huachipa Zoo, Cayetano Heredia Peruvian University, Titicaca National Reserve/Peruvian National Service for Natural Protected Areas, National University of the Altiplano, Regional Government of Perú, Nelida Apaza, Ccori Ampara Collective, Victor Enrique Ramos, St. Vrain Valley School District Innovation Center, Bolivian Amphibian Initiative and the many organizations and individuals who have financially supported our work.

References


Semillas del Océano is a nonprofit organization with the mission to design and implement innovative conservation programs that nurture local leaders capable of promoting sustainable development in their communities. Based on our mission, we aim at creating and educating a new generation of Guatemalan leaders with the abilities and skills needed to protect and preserve our oceans.

Teachers of the Guatemalan Caribbean live in an area full of nature and biodiversity. They have become key actors when we talk about knowledge replication to create a new generation of conservationists. Schools in the rural areas lack a strong environmental education background, which has led them to scarce application of conservation programs and unsustainable actions among their communities. It is believed that environmental education programs contribute to enhancing environmental literacy, which is generally comprised of knowledge, attitudes, dispositions and competencies (Hollweg et al. 2011).

For this reason, the program aimed at strengthening teacher’s environmental literacy, and increasing their perceptions towards nature; this in order to create a new group of replicators who can be able to promote new and better conservation actions in the region.

The program consisted in 10 workshops of different environmental topics, that were held in Puerto Barrios and Livingston, training 20 teachers of different education levels of Guatemala (elementary, middle school and high school), and evaluating the impact that the project had on them.

Methods
Between February and October 2017, a total of 10 environmental education workshops were given to 20 teachers from public schools of Puerto Barrios and Livingston, both in the Guatemalan Caribbean. Using informal education, the program was created including topics such as Introduction to the Environment, Ecological Principles, Nature and its Ecosystems, Environmental Issues, Mapping my Community and Recycling. Furthermore, practical activities and fieldtrips such as beach cleanups and reforestation campaigns were held with participants. These topics were chosen due to the needs of the region.

Since measuring the impact is vital for the project success, evaluations of all (20) participants’ knowledge, perceptions, skills, behaviors and satisfaction based on Russ A. (Ed), were held to demonstrate the success of the education program and help assess the impact. Data were analyzed using Solver.

Knowledge was measured through pre-post evaluations. Satisfactory grades were above 79 points. After finishing the program, interviews with teachers were held to measure how much of the knowledge they acquired was new, and how much of it they remembered.

Change of perception towards the environment was measured through pre-post evaluations conducted at the beginning and the end of the program, which contained 20 statements related to the given topics at the workshops, all of them divided into 5 options: totally disagree, disagree, disregard, agree, totally agree.

Skills were measured through participants’ interviews, where “critical thinking” and “identification of environmental threats” were evaluated as acquired skills as a result of the program. Behaviors were evaluated through personal observation and a checklist of activities that participants do and attribute to the project. Finally, Satisfaction was evaluated through a survey where people could vote between very unsatisfied, unsatisfied, indifferent, satisfied and very satisfied.

Results
Knowledge. 100% of participants passed
their post evaluations with grades above 79 points, considering that the given information was new or totally new to them. By the end of the program most of the participants were more likely to remember information through time (Figure 1).

**Perception.** Participants showed an average increase of positive perception towards the environment of 3.75 (Figure 2). Teachers from Puerto Barrios showed an increase of 3.23 (from PRE 83.63 to POST 86.86), while teachers from Livingston showed an increase of 4.27 (from PRE 80.73 to POST 85).

**Skills.** All the participants agreed or strongly agreed that the program helped them identifying environmental threats and possible solutions to them.

**Behaviors.** The interview shows six categories of activities that teachers started doing as a result of the program (Figure 2).

**Satisfactions.** 90% of the participants were very satisfied with the program, while the other 10% were satisfied.

**Discussion and Conclusions**

**Knowledge.** Results suggest that the environmental education program had great impact on teachers of rural communities, where environmental literacy is scarce. After evaluating teachers, more than the half of the participants received a whole package of new information to replicate with their students, while the rest of them, even though they already knew some of the given information, still got new topics to use at their schools.

In addition, more than the half of participants tended to forget at least 20% of the given information. This effect is completely normal and its percentage can increase through time. This is the reason environmental education has to be a continuous process that refreshes participant’s brains constantly. Nevertheless, we could appreciate that there were some participants that still remembered everything they learned. It is important to mention that those participants were better replicators at the *Replication Workshop* held after the end of the project.

**Perception.** Even though, participants already had a positive perception about environmental topics, an average increase of 3.75 points can be appreciated as a result of the program. This means that perhaps a constant environmental education program can improve people’s perception towards the environment, which could drive them - wanting to do more conservation activities such as reforestation and/or beach cleanups.

**Skills.** Besides participants results at their interviews, through appreciative inquiry, an increase of participants’ skills was noticed. Now, teachers are able
to detect environmental threats easily, including some threats that people don’t usually notice, like the fact that ‘killing animals just because they saw they were harmful for humans in a movie or a Facebook post’ is not a good thing. Furthermore, observation of the group shows that the participants show willingness to work as a group and to form alliances to start new environmental projects that benefit their schools and communities.

**Behaviors.** After finishing the list of pro-environmental activities that was given to participants, where they were asked to answer which of the activities they started doing or implementing as a consequence of the project, results show that participants are doing pro-environmental activities thanks to the change of perceptions. (That is to say, that although they still don’t do these activities 100%, they are half of the way or more ahead.) This fact is promising because they can be able to create a greater impact in their schools and communities. This also enables them to become replicators who can nurture a new generation of local leaders capable of promoting sustainable development through conservation actions.

**Satisfaction.** Satisfaction levels show that participants liked the program. This could be an important element when evaluating the results of a program because they could get more involved and more active due to their satisfaction. It also shows that people are willing to learn more and replicate the program at their schools.

It is relevant to mention that it is crucial to give them a set of new knowledge to share and replicate. This is because knowledge directly affects perception, which helps people to take action for the environment.

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**References**


Uganda Wildlife Education Centre (UWEC) has been implementing the Biodiversity Conservation And Promotion of Eco Tourism project at Makanaga Wetland System in Uganda since 2014. The wetland is important for the socio-economic and cultural values of the surrounding communities. It has a rich biodiversity including useful plants and animals, such as the highly endangered Shoebill stork. This wetland, which was under threat from human encroachment, is part of the expansive wetland system adjacent to Lake Victoria. Despite the high biodiversity of the site, little was being done for wildlife conservation, environment management and livelihood improvement. If urgent interventions were not undertaken by UWEC and partners to reverse the degradation that was going on, soon this wetland would be no more.

Uganda Wildlife Education Centre (UWEC) popularly known as Entebbe Zoo is a lead agency in Conservation Education in Uganda as mandated by UWEC Act 2015. UWEC carries out wildlife conservation education awareness to the Ugandan public with emphasis on the young generation. UWEC also carries out wildlife rescues and rehabilitation of injured and confiscated wildlife, captive breeding of endangered wildlife and undertaking research aimed at conserving Uganda’s threatened wildlife. UWEC is able to carry out its mandate because of its wide and diverse collection of more than 240 animal species enclosed in semi natural exhibits that simulates the ecosystems of Uganda. The animals are managed following international Standard Operating Procedures (SOP) as established by the Pan African Association of Zoos and Aquaria (PAAZA) and World Association of Zoos and Aquaria (WAZA) where UWEC is member.

This article presents the interventions undertaken by UWEC to address the challenges facing the Makanaga Wetland. The overall objective of the project was to raise the profile of Makanaga Wetland ecosystem by supporting activities that would promote ecotourism and biodiversity conservation and improve the livelihoods of local communities. The article also discusses the achievements made thus far in terms of awareness creation, training of the local guides, development of management plans, and support for the management team, establishment of sanitation facilities and information signage, observation towers and boat trails, documentation and promotion of local tourist treasurers and the overall impact of the project. This project is being considered by the Government of Uganda to be a model project for the sustainable management of other fragile wetland ecosystems in Uganda.

Objectives of the Project
1. To promote community and other stakeholder participation in biodiversity management and conservation.
2. To identify and promote ecotourism activities that support livelihood improvement.

Methods
The Biodiversity Conservation and Promotion of EcoTourism project was launched in 2014. The participants were selected through random sampling of women groups, youths groups, schools, community based organisations, resource user groups and local leaders. Questionnaires, discussions and site visits were used to generate baseline information and to mobilize the participants. The participants were engaged through workshops, meetings, excursions and site visits. Inventories were conducted to collect data on soil, water, plants, animals and other local treasures.

Activities Implemented
Workshops and Trainings
A stakeholder identification workshop, teachers’ workshop, biodiversity identification workshop, treasure identification workshop and training workshop for tour guides were held. The participants were drawn from the communities neighbouring Makanaga Wetland, but were mainly from the Bussi Sub County in the Wakiso district and Kamengo Sub County in the Mpigi district.

Project team leaving for the island to attend one of the workshops
Stakeholders identification workshop held at Bussi Secondary School

Tree planting and fencing
A total of 3,200 fruit, shade and medicinal tree seedlings were distributed and planted in the 15 schools and more than 20 homesteads. The beneficiaries were also provided with planting and fencing materials.

Wetland inventory of plants and animals
During the inventory of plants and animals 150 animal species and 112 plant species were identified.

Conservation education, communication and public awareness materials
A total of 550 booklets and 500 posters on important animals and plants of Makanaga Wetland were produced and distributed to the community and other stakeholders. 500 booklets on treasures were produced and distributed to the communities and stakeholders.

Six information boards were developed and erected along the Kamengo/ Masaka road and at the Namugobo landing site / Makanga Wetland landing site directing visitors and providing valuable information on the importance and conservation of the site.

Soil and water analysis
Soil and water quality analyses were conducted at the Makanaga Wetland system and on the neighboring islands of Bussi and Zinga. We were able to determine the type of trees to be grown in dominant soil type. The results from the water analysis provided baseline information for the monitoring of the level of pollution from the neighboring settlements, as these could compromise the hygiene and sanitation of communities and have an effect on the survival of fish and other wildlife in addition to degrading their habitats.
Establishment and improvement of ecotourism facilities

The boat trails were widened to ease transportation and improve accessibility to different viewing points. An old and abandoned toilet was refurbished to improve on the hygiene and sanitation of Namugobo landing site. An observation tower was assembled at UWEC. This awaits land ownership clearance to be transported and erected at Namugobo landing site on Bussi Island. The observation tower will promote wildlife viewing for tourists.

Identification of other treasures

The equator line was discovered at Senkeba Island and plans are under way to develop and erect an information board at the project site. Other treasures such as the equator line at Zinga were identified and documented.

Outreach to schools

The UWEC team was able to engage the learners in wildlife conservation issues through games, presentations, exhibition of wild animals and puppet shows.

Outputs and Impact of the Project

- At the inception of the project, there were only five school wildlife clubs at the project site. But by 2018, thirty two active wildlife clubs had been established.
- At the inception of the project, there were only 2 guides, who also doubled as fishermen. By 2018, 30 guides had been
trained and engaged and these have improved the quality of guiding.

- Only one school had an orchard at the inception of the project. By 2018, 15 schools had well organized botanical gardens of fruit, medicinal and shade trees.
- At inception of the project, there were about 2 km of poorly maintained boat trails. However by 2018, a total of about 5 km of well maintained boat trails were established.
- At inception of the project, there was no tourism directional signage, but by 2018 a total of six signs had been erected.
- At the inception of the project, there was only one boat used by tourists and fishing took place without life jackets. By 2018, four tourism boats, well equipped with life jackets, were in place.
- At inception there was only one home (of a prominent politician) hosting tourists, but by 2018 there were six well established homes promoting homestays.

As the community has become more aware of the project, the successes of the project have increased. The project has created widespread community awareness about indigenous plants and animals found in Makanaga.

1. Local schools are now aware of the establishment of school wildlife clubs and have learnt about sustainability issues.
2. The hygiene at the landing sites has been improved and this will help to decrease pollution of the wetland.
3. Through the erection of the directional signs, visitors now have easy access to the project area. This is critical for tourists travelling in an unfamiliar area. Both tourists and local people have benefitted from the improved water transport through the establishment of the clear boat trails. As the biodiversity resources have been identified and documented, there now exists a baseline dataset from which changes can be assessed.
A project of this nature needs adequate funding and time to realize tangible results. Working with communities takes time and the involvement needs to be sustained over time. The development of carefully planned and sensitive ecotourism opportunities in a wetland ecosystem offer a good opportunity to enhance the management of the fragile resources of the wetland while improving the livelihoods of local communities.

Continued support is necessary for the rewards of sustainable income generating projects for the local people to be realised. These community members have been involved at all stages of the project and their ongoing involvement is critical for the success of the project. Lessons learnt from this project can be replicated elsewhere.

Conclusion

The biodiversity conservation and promotion of ecotourism at Makanaga Wetland in Wakiso district has been endorsed and embraced by the local people neighbouring Makanaga Wetland system. The project is unearthing, documenting and disseminating the hidden community treasures and is promoting tourism, environmental conservation and hence improving people’s livelihoods.

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Readers of this journal have expertise in both traditional and cutting-edge education programs offered by zoos and aquariums. However, our roles as educators continue to expand, as educators are being compelled to become experts in providing not only academic support, but “whole child” supports including social-emotional supports in schools around the world. While such expectations are increasingly prominent in the formal education arena, what social-emotional support can we, as educators in informal settings, provide to benefit the whole child? This article explores one such social-emotional support that is currently being employed in hospitals and Ronald MacDonald Houses across the United States and, increasingly, around the world.

The challenge: supporting healing for hospitalized children

Children who are hospitalized face emotional and physiological challenges resulting from medical procedures, being uprooted from everyday life, or the anxiety of feeling unwell. Past research efforts have provided evidence of the importance and practicality of using animal-assisted therapy (AAT), nature, and distractions to alleviate the stress, anxiety, and pain related to hospitalization. Consider the following research findings:

- Viewing nature scenes prior to a stressful procedure was found to alter autonomic activity during a patient’s recovery period, hastening a faster recovery (Brown, Barton & Gladwell, 2013).
- In a descriptive pilot study, Sobo et al. (2006) found that hospitalized children had decreased pain levels following animal-facilitated therapy (AFT) intervention.
- In primary school-aged children, watching television during venipuncture reduced perceived pain levels more than maternal attempts at distraction (Bellieni, Cordelli, Raffaelli, Ricci, Morgese & Buonocore, 2006).
- Distracting school-aged and preschool children in ambulatory care during painful procedures has been demonstrated to be effective (Cason & Grissom, 1997).

With so much to recommend, AAT, AFT, and other distraction techniques should be a default in patient care. Yet, these methods can be cost-prohibitive and difficult to coordinate for each and every person in a hospital setting. Armed with research that television viewing and interaction with animals can help distract children from the pain and discomfort of hospital care and procedures, the San Diego Zoo Global team set out to build a television channel called San Diego Zoo Kids: low-cost, scalable programming that could be accessible to most hospitals.

San Diego Zoo Kids in action

San Diego Zoo Kids is a broadcast channel that provides fascinating footage from live animal cams, keeper and scientist interviews, and field research. Designed specifically for hospitals, the channel provides young patients and their families with a distraction as they recover from illness or injury. For
example, children learn about animals from keepers at San Diego Zoo and more than 30 zoo and aquarium partners around the world. They can watch giant pandas at play, elephants tussling in a pool, and orangutans enjoying treats; view age-appropriate stories about lowland gorillas growing up; and learn how researchers find koalas in Australia’s forests to help with conservation efforts, how giraffes select a babysitter to watch the calves while they go out browsing, and how animals take their medicine. Especially important is that children see animals experiencing the same medical challenges that they face, from diabetes and cancer to heart disease or losing a limb. These stories are written and produced by San Diego Zoo Global in collaboration with local zoos and aquariums in communities where the channel is featured. While the children may not be able to visit their local zoo or aquarium due to their time at the hospital, the San Diego Zoo Kids channel brings therapeutic animal connections to them.

Figure 1 provides an overview of the channel’s theory of action, from program development to hospital delivery. Figure 2 depicts the program underway in a typical children’s hospital setting.

Evidence of Impact
San Diego Zoo Global has investigated the impact of San Diego Zoo Kids through formative evaluation informing the program’s development, and summative evaluation, which examined the program’s impact.

The summative evaluation phase was completed in spring of 2017. It investigated San Diego Zoo Kids using a mixed method, two-staged model of inquiry informed by the phenomenological tradition. Phenomenological studies seek to document the lived experience (Merriam, 2009). The study involved three children’s hospitals (Sanford Children’s, Omaha Children’s, and Primary Children’s) and one Ronald McDonald House.

The sample included:
- 100 hospitalized children aged 4-18
- 102 parents of hospitalized children
- 88 hospital and Ronald McDonald House caregivers

Responses were recorded using survey instruments customized for each of the three audiences that largely explored the identical areas of inquiry. This was done to develop 360-degree feedback on the program from the perspectives of the three audiences most familiar with its implementation and effects. While the study relied on self-reporting, our methodology strengthened the accuracy of results, where possible, by posing similar questions to each of the three audiences. We then triangulated responses to identify constructs where consensus occurred across two or three of the audiences.

The following descriptions highlight five key findings of the summative evaluation effort. They point to areas of impact, as well as to areas of consensus among the program participants and caregivers working with the hospitalized children.

Finding 1.
San Diego Zoo Kids makes children feel good. Overall, children responded positively to San Diego Zoo Kids. On a five-point Likert scale with a low of “very bad” to a high of “very good,” 89% stated that it made them “feel good.” That percentage included 36% who indicated “very good.” Just 13% selected the neutral rating of “not bad, not good.” While the responding sample of children included a range of ages from 4-18, ratings proved consistent regardless of age.
Specific to gender, there was no significant difference when the responses of boy and girls were compared. In response to similar questions addressing the observations of parents and caregivers and the channel’s effect on children, 91% of parents and 91% of caregivers observed that the channel did appear to make children feel happy. This suggests that parents and caregivers rate the program’s impact, specific to making children feel happy, in the same way as the children—and that there is consensus between all three audiences on this key outcome.

Finding 2.
San Diego Zoo Kids effectively provides a zoo visit for children who cannot visit a zoo.

San Diego Zoo Kids sought to bring the proven impact of animal therapy through programming that would distract children from their current environments, and ultimately offer an experience that is like visiting a zoo.

A full 72% of children indicated San Diego Zoo Kids made them feel like they were visiting a zoo. This included 37% who indicated, “Yes, very much,” and 35% who indicated, “Yes, somewhat.”

Finding 3.
San Diego Zoo Kids prompts animal-related learning, conversations and connections between parent and child in the hospital setting.

Beyond the screen, we wanted to know whether the content provided an opening for conversations between parent and child. That is, beyond providing information and an enjoyable viewing experience, did the programming prompt children and parents to engage with one another about animals? We queried parents about this possibility, with the largely positive results summarized in Figure 3.

Comments provided by parents confirm these survey responses. One parent describing San Diego Zoo Kids said, “It made my daughter smile and gave us something to laugh about together.” The following statements collected from a parent-child pair further illustrate the conversations prompted by the program.

Child: I get to watch it with my mom. She cried a lot, but when we watch it together I get to see her smile.

Parent: Our leukemia is back for the 3rd time in the last year and a half. Each time it is more and more aggressive and through it all my son stays positive and the zoo channel helps us. He is more mature than I am about it all and he always says when we watch the zoo channel is the only time I am not crying and that’s when I am the happiest. It’s because he loves animals and we got special permission to attend the zoo here in Salt Lake and had the best day we have had in a long time, they took special care to have us help feed the rhinos and we got to chat with a few keepers and pet some animals. The zoo channel helps us stay positive and we watch it at the Ronald McDonald House and at the hospital and it makes a big difference in our lives. Our favorite segment is about the elephants and cancer research, because it gives us hope! This has been one of the brightest stars in our world these days. We are blessed to have it and pray the best for those who made it possible.

Finding 4.
San Diego Zoo Kids successfully distracts children from their reason for being in the hospital.

A primary rationale for San Diego Zoo Kids is providing children with distractions in otherwise difficult times—a research-proven strategy. Here, the programming proved especially effective. A full 84% of parents indicated San Diego Zoo Kids provided a helpful distraction for their children; 91% of caregivers acknowledged the program’s impact in this area as well. Responses between parents and caregivers did not differ in statistically significant ways, which indicates consensus between the two groups specific to the distraction benefit San Diego Zoo Kids affords.

Finding 5.
San Diego Zoo Kids provides a shared experience that clinicians integrate into a child’s care.

We were interested in whether the program’s content was integrated into patient care, including dialog about the program and use of such dialog as a distraction during procedures. Did San Diego Zoo Kids content provide an experience that hospital caregivers had leveraged to the benefit of children?

Most caregivers (78%) indicated having integrated San Diego Zoo Kids into their work with the children in their care. A comparison of conversation topic-specific responses finds caregivers largely relying on more general discussions of animals, with relatively fewer focusing on the more discrete programming topics of ill or injured animals or conservation (Figure 4). We also examined this practice based on the responding caregiver’s role in patient care (child life specialists, registered nurses, patient care assistant/technician, and Ronald McDonald House staff). Results of this comparison indicate that integrating San Diego Zoo Kids into patient care occurs relatively equally across hospital personnel and Ronald McDonald House staff. No statistically significant differences were observed.
As a result of watching Zoo Kids TV, my child and I have talked about: how to help animals (i.e., things we can do, ways to keep them from becoming extinct, etc.)

As a result of watching Zoo Kids TV, my child and I have talked about: how animals are cared for when ill or injured

As a result of watching Zoo Kids TV, my child and I have talked about: animals

A child’s experience with Zoo Kids TV provides something I can integrate into the care I provide (i.e., talk about what a child has watched while a procedure is performed)

As a result of children watching Zoo Kids TV, I have engaged with patients about: animals

As a result of children watching Zoo Kids TV, I have engaged with patients about: how animals are cared for when ill or injured

As a result of children watching Zoo Kids TV, I have engaged with patients about: how to help animals (i.e., things we can do, ways to keep them from becoming extinct, etc.)
Conclusion
San Diego Zoo Kids seeks to provide both an educational and supportive experience for children facing health-related challenges by leveraging animal- and nature-based therapeutic benefits. An analysis of the 290 responses resulted in a number of key findings to describe the program’s impact in hospitals and Ronald McDonald Houses. While the study relied on self-reporting, the methodology strengthened the accuracy of results, where possible, by posing similar questions to each of the three audiences. Most notably, the program is providing a helpful distraction that makes children feel happy, helps them learn something new, and, often, results in replicating the zoo visit experience.

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References
**Introduction**

Zoos, botanical gardens and aquariums play an important role in the conservation of species and their vital environments. They have four pillars that justify their actions: conservation, education, research and leisure. Worldwide they are institutions visited by a diverse public, making them capable of a wide range of environmental education and awareness work.

The Zoo, the Botanical Garden and the Aquarium of the Fundação de Parques Municipais e Zootecnica – FPMZB (Municipal Parks and Zoobotanic Foundation), an institution of the indirect administration of the Belo Horizonte City Hall, receives students from public and private schools, from preschool to higher education, as well as other welfare institutions and family groups. Zoos are considered places of non-formal education, presenting their own characteristics where their visitors are not “obliged” to learn, do not have to follow a structure of contents and their knowledge is not put to the test. They are free to make their choices according to their interests and are free to select the content.

Most educators do not know the objectives, attributes and importance of zoological and botanical gardens, and aquariums, for conservation. In order to present their educational potential and to supplement the work of educators, teachers, students and other professionals, the FPMZB Educational Team carried out the mini-course “Education for Conservation” in partnership with the Sociedade de Amigos da Zoobotanica – SAFZB (Society of the Zoobotanic’s Friends), from March 29 to 28 of June 2017. The proposal obtained funds from the Supporting Program to Publications and Events - PAPE of the Conselho Regional de Biologia - CRBio (Regional Council of Biology).

**Methods**

The mini-course had a workload of 40 hours and was divided into 10 biweekly modules with 4 hours a day. The course plan was composed of theoretical and practical classes, as well as technical visits. Publicity was through direct mail sent to schools and colleges and through websites. The financial resources received subsidized the production of two pedagogical games: “Brazilian Savanah Memories” and a board game “Walking through the Rocky Fields”. The first one aimed at the pre-school students and the second for elementary and high school students. Both games are accompanied by a support notebook for the educator and thematic postcards to be distributed among participants. These games can be loaned for classroom work. Additional materials related to the themes of the modules were distributed among the participants, such as books, DVDs, texts, folders, visitation guides, booklets, postcards and other gifts.

The program was divided into modules. The Module I – “Nice to Meet”, addressed the concepts, history and objectives of zoos, botanical gardens and aquariums. The supporting institutions (SAFZB and CRBio) and the participants had time to present and record their expectations. The Module II – “The Other Side of the Zoo” consisted of presenting the structure and functioning of a zoo from the arrival of the animals to the planning, setting and landscaping of the enclosures, as well as some concepts such as management, collection plan and national action plan for conservation. Visits to the quarantine and backstage of the Aquarium (Figure 1), the feline’s enclosure and the Butterfly House Laboratory took place.

The Module III – “Eat and Care, here’s the Place!” was carried out in the Nutrition and Veterinary Hospital sections where participants prepared food for some
animals (Figure 2) and watched the demonstration of
the containment of a hedgehog and snakes. Module
IV - “Animal Welfare”, participants learned about
animal enrichment and animal conditioning practices
and followed the work of zookeepers. During all
classes, biologists, veterinarians and zookeepers
were able to clarify doubts about the Zoo’s routine
work and procedures related to the safety of animals
and people.

Module V – “The Other Side of the Botanical
Garden” involved visits to the reference collections
(Herbarium, Ethnobotany, Seeds, Fruit and Herbs)
where the participants learnt the main techniques of
fixing and conserving plants and their registration in
the database. (Figure 3).

Participants visited the live collections of bromeliads,
araceae (Figure 4), cacti, succulent plants, orchids,
palm trees, aquatic and carnivorous plants, and
the arboretum. Management plans for endangered
species and flora rescue works were discussed in
this lesson.

They also visited the Seed Bank and the Phytosanitary
Clinic where they learned about the homeopathic
treatment of plants, pioneering work among Brazilian
botanical gardens.

The participants took part in an alternative garden
workshop using different containers such as tires
and PET bottles (Figure 5), after learning about
the Seedling Production (Figure 6), responsible for
supplying plants for public afforestation and for
environmental recovery programs. This was the
Earthworm Farm and Composting of Module
VI – “Hands on Earth”.

The Module VII – “An Adventure in the Botanical
Garden”, presented an interesting tour through
the gardens and thematic greenhouses, such as
the Evolution of Plants and the representative
natural environments of Minas Gerais state -
the Caatinga, the Rocky Field and the Atlantic
Forest.

The Module VIII – “Know, Learn and have Fun!”
and the Module IX – “Visitors and the Zoobotânica, What can we do?”
were dedicated to environmental education.
Educational activities (Figure 7) were presented
to the students and they had to prepare an
educational proposal to obtain the course
certificate. In the Module X – “Our Proposal is
…” they presented their final works.

The participants of this mini-course celebrated the World Environment Day by visiting the “Exhibition on Biodiversity” set up by the education team that was part of the “Latin American Campaign Against Illegal Trafficking in Wild Species”, promoted by The International Zoo Educators in 2017.

Results and Discussion

Thirty-three people participated in the mini-course, 21 students, 5 teachers, 2 employees, 2 members of SAFZB and 3 biologists of the CRBio. The high degree of their involvement was evidenced by their attendance and punctuality. The mini-course received the maximum mark on a scale of 0 to 5 points (Figure 8), however this shows the need to improve the publicity of the event. The frequency was considered very good. According to the participants’ statements, the mini-course met or exceeded their expectations. They knew and understood better the role and importance of the work of zoos, aquariums and botanical gardens in conservation.

The participants considered the mini-course well-structured and were surprised by the dedication and didactics of the staff. They said the mini-course made it possible to interact with the institution and offered various ideas for educational activities. The main suggestions given were related to improvements in the dissemination, the duration of the mini-course and the suggestion of new mini-courses during weekends. The US$ 923.00 from the CRBio was used to produce educational material and games, snacks and gifts for participants. The cost of mini-course was US$ 823.00. According to the World Association of Zoos and Aquariums (WAZA), “Visits to zoos and aquariums can deepen understanding and enable people to act in new and positive ways to save biodiversity and protect the environment.”

The statements below confirm this:

“The mini-course provided a new perspective on the Zoo and the Botanical Garden. I really knew how the behind-the-scenes work of these places is, as is the treatment of animals and caring for plants. I learned forms and methods for environmental education and so I can apply in my profession”. (Teacher)

“I believe that environmental education is the most coherent way for a change of habits and this course served as a beginning for new actions and made us have more interest in this area that needs a lot of care and attention. I hope this is the first of several other courses the Foundation will promote”. (Biologist).

“The mini-course not only met but exceeded expectations. The content learned is not restricted to the scientific, but mainly to a personal learning on how to grow, live and know the importance of the Zoobotanic and the family that maintains it! ”. (Student).

Conclusion

It is concluded that mini-courses like this are important tools for environmental education to spread the role of zoos, botanical gardens and aquariums. They allow the involvement and integration of employees and contribute to the improvement of the work of professionals from different areas such as gardeners, zookeepers, trainees, engineers, biologists, veterinarians and others. In addition, they promote significant personal growth. It is important to invest in educational events that promote the formation of multipliers that will promote actions for the conservation of native environments, flora and fauna. The expansion of actions that enable the training of educators who wish to work in non-formal teaching spaces such as zoos, botanical gardens and aquariums is essential for the strengthening of a policy in favor of environmental conservation.
Acknowledgments

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References


PARENT-SPECIFIED BARRIERS TO OUTDOOR PLAY IN WESTERN NEW YORK
Lisa Thibault, Buffalo Zoo, USA

Introduction

Children who spend time outdoors are healthier, happier, live longer, and have lower rates of allergies, obesity, depression, and behavioral problems (Collado & Corraliza, 2015; Friends of the Earth Europe, 2017). Outdoor time also improves mood, memory (Berman et al., 2012), attention span (Berman, Jonides, & Kaplan, 2008; Erickson & Ernst, 2011), and grades in school (Collado & Corraliza, 2015). Additionally, E.O Wilson (1994) found that providing hands-on experience in nature is better for developing environmentally friendly behaviors compared to just teaching about environmental concepts. Collado and Corraliza (2015) and Broom (2017) found evidence supporting Wilson’s statements: when children spend time in nature, they are more likely to develop environmentally friendly behaviors that will carry on into adulthood.

There is surprising evidence which suggests that children are spending less time outdoors than previous generations, despite all of the known health benefits of engaging in outdoor play (Clements, 2004). However, experiencing and playing in nature is not as simple as it seems. In one study, families described time, lack of access, winter weather, and safety as barriers to spending time outdoors (Ernst, 2014), while another found that a lack of time and access to outdoor areas had a larger effect (Reis, Thompson-Carr, & Lovelock, 2012). Francis, Paige, and Lloyd (2013) found that when children are given access to natural areas, which is rare, it is often organized by adults. The tight control many parents have on outdoor play is a growing trend in our younger generations (Francis, Paige, and Lloyd, 2013).

In order to overcome barriers to outdoor time, organizations must first learn about which barriers affect outdoor play. The Buffalo Zoo runs a family nature club that offers free outdoor experiences to club members. Though it was assumed this would be a popular club, attendance at experiences was lower than anticipated, even when several families registered. After two years of running the club, it was apparent that barriers existed which were preventing families from participating in outdoor programming.

The Buffalo Zoo surveyed parents at three nature play events in 2016 to determine the most common parent-specified barriers to outdoor play in families of western New York. Barriers were grouped into five categories: inclement weather, lack of time/over scheduled time, accessibility issues, safety, and technology. For the purposes of this study, safety concerns included traffic, injury, dangerous neighborhoods, and “stranger danger”. Accessibility issues included children who are perceived to be too young for certain outdoor environments, disabilities, and general lack of access to natural areas. The prediction was that time and accessibility issues would be the most common barriers described by parents. This prediction was based on results from a study by Reis, Thompson-Carr, & Lovelock (2012) which found the main factors affecting children’s outdoor play included a lack of time and access to outdoor areas.

Methods

The study was conducted at the Buffalo Zoo, the Aquarium of Niagara and the Reinstein Woods Nature Preserve during nature play events in the Fall of 2016. The events were developed as collaborative efforts among the three organizations. Each event showcased several stations that encouraged visitors to explore and learn about different aspects of nature play. Families belonging to local community centers were offered free admission to each event thanks to a generous grant from Association of Zoos and Aquarium and Disney Conservation Fund. To ensure visitors explored each station, scavenger hunts were organized, requiring families to visit each station in order to be entered to win a prize. A voluntary visitor survey consisting of three questions was administered verbally by the author at one station during each event, with the exception of the event at the Aquarium of Niagara, where one of their educators administered the survey.

The questionnaire included the following questions:

1. How many hours do your children spend playing outdoors every week?
2. What prevents your family from playing outdoors together more often?
3. Do you agree or disagree with the following statement: There is a benefit to having your children play outdoors.

A total of 54 parents and guardians participated in the survey. When a family approached the survey table, one adult was asked to participate. When they were finished, the next family to approach the table was asked. Only one parent in each family was asked to participate and no demographic information was recorded.

Results

The total hours children spend playing outdoors every week was averaged throughout the total number of respondents to determine the average in western
New York. This average was found to be 10.45 hours every week, or 1.49 hours every day. All participants agreed there is benefit to having their children play outdoors.

The barriers the participants provided were counted and organized into categories (inclement weather, lack of time/over scheduled time, accessibility issues, safety and technology) to determine the most common factors. Categories were then put into percentages and calculated throughout the total number of respondents to determine patterns in western New York. In cases where parents named two barriers, both were recorded and counted. As displayed in Figure 1, 44.07% of the families reported a lack of time or over scheduled time as the largest barrier, 37.29% reported inclement weather, 13.56% reported accessibility issues, 3.39% reported safety and 1.69% reported technology. A chi-squared test of goodness of fit was performed to determine if there was a significant difference between the barriers participants chose. The differences between the barriers the parents provided were significant, $X^2 (4, N=59) = 45.15, p<.005$.

Patterns in the data were scrutinized to find trends between how many hours children spend playing outdoors every week and the barriers their parents describe. The goal was to determine whether certain barriers had a larger effect on the amount of time children spent outdoors. Analysis of variance indicated the hours children spend playing outdoors every week compared to the barriers their parents describe were not significant, $F(4,54) = 1.67, p = 2.54$.

Discussion

The original prediction for this study suggested a lack of time/over scheduled time and accessibility issues would be the most common barriers preventing children in western New York from playing outdoors. Though the hypothesis was not entirely supported, lack of time was still the most common barrier as 44.07% of parents described it as the main concern (Fig 1). Inclement weather was the second most common barrier with 37.29% of parents describing it as a concern. The results agree with the study by Ernst (2014) that found lack of access, time, winter weather and safety as the main barriers in northern Minnesota. Minnesota and New York have similar average monthly temperatures, rainfall, and snowfall, so the similarities in the results are not surprising.

Lack of time/overscheduled time was found to be the most common barrier that parents in this study described. Tandon, Zhou, and Christakis (2012) found that less than half of families with young children spend time outdoors every day. According to Highland Spring Group (2015), families only spend 34 minutes of uninterrupted time together each day. It is clearly difficult for families to find additional time outdoors. Covey (2009) talks about children who are over-scheduled and the pressures it puts on them and their families. Many parents feel they need to have activities scheduled for their children at all times in order to make them good parents, which may cause unnecessary stress on the entire family (Covey, 2009). In order to avoid this stress and even pick up additional benefits, families need to set aside time for unstructured outdoor play every day. Environmental educators can help with this by teaching families about fun and fast nature play activities that can be done together such as finding shapes in the clouds, rolling over stones or logs to look for bugs, and just listening to the sounds of the birds.

Inclement weather is another common issue in many locations, especially western New York. For example, Tucker and Gilliland (2007) found that children’s physical activity levels change depending on the
season and weather. The same can be assumed for any type of outdoor play. Tucker and Gilliland (2007) suggest that the way to overcome weather as a deterrent to physical activity is to offer more indoor activities during specific seasons. This can be adapted to nature play. Instead of going outdoors when it is cold and raining, educators can encourage families to do indoor nature activities such as start an indoor herb garden, play with a sensory bucket full of previously collected natural items, or create a meal together from all local ingredients. Experiencing nature, even indoors can provide some of the same benefits as spending time outdoors, though in smaller quantities (Lohr, Pearson-Mims, & Goodwin, 1996, Largo-Wight, 2011). Introducing natural materials indoors can help make connections to the outdoors and possibly encourage families to go outdoors when weather is no longer a barrier.

The average time the children surveyed in this study spent outdoors was 10.45 hours every week. This value reflects the weekly average amount of time the children spent outdoors and cannot be used to determine how many hours each child spent outside daily. Experts in childhood physical and mental health suggest that children should be spending at least 30 minutes to an hour every day engaging in unstructured outdoor play (National Wildlife Federation, 2010). Edelman (2016) found that 65% of children in the U.S. spend less than 1 hour outside every day and Clements (2004) found that only 31% of children spend time outdoors every day. It would be beneficial to do further studies to determine daily averages in western New York.

The resulting average time spent outdoors was higher than expected. It is possible that the high time spent outdoors recorded during this study was because the families surveyed were ones who had chosen to participate in an outdoor event. It could be assumed that these families already had an interest in being outdoors together. The results cannot therefore be extrapolated to the general population of the area. Another possible reason for the high number is that parents may have misrepresented or miscalculated their children’s time outdoors. Most children from the participating families appeared to be under the age of 10. If this observation is correct, this could be another factor affecting the results. Younger children (<10) are less likely to stay indoors than older children (ages 10-19) who have more of an interest in activities like music, watching TV, playing video games and being on the internet or texting (Larson, Green, Cordell, 2011).

In the future, this study should be repeated with families from urban community centers in western New York. These families may not spend as much time outdoors as the families that regularly visit outdoor institutions, such as those interviewed in this study. The two families that described safety as a barrier to outdoor play were from a local urban community center and their children spent an average of 4.5 hours outside every week. It would be important to determine if a trend exists within the families from the community centers and then find techniques for encouraging these families to spend more time outdoors without increasing their safety risks.

This study has provided a baseline from which future studies can be developed. As the primary barriers are now known, future studies could use a 1-10 rating system for different types of barriers or ask parents to rank the barriers in order of importance. It would also be beneficial to have a section on the survey for parents to explain their responses. It may be useful to ask parents to provide information on weekday and weekend time spent outdoors, to obtain a more accurate estimate of time spent outdoors. Collection of demographic information on children’s ages and home area (e.g. rural, urban, suburban), would enable correlations between demographics and responses, which would help in the design of more focused interventions to address the barriers. The replication of this study by environmental educators around the world would enhance our understanding of how to encourage families to spend more time outdoors.

Conclusion

According to parents and guardians in western New York, time and inclement weather are the most common barriers to outdoor play with their children. Children who spend time outdoors are more likely to grow up to be environmental stewards (Collado & Corraliza, 2015). For this reason, future outdoor programming should focus on overcoming these barriers to increase the amount of time children spend outdoors. Action will be taken within the Buffalo Zoo’s outdoor programming to address and overcome lack of time and inclement weather within the next year. Environmental educators could conduct similar studies on their parent populations to determine barriers and develop solutions to overcome them.

Devil’s Hole State Park - WNY Family Nature Club
Acknowledgements

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References


Introduction

One of the most important pillars of existence of a Zoo is to educate and promote environmental conservation. Taking this into consideration, La Aurora Zoo planned a permanent educational exhibit aimed at educating our 1.3 million visitors on natural resource conservation – sustainable living. We did this to help preserve the environment, reverse existing damage and thus help the proliferation of species. One can’t exist without the other. Our goal is to help people make that connection: the environment and human life are not mutually exclusive; a healthy environment supports life.

La Aurora Zoo is located in Guatemala City, Guatemala. It is home to more than 1,600 animals representing more than 240 species. The Zoo was founded in 1924 by the government and has been managed by a not-for-profit organization since 1963. It houses a botanical collection and three historic monuments: The Tea House (1924), Pinula Aqueduct (Colonial circa 1786) and the Snake Mound (Pre-Hispanic circa 200 B.C.). Over 1.5 million people visit the zoo each year.

Why did we want to build an interpretative exhibit? For starters visitors cannot conserve what they do not know, plus we need to provide examples and opportunities to enable visitors to change their behavior. Guatemala’s context provided us with enough proof that this was an urgent need. In Guatemala, there are cultural and legal obstacles, no legal incentives to reduce plastic bag use, no recycling, no law that requires CO2 emission controls, among other obstacles. At La Aurora we feel we also have a responsibility to close the science education gap in Guatemala. The Ministry of Education does not measure student achievement in science, as its priorities are Spanish language and mathematics. Thus, our zoo needed a permanent and accessible exhibit to help our visitors to learn about sustainable living.

We had resource limitations that we had to take into consideration during the design. First, we have limited personnel in the education department (5 educators and 3 administrative and support staff). This meant that visitors would have to visit and learn by themselves without an educator present; a difficult task but achievable through interactive experiences. The exhibit had to be a self-teaching exhibit. Second, most of our visitors (75%) are within the C and D socioeconomic classifications, so it had to be free. Third, limited education resources meant we had to look for aligned sponsors that could donate cash or in kind services. Fourth, there was only limited space available.

The answer was to build an operative sustainable house inside the park, between animal exhibits. The aim of the house was to inform visitors about methods for sustainable living, understand the importance of living sustainably and present existing viable choices to implement at home; a step towards taking action.

What is a sustainable house?

Sustainable in this context means that the choices made for the house do not deplete natural resources or endanger the survival of the planet and have additional benefits for the tenants. It uses natural resources in a smart way. It integrates recycled materials and technologies that:

1. Protect the environment
2. Save money
3. Preserve human health

The sustainable house exhibit covers three of our pillars: recreation, education and conservation. During design and construction we made alliances and found sponsors that shared the same interests and education goals. The house is interactive as people are allowed to interact with every single item. It showcases and promotes many products and technologies that are readily available in Guatemala such as alternative sources of energy, water conservation and collection, other resource conservation techniques, recycling, sustainable...
construction methods, smart use of space and human health. Our goal is to show visitors that it is easier than one thinks to take action and contribute, especially in a house in which one can see oneself living.

The house was built with the support of private and public institutions and business, as well with the support of students, youth groups and visitors. Visitors even participated in making eco-bricks. Everything required to build the house was donated and the Zoo constructed the house. The total cost of the house is estimated in USD $20,000.

Table 1: Visitor knowledge before and after visit to the sustainable house (2016)

<table>
<thead>
<tr>
<th></th>
<th>Partial or complete knowledge of what a sustainable house is</th>
<th>Knowledge of at least one sustainable method</th>
<th>Average number of known sustainable methods</th>
</tr>
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<tr>
<td>Before</td>
<td>39%</td>
<td>57%</td>
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<tr>
<td>After</td>
<td>89%</td>
<td>89%</td>
<td>2.2</td>
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<tr>
<td>Difference</td>
<td>+50pp</td>
<td>+32pp</td>
<td>+0.6 methods</td>
</tr>
</tbody>
</table>

Figure 1: Before and after knowledge (2016)

Figure 2: What is the reason for this exhibit? (2016)
The house was inaugurated in April 2016, and in its first year was visited by more than 150,000 people.

We undertook an impact evaluation during the first six months with 65 visitors between the ages of 11 and 52. We used a pre and post visit research methodology. Visitors were surveyed before they entered the exhibit and then after their visit. The same people were questioned both before and after the visit. Questionnaire:

1. Do you know what a sustainable house is?
2. What alternative or sustainable methods do you know?
3. Why do you think the Zoo has this exhibit (how do you relate it)?

Results April-September 2016
After visiting the sustainable house visitors reported an increase in knowledge of what a sustainable house is and had a better awareness of methods for sustainable living (Figure 1 & 2 and Table 1). Visitors could also explain the role of a sustainable house better after their visit.

After 6 months of opening the exhibit we wanted to improve the results obtained in questions 2 and 3. We analyzed every possible education component that we might have missed. After much discussion, we decided that audio (hearing) learning was not incorporated enough. We had many visual (a television) and tactile education components but we did not have an audio-visual guided tour of the house. We designed and implemented an audiovisual guided tour and removed videos from the TV.

As soon as we started measuring results, we noticed they plunged and remained like this for a few months until we decided that our changes were NOT working. We decided to ADD the audiovisual tour to the other videos on the TV and play the loop.

Results January-June 2017
We administered the questionnaire to 94 visitors between the ages 6 and 58 and results improved for questions 2 and 3 (Figure 3 and Table 2). Results to question 3 where visitors were asked to explain the reason for the sustainable house remained the same for “does not relate”. However, the rest of the answers were redistributed towards awareness and recognizing human responsibility. Knowledge of methods for sustainable living increased after the visit (Table 3).

Conclusion
As educators our ultimate goal is to seek behavior change. That is why we must be honest and ask ourselves many hard and demanding questions. Some, such as long-term behavior change, are almost impossible to answer because they would require a follow up in coming years to the same people that were interviewed.

What will be the information retention rate? Do these results indicate possible behavior change? Is a 5% increase acceptable? A 10% increase? We don’t know the answer to these questions.

However, the results of this evaluation showed us a trend that is very valuable for analysis. The MAIN challenge remains that most people do not seem to be able to interact and connect thoughts and assess what is not obvious; it is very hard for visitors to read between the lines. More specifically, people cannot relate themselves to the environment. There is a lack of understanding to everything’s interconnectedness (including themselves as human beings to everything).

Our next challenge is to create different activities that educate the visitors on interconnectedness between all living things and their environment.

**Table 2: Visitor knowledge before and after visit to sustainable house (2017)**

<table>
<thead>
<tr>
<th></th>
<th>Partial or complete knowledge of what is a sustainable house</th>
<th>Know of at least one sustainable method</th>
<th>Average number of known sustainable methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>41%</td>
<td>54%</td>
<td>0.8</td>
</tr>
<tr>
<td>After</td>
<td>66%</td>
<td>94%</td>
<td>2.4</td>
</tr>
<tr>
<td>Difference</td>
<td>+24pp</td>
<td>+39pp</td>
<td>+1.5 methods</td>
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</table>

**Table 3**

<table>
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<tr>
<th>Known methods</th>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>&gt;3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>43</td>
<td>31</td>
<td>12</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>After</td>
<td>6</td>
<td>12</td>
<td>30</td>
<td>32</td>
<td>14</td>
</tr>
</tbody>
</table>

Figure 3: Before and after knowledge (2017)  
Figure 4: What is the reason for this exhibit? (2017)
SÃO PAULO ZOO GOES TO THE COMMUNITY TO TELL ABOUT YELLOW FEVER

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Introduction

Brazil is currently experiencing the largest outbreak of yellow fever observed in many years, mainly involving the states in the Southeast region of the country, including São Paulo. So far, the reported cases have dealt with the wild cycle of the disease, which affects monkeys, the virus’s natural hosts. The disease is transmitted by the bite of infected mosquitoes of the genera Haemagogus and Sabethes, found only in closed forest regions, into primates and people who enter their natural habitat and have not been vaccinated.

In January 2018, after confirming the death of a wild howler monkey by yellow fever in the Ipiranga’s Fountains State Park (IFSP), a Conservation Unit where the São Paulo Zoo is situated, the State Department of Health and Surveillance Epidemiology of São Paulo State decided that visits to institutions located in the Park would be stopped.

Located in the southeastern region of the São Paulo City, the IFSP has an area of approximately 540 hectares of Atlantic Forest, being considered a “green island” in the middle of the urban environment (Figure 1). The Park includes several institutions in its territory, all of them legally established, each with their own administration and distinct functions, including activities focused on research, health, leisure, education, sports, tourism and economic development (São Paulo, 2008).

IFSP represents a place of great environmental importance. As it is the largest fragment of Atlantic Forest in the metropolitan region of São Paulo, it contributes to climate, air and flood control in the surrounding region. In addition, it has a great natural and historical wealth, sheltering the sources of Ipiranga River, a water network with several preserved bodies of water and species of flora and fauna, many of them threatened with extinction, including the howler monkey (Alouatta guariba clamitans), one of the species most susceptible to yellow fever (Figure 2).

The recent circulation of the disease virus in Brazil has left a sad heritage for our fauna: populations of monkeys have been decimated by yellow fever and...
also by the lack of information. There are numerous records of attacks on primates by people who believe they can contribute in some way to the spread of the disease. However, monkeys are considered true “guardian angels” because they indicate the areas where prevention and control actions should be intensified. Despite this, in some regions, human attacks on certain species of primates outnumber the rate of death of animals by yellow fever itself.

In this context, with the temporary suspension of visits to the São Paulo Zoo, and the resulting suspension of educational activities for visitors, the Zoo Environmental Education Program team decided to invest in other efforts, working on an information campaign on yellow fever for the general population and, especially the neighboring community around the IFSP, through education and communication activities.

The aim of the information campaign was to help the general population to understand the general aspects of the disease and its prevention, the situation of yellow fever in the Park and, especially, to prevent future attacks on free-living animals, especially the howler monkeys.

Campaign: “If you cannot go to the zoo? The zoo will come to you! “
Within the scope of the campaign, a series of educational actions were carried out, such as visits by environmental educators to residents’ houses located on streets very close to PEFI and partnerships with neighborhood associations, local radios and schools. In addition, communication actions were also carried out on the Zoo’s social networks and in the format of digital information.

**Visit to the IFSP residents**
The logistical and methodological planning of field trips supported the work of the zoo educators team and contributed to the good results obtained in this campaign. In order to define the priority areas for the action, a survey on the avenues and streets located around the PEFI was carried out. This allowed the identification of residences that were closer to the forest boundaries and that, therefore, would have priority for visits by the team of educators. After defining this point, the team also planned the frequency and timing of visits, the maximum duration of each visit, what materials would be offered to the residents, and how the group of educators would be distributed during the activity.

Afterwards, training to raise knowledge about the main aspects related to the disease and the situation of the PEFI was developed and provided to all educators. This answered questions, explained the logistics of action, defined the message which should be the focus of the approach and provided guidance on how to act together with the residents, since this was the first time that the most of the group had performed an activity outside of the Zoo. To obtain data about the action and the surrounding population of IFSP, a simple form to be filled by the educator after each visit was prepared. After the training and planning, the field work was started. This took place on 11 days between the end of January and throughout February. In this period, the team of educators traveled through 42 streets and avenues located in the surroundings of PEFI, visiting 369 residences.

In addition to clarifying with the residents details of the disease and issues related to the PEFI and howler-monkeys, educators also explained and distributed informational materials about yellow fever, with useful phone numbers in the case of finding sick or dead animals, or even to report animal cruelty. The great majority of residents were extremely receptive to the action (Figure 3).

During the visits, the educators counted the number of residents in the houses visited. Thus, approximately 1400 residents were met directly or indirectly through this campaign. Data collected during the visits noted that 80% of the residents who participated had already seen wild monkeys in the vicinity of their residences, demonstrating the importance of this campaign to prevent attacks on the animals, through the dissemination of accurate information about yellow fever and also messages that focused on the importance of PEFI and conservation of this forest fragment and its fauna.
Partnerships with neighborhood associations, local radio stations and schools

To broaden the campaign, while the visits to the inhabitants of the surroundings were planned, a meeting was held with the Association of Residents and Friends of Água Funda (AMAAF), which covers a part of the neighborhoods located in the vicinity of the PEFI and with whom our team had developed other projects in partnership. The objective was to clarify some aspects of the disease in the region and share the actions that were being planned to educate the community. Several directors of the Association were present and were able to better understand the situation and respond to questions. They were also very excited about the actions along with the residents and, soon after the meeting, they managed to schedule an interview on the local radio for our staff to speak on the subject. The interview, which happened on January 31, took almost 40 minutes, and included the participation of the listeners as the team took questions about the disease and the situation in IFSP.

Another consequence of the campaign was an education action performed in an Elementary State School located nearby the PEFI. The school had already been our partner in the previous year, participating in a pilot training course for teachers in the region, aimed at enhancing the park and encouraging the participation of the community in the environmental issues of the area. Since this contact between the Zoo and the school had already been established we suggested to the coordinators to do an action on the yellow fever for parents and/or students. A few weeks later, the school invited us for a chat about the topic during the parent-teacher conference, which was attended by about 70 people.

Communication actions

In addition to the activities developed directly with the surrounding community, communication actions to reach a wider audience were also developed. For this reason, we explored the potential for dissemination of information through our social networks, intensely publishing news about the matter and developing a special edition of our digital newsletter “Abrindo o Bico” (Opening the beak), which is distributed to a large number of people through our mailing contacts and published on the Facebook page of the Zoo. The central theme of the February issue was yellow fever, discussed under various aspects in all the columns of the informative (Figure 4).

Final Considerations

As a result, our team returned to the usual educational activities of the park but, nevertheless, this work left something very significant: we have learned that even in the face of something as delicate and worrying as the issue of yellow fever, it is possible to extract positive experiences. This is evident through the improved involvement and effective interaction with the surrounding community of the Zoo and the IFSP evident during this initiative. In addition, the commitment of all educators from the Zoo, acting together with the community in such a critical and contextualized situation, made it possible to understand and experience the true meaning of Environmental Education for the conservation of biodiversity.

Acknowledgements

To the educators team that participated in this campaign: Cibele dos Anjos; Daisy Silva; Daniela Araújo; Isabela Santos; Jessica Carvalho; Jonathas Viana; Lais da Silva; Lorena Pereira; Margarida Silva; Rafaela Karalkovas; Raphael de Sousa.

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References

Introduction

The effects of climate change are being felt by people and marine mammals around the world today. Despite the overwhelming scientific consensus, great confusion still exists around the globe, and in the United States in particular, where only 54% of Americans understand that global warming is mostly human-caused (Leiserowitz et al., 2017). It has become clear that zoos, aquariums, science centers and other informal environmental organizations can serve as resource hubs and important messengers of climate science and climate solutions. Studies have shown that visits to aquariums, zoos, science centers and national parks appear to raise concern about ocean health and increased interest in conserving animals and habitats (Luebke et al., 2012). Not only do the interactions inspire interest, but 91% of visitors appear willing to change their behaviors in national parks and wildlife refuges to help mitigate threats such as climate change (Schweizer et al., 2013). Unfortunately, despite this opportunity, a cycle of silence persists in the United States with only one in five Americans hearing people they know talk about global warming at least once a month (Maibach et al., 2016). To overcome this barrier, informal education organizations can leverage their visitation and trust as scientific messengers to both provide an opportunity to engage guests about climate change, and utilize tested communication strategies to overcome cognitive barriers around climate change science.

As the world’s largest marine mammal hospital, The Marine Mammal Center is uniquely positioned to rescue and rehabilitate sick and injured marine mammals from over 600 miles of California coast, with the ultimate goal of releasing the animals back to the wild with a second chance at life. Utilizing a state-of-the-art hospital and education facility, The Marine Mammal Center cares for an average of 700 animals each year, while engaging over 100,000 visitors to the hospital. As mammals, seals and sea lions face many of the same threats posed by climate change as people, from sea level rise eliminating critical habitat for breeding and resting, to shifting fish stocks, and increases in harmful algal blooms causing neurotoxins to accumulate in the food chain (McKibben et al., 2017, Funayama et al., 2013, Simmonds & Isaacs, 2007). By connecting guests to the threats, both present and future, that marine mammals face, guests learn how they can become ocean stewards in their own communities.

In 2013, The Marine Mammal Center joined the National Network for Ocean and Climate Change Interpretation (NNOCCI), a collaboration of Woods Hole Oceanographic Institute climate scientists, communication experts from Frameworks Institute, and a collective of 170 informal education centers around the United States. Using scientifically-tested language and communication strategies, simple metaphors, value statements and messages were created to overcome traps in public thinking and redirect conversations to impactful, community-level solutions (Bales et al., 2015). These practices have been utilized among The Marine Mammal Center staff and volunteers, with high school volunteers most recently being trained as climate change interpreters. As part of our 9-month service-learning program for high school students called Youth Crew, youth ages 15-18 work alongside staff and adult volunteers providing critical life-saving care to sick and injured marine mammal patients, while also serving in education roles each summer as either interpreters or summer camp counselors. As young community leaders and with a strong passion for climate change action, these high school students not only gain skills in public speaking and climate science, but serve as powerful messengers to our visitors with a key conservation topic.

Methods

During a four-week period in the summer of 2017, the Center’s education team welcomed eight Youth Crew (seven new youth volunteers and one returning youth alumna) as Climate Change Youth Interpreters. With two days of training, the high school students were introduced to the science of climate change, scientifically-tested communication strategies, and best practices of interpretation as they prepared to engage guests at the hospital about the impacts of climate change on marine mammals and how we can take action to prevent future climate change.

Two interpretive stations were developed for the volunteers to utilize in key public areas of the hospital. One station highlighted the impact of sea level rise on Hawaiian monk seals and Northern elephant seals, utilized an interactive model showing the presence of carbon dioxide emissions in our atmosphere from different sources, and had pictures and stories of some of our most recent seal patients. After sharing the science and causes of sea level rise, along with the major sources of carbon emissions, the volunteers highlighted current solutions to take action, including utilizing renewable energy (as The Marine Mammal Center does with onsite solar panels and a partnership with Marin Clean Energy). Guests could then take a pledge at the stations by placing a physical card into a display box to reduce their carbon footprint by switching to renewable energy for their home, school or
business, or pledge to carpool to school or work at least once a week.

The second station focused on the role of diet choices and food with respect to climate change. Highlighting that not all food is created equal due to the resources needed to produce it and get it to your plate, youth interpreters facilitated an interactive game where guests could guess the carbon footprint resulting from their food choices. Armed with compelling stories, like how omitting just one meat dish a week is equivalent to driving 1,100 fewer miles each year, the youth interpreters engaged guests about how our food choices matter to marine mammals as well. Using pictures and stories, they shared that many of our California sea lion and Guadalupe fur seal patients are rescued due to malnutrition and appear to be struggling to catch fish in a warming ocean (as prey species dive deeper and farther offshore in search of colder, more productive water). Guests could then take a pledge by placing a card in a display box to reduce their carbon footprint by skipping one meat dish a week, or setting up a compost program at their home, school or work (to reduce harmful methane emissions from uneaten food waste).

Throughout the summer, data was collected from the visitors who engaged with our youth interpreters, as well as from the youth themselves. Data was recorded for the number of visitors who engaged with youth interpreters at the interpretive stations (via a count clicker) and the numbers and types of pledges recorded each day. In addition to making physical pledges at the tables, guests also had the option to sign up (via an iPad) to receive helpful resources about how to fulfill their pledges, while also providing us a way to contact guests later in the summer via an online survey in order to evaluate the impact of their pledge.

Pre- and post-data was also gathered via surveys during the initial training and exit interviews at the end of the summer about the youth interpreter’s experience, including their attitudes and behaviors related to climate change prior to serving as education volunteers, their satisfaction throughout the summer, their expectations, and the skills and knowledge gained from their volunteer role.

Results

The eight youth volunteers committed 450 hours of volunteer service and engaged 3,589 visitors about climate change. In addition, 864 people made a physical pledge at the stations to take action (skipping one meat dish a week was the favorite choice, followed by carpooling) for a 24% pledge rate. In total, 197 pledge responses (154 distinct respondents) were completed through the iPad. A follow-up online survey was conducted two months after the summer concluded to elicit details on whether participants completed their pledge. The survey was open for two weeks and received 15 responses (10% response rate). We incentivized responses by offering a raffle drawing for a $50 Amazon Gift Card, randomly selected from survey respondents. Follow-up data revealed that two-thirds of the respondents succeeded in their pledge during the first two months, including comments such as “I stopped eating meat at least one day a week, and I talked with the community, and got the right things done to allow the community to let me build a compost bin, and my friends and I got together one day and made a permanent compost bin”, “We have almost completely stopped using our car in favor of walking and taking the train, because we don’t think the atmosphere needs our CO2”, and “Yes, I actually am eating a completely vegetarian diet now! I own a solar panel that charges phones, laptops, etc...”. These results highlight that individuals not only took action themselves, but engaged their local communities for an even greater impact.

Exit interviews with the youth interpreters revealed significant increases in their knowledge about climate change science and solutions, comfort and confidence public speaking, and their willingness to take action related to climate change. Testimonials included statements such as, “felt like I was important and making a real impact”, in addition to “doing something beneficial for the world/
environment*. Post surveys showed a 29% increase among responding volunteers regarding their comfort and understanding of climate change science following the training. More than 80% of participating Youth Crew indicated that they are likely or very likely to take action on all four of the climate pledges following their summer experience (skip one meat dish a week, set up a compost program, investigate/switch to renewable energy, and carpool or use active transportation at least once a week).

Discussion
This project was successful in utilizing high school volunteers as impactful climate messengers to mixed-age audiences and increased engagement of guests with climate science and actions to reduce their carbon footprint. The implementation of our youth climate interpreter program strengthened our climate messaging through the use of interactive elements and a behavioral pledge to facilitate evaluation. As a small pilot, it appears that short, informal interactions can create a behavior change in guests following their visit and should be explored further at a larger scale. For the high school volunteers, climate training and opportunity to serve as front-line interpreters was a highly desired and appreciated experience, along with building confidence in public speaking, climate science and increasing self-reported environmental behaviors.

In the future, we hope to increase both the number of participating high school volunteers, as well as the number of visitors engaged and making environmental pledges. This climate training for high school volunteers, interactive climate change activities and evaluative methods can serve as a template for other organizations to integrate similar messaging and opportunities into their existing programs.

References


The eight youth climate interpreters contributed over 450 hours of volunteering and engaged 3,589 visitors about climate change.
FROM “YOOZ-NAQALI” TO “PERFOR-YOOZ”:
Lessons learned from eight years of using the arts in narrative education and outreach in Iran

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Introduction

Storytelling and narratives have a long-standing history in Iran. The majority of the ancient stories have an educational side, and such messages used to be transmitted through allegory, metaphors, and moral words. Storytelling was even used by nurses in Gundeshapur Hospital in the 6th and 7th century to enhance the quality of life for patients (Jazini, 2007).

The Iranian Cheetah Society (ICS) is a non-governmental organization that aims to protect large carnivores in Iran, with a focus on the critically endangered Asiatic cheetah (Acinonyx jubatus venaticus) and Endangered Persian leopard (Panthera pardus tulliana). ICS uses conservation education and awareness campaigns to increase the knowledge and tolerance of the public and local communities towards the Asiatic cheetah and Persian leopard, to promote human-large carnivore coexistence. To achieve this goal, multiple small to large-scale education projects that involved using narratives were undertaken between 2008 and 2015. Here, we review the projects to evaluate their accomplishments and challenges encountered during each project. We emphasize the usefulness and effectiveness of integrating oral storytelling and narratives in conservation education projects in Iran, and provide suggestions for the future.

The target audience

Each project was unique in terms of the goal and objectives. Consequently, target audiences were selected from different age, sex and social groups.

Project 1: “Yooz-Naqali 1” [2008]

In 2008 we decided to use narrative education. We started with Naqali, a traditional Persian oral storytelling. Naqali was included the 2011 UNESCO’s Representative List of the Intangible Cultural Heritage of Humanity. Beyzaei defines Naqali as: “Quoting of an event or a story, as a poem or a prose with motions and states of expression in front of crowd [...] purpose of Naqali is, to entertain and excite audiences.” Naqali is an action based on speech and performed by a Naqal (narrator). Behind the Naqal a curtain depicting some part of the story and characters usually hangs. The Naqal uses a stick to point to those illustrations during the performance.

Project 2: “A Cheetah Troubles” theatre [2010]

After experiencing the “Yooz-Naqali 1” and based on the reactions we received, we decided to use theatre as an educational approach. As it was the first experience in Iran, we needed to get a consultant with theatre expertise. The “A Cheetah Troubles” theatre had a song and dance included, which would prepare the audiences about the scene, get their attention and excite them. The theatre was performed by two actors, with one actor as...
“The story of a wandering leopard” theatre

“A Cheetah Troubles” was performed over 35 times in the festivals and educational programs in Tehran (Iran’s capital), other cities and villages next to the Asiatic cheetah’s natural habitats in Semnan, North Khorasan, South Khorasan, Kerman, Yazd and Isfahan Provinces.

Project 3: “Yooz-Naqali 2” [2011]
The Positive feedback that we received from “Yooz-Naqali 1” performance motivated us to repeat this experience with some improvements. People stopped when they saw us and listened with interest. But we found that our weakness and barriers were mainly about the narration. In the “Yooz-Naqali 1” we used to transfer the scientific information with a narrative intonation and not as a structured story. The other problem was the story curtain, which was not painted by hand, as dictated by tradition; the lack of proficiency of the narrator was another weakness, the narrator was supposed to be more epic and heroic.

Project 4: “The story of a wandering leopard” theatre [2011]
The critical status of the Persian leopard in Iran encouraged us to apply our experiences in educating about this species by theatre. Therefore, we designed and played the theatre “The story of a wandering leopard”. Its design method, script structure, the director and training process followed almost the same procedure as for the cheetah theatre. The script was fun and attractive and at the same time gave information about leopard threats and human mistakes, which causes conflict with this animal.

Project 5: “Your pal, the cheetah” music video and “From now on it’s up to the humans...” music video [2013]
We first produced the “Your pal, the cheetah”4 and “From now on it’s up to the humans...” songs as part of the theatre performance, but later we decided to develop them to independent educational tools according to the feedback we received. Both music videos were used in our educational programs and broadcast in ICS-related social media. These videos covered a wide range of audiences and helped the songs to be better heard. We used emotion simulation and humour elements in this approach as well.

Project 6: “I am still here” theatre [2013]
In this show, we dominated the artistic aspects of a professional theatre over scientific facts. Due to its minimalistic dimension, we expected this to appeal to the more theatre focussed audiences rather than local folk.

Project 7: “Perfor-Yooz” [2015]
The performance art was chosen as its style could represent the current social atmosphere. Its flexibility and differences in play and the connection with the audience, leads them to engage in the story. It can also be performed at almost any time or place. In the 20

4 https://www.youtube.com/watch?v=fiOASWuQF6k
5 https://www.youtube.com/watch?v=M-CdpEr6l0
minutes of “Perfor-Yooz”, the actors play the threats of the cheetah’s life and created an environment in which people feel sympathy with Asiatic cheetah and through this become more concerned about the conservation of this species.

Discussion

Our program developed between 2008 and 2016. This article shows the importance of using the story, narrative and shows in education and our results show how the methods and tools must be flexible according to the audience and its level of knowledge. Our evaluation showed that at the start, the target audience needs to know about existence of the Asiatic cheetah in Iran, differences between cheetahs and other wild cats and their distribution. After improving the public’s knowledge about these topics, they need to know about factors threatening cheetah and what Iranians can do to conserve this species.

Our evaluations show that over time some trends can be observed:

Knowing the audience is a key issue:

From two points of view:
1. The level of knowledge
2. The acquaintance with art, storytelling and theater.

Over time the knowledge of the public about cheetah has changed. In the beginning they used to ask if we have cheetah in Iran; and some used to think that cheetah are leopard cubs. But now most of the Iranians know that we have cheetah in Iran and that it is critically endangered. They want to know about its threats and the solutions. In addition, it is important to measure how familiar the audiences are with art and theatre. Rural residents usually need simpler and more traditional methods of delivery while urban citizens prefer modern ways.

Using the methods that have roots in culture are helpful

Oral storytelling is as old as mankind itself. In Iran people grow up with stories and by choosing the method closer to the culture of our audience, makes it easier to convey our message.

Repetition is helpful

To make sure that our educational points are transmitted efficiently, we need to use various methods and repeat the facts. We ended up with a multi-method program. It was a 90 minute educational program including the related games, playing documentary videos and photos about that area’s wildlife, an expert’s speech, educational song and theater. Using different methods ensured repetition and aided recall.

Humour cheers up the audience

Combining the story with humour has a better influence on the audience and encourages learning. It is usually more difficult to get a reaction from adults. However when there are laughing kids among the
audience, we see open smiles on adults’ faces and they appear more relaxed and receptive.

**Consulting with experts is necessary**
We could not afford to permanently work with professionals, thus our own trainers and members worked on their behalf. Expert help was necessary to learn the details and improve the quality of the work.

**Rhythm matters**
Our audiences are mostly families: children, together with young and old people; all have seen our performances. So we have to have different things to attract everyone. The music of the cheetah video is closer to hip hop mixed with Persian musical instruments. This was interesting for young people and delightful for elderly people. The music for the video clip of the leopard was more interesting for adults, so we had to add some details to the theatre to make it joyful for children as well. The multi-age programs are more complicated because we have to be careful about the needs of all generations.

**Accessory everywhere**
The accessories of the theatre should be light and mobile, because we have to perform it in any situation and under any conditions, from an open area in the zoo or a mosque with just an amplifier to a full theatre in a city.

**Using puppets is interesting**
Using real sized puppets in the theater is interesting for the audiences. Although apparently the children are the main target group for this kind of show, our experience proved that even adults are interested in animal puppets, especially in the local areas and festivals.

**A souvenir is always memorable**
To make sure that we have delivered our educational message, we use different methods and repetition. To reinforce the message we give interesting take home gifts to the audience - a poster, image or CD help the audience to remember the facts that they learnt.

**Conclusion**
Story-telling facilitates a deep comprehension of educational facts by building a bridge between the subject and people’s emotions. Parts of the Asiatic cheetah’s fate is in the hands of people. They can demand that the government apply more practical conservation strategies if they understand the importance of protecting the cheetah. To reach this level, it is necessary to raise the level of general knowledge about Asiatic cheetah and to clarify the importance of conservation planning. Education using story and narrative can effectively stimulate people’s emotions to help them to become cheetah activists in society.

Our experience showed that an educational program that includes the theater, storytelling and narrative, can be a suitable method for NGOs and groups that have a wide and diverse audience. However, these types of programs require complex conditions: such as a suitable team, adequate budget and good cooperation with local authorities. The combination of these factors may not be easy to achieve, but where present, results can be positive depending on the location and time.

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**References**

Making the “From now on its up to the humans” video
Introduction

In conservation, taking action to protect the future is as important as taking action for the present. It is crucial to conservation education that its impact is generation-wide, inciting a change in mindsets and behaviours of society for the betterment of our earth. In 2016, Zoos South Australia (SA) adapted an established national Youth at the Zoo program, designed to support young people to become advocates and strong voices for conservation. This was sparked by a need to bring more young people into the zoo community, in order to make sure that the hard work by previous generations of staff and volunteers was not wasted. The program has taken massive leaps in its reach; in just two years it has stretched from a small program inside the zoo grounds, to over 10,000 kilometers away in Zambia.

Content

Youth at the Zoo, or YATZ (pronounced y-at-z) as it is called by its members, is a program aimed at high school students from Years 9 to 12 with a passion for nature and the environment. The application process is designed to feature young people who think outside the box and have a true passion to make a difference and work hard. The focus of the program is to create and spread a young and fresh voice, allowing the zoo to continue its vital work successfully in the 21st century.

At the beginning of each year, the program swings into action with an induction camp in early January where the new YATZ team can bond and become accustomed to our unique style of education. The program is not designed to mimic a school environment; instead its aim is to support the young people to have the freedom to learn for themselves. Every year without fail the YATZ are able to become great problem solvers and broad thinkers within only a few program sessions; after all conservation can not wait.

Throughout the year, workshops are held once or twice a month, with a range of activities and learning opportunities included in each session. Depending on which Zoo we are at (Adelaide Zoo or Monarto Open-Plains Zoo), the YATZ are given “hands-on work”, where they work in the group to get menial tasks done, helping out the often time-poor keepers. These tasks include but are not limited to building new paths, painting enclosures and picking up animal dung. As a reward for their hard efforts, the YATZ are often treated to special behind the scenes views of the zoo, as well as the knowledge that they have made a huge difference to the day in the life of a keeper. In 2016 and 2017, activities outside the zoo were featured including: weeding in conservation parks, up close experiences with South Australia’s unique fauna and even exclusive tours inside rubbish and waste disposal facilities in Adelaide.
YATZ also ran campaigns in their first two years, with a focus on Palm Oil in 2016 and Soft Plastic Recycling in 2017. These campaigns enabled the YATZ to develop valuable skills for conservation through connecting with the general public and people in their communities, all while getting tangible results and strengthening their relationship with people in the conservation field. The campaign in 2017 was impressive, the YATZ spent the year collecting soft plastic rubbish from their homes and made it into a large “blanket” which was displayed at the zoo, along with messages urging the public to properly recycle their soft plastics. At the end of the year the blanket was sent to a recycling facility where it was turned into a platform. The platform was given to the Children’s zoo and this is now used with much appreciation and enthusiasm by the resident goats.

The success of the program in 2016 meant that 2017 was an enormous step up, with the introduction of two new sub-programs of YATZ; Ambassadors and Mentors at the Zoo (MATZ, pronounced mates).

The Ambassador program is a guided journey into zoo keeping, available to any member over the age of 16. In the program, the YATZ work with keepers in the Children’s zoo in shifts of a few hours on a monthly roster, helping with normal daily tasks and learning valuable skills. Over time in the program, YATZ gain certain competencies ticked off eventually enabling them to work unsupervised in more of a Junior Keeper role. So far the program has lived up to its name, with all participants stepping up as amazing ambassadors for the public face of YATZ and young people everywhere.

A step above YATZ is the Mentors at the Zoo (MATZ) program for past YATZ members who have graduated from school and are looking to continue their involvement with the Zoo. In 2017, MATZ was developed to support YATZ, where the mentors provided program development, leadership and role-modelling to their younger counterparts. However, from its huge success, MATZ has now reached unprecedented levels, becoming its own parallel program with YATZ and expanding to encompass global issues.

At the end of 2017, MATZ was successful in receiving an educational grant, enabling a two year plan to be enacted, based around a connection with a conservation partner in the community of Mfuwe in Zambia. The intensive program aims to bolster the knowledge gained by the mentors from their time in YATZ, including problem solving, resilience, initiative and important public speaking skills. The two year program culminates in an Australian-Zambian exchange, in which the seven mentors will travel to Zambia for three weeks in the middle of 2018 and the following year 14 Zambian conservation club students will return to Adelaide. The exchange will enable the YATZ and MATZ to incorporate different perspectives of conservation into their experience in the program and their own lives. This will highlight the differences and similarities between Zambian and Australian cultures and way-of-life to create a 10,000 kilometre long connection with young people who have the same passion and enthusiasm for conservation.

Looking to the future, YATZ aspires to be bigger than ever before, growing children from even younger ages into young conservationists, who can rise up through the program and enable their passion for protecting the environment to flourish. They can then take the leap into mentorship, where they will be able to reinforce the global link with Zambia and provide Zoos South Australia with the youthful energy and vibrancy it has been lacking. With this development of a new generation of educated and enthusiastic young people, it will be so much easier to shift conceptions of conservation from those of the past to a more proactive and forward-thinking approach, where conservationists are no longer outspoken or controversial. We firmly believe that this program will make a difference for today AND for tomorrow.
INTRODUCTION

Education is one of four important functions (research, conservation, education, entertainment) of the Saigon Zoo and Botanical Garden. In order to perform that, the Zoo Education Center - Saigon Zoo and Botanical Garden was established in 1996. In 1999, the “Conserving and Protecting Environmental Education” introductory course was established based on biological knowledge of grades, wildlife conservation experiences at the zoo and especially the experience of conservation education at Melbourne Zoo Australia.

After 18 years of application, this program has had certain achievements in educating students about the role of wildlife and the status of current species. This has contributed to shaping and enhancing their awareness of wildlife and environmental protection for a large number of students in Ho Chi Minh City, and in neighboring provinces as tens of thousands of students come to the zoo to participate in this program every year. With the above results, the Zoo Education Center - Saigon Zoo and Botanical Garden has been awarded two certificates by the Minister of Natural Resources and Environment for their outstanding achievements in environmental protection propaganda in 2007 and 2011.

Recently, to stay up to date with the changes in the Vietnam education system, Saigon Zoo and Botanical Garden cooperated with the Ho Chi Minh City Department of Education and Training to compile a “Lesson outside the school” program, as a learning and relaxing environment for students in Ho Chi Minh City. In this way, they can study biology - intuitively and vividly - based on the collection of rare and valuable wildlife cared for at Saigon Zoo and Botanical Garden. The program also meets students’ needs to learn through actively searching for knowledge instead of just listening and recording passively.

On that basis the “Lesson outside the school” program was born on May 2016. Since then the team has compiled 17 topics for six grades. These are:

**Grade 6** includes 5 topics: Plant roots, leaves, stems, diversity and breeding.

**Grade 7** includes 5 topics: Vertebrates, invertebrates, beauty of birds in the zoo, biodiversity of fish, amphibians and reptiles, learn about the mammals in the zoo.

**Grade 9** includes 3 topics: Ecosystem, ecological factors, cellular technology and variability.

**Grade 10** includes 2 topics: Biodiversity, cellular observation.

**Grade 11** includes 1 topic: Animals habit decoding.

**Grade 12** includes 1 topic: Evolutionary evidence.
Method
1. Materials
In addition to the available wildlife collection, to implement the “out-of-school lesson” program, the zoo education center prepared a lot of materials for lessons. This was to enable students to learn about different topics.

2. Method
We use positive teaching methods when implementing this program, in order to help pupils take the initiative in learning: actively learning through the activities at each station, then they are evaluated by a test.

3. Implementation forms
Instead of being led by the zoo educators as in the old program, in the new program students take the group and the zoo map showing the operation stations on each topic. They follow the route shown on the map to each station where they find out about the specific species to complete the test on their topic.

In the previous program, students only listened to and recorded information from the zoo educators. In the new program, they learn through direct observation of biological characteristics - shapes, colours and information are displayed on the species information sheets in each exhibit and if there is not enough information to complete the worksheet, the student can ask the zoo educator for answers.

4. Result
After the program was completed, the zoo education center implemented a test in the second semester of 2016 - 2017. Despite the recent launch in schools, a number of topics were selected in accordance with students’ studying progress. These included:

For the topic “Leaves in Plants” in Grade 6, students learnt about:
- The structure of a leaf
- The characteristics and functions of deformed leaves. At this station they were very interested in learning about the role of the leaves.
- Finally, they collected samples and pressed them to make plant specimens under the guidance of the zoo educators.

For the topic “Discovering the World of Invertebrate” in Grade 7 students learnt about:
- The life cycle of the butterfly and they identified some species. In this activity students go to the Butterfly Garden to learn about butterflies and their life cycle, learn the process from egg to insect to cocoon to butterfly, learn about the host plants of some species and finally students hold a racket to catch butterflies in the zoo and identify them.
- Earthworms: Students dig the land to find worms, find out the role of Earthworms and then using a magnifier observe the shape, movement, position...
Students studying ocean invertebrates

- Learn about some of the ocean invertebrates. Students observe species such as: coral, Vu Nang shellfish, octopus, shrimp and learn about morphological descriptions.

In other activities students actively observe and directly search for information about a specimen:
- Observe and compare skeletons where students observe what the skeleton contains. Compare the differences in the teeth of herbivores, carnivores and omnivores, then remark about the adaptation of teeth for food.
- In the Grade 9 ecosystem activity students survey a fixed area to record the current plants and animals and then in groups together complete the food network of this survey area.
- Grade 11 elephants: Students observe activities at the giraffe exhibit.

After studying at the stations and completing their worksheet the students are photographed with a number of domesticated animals: Asian elephant, yellow python, parrot, turtle. This activity helps to make the children feel closer to wildlife and form a sense of protecting them.

To date the program “Out-of-School Lessons” has improved the quality of conservation education at the Saigon Zoo and Botanical Garden, and has also enhanced the teaching and studying of biology at Secondary and High schools in Ho Chi Minh City, attracting more than 28,000 students in just over 7 months (November 2016 - May 2017). The new style of teaching has been well received. The new style helps students to be more active in their studies. This is reflected in the survey results of participating pupils. The survey results showed that most of the students are excited about this new program (94.7% yes) and also showed that the implementation of the program met their learning needs (94% yes).

To compare the new “School Out-of-School Lesson” program with the old program “Environmental Conserving and Protecting Education” program, we conducted a survey of students.
- The students preferred taking their own maps to the operating stations (68.67%), rather than being guided as in the old program (31.33%).
- Students preferred actively learning and recording information (78%) over commentators reading the answer (22%).

It is clear that the implementation of this new program meets the educational needs of children better than the old program.

Conclusion
Since the trial launch and adoption of this new conservation education program at the Saigon Zoo and Botanical Garden, we have attracted about 28,000 students. Initial evaluations by students of the program suggest that this program is more effective than previous programs. The new program meets the needs for innovation in teaching and learning for students in Ho Chi Minh City according to the policy of Ho Chi Minh Education and Training Department.
Introduction

"Where appropriate, keepers are encouraged to engage in conservation, education, and science initiatives both in zoos and in the wild" (Reid 2013). Animal keepers have an important role in zoo education. Particularly their care for their animals makes it possible for them to talk confidently to their audiences. Animal keepers not only care for their animals (for example cleaning exhibits, preparing the food, and breeding animals) but they can also interpret their animals’ behavior and work as a bridge between them and the audience. Animal keepers know general information about their animals as well as each individual’s character and relationships between the animals.

This article will demonstrate three points:
1. The keeper’s role to translate the animals’ characteristics and behavior to visitors as an interpreter
2. To exhibit the animals more effectively as a presenter, and
3. To use the keeper’s understanding of animal behavior to build a bridge between visitors and the animals.

Methods and materials

The method is a kind of “participant observation”. Chiba Zoo opened two new lion exhibits in 2016.

There are two exhibit styles (Figures 1 and 1b):
1. A natural savanna exhibit. The visitor can see a lion’s natural habitat and find out about the lion’s natural behavior. The exhibit gives visitors an ecological view where it is possible for them to observe a natural habitat and living conditions and
2. The second exhibit is surrounded by glass. Visitors can observe the lion’s physical features more closely through the glass wall.

Chiba Zoo has two male lions –Touya, born in 2010, and Allen, born in 2013 (Figure 2).
Results and discussion

The author would like to mention three points through these 2 types of lion exhibits.

1. The keeper’s role to translate the animals’ characteristics and behavior to visitors as an interpreter

Zoo keepers can inform visitors of not only general information but also characteristics of each animal and the meaning of displayed behavior.

For example, how to identify Touya. Looking at figure 3, it is clear that Youya’s face has scars on the left and he has heart-shaped nostrils. This is a good introduction for the visitors to focus their interest on Touya. Then we can start to interpret the meaning of his behavior. Generally people say - “Oh, a lion is sleeping and doesn’t move, it’s so boring, let’s go!” Naturally, a male lion rests for about 16 hours a day. An adult male lion sometimes has to fight other male lions to protect his territory and his pride. Fighting needs a lot of energy, so a male lion rests to save energy. The visitors will now know the real meaning of a lion’s sleep behavior through the keeper’s talks (interpretation).

2. To exhibit the animals more effectively as a presenter

Allen lives in the outdoor exhibit behind a glass wall. This allows the visitor to get closer to Allen and observe details of the lion’s body. Allen was hand-raised so he does not have a fear of humans. He often comes up close to the glass which makes him a perfect inhabitant of the grass wall outdoor exhibit. Visitors can see each part of his body up close. For example visitors can see the difference between his front and hind paw pads. Keepers need to understand the design of the exhibit and each animal’s character. In this case, Allen has an interest in humans. This means the keeper can talk to visitors about lions in front of a real lion, safely behind the glass wall. Allen is curious and sometimes gets close to school children and their teacher.

3. Keeper’s role: to use your understanding of animal behavior to build a bridge between visitors and animals

Allen sometimes eats grass on the ground in his exhibit. This surprises visitors who don’t imagine lions eating grass, they think lions only eat meat. But lions sometimes eat grass to enhance intestinal stabilization. It is important for keepers to provide real information to the visitors. Keepers can become a bridge between visitors and animals.

Saunders (2013) mentioned that “when visitors are more interested in entertainment than in learning, it is often possible to initiate and capture their interest and then channel it toward the goal of education by using good interpretive techniques” (Saunders 2013). This suggests that it is very important for keepers to know their animals and to also know their exhibit features and to use this knowledge for conservation education with visitors.

Acknowledgements

I’d like to acknowledge my colleagues at Chiba Zoo and IZE Board Members who helped me write this article.

References

Using Evaluation to Increase Internal Audience Awareness

Melanie Sorensen, Houston Zoo; Brian Johnson, PEER Associates; Joy Kubarek, PEER Associates

Introduction

Spontaneous, Passionate staff, creating Awe and inspiring interactions while building Relationships with our guests and Keeping them first in all we do defines the SPARK team at Houston Zoo. This program started with just one staff member interacting with guests as a value-added experience during their Zoo visit. In 2016, the Zoo completed a new strategic plan, which included priorities such as “creating meaningful experiences,” “delivering a world-class guest experience” and “advancing conservation education.” In order to make evidence-based decisions about future programming directions that support these priorities, the Zoo’s Conservation Education department made a commitment to better understand a range of guest experiences through evaluation. The SPARK team performs three types of guest engagements:

<table>
<thead>
<tr>
<th>SPARK Engagement Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spark Animal Demonstrations</td>
<td>Animal demonstrations involve a SPARK team member and an animal ambassador at locations throughout the Zoo. On many mornings when the Zoo first opens, an animal demonstration takes place at the Zoo’s entrance. The SPARK team member shares the animal’s story and often invites visitors to touch the animal.</td>
</tr>
<tr>
<td>Conservation League of Heroes</td>
<td>SPARK team members perform a 15-minute scripted theatrical production about reducing or recycling plastic to save sea turtles in the wild. The show takes place near the Children’s Zoo in a performance area that can seat up to 150 people.</td>
</tr>
<tr>
<td>SPARK Guest Engagements</td>
<td>Guest Engagements position a SPARK team member near Zoo exhibits to engage in unscheduled interactions with guests throughout the day. Conversations include anything from wildlife-saving messages to sharing detailed stories about our animals.</td>
</tr>
</tbody>
</table>

Methods

The purpose of the evaluation of SPARK engagements was three-fold:
1. To describe the role SPARK engagements play in a visitor’s Houston Zoo experience.
2. To inform future decision making about allocation of resources toward SPARK engagements.
3. To articulate connections between SPARK engagements and the Zoo’s recently developed Conservation Education Outcomes Framework.

Through a series of stakeholder conversations, we identified the following evaluation questions:
1. What value do SPARK engagements bring to the Houston Zoo visitor experience?
2. How is each SPARK engagement format unique in its contribution to the visitor experience?
3. How do SPARK engagements contribute to the wider Conservation Education department and institution’s goals?

To assist with this process, the Zoo worked with PEER Associates, an independent program evaluation firm. PEER applied a participatory approach to the evaluation process, modeling evaluative practices and training staff to contribute to the evaluation process when appropriate. Rather than be prescriptive to measuring specific visitor outcomes, this evaluation sought to characterize the experience and explore potential avenues for future program development and resource allocation. To better understand...
visitor perspectives about SPARK engagements, PEER and trained Houston Zoo staff and volunteers conducted 190 in-person interviews with visitors on Zoo grounds in late 2017.

A PEER research associate first pilot tested the visitor interviews as exit interviews using continuous random sampling. However, it was difficult to find visitors who had or remembered having an interaction with a SPARK team member. Given the limited time available for conducting interviews, the approach shifted to intercepting visitors immediately after they completed a SPARK interaction (convenience sample). Pilot testing of an interview guide for each engagement type suggested that the SPARK engagements were too brief to warrant the level of detail probed in the original interview guide. Therefore, the interview guides were edited to focus on several essential questions and a limited number of demographic questions.

PEER transcribed the interviews and uploaded transcripts into Dedoose® for analysis. Two PEER research associates conducted qualitative analysis, one using open coding for emergent themes and the other using a priori coding based on the Houston Zoo’s Conservation Education Framework. A priori coding for Conservation Education Framework outcomes resulted in 121 occurrences of Framework outcomes represented in 96 (50%) of interviewed visitor responses.

Results

The results are organized in three sections according to engagement type: Animal Demonstrations, Conservation League of Heroes theatrical production, and Guest Engagements.

SPARK animal demonstrations

SPARK Animal Demonstrations help visitors learn about wildlife, promote greater appreciation for animals, and strengthen the visitor experience. First and foremost, visitors valued the opportunity to get up close to and touch an animal. They also appreciated being able to experience an animal outside the confines of an exhibit. “I think it makes a bigger impact on [my children], definitely, because they see how it actually moves, how it works, how it acts,” a parent noted. “And they get a better impression of what it does, rather than seeing it behind glass.” Visitors also enjoyed the information they learned about the animal during the demonstration. “It’s fun to learn more, too, because sometimes you see the animals but don’t read the signs,” a visitor said. While learning new information by itself is unlikely to directly lead to the type of attitudinal or behavior changes the Zoo is ultimately hoping to see in its visitors, this finding should not be discounted given the brevity of the experience.

SPARK Animal Demonstrations are a regular part of the Zoo experience for frequent visitors, and an unexpected welcome for new guests. Visitors cited four main reasons for taking part in the SPARK Animal Demonstrations: the opportunity to touch an animal at the Zoo; the animal was new or unusual to them; they had an existing interest in the animal; or it was a learning opportunity for children. For some visitors, the SPARK Animal Demonstration is a regular part of their visits. These visitors (typically Zoo members) know the SPARK team members by name and always look for them in the Zoo. For new or infrequent visitors, the animal demonstrations taking place nearing the Zoo’s entrance provided an unexpected welcome to the Zoo.

SPARK Animal Demonstration interview responses demonstrated outcomes in primarily one domain of the...
Conservation Education Framework: attitudes. Visitor responses demonstrated learning outcomes in two domains of the Conservation Education Framework: knowledge (n=1) and attitudes (n=16). Knowledge-based outcomes as articulated in the Conservation Education Framework were not prevalent in the animal demonstration visitor responses. However, many visitors did recite specific animal information related to the demonstration, such as what the animal eats or where it lives in the wild. This information did not go further into descriptions of connections with people and the environment, which was required to be categorized in the Framework’s knowledge outcomes domain.

SPARK Conservation League of Heroes
Conservation League of Heroes provides a fun, enjoyable, educational experience for visitors. Visitors noted that the story and performances were engaging for both children and adults. They also highlighted the show’s focus on a conservation theme as a strength. The interview data also suggest that the show was particularly appealing to children. Parents and caregivers valued three aspects of the performance, in particular: the interactive components and audience participation opportunities; the simple, yet important, conservation theme; and the use of superheroes as a plot device.

Visitors valued the show’s clear conservation message delivered in a surprising format. Nearly all visitors interviewed were able to cite recycling, pollution, plastics, and/or general conservation as the main messages of the show. This sets the show apart from the other SPARK engagement types, where conservation themes were rarely mentioned by visitors. One visitor commented: “When I get the Houston Zoo survey at the end of my visit as a member, I’ll be able to say, “Yes, the Houston Zoo taught me ways that I can make a difference outside of the Zoo.”” Visitors also valued the performance as a surprising addition to the Zoo experience, noting they did not expect to see live theater at the Zoo.

Conservation League of Heroes interview responses demonstrated outcomes in three domains of the Conservation Education Framework: awareness, attitudes, and knowledge. The Conservation League of Heroes visitor responses demonstrated the greatest number and diversity of learning outcomes of the three SPARK engagement types. Responses demonstrated outcomes in three domains of the Conservation Education Framework: knowledge (n=10), attitudes (n=14), and awareness (n=56). The most prevalent outcome was within the awareness domain, with 44 occurrences of visitors recognizing “Take Action” messages.

SPARK guest engagements
Visitors noted that they learned more during their visit because of the SPARK Guest Engagement. While it is important to recognize the appreciative and inspirational value of simply observing an animal, visitors most appreciated the opportunity the SPARK Guest Engagements provided them to interact with a knowledgeable Zoo staff member who could answer their questions. One visitor noted: “This is the only person we’ve talked to, and we learned a lot more about the animals than we would have just by reading the plaques. Made it more personal.” Unlike visitors who experienced the SPARK Animal Demonstrations and the Conservation League of Heroes performance, which had consistent learning or messaging takeaways, those who took part in a SPARK Guest Engagement reported a range of topics, takeaways, or experience components. This is not surprising given the responsive nature of the SPARK Guest Engagements to visitor needs and interests, but it does
suggestion an opportunity for finding creative ways to develop consistent messaging across the SPARK Guest Engagements. Finally, the data also suggest that the combination of seeing an animal along with getting information from the SPARK team member provided an opportunity to forge a deeper connection to, or appreciation for, the Zoo’s animals.

A unique feature of SPARK Guest Engagements is that visitors felt like they were getting an individualized experience. Visitors noted that the SPARK team member helped them have an experience they might otherwise have missed. For example, visitors described how the SPARK team member walked them to a different area of an exhibit for better viewing or to see part of the exhibit that many visitors pass by. More-frequent visitors appreciated recommendations for new things to see at the Zoo. “It makes it more pleasant,” a visitor said. “They tell you what’s going on. It’s kind of a behind-the-scenes tour when you’ve got someone there.”

SPARK Guest Engagement interview responses demonstrated outcomes in just one domain of the Conservation Education Framework: attitudes. Eleven responses demonstrated outcomes within the Framework’s attitudes domain. Similar to the SPARK Animal Demonstrations, knowledge-based outcomes as represented in the Conservation Education Framework were lacking, but visitors did share animal information they had learned.

Discussion/Conclusion
It has long been known that capturing—and sustaining—people’s attention can be challenging. Zoos and other curated informal learning settings have struggled to find the balance of content and engagement. The findings of this evaluation support the importance of live interpretive experiences such as SPARK engagements to grab the attention of visitors. Many visitors noted how the SPARK engagement was unexpected but welcome, and got them interested in learning more. Interpretive text on panels and signage still plays a role in the visitor experience, but the interaction with another human being is likely more effective in hooking someone’s attention.

One of the purposes of this evaluation was to identify what, if any, connections could be made between SPARK engagements and the Zoo’s new Conservation Education Framework. SPARK engagements had not previously targeted specific outcomes. This evaluation has helped establish a baseline understanding of what is currently being accomplished for learning outcomes given the new Conservation Education Framework, though there is variability in which outcomes are likely to be met within the different engagement types. Across the three SPARK engagement types, the Conservation League of Heroes performance showed the greatest occurrence of learning outcomes (n=80). Most were in the awareness domain (n=56), though this program also showed the highest occurrence of knowledge-based outcomes (n=11). SPARK Guest Engagements had the fewest (n=11), and these outcomes were all in the attitudes domain. The variability in the occurrence of outcomes prompts questions about what the intended learning outcomes for each SPARK engagement type could (or should) be, as well as what interpretive strategies may best accomplish those outcomes.

Additionally, there may be opportunities to accomplish more learning outcomes through SPARK engagements. Many visitors in the SPARK Animal Demonstrations and SPARK Guest Engagements referenced animal-based information they heard in their interaction with a SPARK team member. This information could potentially transition to a knowledge domain outcome (e.g., “People describe the connections between people, animals, and the environment”) by taking the information a step further and making connections.

Visitor responses also expressed interest to learn more about animals at the Zoo. In particular, visitors from the SPARK Guest Engagements were enthusiastic about what they had learned and made many “I wonder” comments. Interest and curiosity are not currently represented in the Conservation Education Framework. However, recent research has shown that curiosity is a crucial part of learning. Aspiring to trigger and harness curiosity as part of a SPARK engagement may be a valid outcome to strive to achieve. In addition to better understanding the nature of the SPARK engagements, a final purpose of this evaluation was to inform future decision making about allocation of resources toward SPARK engagements. In the end, this evaluation provided evidence of the concrete value of SPARK engagements. This allowed the Conservation Education Department to make a stronger case for expanding the size of the SPARK team and increasing the expense budget for props to enhance the Conservation League of Heroes and other theatrical productions. Finally, as one of the first evaluations conducted since the adoption of the Zoo’s new strategic plan and the Conservation Education Department’s new outcomes Framework, the evaluation boosted the entire Conservation Education team’s appetite for more program evaluation. To that end, Houston Zoo is now working with PEER Associates on an intensive year-long series of trainings and hands-on evaluation capacity building with the Zoo’s entire full-time Conservation Education staff.

Acknowledgements:
The authors wish to thank the Houston Zoo SPARK team members Bennett Dones, Sarah Fern and Celina Burgueño, as well as the wider Conservation Education team, for their enthusiastic participation in this evaluation.
Taronga Teachers Association was established in 2011 to support and inspire passionate, environmentally focused lighthouse teachers through collaboration and innovative Zoo based teaching and learning opportunities. Recently, Taronga Teachers Association Zoo Friends has been revitalised and is kicking goals with significant membership growth (Figure 1) and increased teacher engagement with both Taronga Zoo and Taronga Western Plains Zoo. In 2016, Taronga Education expanded its professional learning offerings for Taronga Teachers Association members to include NESA Registered Professional Learning courses (Figure 2).

The Taronga Institute of Science & Learning, a state of the art precinct in the heart of Taronga Zoo, is set to open mid 2018. It will provide 21st century, conservation and research facilities for students (preschool - PhD), teachers, scientists and conservation experts. School students will be inspired in the immersive classrooms, themed around rainforest, woodland and desert habitats (Figure 3). To maximise teacher engagement with this innovative, learning hub, the Taronga Teachers Association pricing structure, benefits and marketing strategy were evaluated and modified to meet the needs of teachers across the state.

Through collaboration with the Taronga marketing team, the Taronga Education team developed a package for teachers that was affordable, enticing and offered them a wealth of curriculum relevant learning opportunities. A competitive membership rate, coupled with free membership for up to two children, allows teachers the opportunity to visit the Zoo in their free time. The team deemed this necessary in order for teachers to maintain a connection with the education team and engagement with the animals in our care and the associated conservation campaigns.

To add further value, a program of special events for Taronga Teachers Association members was developed and launched in February this year, at an Exclusive Teacher Preview Day. The event was highly successful with over 700 registrations (maximum capacity). Special events throughout the year include behind the scenes events, video conferences about current school resources and curriculum linked education workshops.

To further promote Taronga Teachers Association a one month trial membership was promoted in February and all new teachers that joined at the Exclusive Teacher Preview gained an extra six months of membership for free. Throughout all these promotional opportunities market research has been carried out to clarify teacher’s perceptions of the Zoo, our education offerings and how we can support them and their students into the future.
Creativity, collaboration, critical thinking, communication, and citizenship are deep learning competencies that are a focus in our schools today, to prepare our students for the future. At Taronga we have the perfect tools, staff and an authentic environment to stimulate and inspire this learning. Our future focus for Taronga Teachers Association is for teachers to have an understanding of what we offer and to build a collaborative environmental education network which will ultimately have a positive impact on both student outcomes.
BLOWING BUBBLES TO SAVE SEABIRDS
A zoo-based community conservation program
Emily McLeod1, Ben Sanders2, and Lian Wilson3
1Senior Social Science Research Manager; 2Senior Manager Conservation Campaigns; 3General Manager Community Conservation, Zoos Victoria

Introduction

Marine litter is a fast growing environmental issue. Plastic pollution, in particular, poses a serious threat to marine biodiversity with close to 650 species known to interact with plastic debris (Derraik, 2002; Gall & Thompson, 2015). Entanglement and ingestion are the main mechanisms by which marine species interact with plastic debris, causing lethal and sub-lethal effects (Wilcox et al., 2016). Seabirds are particularly vulnerable to marine plastic pollution due to their tendency to ingest floating plastic while foraging (Wilcox et al., 2015).

In Australia, flesh-footed shearwaters (Puffinus carneipes, Figure 1) are one of the most affected seabirds, with around 90% of adults and chicks ingesting plastic (Lavers et al., 2014). The ingestion of such high levels of plastics has been associated with the decline of these birds on Lord Howe Island (Lavers et al., 2014; Pridell et al., 2006). Balloons and their attachments are one of the most prevalent and identifiable items found in the stomachs of these birds (Lavers et al., 2014, Fig. 2). Indeed, balloons have been identified as one of the three most harmful pollutants entangling and threatening wildlife (Wilcox et al., 2016).

To alleviate this human driven threat to seabirds, Zoos Victoria launched the When Balloons Fly community conservation program in early 2017 to raise awareness of the impact balloons can have on wildlife and empower Australians to use bubbles instead of balloons at all outdoor events. We’ve partnered with Phillip Island Nature Parks, a local organisation, to increase the reach and impact of this program. The primary target audience is families with young children, as this group regularly use balloons and makes up a large proportion of the visitation to Zoos Victoria properties, making them ideally placed to receive the behaviour change message during their visit. The secondary target audiences for this program are organisations including businesses, schools and local councils.

The call to action is to make a public commitment to use bubbles, not balloons, outdoors. Using best practice community-based social marketing tools, we make the commitment public and durable to increase the likelihood that people will change their future behaviour (McKenzie-Mohr, 2011). Visitors to our zoos write their name on a bubble sticker and place it on the public pledge boards (Fig. 3). Online, the names of recent people to make the commitment are displayed in bubbles while business, local councils and schools are listed on a supporter’s page as organisations that have made a promise to no longer use balloons outdoors.

Engaging all our community

The seal presentation at Melbourne Zoo and the platypus presentation at Healesville Sanctuary have been designed specifically to connect visitors to these species and educate them about the threat of balloon pollution. When visitors walk through the seal and platypus areas of the zoos they are immersed in program messaging through talks, imagery, bubble
machines and animations. Special activations run in peak visitor periods from volunteers engaging visitors in blowing giant bubbles, to a ‘bubbleologist’ Dr Bubble and a specially designed penguin puppet called Poppy made from recycled materials. Key to these experiences is demonstrating that bubbles can be just as fun and engaging as balloons. To date, over 130,000 individuals have pledged to blow bubbles outdoors instead of balloons.

Engaging schools in conservation
Around 150,000 students visit one of Zoos Victoria’s properties each year to engage in inquiry-based learning experiences that aim to foster wildlife friendly attitudes, build understanding and facilitate actions to help save wildlife. Schools are invited to take up one of our community conservation programs to help extend their learning beyond the zoo visit, and those that choose When Balloons Fly are given innovative learning opportunities and additional resources including:

- The Marine Debris Monitoring Project where students conduct regular beach clean-ups, contributing data to the Australian Marine Debris Database. In partnership with Tangaroa Blue, students are engaged in a citizen science project and encouraged to reflect on the debris being collected over time. Support is provided with teacher professional learning opportunities, web conferencing and zoo educators.

- Balloon Free Event Kits that include teaching resources, learning resources and hand-knitted flesh-footed shearwater mascots.

In the first 12 months, 21 schools participated in the Marine Debris Monitoring Project after visiting Zoos Victoria, and reported 49 balloons and 46 ribbons or clips collected as marine debris. One school in Mallacoota, 500km from Melbourne, reported that they used the beach clean-up as a catalyst for greater change with the students taking on the challenge of reducing forms of marine debris in their local community. This ranged from writing a book for the local kindergarten students, to running bees wax wrapping workshops with the Year 4 to 6 students. The project started conversations in the school community, with the school noting a shift in the accepted norms around the use of single-use plastic alternatives. A further 59 schools committed to no longer using balloons outdoors.

Turning organisations into supporters
Key contacts within relevant businesses, local councils, and major events were given information on the issue of balloon pollution and how they can have a positive impact by committing to no longer using balloons outdoors, before being invited to the program as a supporter. All supporters are provided with a free kit containing materials to brand themselves as balloon free and to help them create and promote their own When Balloons Fly initiatives.

The benefits of targeting businesses, councils, and festivals are two-fold. Not only does it greatly reduce the risk of balloon pollution, as many of these organisations in the past have regularly handed out and used balloons outdoors, it also helps to extend the reach of the program and establish new norms in the community about appropriate balloon use. The result is a growing network of over 180 organisations committed to wildlife-friendly alternatives to balloons. Outdoor festivals and community events have engaged their stallholders on the impacts of balloons, further promoting the program and leading to the use of bubble performers or machines instead of balloons.

Taking it to the wider community
A strong social media presence is vital for not only promoting and connecting people with the When Balloons Fly program, but as a way of continuing to prompt and remind people of the importance of their pledge to not use balloons outdoors. In the first 12 months, our Facebook posts (paid and unpaid) reached 3.7 million people and received over 700,000 engagements (e.g. likes, shares, and comments). Through strategic use of social media we have created a strong online presence of the campaign, helping to further spread the When Balloons Fly message.

Zoos face a challenge in trying to reach new audiences that do not traditionally visit the zoo. We developed a unique initiative to raise mass awareness through an attempt to break the Guinness World Record for the ‘Most people simultaneously blowing bubbles’.

Figure 2: Plastic items commonly found inside shearwaters. Photo credit Ian Hutton
Given the size of the audience needed for this attempt (at least 23,680), we secured the support of Melbourne’s iconic sporting ground, the MCG, and held the attempt prior to a cricket match. Although the record was not broken, we filled the MCG with bubbles and received a total audience of more than 934,000 including:

- 11,500 who blew bubbles on the day (Fig. 4)
- 1,100 signed up as independent volunteer stewards
- 48,086 received the campaign message from the big screen at the MCG
- 115,078 exposed to the message through television coverage
- 118,313 through pre-event media
- 660,775 reached on social media

This initiative provided a unique and successful opportunity to engage a very different audience in our message.

Program development and evaluation

For behaviour change initiatives to be effective, they need to focus on removing the barriers and increasing the benefits to performing the behaviour in question (McKenzie-Mohr, 2011). Focus groups with zoo visitors were run early in the development phase to identify barriers and benefits to using wildlife-friendly alternatives to balloons outdoors. Strategies to help remove these barriers and highlight the benefits were then built into the program.

After building a behaviour change program based on a thorough understanding of the predictors that drive the behaviour, it is important the program is evaluated for its effectiveness at changing behaviour. Evaluation is essential to ensure the often limited funds available for conservation work are being used effectively, by ensuring the initiatives have the greatest impact on their target audience (Ferraro & Pattanayak, 2008). When Balloons Fly has embedded measures to evaluate the social outcomes (shift in attitudes, beliefs and target behaviour) and biological outcomes (decreased impact of balloons on flesh-footed shearwaters).

The biological outcomes of this program will be gradual and long-term. As such, we are working with partners at Lord Howe Island and Phillip Island Nature Parks to monitor the prevalence of balloons and their attachments on beaches and in the ocean over time. Annual sampling of the stomach contents of flesh-footed shearwater chicks at nesting sites on Lord Howe Island has begun, and will continue to monitor the amount of balloon waste over time.

Researchers from the University of South Australia were engaged to evaluate the conservation effects of the program on changing visitor understanding about the threats balloons pose to marine wildlife, attitudes and beliefs concerning use of balloons outdoors and behavioural intentions related to outdoor balloon use. Zoo visitors and the wider community were surveyed across three time points (prior to program launch, 6 months post-launch, and 12 months post-launch) to compare changes in beliefs and behavioural intentions over the course of the program. Preliminary results from these surveys show marked increases over time in the number of people aware that balloons specifically contribute to marine debris and who identified the choking/ingestion risks to wildlife as a negative impact of using balloons outdoors (Mellish et al., unpublished data). Twelve months post-launch, there was a statistically significant ($p < .05$) decrease in the self-reported likelihood of using balloons outdoors in the future, and an increase in the likelihood of using wildlife-friendly alternatives (Mellish et al.,...
unpublished data). Indeed, 6 months after visiting the seal show at Melbourne Zoo two thirds of visitors reported changing their behaviour while attending or hosting an outdoor event as a result of their zoo experience (Mellish et al., unpublished data). Overall, these results indicate that the program is achieving its social objectives of raising awareness about the negative impacts of balloon use and encouraging people to change their behaviour.

**Conclusion**

Engaging the whole community, from general zoo visitors to schools and organisations, has helped to increase the reach and impact of the When Balloons Fly program and ensure its success. Through targeted use of behaviour change tools, Zoos Victoria has succeeded in empowering the community to not only switch to a wildlife friendly behaviour but advocate on the zoo’s behalf, taking us closer to creating a social norm, that in time, will help reduce the impact of plastic pollution on marine wildlife.

www.zoo.org.au/balloons

**Acknowledgments**

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VISITOR UNDERSTANDING OF ZOO CHAT MESSAGES
Are they picking up what we’re putting down?
Nichole Nageotte, Doctoral Student. Gayle Buck, Professor of Science Education, Indiana University, USA

Introduction
Every year, around 700 million people visit zoos worldwide (Gusset & Dick, 2011), each with their own reasons for visiting. Some come to learn, others to see animals, others to visit with friends or family, and still others to celebrate a special event (Patrick & Tunnicliffe, 2013). But whatever their motivation, once within the parks, they are the recipients of the various messages that zoos provide. Even if visitors are not at the zoo specifically for education, it is likely that they will learn something (Falk and Storksdieck, 2010).

Most zoos view education as a priority (Roe, McConney, & Mansfield, 2014). This can be seen in zoo mission statements, where both education and conservation are prominent themes (Patrick, Matthews, Ayers, & Tunnicliffe, 2007). Despite this emphasis, it is unclear how much conservation the public notices. The priorities of zoos and priorities of zoo visitors do not always match (Roe et al., 2014). There are elements of zoological institutions that many visitors are not aware of. In order to bridge this gap, it is important to educate guests about the conservation work that zoos do. The purpose of this research was to measure the effectiveness of such education by examining the short-term recall of the main conservation messages of zoo chats.

Methods
Five different keeper chats / animal demonstrations were observed at the Indianapolis Zoo in Indiana, USA. The researcher observed each presentation and collected notes on each chat’s main messages. Next, visitors that attended the chat were interviewed. Visitors were asked questions regarding the main message they took from the chat, and ways they knew of that the zoo advances conservation.

Data was collected over five days in August and September 2017. Six lion, five walrus, and five python chats, as well as eight macaw and five dolphin presentations were observed. Due to scheduling, it was not possible to observe the same number of chats for each species. One researcher interviewed all 49 participants.

Results
Observed Chat Messages
Different chats had different messages based on the target species. The walrus chat discussed facts about walruses and animal husbandry. The conservation message focused on climate change and ways that visitors can help.

The lion chat discussed animal husbandry and purposes for training the lions. It provided lion facts and explained the impact of climate change. The chat concluded by explaining how the zoo uses 100% green power and invited the visitors to consider using green power options in their own homes.

The python chat discussed facts about Burmese pythons. The educators talked about how this species is invasive in the Florida Everglades due...
to people releasing unwanted pets. The chat stressed the importance of responsible pet ownership. This was the only “hands-on” chat that allowed the guests to touch the animal.

The macaw presentation introduced visitors to different species of birds. The chat highlighted some of the adaptations each species has for survival. It also talked about some of the conservation challenges these birds face and how the zoo collaborates with different conservation organizations to help macaws.

The dolphin demonstration emphasized connections between people and dolphins. A video during the demonstration described how people in Indiana are connected to the dolphins in the Gulf of Mexico through waterways. In particular, it mentioned how fertilizers put on the soil in Indiana can be washed into waterways during heavy rain, then eventually flow into the Gulf of Mexico where they contribute to the dead zone. The educators in the demonstration directed visitors to the zoo website to learn more about conservation.

Chat Messages Identified by Zoo Visitors
Some visitors identified multiple messages for each chat. Therefore, the number of comments do not match the number of visitors interviewed. Table 1 shows the messages that the visitors identified for each chat, along with the percentage of visitors that stated each one. Conservation messages that visitors stated were coded as more general comments such as “save the environment” or as more specific actions such as “drive less.” General conservation statements were the most common responses (39%). Specific conservation statements (21%) were the second most common, followed by animal facts (16%). Figure 1 depicts the response percentages for all chats regarding the main message of the chat.

For all chat interviews, when asked about the main message, 65% of visitors made a comment that was related to the chat theme. Table 2 shows the percentage of comments that related to each chat. Other visitors made comments that were unrelated to the chat messages. For example, one person after the macaw chat said that “the birds were beautiful” when asked to state the main message of the chat. Figure 2 shows the percentages of comments related to each presentation’s content.

Conservation Actions Identified by Zoo Visitors
When asked about conservation actions the zoo takes, only 32% were able to state an action that was related to the chat they had just seen (Table 2). Others either did not know of any or mentioned actions that were not discussed in the chat. The most common response about actions the zoo takes to advance conservation was uncertainty (30%). These people were unsure of ways the zoo advanced conservation.

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**Table 1:** The themes that emerged as main messages of each chat and the percentage of visitors that perceived each theme as a main message.

<table>
<thead>
<tr>
<th>Message</th>
<th>Walrus</th>
<th>Lion</th>
<th>Dolphin</th>
<th>Python</th>
<th>Macaw</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal care at the zoo</td>
<td>11%</td>
<td>29%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>5%</td>
</tr>
<tr>
<td>Conservation: general</td>
<td>33%</td>
<td>43%</td>
<td>31%</td>
<td>13%</td>
<td>55%</td>
<td>39%</td>
</tr>
<tr>
<td>Conservation: specific</td>
<td>22%</td>
<td>14%</td>
<td>38%</td>
<td>25%</td>
<td>10%</td>
<td>21%</td>
</tr>
<tr>
<td>Unsure</td>
<td>11%</td>
<td>0%</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
</tr>
<tr>
<td>Animal facts</td>
<td>22%</td>
<td>14%</td>
<td>8%</td>
<td>38%</td>
<td>10%</td>
<td>16%</td>
</tr>
<tr>
<td>Entertainment</td>
<td>0%</td>
<td>0%</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
</tr>
<tr>
<td>Emotion</td>
<td>0%</td>
<td>0%</td>
<td>8%</td>
<td>25%</td>
<td>20%</td>
<td>12%</td>
</tr>
<tr>
<td>Total comments</td>
<td>9</td>
<td>7</td>
<td>13</td>
<td>8</td>
<td>20</td>
<td>57</td>
</tr>
</tbody>
</table>

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**Figure 2:** The percentage of comments related to each presentation’s content.

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**Figure 1:** The percentage of comments related to each chat's content.
Educating the public was the next most common response (24%). Figure 3 shows the percentages of responses to this question for all the chats.

**Discussion**

Understanding how people receive conservation messaging in zoos is important to understand in order for these institutions to improve their programs.

Although there were not enough participants to make this data generalizable to a larger zoo population, the findings here still provide some important insights to consider when planning for educational programs. This research found that 65% of the visitors were able to immediately recall at least one message from the chat. However, only 32% of interviewed visitors were able to recognize conservation actions that the zoo took.

Part of this could have been because not all chats explicitly discussed how the zoo helps with conservation. The python chat had the lowest percentage of people that were able to state a conservation action related to the chat that the zoo takes (14%). This could be because the python chat did not give an explicit message about how the zoo advances conservation. In science education, explicit instruction is demonstrated to be important for learning nature of science content (Khishfe & Abd-El-Khalick, 2002). While the content is not the same in these two contexts, it can be assumed that an application of explicit instruction in the informal setting would also lead to a higher retention of the information. This can also be seen in the current study when comparing the python chat to the lion chat. The lion chat had the highest percentage of people able to state conservation actions that the zoo takes that related to the chat content (60%). This chat explicitly discussed that the Indianapolis Zoo uses 100% green power and encouraged guests to enroll in green power options provided by their power companies. It could be argued that this explicit message was what lead to a higher percentage of visitors remembering the conservation actions of the zoo.

While explicit messaging could relate to the difference between the python and the lion chat, it does not support the findings of the macaw and walrus chat, which had 28% (macaw) and 33% (walrus) of people able to identify conservation actions that the zoo takes. The walrus chat had nearly the same conservation message as the lion chat. However, only 33% of people mentioned the green power actions of the zoo. The educators in the macaw chat also explicitly stated ways that the zoo helps advance macaw conservation by describing partnerships with the Ara Project and the World Parrot Trust. Despite this explicit messaging, very few people stated this as a way that the zoo advances conservation.

The ability of people able to describe the main message of the chat was different for the different chats. The Macaw chat had the lowest percentage of visitors being able to repeat information from the chat (39%) and the dolphin presentation was the second lowest (54%). One reason could be the excitement factor of these two presentations. This could explain both the low ability to identify the main message and the low ability to identify conservation actions of the zoo. Although excitement was not measured directly in the interviews, these two presentations could be considered more exciting than the others. During the Macaw presentation, the birds flew into the stage area, over the heads of the audience. Guest spoke of how beautiful the birds were and how cool it

<table>
<thead>
<tr>
<th>Visitation</th>
<th>Porcupine</th>
<th>Lion</th>
<th>Dolphin</th>
<th>Python</th>
<th>Macaw</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main message of the chat</td>
<td>67%</td>
<td>80%</td>
<td>54%</td>
<td>86%</td>
<td>39%</td>
<td>65%</td>
</tr>
<tr>
<td>Conservation actions of the zoo</td>
<td>33%</td>
<td>60%</td>
<td>23%</td>
<td>14%</td>
<td>28%</td>
<td>32%</td>
</tr>
</tbody>
</table>

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**Figure 3: Visitor perceptions of conservation actions that the zoo takes**

**Table 2: Percentage of comments related to the chat content for the main message and the conservation actions that the zoo takes**
was to see. Other chats did not have as many comments on the “cool” factor. The Dolphin demonstration could also be considered exciting because the visitors had the opportunity to see the dolphins perform impressive feats. As the dolphins performed these behaviors, the visitors could be heard making sounds of awe and astonishment. Promoting emotions is an important strategy for education in zoos. Emotional arousal is associated with learning (Staus & Falk, 2017) so it is important for education programs to provoke different emotions in the visitors, such as excitement. However, there is such a thing as too much excitement. This can distract from the visitors and prevent them from absorbing the messages of the programs (Staus & Falk, 2017). Finding the right balance between excitement and distraction could be an area of further research for zoo education.

Conclusion
In the past several decades, zoos have positioned themselves to be important agents of conservation for both wildlife and wildlife habitats. This can be seen in both zoo mission statements (Roe et al., 2014) and the actions zoos take, such as collaboration in various conservation efforts around the world (Silver, 2018). However, research presented in this paper suggests that there may be little public awareness about these initiatives.

More is needed to connect visitors to the conservation messages and efforts that zoos take to advance conservation. If we want to show that zoos can make a difference in conservation (Silver, 2018), we may need to rethink our educational strategies. One suggestion would be to ensure that more conservation messages within zoos highlight the impact of the zoo’s actions. Swaisgood and Sheppard (2010) posit that a balance is needed in conservation messaging between distressing facts and hopeful stories. They state that stories of hope can be inspirational and empowering. By sharing our own hopeful stories from the zoo, we can provide this inspiration. It is important to focus on the positive, stating what actions are currently being done and what people can do at home or in their own lives to help conserve wildlife.

Acknowledgements
We would like to thank the Indianapolis Zoo for allowing us to collect data at their facility.

References