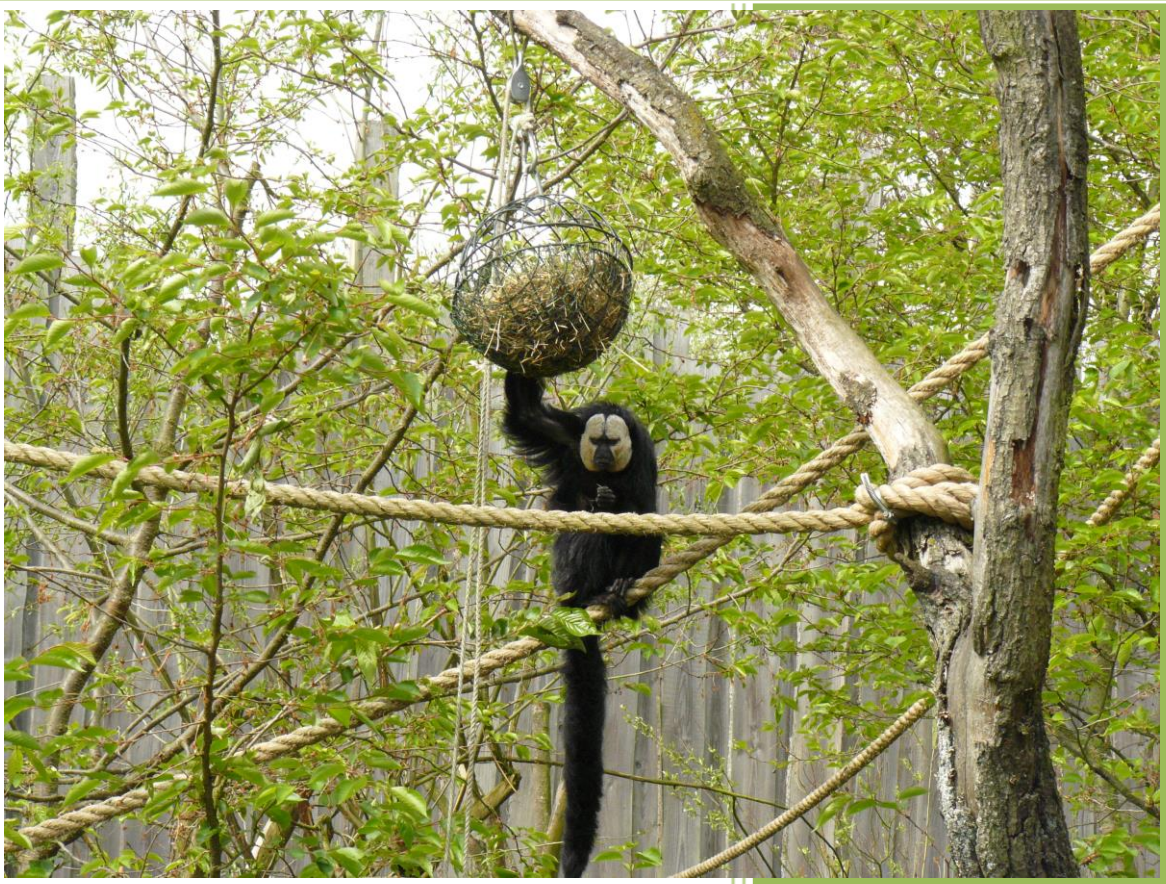
The Sustainable Zoo:

Mediating the sustainability message through education in GaiaZOO Kerkrade.



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ABSTRACT

The role of zoos in society has historically changed many times. Recent developments suggest a shift or expansion of zoos towards becoming sustainability agents aiming at raising awareness amongst visitors of our relations with animals and nature and ultimately guiding them towards sustainable behaviour. The 'sustainable zoo' -- or the zoo as a sustainability educator -- demands new empirical insights on the practices zoos take on as they function as centres for conservation-education and sustainability stewardship. The aim of this paper is to contribute to the discussion on the contemporary role of the zoo as a sustainability educator by providing an empirical case study in GaiaZOO in Kerkrade in the Netherlands. What institutional relations and educational techniques are employed by GaiaZOO to fulfil their novel role of sustainability mediator? We used observation, surveys, in-depth interviews and content analysis to answer this research question. The results show that the content visitors report to learn about and the information provided on the panels in the zoo relates to classical biological and ecological information, rather than broader sustainability content. This contradicts the vision of the zoo and the aims of the staff, who define sustainability as the main topic they want visitors to learn about. Free Choice Learning is the main didactic technique applied in GaiaZOO. The zoo could benefit by increasing Entertainment Education and Education for Sustainable Development to enhance emotional and behavioural connectivity between the zoo visitors and the planet and to further its mission as a mediator of the sustainability message.

KEYWORDS

The Sustainable Zoo; Zoos as Educators; Sustainability Education; Zoos as Sustainability Mediator; Human-Nature Relationship

INTRODUCTION

Worldwide, 1,300 registered zoos and aquariums receive more than 700 million visitors each year (Fennell, 2012). Visitors of all levels of society visit zoos, and zoos are seen as unique places to educate about conservation and the current state of the environment (WAZA, 2014; Wood et al., 2013). A main argument for the existence of zoos is brought up by Kidd, Kidd & Zasloff (1995) and by Beck & Katcher (1996) who studied the way interaction of children with animals in a zoo can foster positive attitudes towards animals and wildlife and a greater interest in nature. More recent literature confirms the positive effects on attitudes towards nature of zoo visits, inspiring positive emotions for the natural environment (Powell et al., 2014) or fostering an "environmental identity" (Clayton et al., 2011; Clayton et al., 2009; Clayton et al., 2010) such as being an "Explorer" or a "Spiritual Pilgrim" (Falk et al., 2007). A large NSF funded visitor impact study conducted by the Association of Zoos and Aquariums (AZA) demonstrated that in North America "zoos and aquariums are enhancing public understanding of wildlife and the conservation of the places animals live (Falk et al., 2007)."

Generally spoken: through their wide base of visitors, it can be said that that zoos are institutions that reflect the way society relates to animals and nature (Baratay et al., 2002). As Baratay and Hardouin-Fugier (2002) describe: "This observational space – the zoo – is the constantly renewed and transformed product of the views and attitudes which it helps to shape (Baratay et al., 2002, p.10)." In the last half-century, zoos grew out to a global zoo community of cooperating associations acting on behalf of animals, nature and biodiversity by supporting in-situ conservation projects, by ex-situ breeding projects, to stimulate visitors to reconnect with nature and animals (Berg, 2010), and to increase awareness through educational messages (Fa et al., 2011; Klenosky et al., 2007; Trewhella et al., 2005; Whitehorn et al., 2012). Recent developments suggest a shift or expansion towards zoos as explicit sustainability contributors aimed at educating and guiding visitors towards awareness, a positive attitude and ultimately to more sustainable behavior. (Dickie, 2009; Heimlich et al., 2013; Koldewey et al., 2009; Landman et al., 2009; Packer et al., 2010; Townsend, 2009).

The recent shift towards 'the sustainable zoo' is threefold: 1. Internal efforts of the zoo to more sustainable internal operations; 2. efforts for biodiversity conservation (captive breeding programmes); 3. efforts to educating visitors about the state of the environment and sustainability issues. It furthermore shapes the debate of what 'is' and what 'ought' to be the legitimating basis of contemporary zoos, and consequently, demands a critical outlook based on empirical evidence on the role of zoos as centres for conservation-education and sustainability stewardship (Goulson, 2013; Potts et al., 2010; Whitehorn et al., 2012; Wood et al., 2013). Through a case study in GaiaZOO in Kerkrade, the Netherlands, we aim to contribute to the discussion on the changing role of zoos in society and public education for conservation and sustainability (Frost, 2011; Funtowicz et al., 1998; Gibbons, 2000; IUCN, 2011a; IZEA, 2005; Lang et al., 2012; Moss et al., 2014; Nowotny et al., 2003; Trewhella et al., 2005; Whitehorn et al., 2012; Wiek et al., 2012). Therefore, the leading question for this paper is: *What institutional relations and educational techniques are employed by GaiaZOO to fulfil their novel role of sustainability mediator?* In order to focus our assessment we define sustainability as the *ecological, social and economic imperative to live and to use resources within earth's carrying capacity, now and in the future*. This paper specifically focuses on 'Sustainability Education' which addresses the overall sustainability performance of the zoo. A zoo, for example, can educate about their own internal efforts of increasing sustainability in the zoo (i.e. through the way energy use is being organized or waste is being disposed); about the captive breeding programmes the zoo participates in for the conservation of species; or about the impact of human-animal relations on shaping cognitive affection and positive attitudes towards the planet and its diverse inhabitants.

Hutchins and Thompson (Dawson et al., 2011) have outlined an overview of the scientific studies that were performed in zoos in the last decades. Only the last years have shown a shift and broadened field of scientific studies to include an ecosystems approach, wildlife management, landscape ecology, and conservation. In 2011, Fa, Funk and O'Connell proposed the new term of 'zoo conservation biology' that focuses on "how science can be applied within zoos to achieve species recovery and environmental awareness at a global scale (Falk, 2005, ix preface)." Recent academic studies have made first attempts to examine the potential contribution and actual performance of zoos for sustainability (Falk, 2012; Khalil et al., 2011; Moss et al., 2014; Whitehorn et al., 2012). In addition to the growing number of research efforts, a small number of zoos presented evidence of sustainability performance through

engagement in voluntary (ISO 14001) Environmental Management Systems (EMS) (e.g. Bristol Zoo, Copenhagen Zoo, Denver Zoo, Edinburgh Zoo, Chester Zoo). Studies on sustainability education in relation to zoos, and the potential they hold for 'learning for sustainability' are increasingly available but still scarce (Catibog-Sinha, 2008; Moss et al., 2010; Moss et al., 2014).

Looking at the current literature (Adams, 1996; Ballantyne et al., 2011; Clayton et al., 2009; Esson et al., 2013; Falk, 2012; Fernandez et al., 2009; Fraser et al., 2007; Hutchins, 2003; Jacobson, 2010; Khalil et al., 2011; Klenosky et al., 2007; Miller et al., 2004; Mony et al., 2008; Rabb, 2004; Tribe et al., 2003; WAZA, 2014; Whitehorn et al., 2012) (Bitgood, 2002; Dawson et al., 2011; Dickie, 2009; Ehmke, 2001; Fraser et al., 2007; Freeman, 2009; Koldewey et al., 2009; Pedersen, 2007; Potts et al., 2010; Turner, 2009; Wood et al., 2013) we see that two legitimating roles of the contemporary Western zoo particularly stand out: first, the zoo as contributor to biodiversity conservation and partner in a global institutional network of conservation governance; and second, the zoo as contributor to educating the public about the state of the natural environment, conservation, and sustainability. With these two main roles in scope it becomes visible how the contemporary zoo fulfils an important task of mediating abstract and institutional knowledge to the level of civil society.

THE ZOO AS A MEDIATOR BETWEEN GLOBAL CONSERVATION INSTITUTIONS AND CIVIL SOCIETY

Conservation is understood as a pluralistic practice that involves many societal fields, from NGOs to tourism and from governance to public-private partnerships with the aim to protect biological diversity (Beumer, 2014; Robinson, 2011). In the international policy context, a governance mechanism emerged to address complex concerns of biodiversity in a cooperative manner. Part of this *polycentric* (Cole, 2011) *global biodiversity governance system* (Visseren-Hamakers et al., 2012) are umbrella institutions such as the United Nations (UN) and the International Union for the Conservation of Nature (IUCN), who, together with a multilateral network of stakeholder members cooperate under conferences, programmes, conventions and other forms of partnerships. The integrated conservation approach of IUCN's *One programme Charter* (IUCN, 2011b) and the ecosystems approach of the *Convention on Biodiversity Diversity* (CBD), including its *2011-2020 Aichi Biodiversity Targets* (CBD, 2011), are prominent examples of cooperative governance policy instruments to enhance global biodiversity (Moss et al., 2014). The latter instrument falls under the 2011-2020 United Nations Decade for Biodiversity, declared by the UN General Assembly (CBD, 2011). Most contemporary Western zoos are directly, or indirectly, a member of IUCN. The zoo associations WAZA and the European Association of Zoos and Aquaria (EAZA), are both partners of the CBD. During the Decade on Biodiversity 2011-2020 they have declared their commitment to contribute in reaching *Aichi Target 1*: "by 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably (CBD, 2011)." Being embedded in this global institutional governance, zoos are able to mediate global conservation and sustainability targets and messages to civil society (Moss et al., 2013; Moss et al., 2014).

THE ZOO AS A CONTRIBUTOR TO EDUCATE THE PUBLIC ABOUT CONSERVATION AND SUSTAINABILITY ISSUES

A recent and comprehensive study by Moss et al (2014) points out the positive value of education for conservation through zoos (Moss et al., 2014). As Hancock, 2001 describes: "the opportunities of education cultivates environmental sensitivity among hundreds of millions of patrons across the world (in Fernandez et al., 2009,p.69)." Educative commitments in zoos are usually approached and translated through the presumption that 'educating the public' is based on a linear learning model: from thinking (cognitive), to positive change in attitude (affective), to desired social change (behavioural) (Vining, 2003; B. Wilson, 1998). However, this learning model is not well supported in the literature in terms of achieving desired outcomes (Dunlap et al., 2002; Homburg, 2006; Jackson, 2008; Kurtz, 2002;

Saunders et al., 2003; Schmuck et al., 2003; Schultz, 2011; Smith et al., 2000; Swanagan, 2000). Increasing knowledge does not automatically lead to behavioural change (Schultz, 2011).

The most commonly discussed learning technique in zoo education literature is *Free Choice Learning* (FCL) (Ballantyne et al., 2005; Ballantyne et al., 2011; Bamberger et al., 2007; Coll et al., 2003; Khalil, 2012; Kola-Olusanya, 2005; Schultz, 2011; Tofield et al., 2003). FCL is "learning that is self-directed, voluntary, and rather than following a set curricula, is guided by a learner's [*own*] needs and interests (Tofield et al., 2003, p.67)." Rooted in constructivist views on learning (Pinch et al., 1984; Ryan et al., 2004) FCL is explicitly applied in informal learning settings (Bamberger et al., 2007; Khalil, 2012; Kola-Olusanya, 2005). The prerequisite for people to learn something about sustainability through FCL – for example through reading information panels -- is that they already have an interest in the topic. Impacts and effects of this type of zoo education are also extremely difficult to measure. Most assessments on the effectiveness of education programmes therefore focus on short term outcomes of specific programmes that allow for direct measurement and not on social systemic change on the longer term (Hutchins et al., 2008; Trewhella et al., 2005; WAZA, 2014; Whitehorn et al., 2012).

A more recent take on non-formal learning is *Entertainment-Education* (EE): "the process of purposely designing and implementing a media message to both entertain and educate, in order to increase audience member's knowledge about an educational issue, create favourable attitudes, shift social norms, and change overt behaviour (Rees, 2003, p.5)." EE assumes that an effective way of learning happens through storytelling, engagement, identification and persuasion (Carr et al., 2011; Moyer-Gusé, 2008; Singhal, 2004). The perceived effectiveness of EE is related to the narrative structure that encourages an emotional experience by becoming involved with a character and its story line (Moyer-Gusé, 2008). By telling an engaging story in which certain characters are used, people are persuaded to connect to, identify with, or like characters, and simultaneously become resistant to message rejection (Moyer-Gusé, 2008). An example of an engaging character is *Ollie*, the mascot of the zoo Diergaarde Blijdorp in Rotterdam, the Netherlands; Artis de Partis of Artis Royal Zoo, Amsterdam, The Netherlands; or *Colonel-in-Chief Sir Nils Olav,* a King Penguin living in Edinburgh Zoo, Scotland. Zoo animals and their life story are strong enhancers of visitors' emotional connectivity with the species and (the future of) their natural habitat (Powell et al., 2014). In zoo education literature, creating an educative 'fun' element is much advocated (Klenosky et al., 2007; Reade et al., 1996). Contrary to FCL, Entertainment-Education (EE) aims to cope with the notion of 'resistance towards learning', and bridges the prerequisite inherent in FCL that visitors should have an already existing interest in the topic they are being engaged with through the EE experience (Dierking, 2002; Rees, 2003; Tofield et al., 2003).

EDUCATION FOR SUSTAINABLE DEVELOPMENT

Learning for Sustainability or Education for Sustainable Development (ESD) (Benn et al., 2010; Tilbury, 2011) is a novel take on the aim of increasing environmentally sustainable behaviour. This relatively young field – based on sustainability science -- draws on varieties of learning theories from various strands of (environmental) sociology, psychology, sustainability science, and innovation studies (Valkering et al., 2013). It has a focus on joint learning processes in trans-disciplinary participatory network settings (Lang et al., 2012; Valkering et al., 2013; Wiek et al., 2012) with an emphasis on transformational change in society. In order to foster learning processes amongst varieties of stakeholders, '*boundary objects*' -- "artefacts that support learning across boundaries by providing a common reference point for communities within different knowledge domains (Valkering et al., 2013, p.87)"-- may function as bridges that serve as common learning facility (Benn et al., 2010; Hoppe, 2010; Huitema et al., 2009; Star, 2010; Star et al., 1989; Valkering et al., 2013). Zoos, activities organised within zoos, facilities to promote learning in zoos, and even sold goods or artefacts may be regarded as such potential boundary objects.

In opting for a more active role to reach their conservation claims, zoos may extent their education offerings, move beyond classical education, and hence increase their impact and effectiveness. This may be done by 'learning through fundraising' (Gusset et al., 2011); by the provision of post-visit action resources (Whitehorn et al., 2012); by becoming sustainability stewards through incorporating sustainability practices through a triple bottom-line approach (Falk, 2012); through conservation marketing (Dawson et al., 2011); and through strategic entertainment-education messages (in joint force with zoo-associations) through offering 'sustainability or wild-life friendly products' in gift shops (Gusset et al., 2011), and finally, by offering eco-friendly food in zoo restaurants (Miller et al., 2004).

In order to get a better grasp at the way GaiaZOO implements facilities that foster learning for sustainability we focus on the way the zoo *mediates information about sustainability*. We call this Sustainability Education (SE). The case study results show what educational techniques and content focus are employed in GaiaZOO how they are experienced by visitors, volunteers, and staff and how (strongly) they mediate the sustainability message to the public .

METHODS

To find out what educational techniques and content focus are employed in GaiaZOO to mediate the sustainability message and how these are experienced by both zoo visitors and staff we combined various approaches: surveys with visitors, volunteers, and staff; in-depth interviews with staff and volunteers; a content analysis of written information panels and of an annual report (2013) and of various press releases. Initially, we made an observational inventory of potential boundary objects within the zoo that may increase an understanding of sustainability issues within the visiting public.

OBSERVATION

The researchers explored the zoo and the texts on the GaiaZOO website for visible clues on present facilities and objects that could intentionally or unintentionally mediate a sustainability message to the visitors. An observation of how visitors related to such objects was beyond the scope of this research but may be interesting for future assessment.

SURVEYS

On-site surveys were distributed during the spring holiday break in May 2013, over nine days. Twelve questions were asked, of which n=2 were open questions, n=5 were multiple choice questions and n=5 were preference ranking questions. The selection of day-visitors took place on a systemic base: every third visitor was approached and invited to participate. On-site, season ticket holders were not included. Two sites have been set up to collect data: both located around the central plaza, next to the main passages. Surveys were provided in Dutch and German. Participants responded to the questions independently. Filled out surveys containing more than three questions left open were not analysed. We distributed 527 surveys. In total, 380 surveys were returned, with an approximate response rate of 72%.

Season ticket holders received online surveys attached to the monthly newsletter e-mailing sent out by GaiaZOO in May 2013. The e-mailing represented a sample of 8.201 email addresses. Over seventeen days, 403 surveys were returned, with a response rate of 4.91%. GaiaZOO employees and volunteers received an invitation to participate through an invitation letter sent by email with a link to the survey. The sample consisted of 88 employed GaiaZOO members, which represented 31 email addresses of GaiaZOO employees at all levels and departments throughout the organization, and 57 email addresses of GaiaZOO volunteers. In total, 62 surveys (employees, n=36; volunteers, n=26) were collected with an overall response rate of 71.59%. The data of the surveys were processed by an online survey software tool (SurveyMonkey). Analysis took place on basis of descriptive statistics, using IBM SPPS Statistics 21.

IN-DEPTH INTERVIEWS

Complementary to the survey-data we examined deeper lying motives and values from a zoo educator's perspective by conducting in-depth interviews with GaiaZOO employees and volunteers. Nine interviews were held in June 2013: with the head of zoo keeping; a zoo keeper; the head of facility services; the head of the technical department and green facilities; an employee of the education and communications department; and a member of the board of directors. All interviewed people are member of the *Green Team* -- a team of GaiaZOO representatives devoted to discuss sustainability initiatives. In addition, two educational volunteers were interviewed, as well as an externally

employed member facilitating presentations. The interviews were semi-structured and guided by a checklist of twenty-five to thirty questions divided over four themes, or question areas. The interview question areas examined values and perceptions related to [1] the concept of sustainability; [2] the applicability of sustainability in the zoo; [3] the role of GaiaZOO in society; [4] the role of GaiaZOO as education centre. In addition, all interviewees were invited to fill out a response sheet to value the proportions of three educational topics (see table 1): Classical Biology and Ecology Education (CBEE), related to taxonomy, animal behaviour and habitat; Biodiversity Conservation Education (BCE), related to endangered species, habitat destruction, conservation and breeding projects; and Sustainability Education (SE), related to the three pillar approach of people, planet and prosperity, climate, interconnectivity, societal ethics, and (un)sustainable consumption and lifestyle patterns.

CONTENT ANALYSIS

Analysis of the transcripts have been done with IBM SPSS Text analytics and with the text analysis software MAXQDA. This has been combined with close reading and interpretation of the results (Bernard, 2011; Holstein et al., 2004; Wodak et al., 2008). Additionally, a content analysis (GAO, 1989; Krippendorff, 2004; A. Wilson, 1993) on *written information* in and about GaiaZOO has been conducted to get a view on the way written texts are employed for sustainability education. All information panels (n=36) located across the four biotopes of GaiaZOO were analysed to evaluate the educational topics that are on offer for visitors. Furthermore, the annual report of 2013 and n=40 press releases were analysed as well. For this purpose, two data analysis software tools (IBM SPSS Text Analytics, MAXQDA) were used to locate and relate educational messages. The texts (in rich text format) of the information panels were scanned on words referring to key concepts related to the potential education topics CBEE, BCE, and SE (see table 2).

Table 1. categories for content analysis of signage in GaiaZOO

Category	Topics	Abbreviation
Classical Biology and Ecology Education	Animal facts; taxonomy, behaviour, origin, ancestry	CBEE
Biodiversity Conservation Education	Biodiversity conservation; protected-; endangered-; extinct species	BCE
Sustainability Education	Balancing people, planet, prosperity, interconnectivity, climate, societal ethics, and (un)sustainable consumption and lifestyle patterns	SE

LIMITATIONS

The aim of this study has been to contribute to the discussion on how contemporary zoos legitimise their existence through their changing role towards sustainability educators. We assessed educational techniques and messages mediated to the public in a zoo that promotes itself as a sustainable zoo. One case study, however, does not justify any generalisations towards the way other zoos fill in this novel role. We were also restrained by time limits. Therefore, excluded from our study was the question whether visitors have become more aware or (have intentions to) act more sustainably after a visit at GaiaZOO. A long term study with follow up sessions would have been necessary in order to be able to assess this nevertheless important question. In this respect, we also did not cover *what* people actually learn during a zoo visit, but what they *say* they have learnt. Another option for future research is conducting a systematic observation of the way zoo visitors relate to boundary objects that could intentionally or unintentionally mediate a sustainability message to the visitors and what they learn from such engagements.

RESULTS

OBSERVATION

As a member of EAZA, GaiaZOO participates in ex-situ animal conservation through breeding programmes, and has set up its own foundation -- Gaia Nature Fund -- to support in-situ biodiversity conservation in wild habitats. The zoo provides twenty hectare of visitor experience to an annual average attendance of 450.000 visitors. The young zoo has been frequently awarded by public and by private organizations such as the Education Award (2005) by the EAZA and the Zoo Award for Nature and Education by WWF (2011). This information is accessible via the website of the zoo.

The Gaia concept (Lovelock, 2000) has been carried through in the zoo's design that reflects a variety of biome and historical epochs. Animal exhibits are relatively spacious and all animals have the opportunity to spend time outdoors and to hide from visitors in their shelters. The residences mostly include natural materials and vegetation. There is a section of animals native to the region of Limburg; a section with Taiga animals, a section with animals from the Savannah; animals from a rainforest habitat; and there is a section with playful information and learning possibilities about extinct paleontological species like dinosaurs and mammoths. Immediate education in the park is provided primarily through signage, regular feeding presentations and a bird-of-prey-show. In the restaurant areas and the shop most direct information is given about sustainability and the measures the zoo takes to contribute to a sustainable world. Since 2013 the park does not sell products based on palm oil; the coffee is certified fair trade and rainforest-friendly; GaiaZOO collects old cell-phones for the recycling of the scarce and impactful resource coltan; printed communication or paper materials are made of FSC certified paper; toilet paper is made of 100% recycled paper; plastic bottles are collected to be recycled for flip-flops; the zoo's website is announced to be CO2 neutral through compensatory measures by means of protecting forests in Bolivia. The animals of the zoo are fed with MSC certified fish. Although the Gaia story is breathing throughout the place, this may remain perceived as rather abstract. The zoo does not have a mascot, or any tangible character for the visitors to identify with in this story. The animals are rather described on the information panels as a species than as individual characters with a life story. These observations indicate that the zoos educational techniques are grounded in Free Choice Learning rather than Entertainment Education. Also a number of boundary objects providing potential for Education for Sustainable Development are already present in the zoo. However, these boundary objects may still lack the intentional set-up of being brought about as facilitators for creating a dialogue between zoo visitors or a (social) network of common understanding on the sustainability issue (Benn et al., 2010; Huitema et al., 2009) .

SURVEYS

MOTIVATIONS FOR VISITING A ZOO

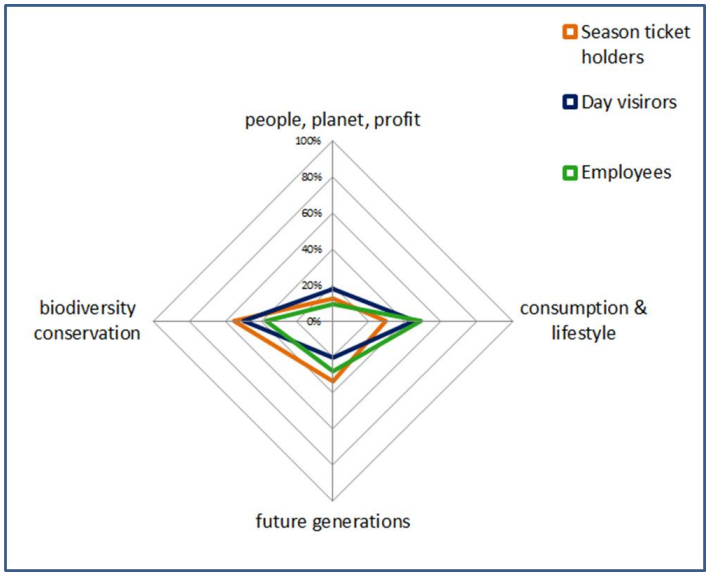
We asked day-visitors and season ticket holders about their motivations for visiting a zoo. The results of the questionnaires show that 53% of the day-visitors visit zoos predominantly as a nice family outing; 38% visit the zoo to see animals. A small group (6%) visits zoos for relaxation or hobbies (photography, hiking). Limited day-visitors show a primary motivation for learning (4%). Visitors holding season tickets show different motivations for zoo attendance than the visitors without season tickets. Of the season ticket holders 28% pay a visit to the zoo as 'time for themselves'. They furthermore, visit zoos primarily to see animals (43%). Almost a quarter (22%) visits zoos in social settings as 'a nice day out'. Again, only a small proportion of season ticket holders visit zoos for learning purposes (7%).

PERCEPTIONS AND CONCERNS ABOUT BIODIVERSITY AND SUSTAINABILITY

Day-visitors mostly associate the concept of sustainability with *biodiversity conservation* (48%), followed by *altering consumption and lifestyle patterns* (45%). Less frequently, day-visitors relate sustainability to *responsibility of future generations* (20%), and *balancing social, economic and ecological dimensions* (18%). Season ticket holders associate sustainability, similarly, with biodiversity conservation (55%), however, followed by *responsibility of future generations* (34%) and altering consumption and lifestyle patterns (29%). Less frequently, season ticket holders relate the word sustainability to balancing social, economic and ecological aspects (12%).

GaiaZOO employees define sustainability within the altering of consumption and lifestyle patterns (49%), next to biodiversity conservation (37%), and responsibility of future generations (28%). Few (9%) relate to the three pillars of sustainability, balancing social, economic and ecologic aspects. The results are visualised in Figure 1. Of the day-visitors 67% are concerned about the future of animals and nature. Season ticket holders are slightly more concerned (74%). Employees of GaiaZOO report to be the most concerned 79%. Day-visitors report to be less concerned with regards to the future of humanity (48%), just as GaiaZOO employees (47%) who are equally concerned. Season ticket holders show more concern (55%). Related to climate change, day-visitors are least concerned (70%), followed by season ticket holders who are slightly more concerned about climate change (69%). GaiaZOO employees are the most concerned about climate change (75%).

Figure 1. Perceptions towards the concept of sustainability

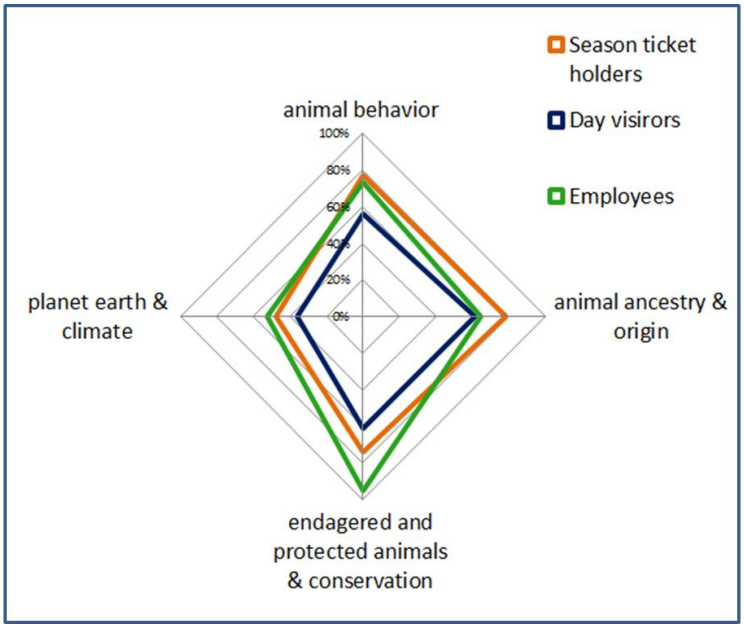


INTERESTS AND ATTITUDE TOWARDS LEARNING AT THE ZOO

Day-visitors perceive it equally important to gain more knowledge on animal behaviour (important 56%; moderately important 37%), origin and ancestry (important 61%; moderately important 34%), as well as the endangered or protected status of animal species (important 61%; moderately important 32%). The attitude towards learning more about planet earth and its climate is less strong, with 36% of the day-visitors who report it important and 45% who consider it moderately important. Season ticket holders show a more positive attitude towards learning. They report the importance of learning about the predefined topics as follows: animal behaviour (important 77%; moderately important 22%), and habitat, ancestry and origin (important 78%; moderately important 20%). The same holds for learning about endangered species (important 74%; moderately important 24%). Again, a less dominant interest is expressed in learning more about planet earth and climate (important 48%; moderately important 45%).

GaiaZOO employees show similar results about the attitude towards learning about animal behaviour and habitat (important 73%; moderately important 25%) and ancestry and origin (important 64%; moderately important 36%). A significant difference, however, reveals that employees perceive it dominantly important to teach about endangered species (important 95%, moderately important 5%). The expressed preference to teach about the earth and climate is less, however, still makes up a large proportion (important 55%; moderately important 46%) (see Figure 2).

Figure 2. Interest and attitudes towards learning at the zoo



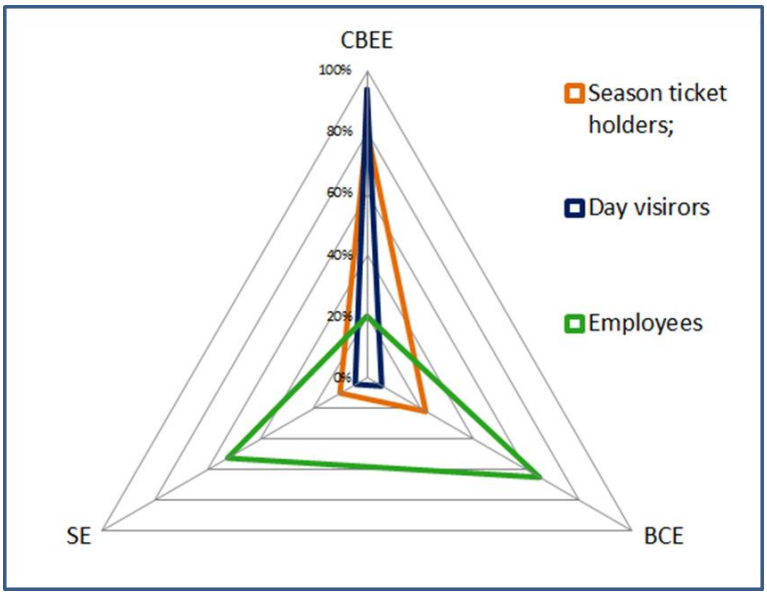
WHAT VISITORS SAY THEY LEARN DURING A ZOO VISIT

Figure 3 provides insight in what visitors say they learn during their visit at GaiaZOO. Concepts and narratives for this partly open ended question are categorized within the three dominant educational topics: CBEE, BCE, and SE. Of the day- visitors 94% report to learn about CBEE, 6% say they learn about BCE, and 4% mentioned to learn about concepts related to sustainability. Furthermore, 36% of the day-visitors report to have learned specifically about GaiaZOO. They primarily relate this to the design of the park or its (care for) animals. 26% of the day-visitors relate to *respect, awareness and caring for nature and animals*. Expressions such as 'animals are treated with respect', 'animals in captivity are well kept', or 'become aware about how beautiful nature' is and 'the importance to respect animals', are frequently reported. Furthermore, day-visitors say they learn things through feeding presentations in 11% of the cases.

Comparing the different feeding presentations day-visitors report to learn at the bird of prey presentation twice as much compared to the other presentations (20%). A different pattern reveals what season ticket holders report to learn. Similarly, season ticket holders predominantly mention to learn about CBEE (81%). A larger group, however, reports learning on BCE (22%). In addition, a small fraction of season ticket holders reportedly learns twice as much about SE as compared to day-visitors (10% against 4%). Moreover, a dominant group (29%) report on having learned about concepts of caring, respect and awareness of nature and animals. Season ticket holders reportedly learn less via presentations, as compared to day-visitors (feeding presentations 7%; bird of prey presentation 6%). In comparison to day-visitors, season ticket holders report to learn a lot from a zoo visit (38% against 15%). One-tenth of the visitors (day-visitors 11%; season ticket holders 9%) admit that they hardly learn anything at the zoo.

Similarly, GaiaZOO employees were asked what they considered most important with respect to visitor learning (see figure 3). Employees indicate that they generally want visitors to learn more about BCE (65%) and SE (53%). Learning about CBEE is less frequently addressed (20%). This means there is a large gap between what visitors report to learn and what employees hope the visitors learn during a zoo visit.

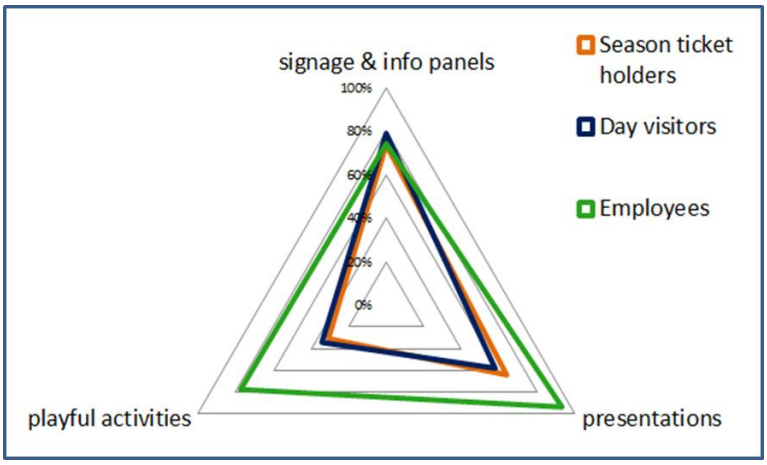
Figure 3 What visitors say they learn and what zoo employees want to educate about



PREFERENCE FOR EDUCATIONAL MESSAGES

Day-visitors and season-ticket holders favour information through signage and information panels (respectively 79% and 74%), against (feeding) presentations (respectively 58% and 74%), or playful activities (respectively 34% and 31%). Interestingly, employees throughout all departments most frequently prefer to provide information via (feeding) presentations (94%), followed by playful activities (77%), and information provision via signage and information (74%) (see figure 4). This means that on the level of learning through signage the expectations and preferences match between visitors and employees. However, the employees might put more value on playful activities and presentations in comparison to the visitors.

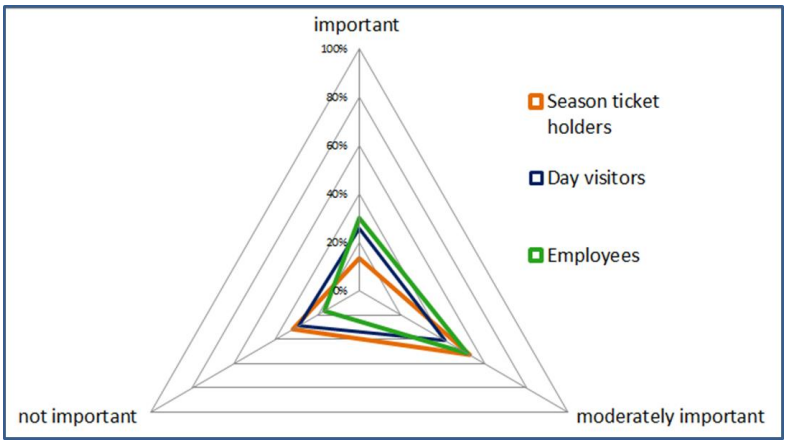
Figure 4. Preferences towards mediating educational messages



EXPECTED ENTERTAINMENT

Of the day-visitors 66% reports that entertainment is important in zoos, of which 26% of the day-visitors perceive entertainment provision important, and 41% as moderately important. 29% do not consider entertainment at the zoo important. Season ticket holders report an overall similar level of importance. However, a different distribution reveals that this group considers entertainment slightly less important (13%, important; 53%, moderately important). In contrast, GaiaZOO employees perceive the provision of entertainment an important aspect to offer its visitors (30% important; 52% moderately important), and 17% does not consider it is important to provide entertainment at zoos (see figure 5). A strong relation of evidence (Chi-square = 19,993, df = 6, $p < 0,05$) is detected between expected entertainment at the zoo and visitor preference of leisure activities. Respondents who perceive entertainment at zoos important, favour amusement- and theme parks (38%) against cities and cultural sites (23%) and being in nature (19%). Respondents that do not consider entertainment at zoos important, favour to be in nature (32%) against amusement, and theme parks (14%).

Figure 5. Expected entertainment provision at the zoo



THE ROLE OF THE ZOO IN SOCIETY

Of the day-visitors 77% report that it is important that zoos take an active approach to benefit nature and society. 20% report it moderately important. Of the season ticket holders, 84% agrees to this statement, whereas 15% moderately agrees. To the question what the role of the zoo in society ought to be, GaiaZOO employees were asked what they feel zoos needs to be effective towards. All proposed roles show dominantly positive responses. The role that is perceived most important is *conservation of endangered species* (92%), followed by *sustainability performance according to three-pillar approach* (88%). Other roles that are perceived to be of importance are *nature conservation of natural habitat* (in-situ) (85%), *education to raise awareness* (85%), *sound research to benefit conservation* (71%). Interestingly, of all proposed roles, *education to change behaviour* is perceived the least important (68%).

IN-DEPTH INTERVIEWS

PERCEPTIONS TO THE CONCEPT OF SUSTAINABILITY

GaiaZOO employees (n=9) that were interviewed in the second phase of the empirical study provided in-depth insights into perceptions on the role of the zoo in sustainability and sustainability education. Employees described the concept of sustainability predominantly in practical terms of what they themselves could do to make better or more responsible decisions in private as well as in business settings.

THE ROLE OF THE ZOO IN SOCIETY

To the question what the role of the zoo -- and specifically GaiaZOO's role -- in society ought to be, three out of nine interviewees mentioned that zoos ought to be role models of best practice in society (n=3). Others mentioned that zoos act predominantly as recreational park (n=5). Three interviewees (n=3) reported that education was the most important role of the zoo in society, (n=3). No interviewee reported that education did not provide an important role. One interviewee acknowledges that "although we are primarily a recreational organization we all know that education provides its reason of existence". Only one interviewee (n=1) specifically mentioned the role of the zoo in biodiversity conservation though acknowledging that: "in a general sense, nature conservation is just a drop in the ocean in terms of what zoos could actually mean for the conservation of nature".

GAIAZOO AS CENTRE FOR SUSTAINABILITY AND SUSTAINABILITY EDUCATION

Gaiazoo employees describe the mission of GaiaZOO in different manners. One volunteer affirmed that the mission encompassed "on the one hand the conservation of nature and animal welfare and on the other hand the centrality of visitors, and hereby, to let them connect with animals, nature and the conservation of nature". One interviewee believes that the mission of GaiaZOO and its message was carried through much stronger in the early days of GaiaZOO. An employee within the technical, facility and park services stated that sustainable entrepreneurship is part of GaiaZOO's mission. Yet, another interviewee questioned whether GaiaZOOs' mission would be at all different from any other zoo that is to "keep animals and place them on display for its visitors". Placing the visitors in central position is acknowledged as well by a member of the Board of Directors who describes GaiaZOO's mission according to three main goals: "high-quality accessibility of the park, high-quality accessibility of all animals exhibits, and visibility of all animals on display: every day throughout the year".

Sustainability performance, entrepreneurship, or corporate social responsibility by GaiaZOO is perceived moderate to good. Initiatives that were frequently reported (n=6), such as the initiation of the 'green team', the use of responsible wood sourcing, the collection of plastic bottles for recycling, or the use of cradle-to-cradle certified toilet paper, reveal an active approach. The initiation of the green team is seen by all members as relevant (n=6) and "a good way to keep each other sharp". Yet, the vast majority of green team members reported lack of activity or urgency (n=5). Interviewees describe duality in conflicting goals and inconsistency in carrying through sustainability practices when it

comes to decision making. In this vein, some employees express a certain feeling of awkwardness towards sustainability performance. Five interviewees (n=5) reported on their understanding of compromises and practicalities needed for operating a zoo, and hereby state that sustainability performance is not a matter of un-willingness but rather a matter of lack of money. There is a dominant belief (n=5) that once the zoo would make more profit the level of sustainability performance would simultaneously increase. A member of the Board of Directors describes: "choosing for sustainable options is part of GaiaZOO's DNA. It is one of our Unique Selling Points". With respect to sustainability education, the majority of interviewees reported that sustainability is an important yet difficult topic to offer to visitors predominantly seeking for enjoyment and pleasure (n=7). Moreover, some interviewees (n=4) question whether visitors would be able to understand certain messages that relate to conservation and sustainability, and therefore suggest simplistic language. One volunteer mentioned: "I try to teach them [visitors] to respect animals and nature, mainly by the use of games or conversation". Sustainability is, hence, perceived as a topic that is not necessarily of interest for visitors. Yet, interviewees feel it is something that 'ought' to be offered, be it in a subtle (n=6), or even unconscious manner (n=2).

The ultimate goal to offer education is described in several manners: making the public aware of the fact that "nature is not doing well", "that many animals are endangered and should not become extinct", by "making the public realize what their own actions are", and "what they [visitors] could do for themselves to support environmentally friendly behaviour". Other goals reported are "making the public think", "to becoming just a bit more **KNOWLEDGEABLE",** and, finally, "to encourage fascination and wonder". All interviewees have reported that pedantic speech should be avoided. Five Interviewees (n=5) mentioned the importance of interactive learning to convey messages: by experiencing, touching and doing. All interviewees, furthermore, reported that the messages and ways of learning should have a 'fun factor' or should at least be positive by nature, seeking a balance between information and entertainment. A member of the Board of Directors believes that by presenting the harsh reality people may start ignoring the message.

CONVEYING EDUCATIONAL MESSAGES

Gaiazoo employees were asked to place weight on the zoo's educational messages, of which they felt work best to reach their educational goals. Overall, most weight is distributed to CBEE. The majority of interviewees (n=6) belief that information panels are not the best way to convey messages. They favour interactive (n=3) or interpersonal (n=4) communication. Three interviewees (n=3) report that during presentations, which generally take around ten minutes, most visitors stay only the first (five) minutes at the most, before they head for somewhere else. Educational volunteers are seen as another effective way to convey messages through interpersonal contacts (n=4). The volunteers are often the "first point of contact with respect to the content of stories." This way, they get a good sense of "what visitors want to hear" and, "what visitors are interested in".

TEXT ANALYSIS

EDUCATIONAL MESSAGES ON INFORMATION PANELS

The analysis of the information panels (n=36) reveal that the majority of the text on the panels is devoted to concepts within CBEE (80%), 18% is devoted to BCE, and only 2% of the text messages are devoted to SE (figure 6 and table 2). We coded each information panel by colour. CBEE is visualized in orange, BCE in purple, and SE is coded green. This visualises what part of the text is devoted to what particular topic. These images reveal that CBEE is more dominantly represented in some of the panels, than in other panels. The visual illustration furthermore reveals that SE has been only detected on 2 out of 36 information panels.

EDUCATIONAL MESSAGES THROUGH EXTERNAL COMMUNICATION

Next to on-site communication, GaiaZOO provides external communication messages through press releases and the annual report GaiaJaar (Pearson et al., 2013). The GaiaJaar annual report of 2013 and n=40 press releases were analysed to detect the content of the messages devoted to CBEE, BCE and SE. The press releases revealed a distribution

of 73% devoted to CBEE; 35% to BCE and 15% to SE. GaiaJaar has an equal distribution of 39% devoted to CBEE, 33% to BCE and equally 33% for SE. In figure 7 an overview is given of the overall educational message distribution, preferences and learning at GaiaZOO.

Table 2. Key concepts of content analysis of the information panels in GaiaZOO (n=36)

Classical Biology & Ecology Education (CBEE)	**Frequency**	**Percentage (valid)**	**Percentage of total**
Ancestry	33	12,22	
Behaviour	59	21,85	
Breeding and nurturing	35	12,96	
Feeding and hunting	67	24,81	
Human-animal relations	6	2,22	
Natural habitat	16	5,93	
taxonomy	54	20	
Total	270	100	80%
Biodiversity Conservation Education (BCE)	**Frequency**	**Percentage (valid)**	
Breeding programmes	14	22,95	
Endangered species	27	44,26	
Nature conservation	6	9,84	
Projects and funds	9	14,75	
Reintroduction wildlife	5	8,2	
Total	61	100	18%
Sustainability Education (SE)	**Frequency**	**Percentage (valid)**	
Ecological dimension	1	14,29	
Ethical dimension	0	0	
Economic dimension	3	42,86	
Social dimension	3	42,86	
Sustainability	0	0	
Total	7	100	2%

DISCUSSION AND CONCLUSIONS

GaiaZOO presents itself as a zoo aiming to promote sustainability towards its visitors. This is visible in different elements of the design and set-up of the park and its facilities. Especially facilities for Free Choice Learning are ingrained in the zoo's setting, through a number of shows, educational panels and boundary objects. Entertainment Education and Education for Sustainable Development are still underrepresented didactic methods in GaiaZOO. It could be an interesting opportunity for the zoo to explore integrating such didactic methods into their programme in order to increase the emotional and behavioural connectivity of zoo visitors to nature and the planet. The effectiveness, however, of these methods would also require further empirical underpinning. Therefore, zoos and researchers could set up cooperative experiments to explore and test the effectiveness of emotionally engaging and identity-shaping fun elements and various boundary objects and the way this mediates the global sustainability message to the visitors.

The NSF funded study by AZA (Falk et al., 2007) showed that most North American zoo visitors visit zoos for identity reasons. The authors grouped visitors into four categories: Facilitators, Explorers, Experience Seekers, Professional/Hobbyist and Spiritual Pilgrims (Falk et al., 2007). Although we did not use such categories in our study, the results of underlying study demonstrate that GaiaZOO day-visitors are predominantly visiting zoos as 'nice family or social outing'. This group may fall into the category of 'Experience Seekers'. According to the results of the AZA study, Experience Seekers (who only represent a small percentage of the North-American visitors) "possess the least knowledge and the lowest expectations for their visit (Falk et al., 2007, p.13)." However, these Experience Seekers were also the group showing significant positive change in both cognition and affection (Falk et al., 2007). This may be a promising indicator for the effects of a visit to GaiaZOO in the dominant group of our study, experiencing the visit as a family or social outing.

Season ticket holders are predominantly motivated to 'see the animals', which is arguably typified by Packer and Ballantyne (2012) as *passive enjoyment.* Only a small fraction of visits to the zoo, however, are initially driven by educational or learning purposes (FCL). This group may be particularly open towards a more personalised EE experience with the zoo animals that playfully engages visitors in identification processes with the animals, their story and their habitat and with what is necessary and helpful to protect these. Although, the vast majority of visitors does not visit the zoo with a predominant motivation to learn, previous literature found that 'having a nice day out', and 'being open to communication and education messages' are compatible (Morgan et al., 1999), or may even work reinforcing (Falk et al., 2007; Gusset et al., 2011; WAZA, 2014). Such engagement and identification processes through EE may even pave the way for FCL and visitors wanting to learn more in a more systematic way (Gusset et al., 2011).

Next to these issues, there seems to be a gap between the desired learning topics reported by zoo employees and the actual learning that takes place in visitors. Results show that the vast majority of GaiaZOO visitors especially learn about CBEE. This can be attributed to the information panels which predominantly reflect CBEE issues. In contrast, GaiaZOO employees indicate that they find it most important that visitors learn about BC and SE. They see zoos as role models for best practice with respect to sustainability issues. However, very limited information on the panels is directed to address sustainability issues, which contrasts to the desires of the GaiaZOO staff.

It is interesting to note that season ticket holders indicated to learn more about concepts related to conservation and about sustainability issues compared to day-visitors. Several possible explanations for this difference in results may be suggested. First, it seems possible that -- as season ticket holders visit the zoo significantly more often -- this group learns more about biodiversity conservation and sustainability issues due to a higher frequency and higher rate of message exposure. Findings, furthermore, indicate that in comparison to day-visitors, season ticket holders learn more outside the zoo setting through pre- and post-visit information materials provided by GaiaZOO through its website, monthly newsletters, social media, and the annual publication. Of course their intrinsic motivation to learn about such issues may also be higher, but we did not test this.

Text analysis of the annual report reveals that biodiversity conservation and sustainability issues are equally distributed, and are more frequently addressed, as compared to classical biology and ecology in the document compared to content

of the distributed messages in the park itself. The press releases show a distribution similar to the information panels on-site, in which classical biology and ecology messages outnumber conservation messages, however, with a slightly higher number of sustainability messages.

A strong relation of evidence shows that visitors who do not find it important to learn more about climate and earth, correspondingly, did not learn about sustainability issues at the zoo. Contrarily, visitors who do find it important to learn more about climate and the earth, reported on sustainability issues at the zoo to a higher extent as people who find the topic moderately important. The results of this study seem to be consistent with the notion that FCL only works for visitors interested. Therefore, a tendency to resist messages that are not of interest to the public seems plausible. Especially such visitors could be reached better through EE methods.

A strong relation of evidence shows that visitors who are more concerned perceive it dominantly more important to learn about endangered and protected animals species, the planet and climate. Conversely, and contrary to expectations, the majority of day-visitors who perceive it important to learn more about the conservation and the planet and climate, did not express to have learned much about sustainability issues at the zoo. This seems to be in line with the AZA study that also indicated that the Explorers, a large group of North American people who visit zoos for personal interests in nature, show no significant change in cognition or affect (Falk et al., 2007). The North American zoos – even though explicitly tending and designing for this group – seem not to be successful in their approach (yet). This group of nature-interested people, according to the AZA study, could be helped with more temporary exhibits, in-depth programs and the creation of more challenging experiences than currently seem to exist in some zoos and aquariums. Exploring the integration of such elements in GaiaZOO may be a way to facilitate the enhancement of EE or SE through ESD.

Concluding, GaiaZOO offers many opportunities for learning about and for sustainability through FCL, but may be winning further hearts and minds for bringing about a sustainable planet by exploring the potential of other educational tactics such as EE and ESD. EE has the potential to engage visitors in a playful way, connecting emotionally to the message(s) the zoo wants to bring across. SE in the zoo can be further improved by strategically implementing facilities – boundary objects -- that foster common learning for sustainable development (ESD) and mediate global sustainability and conservation messages to the visitors. Overall, the vast majority of GaiaZOO visitors perceive conservation and sustainability important concepts to learn about. The challenge is to mediate the global sustainability message in ways it will be conceived and processed towards sustainable behaviour in the hearts and minds of the variety of zoo visitors with their own motivations and expectations of a day out in the zoo.

Figure 6. MAXQDA content analysis; signage text messages coded to educational topics CBEE, BCE and SE

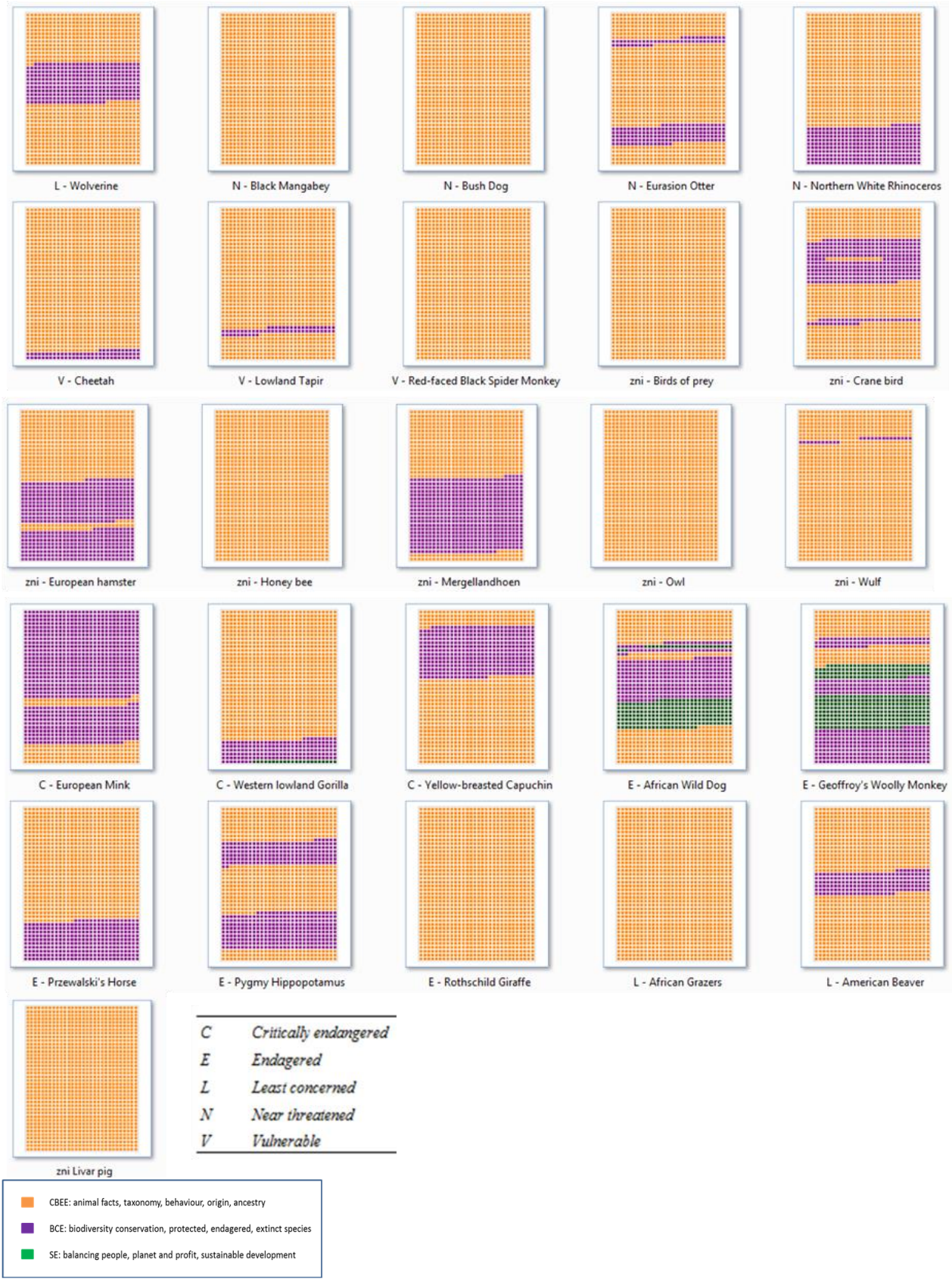


Figure 7. Educational message distribution, preferences, and learning at the zoo

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ETHICAL CODE OF CONDUCT

No animals were used in this research and children were excluded from the on-site interviews.

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