

# **Strategies and effectiveness of zoo education in the field of conservation biology**

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*Each of us matters, has a role to play, and makes a difference. Each one of us must take responsibility for our own lives, and above all, show respect and love for living things around us, especially each other.*

*Jane Goodall, Reason for Hope: A Spiritual Journey*



# Zusammenfassung

Diese Arbeit ist in Form einer Monographie verfasst, und in neun Kapitel gegliedert.

**Kapitel 1** gibt eine Einführung in das Forschungsfeld der Naturschutzbildung und die Rolle der Zoos sowie einen allgemeinen Überblick über die in dieser Arbeit verwendeten theoretischen Konzepte. Außerdem erläutert Kapitel 1 den wissenschaftlichen Hintergrund und das aktuelle Interesse der Zoowelt an dieser Arbeit.

In den **Kapiteln 2 und 3** werden die Ziele sowie die verwendeten Materialien und Methoden vorgestellt.

Die **Kapitel 4 bis 6** enthalten die wichtigsten Ergebnisse, die während der Arbeit erzielt wurden.

**Kapitel 4** beschreibt die wichtigsten Informationsquellen über gefährdete Arten in Europa, wobei der Schwerpunkt auf dem Zoo liegt.

**Kapitel 5** erklärt, welche Interessen, Gefühle, Beziehungen und Einstellungen bei Zoobesuchern und Nicht-Zoo-Besuchern gegenüber Tieren in europäischen Zoos vorhanden sind.

**Kapitel 6** misst quantitativ das Naturschutzbewusstsein, das Interesse an Tieren und die Einstellung zu Zoos innerhalb von Personen und außerhalb des Zoos.

In **Kapitel 7** werden die in dieser Arbeit erzielten Ergebnisse diskutiert.

**Kapitel 8** umreißt die wichtigsten Schlussfolgerungen der Dissertation.

**Kapitel 9** schließlich erörtert zukünftige Forschungsansätze basierend auf den Ergebnissen dieser Dissertation.

Die Daten aus vielen wissenschaftlichen Studien deuten zunehmend auf einen signifikanten globalen Rückgang der Biodiversität hin. Die Treiber dieses Rückgangs sind zahlreich, darunter Lebensraumzerstörung und Überbeanspruchung, schnelle Abholzung,

Umweltverschmutzung, invasive Arten oder Krankheiten sowie der Klimawandel (Nakamura, Monte-Luna, Lluch-Belda & Lluch-Cota, 2013; Hancocks, 2001; Pereira, Navarro & Martins, 2012). Die Sensibilisierung der Öffentlichkeit für die Notwendigkeit der Erhaltung der biologischen Vielfalt ist von wesentlicher Bedeutung für den Schutz des Reichtums an Lebensformen auf der ganzen Welt (Lindemann-Matthies, 2002). In diesem Zusammenhang haben Institutionen wie Naturkundemuseen, Zoos und Aquarien das Potenzial, eine wichtige Rolle einzunehmen (Rennie & Stocklmayer, 2003). Insbesondere Zoos können eine produktive Lernumgebung bieten (Miles & Tout, 1992), die die Förderung des öffentlichen Bewusstseins für den Naturschutz und die Ausbildung umweltfreundlicher Verhaltensweisen erleichtert und somit die negativen menschlichen Auswirkungen auf die biologische Vielfalt reduzieren würden (Barongi, Fischen, Parker & Gusset, 2015).

Meine Studie trägt zum sich entwickelnden Bereich der Besucherstudien bei, die aus verschiedenen Gründen von unschätzbarem Wert sind (Ament, 1994; Bitgood & Shettel, 1996; Maitland, 2000). Diese Studie konzentriert sich, auf verschiedene Aufgaben im Bereich Naturschutzbildung, die in der Welt-Zoo- und Aquarium-Naturschutzstrategie aufgeführt sind (Barongi et al., 2015).

Die Untersuchung dessen, was die Menschen über Naturschutz, bedrohte und nicht bedrohte Arten und über Zoos im Allgemeinen wissen und denken, kann zur Gestaltung von Umweltbildungsprogrammen beitragen, die wiederum den Naturschutz unterstützen können. Die Untersuchung des Naturschutzbewusstseins und der Einstellung gegenüber Zoos ist wichtig, weil es an Informationen über den Erfolg von Zoos bei der Aufklärung der Öffentlichkeit über Naturschutz mangelt (Dierking et al., 2002).

Die Ziele dieser Arbeit, bestehen in erster Linie darin, (1) zu prüfen, ob Zoos in der Lage sind, Informationen über gefährdete Arten in Europa zu fördern, (2) die Interessen, Gefühle, Zusammenhänge und Einstellungen von Zoobesuchern und Nicht-Zoobesuchern gegenüber

Tieren in ganz Europa zu verstehen, (3) den Unterschied im Interesse an Tieren und in den Einstellungen gegenüber Zoos zwischen Zoobesuchern und Nicht-Zoobesuchern quantitativ zu messen, (4) den Unterschied im Naturschutzbewusstsein und Interesse an Tieren zwischen Zoobesuchern und Nichtbesuchern zu analysieren, und (5a) die wichtigsten Aufgabe von Zoos, (5b) die Rolle von Zoos und (5c) den Hauptzweck von Zoobesuchen herauszufinden.

Die Vorgehensweise dieser Arbeit bestand darin, diese Ziele schrittweise und aufeinander aufbauend zu untersuchen, um zu verstehen, welche Auswirkungen ein Zoobesuch auf das Naturschutzbewusstsein haben kann. Zu diesem Zweck wurden sowohl Zoobesucher als auch Personen außerhalb des Zoos (städtische Lage, z.B. in der Fußgängerzone), die in den letzten 12 Monaten nicht in einem Zoo waren befragt. Gefragt wurde nach der emotionalen und perceptiven Reaktion auf Tiere, nach der Einstellung zum Artenschutz, nach den Vorstellungen über Zoos im Allgemeinen und nach den Hauptgründen für den Zoobesuch (Tabelle 1 und ergänzendes Material).

Die Studie wurde in neun großen (10 - 36 ha) Zoos und den dazugehörigen Städten in sieben verschiedenen europäischen Ländern durchgeführt: Zoo Sofia (Bulgarien), Zoo Yerevan (Armenien), Zoo Attika in Athen (Griechenland), Zoologischer Garten Lyon, besser bekannt als Zoo Lyon (Frankreich), Litauischer Zoo, früher bekannt als Zoo von Kaunas (Litauen), Welsh Mountain Zoo in der Nähe von Colwyn Bay (Wales, Großbritannien), South Lakes Safari Zoo in der Nähe von Dalton-in-Furness (England, Großbritannien), Zoo Heidelberg und Opel-Zoo Kronberg, beide in Deutschland. Die ausgewählten Studienorte umfassten eine große Bandbreite europäischer Regionen mit entsprechenden kulturellen Unterschieden.

Die Studie identifizierte Unterschiede zwischen unregelmäßigen und regelmäßigen Zoobesuchern im Hinblick auf das Interesse an Tieren sowie die Einstellung der Besucher zu Naturschutzfragen und Zoos. Die Ergebnisse der vorliegenden Studie zeigen, dass positive emotionale Reaktionen und insbesondere das Gefühl der Verbundenheit mit dem Tier von der



Häufigkeit der Zoobesuche abhängen. Bemerkenswert war auch, dass das Naturschutzbewusstsein durch das Interesse an Tieren, der Häufigkeit des Zoobesuches, der Einstellung zu diesen Institutionen sowie vom Alter und Herkunftsland beeinflusst wurden.

Die wichtigsten in der vorliegenden Arbeit erzielten Ergebnisse sind in den folgenden Punkten zusammengefasst:

- Ein hoher Prozentsatz der Teilnehmer in ganz Europa informierte sich über bedrohte Tierarten; der Zoo ist jedoch nicht die Hauptinformationsquelle. Fernsehen und Internet erwiesen sich als die Hauptinformationsquellen.

- Im Vergleich zu Nicht-Zoobesuchern, zeigten Zoobesucher mehr positive emotionale Reaktionen, ein stärkeres Gefühl der Verbundenheit mit dem Tier, ein gesteigertes Interesse an Tier, ein größeres Ausmaß an Naturschutzbewusstsein und an Unterstützung für Zoos.

- In den südöstlichen und östlichen Ländern - Armenien, Bulgarien, Griechenland und Litauen - ist sowohl das Bewusstsein für den Naturschutz und das Interesse an Tieren, aber auch der Widerstand gegenüber Zoos am größten.

- Besucher mit hohem Naturschutzbewusstsein betrachten Artenschutz, Schutz von Individuen und die Wiederansiedlung von Arten in der Wildnis sowie die Besucher über Tiere und Naturschutz zu unterrichten als die wichtigsten Aufgaben von Zoos.

- Die Befragten mit dem höchsten Naturschutzbewusstsein und dem größten Tierinteresse betrachteten Artenschutz und Bildung als die wichtigsten Rollen der Zoos.

- Das Naturschutzbewusstsein wird durch das Interesse an Tieren, das Interesse am Zoobesuch und die Einstellung gegenüber diesen Institutionen beeinflusst.

Der Hauptgrund für den Besuch von Zoos war in den untersuchten Ländern einheitlich: „etwas über Tiere zu erfahren“. Dies unterstreicht den Bildungsauftrag der Zoos und unterstützt weitgehend die Idee, dass Menschen Zoos als Lernort annehmen und somit etwas über Tiere lernen. Durch die intensive Beschäftigung mit den Tieren, werden Inhalte zum

Artenschutz erlernt und eventuell Einstellungsänderungen bei den Besuchern erzielt. Zoos haben daher besondere Möglichkeiten mit Besuchern, Gemeinschaften und der Gesellschaft zu interagieren und einen Beitrag zum Arten- und Naturschutz zu leisten, indem sie eine informative und unterhaltsame Lernumgebung bieten. Der Besuch von Zoos könnte dazu beitragen, die Verbundenheit zu Tieren und das Interesse an Arten nachhaltig zu fördern.

Generell hat es den Anschein, dass die Ansichten der Besucher über die Rolle der Zoos immer mehr mit dem Auftrag der modernen Zoos übereinstimmen. Zoos stellen nicht mehr nur einen Ort der Unterhaltung dar; Themen wie Tierschutz, Bildung und Naturschutz rücken immer mehr in den Vordergrund. Zoos stehen nun vor der Herausforderung, effektiv eine größere Anzahl an regelmäßigen Besuchern zu gewinnen und das Bewusstsein für Naturschutzthemen bei den Besuchern zu schärfen. Die Aufmerksamkeit der Besucher, aber auch der Nicht-Zoobesucher, zu gewinnen und an ihr Interesse zu appellieren, ist notwendig, wenn die Zoos erfolgreich ein tieferes Verständnis für Fragen der Erhaltung der biologischen Vielfalt fördern wollen. Es ist nachvollziehbar, dass dieser Appell nur auf der Grundlage von Kenntnissen über Einstellungen und Emotionen der Menschen gegenüber Zoos sowie deren Naturschutzbewusstsein erfolgreich sein kann. Wie diese Arbeit gezeigt hat, wird das Naturschutzbewusstsein durch das Herkunftsland beeinflusst. Angesichts dessen und der großen Vielfalt an Zoos in Europa muss entsprechende Forschung daher einen internationalen Charakter haben.

# Summary

Evidence is increasingly pointing towards a significant global decline in biodiversity. The drivers of this decline are numerous, including habitat change and overexploitation, rapid deforestation, pollution, exotic species and disease, and finally climate change as an emerging driver of biodiversity change (Nakamura, *et al.*, 2013; Hancocks, 2001; Pereira, Navarro & Martins, 2012). Raising public awareness of the need to conserve biological diversity is essential to safeguard the richness of life forms all over the world (Lindemann-Matthies, 2002). In this regard, institutions such as science museums, zoos and aquariums have the potential to play an important role (Rennie & Stocklmayer, 2003). Especially, zoos can provide a productive learning environment (Miles & Tout, 1992), facilitating the promotion of public conservation awareness and the adoption of pro-environmental behaviours that would reduce negative human impacts on biodiversity (Barongi, *et al.*, 2015).

Based on these concepts, my study contributes to the developing field of visitor studies. Taking as reference non-zoo visitors and zoo visitors, I have focused on reviewing some aspects of conservation education, such as people's awareness of conservation, people's interest in animals and people's feelings towards animals and attitudes towards zoos. The study identified differences between non-regular and regular zoo visitors in interests in animals, as well as visitor attitudes towards conservation issues and zoos. Therefore, the present study indicated that positive emotional reactions and, in particular, a perceived sense of connection to the animal were linked and depended on the frequency of zoo visits. It was as well remarkable, that conservation awareness was influenced by the interest in animals, the interest in visiting zoos, the attitudes towards these institutions, and the age and the country of origin. All these variables had a greater effect in the conservation consciousness of the participants. Additionally interestingly, the main reason for visiting zoos in every country was to *learn*

*something about animals.* This highlights the educational role of zoos and broadly supports the idea that people want to visit zoos to learn something about animals, in turn facilitating pro-conservation learning and changes in attitude. They are uniquely positioned to interact with visitors, communities, and society and to contribute by providing an informative and entertaining environment. Visiting zoos could lead to contribute to promoting animal connectedness and interest in species.

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# Preface

This thesis was submitted to the University of Goethe, as a partial fulfillment of the requirements to obtain the PhD degree. The work presented here was developed in the years 2014 – 2017 under the supervision of Prof. Dr. Paul W. Dierkes at the Department of Zoo Biology of Goethe University of Frankfurt. Most of the experimental work was carried out using the scientific equipment available at the University and the human help of the Zoo Partners around Europe.

## Thesis objectives

The objectives of the work reported in this thesis are primarily to (1) check if zoos are able to promote information about endangered species in Europe, (2) understand the interests, feelings, connections, and attitudes in zoo visitors and non-zoo visitors towards animals around Europe, and (3) measure quantitatively the conservation awareness, interest in animals, and attitudes towards zoos between zoo -, and non- zoo visitors. Starting from these premises, the line of work was designed in such a way that each step taken was well grounded on the previous one and added a new piece to understand which effects a zoo visit can have. The issues I aimed to investigate are the following ones:

- Analysis of the zoos as information centres regarding threatened species information.
- Analysis of the feelings elicited by animals - zoo and wild - in zoo visitors and in non-visitors.
- Analysis of the conservation awareness and interest in animals between zoo visitors and non-visitors.
- Analysis of (a) the most important task of zoos, (b) the role of zoos, and (c) the main purpose for visiting zoos, according to the respondents.



# Thesis outline

This thesis is organized in the form of a monography. The work is divided into nine chapters.

**Chapter 1** introduces the research field of conservation education and the role of zoos, provides a general overview of the theoretical concepts used through the text and explains the scientific background and current interest of the world of zoos included in this thesis.

**Chapters 2 and 3** present the objectives, and the materials and methods techniques used.

**Chapters 4 to 6** include the main results obtained during the thesis.

**Chapter 4** describes the main sources of information about endangered species in Europe, focuses on the zoo.

**Chapter 5** explains which interests, feelings, connections, and attitudes are present in zoo visitors and non-zoo visitors towards animals around Europe.

**Chapter 6** measures quantitatively the conservation awareness, interest in animals, and attitudes towards zoos within zoo -, and non- zoo visitors.

**Chapter 7** discusses the results obtained in this thesis.

**Chapter 8** outlines the key conclusions of the thesis.

Finally, **Chapter 9** discusses future development for complementing and expanding the research initiatives launched during this PhD work.

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# GLOSSARY

## Abbreviations

<b>CBD</b>	Convention on Biological Diversity
<b>WAZA</b>	World Association of Zoos and Aquariums
<b>IUCN</b>	The International Union for Conservation of Nature
<b>SSC</b>	Species Survival Commission
<b>CBSG</b>	Conservation Breeding Specialist Group
<b>EAZA</b>	European Association of Zoos and Aquariums
<b>GDP</b>	Gross Domestic Product
<b>CEEC</b>	Central and Eastern European Countries
<b>PCA</b>	Principal Component Analysis
<b>UK</b>	United Kingdom

## Nomenclature

<b>n</b>	Number of test subjects
<b><math>\chi^2</math></b>	Chi-square test
<b>p</b>	p-value
<b>z</b>	Mann-Whitney U test (M-W)
<b><math>X^2</math></b>	Kruskal-Wallis test (K-W)
<b><math>\alpha</math></b>	Cronbach alpha
<b>M</b>	Mean
<b>SD</b>	Standard deviation
<b>Me</b>	Median
<b>r</b>	Correlation coefficient
<b>B</b>	Un-standardised beta coefficient
<b>SE B</b>	Standard error
<b><math>\beta</math></b>	Standardised beta coefficient
<b>F</b>	F-Test for regression analysis
<b>R<sup>2</sup></b>	Coefficient of determination



# INTRODUCTION

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This chapter introduces the research field of conservation education and the role of zoos, provides a general overview of the theoretical concepts used through the text and explains the scientific background and current interest of the world of zoos included in this thesis.

# 1. Introduction

## 1.1 Committing to conservation

Ancient societies valued the profound connections between humans, nature and animals, that is, human beings and nature were united in balance. More recently, the need to use nature has led to abuse, consequently causing species extinction, deforestation, water and air pollution, and climate change. People have now realised that there is a need to recognise environmental change, to assess its impact and to preserve nature as a livelihood. Ensuring the well-being of other species is essential if humans are to ensure their own. The condition and quality of land, air and water not only affect the wild populations of animals and plants but will eventually determine humanity's fate as well. Rapid and effective action must be taken to deal with the profound anthropogenic issues that confront natural ecosystems (Barongi *et al.*, 2015). However, it has proven extremely difficult to mobilise and sustain the necessary skills to change society behaviour for the benefit of planet's biodiversity. The topic of environmental sustainability may very well become one of the major social issues of the present century (Wilson, 2002). Current rates of population growth, consumption, and the use of non-renewable resources are not sustainable (Oskamp, 2000); thus, individual, societal, and structural changes on a large scale will have to occur in the near future. The key strategy for achieving the required marked changes in attitudes and behaviours is to reconnect the public with nature. Humans must change how they live, and recover the balance with nature. This need for urgent action has resulted in the United Nations *Strategic Plan for Biodiversity 2011-2020*, by far the strongest commitment ever made by world's governments to address the escalating extinction crisis, including 20 targets, collectively known as the *Aichi Biodiversity Targets*. Together these targets provide a framework for halting the loss of biodiversity. Their purpose is to inspire broad-based action in support of biodiversity over this decade.



Nevertheless, to achieve this goal, it will be required a global effort, not only from governments, but also from civil society organisations, such as zoos, aquariums, science museums and many others. One of the twenty targets, Target 12 of strategic goal C, states, “*by 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained*”. It is at this point, where zoos and aquariums (hereafter ‘zoos’) can be targeted organisations; uniquely positioned to contribute to successful conservation of species and ecosystems. Many different wildlife species are kept in zoos, which attract large number of visitors who are delighted and inspired by such close encounters with nature (Barongi *et al.*, 2015). The collective social, political and financial power of the zoo community, as well as the potential impact of such large audiences, can be strong. Zoos enjoy wide-ranging levels of public credibility and trust, and provide fun and intellectually stimulating destinations for visitors of all ages (Barongi *et al.*, 2015). As a community committed to educating people about the changing natural world zoos must act responsibly, and inspire and mobilise society to respond.

## 1.2 The role of zoos

Zoos are important and popular tourists’ attractions. Spread around the world, they range from substantial operations in major cities, with visitation levels comparable to other top attractions, to small, regional, owner-operator ventures (Frost, 2011). They are dynamic institutions, which possess and manage collections that primarily consist of wild, non-domesticated animals of one or more species. Zoos have been regarded as important institutions that have or are changing from pure exhibitors of wildlife to direct contributors to nature conservation (Fa, Funk & O’Connell, 2011). Zoo conservation efforts should focus in four main disciplines; these are captive animal management, small population biology, re-establishment

of populations in the wild and relying the importance of all this through active education of the visiting public (Fa *et al.*, 2011).

### *1.2.1 The educational role of zoos*

Since the early 1990s zoos have been in a state of transformation, shifting their strategic focus from recreation and entertainment to conservation-based education in response to changing community attitudes and values (Ballantyne, Packer, Hughes & Dierking., 2007; Barongi *et al.*, 2015; Patrick, Matthews, Ayers & Tunnicliffe., 2007; Wijeratne, Van Dijk, Kirk-Brown & Frost, 2014). At the end of the 20<sup>th</sup> century, there were revolutionary changes in the way zoos defined their role in society and, as a result, changed the experiences they were offering their visitors. This was primarily driven by major shifts in public attitudes to nature and conservation (Frost, 2011). Zoos can be regarded as places of learning and exhibition, similar to museums. They often have zoo pedagogical departments with trained staff, and host and maintain a collection of wildlife, which is shown to the public (Alexander, 1979). Mason (2000) argued that zoos might be perceived as having a specific educational role, which can be characterized as the process of gaining knowledge about animal species. They can develop awareness of major ecological issues and hence a zoo's role is education with regard to conservation. Various scientific researchers, such as Mason (2000), stress this broader educational role when they claim that zoos can be regarded as significant ecotourism attractions. Zoo experiences are nature based or natural resource based, focusing on learning about nature, contributing to conservation, in small scale, and locally orientated (Fernell, 1999). Mason (2007) argued that it is the important educational role of zoos, particularly in terms of ecological education.

### 1.2.2 *The scientific role of zoos*

Zoos have a number of related scientific roles; the zoo conservation biologist must therefore, as Meffe & Carroll (1994) suggest for conservation biologists in general, think “probabilistically” and understand the nature of scientific uncertainty. He or she must promote a non-invasive but quasi-experimental statistical investigation of the dynamics and interactions of captive individuals and populations. Zoos and *ex-situ* conservation can contribute directly to species conservation. Zoo scientific role promotes the active propagation of captive animals and the re-establishment of endangered species populations in the wild (Fa *et al.*, 2011) as well as taxonomic, observational, reproductive, physiological, veterinary and genetic scientific issues (Bostock, 1993).

### 1.2.3 *The entertainment role of zoos*

The contemporary justification for zoos, as seen, is based on their ability to act as sites of wildlife conservation. Alongside this is the reality that zoos have historically been defined as sites for the entertainment of the general public and continue to be dependent on the revenue raised through visitor receipts (Carr & Cohen, 2011). Consequently, zoos today are identified as sites of conservation, research, education, and entertainment. Despite for many visitors recreation is still a principal factor in the decision to visit a zoo (Rajack & Waren, 1996; Reading & Miller, 2007; Turley, 1999), a number of studies show that the new tendency is to visit zoos for the environmental education (Mazur, 1995; Carr & Cohen, 2011).

## 1.3 Creating a culture of conservation

In recent years, zoos have demonstrated a greater commitment to conservation through a wide range of programmes, including education and public programmes, conservation – research programmes, field – conservation programmes as well as learning and training

programmes (Barongi *et al.*, 2015). This strategy comprise three components; the first is global collaborations, involving zoos, conservation organisations and protected area agencies. The second is the work on conservation projects in the countries of origin of wildlife species, the protection of habitats and the conservation of the remaining populations. The third is that zoos give their visitors compelling messages about how people can help conserve endangered species (Frost, 2011). Since we are also one of the Earth's species, we have good reasons for conserving biological diversity. The first is moral, it is right to do so, and the second is practical. Biological diversity supports human survival, notably through health, food and industry (McNeely, Miller, Reid, Mittermeier & Werner, 1990), and in the face of ever-declining biodiversity, zoos have a major role to play in species conservation.

#### 1.4 Zoos and the conservation of threatened species

Collectively, zoos maintain about 1 million living wild animals from various parts of the world. Half of these collections are mammals, birds, reptiles and amphibians (Frost, 2011). Zoos play a significant role, especially for species that are exposed to a real risk of extinction (Dick & Gusset, 2010; Conde, Flesness, Colchero, Jones & Scheuerlein, 2011; Gusset & Dick, 2012). One of the main reasons is that twenty-first century zoos have positioned themselves as *ex situ* and *in situ* conservation institutions (Miller *et al.*, 2004; Conway, 2003; Hutchins & Smith, 2003; Mallinson, 2003; Tribe & Booth, 2003). Zoos are engaged in the conservation of several threatened species both in their natural habitat (*in situ* conservation) and in captivity (*ex situ* conservation). Through their information strategies, zoos make visitors aware of zoos' contribution to sustainable tourism and species conservation (Frost, 2011). *Ex situ* conservation is considered by the Convention on Biological Diversity (CBD; Article 9) as a complementary measure to *in situ* conservation (Emerton, 2000). *Ex situ* conservation involves establishing back-up populations of threatened species through captive breeding, which is necessary only

when their natural habitats are seriously degraded and/or the species themselves are over-exploited. On the other hand, *in situ* conservation includes the maintenance of species in their natural environment through wildlife protection as well as habitat management and restoration (Frost, 2011). Modern zoos have a crucial role in contributing to the country's conservation efforts through the simultaneous implementation of *in situ* and *ex situ* measures. Linking both conservation measures is vital in zoo research and conservation science (Ryder & Feistner, 1995; WAZA, 2005; Zimmermann, Hatchwell, Dickie & West, 2007). The number of different approaches to global conservation championed by conservation organisations has increased in number, scope, and complexity in recent years (Redford *et al.*, 2003). According to Brooks *et al.* (2006), since 1988, at least nine major institutions templates of global biodiversity conservation prioritization, developed exclusively by nongovernmental organisations, have emerged. Many of these organisations and zoo societies, such as the World Association of Zoos and Aquariums" (WAZA), the IUCN/SSC (The International Union for Conservation of Nature/Species Survival Commission), the Amphibian Specialist Group, and the IUCN/SSC Conservation Breeding Specialist Group (CBSG), are working together to describe large number of species (McGregor & Zippel, 2008). Nevertheless, the amount of threatened species saved from extinction is still low (Fa *et al.*, 2011). Most of the zoos' species collections include large animals, often colourful and have interesting behavioural characteristics (Churchman & Bossler, 1990; Puan & Zakaria, 2007; Turley, 2001; Ward, Mosberger, Kistler & Fischer, 1998; Conde *et al.*, 2011). Many of these charismatic zoo animals are rare because they inhabit only certain geographical areas, were persecuted for their peculiarities, have restricted biological requirements or their populations have declined over the years due to habitat loss, over-exploitation or combinations of all these factors (Gaston & Blackburn, 1995; Miller & Lacy, 2003). Hunters for game and meat (Dobson & Yu, 1993), for example, often target large animals. Because of their vulnerability and irreplaceability, many zoo visitors tend to

sympathise with their situation. Hence, attractive threatened species in zoo collections can be used as flagship species in fund raising and conservation campaigns (Frost, 2011). A single popular animal (or a small group of these) might serve as a flagship species and help its endangered relatives in the wild, or their natural habitat and its residents, to gain the necessary financial support from the public (Dietz, Dietz & Nagagata, 1994). Therefore, it is important that zoos attract many people to play their essential role as species ambassadors.

### 1.5 Conservation education in zoos

Returning to the educational role of zoos, the other important reason to see zoos as a conservation centres is that they are providers of conservation and environmental education (Ballantyne *et al.*, 2007; Falk *et al.*, 2007; Randler, Baumgartner, Eisele & Kienzle, 2007; Swanagan, 2000). They are becoming increasingly important centres for promoting and actively engaging in animal conservation (Fa *et al.*, 2011).

In general, there is consensus that natural history institutions, - botanic gardens, arboretums, public aquariums, marine parks, zoos, and a variety of specialist natural history museums -, have a fundamental responsibility to tackle environmental problems, largely to educate visitors to create a citizenship with a better knowledge base, greater sense of compassion, a stronger commitment to care, and a deeper connection to the world of nature (Miller *et al.*, 2006). Zoos are uniquely placed to interact with visitors, communities and society on conservation issues in an entertaining environment. Zoos are able to influence and inspire positive conservation behaviours, and make important differences that support their core mission, that is, to conserve biodiversity. A goal of all zoos should be to engage with visitors, other zoos and conservation organisations, and communities to encourage conservation-sensitive behaviours that support conservation. This goal can be achieved by influencing desired attitudes and knowledge, and by drawing on conservation psychology. By lying out

clear, measurable objectives, it will be possible to evaluate the impact of such interactions between zoos and their visitors (Barongi *et al.*, 2015). The importance of connecting people with nature is vital to building support for conservation. The European Association of Zoos and Aquariums (EAZA) clearly stated that the developing of conservation learning and engagement for the future according to the Aichi target 1 is the major goal within the next years. If conservation is to succeed, people need to be inspired to care about and understand animals and the threats they face in the wild. As EAZA states, “*conservation education in zoos should aim to raise awareness of biodiversity loss, connect people to nature and encourage sustainable behaviours*” (EAZA Council, 2016). Furthermore, because zoos are often in urban locations, they can educate a large and diverse audience that more closely resembles the general population than other conservation education venues (Mony & Heimlich, 2008). A variety of techniques such as formal instruction or education programmes, live interpretation, interactive elements, signage and exhibit layout are used to educate zoo visitors about conservation issues and encourage changes in conservation-related attitudes and behaviour (Barongi *et al.*, 2015; Mony & Heimlich, 2008; Smith, Broad & Weiler, 2008). Zoos provide opportunities for visitors to view and interact directly with wildlife, albeit in artificial conditions. Zoo tourism can help generate the funds needed to support the role of zoos in conservation, education and research. Through their educational programmes, zoos can make visitors aware of and responsive to the zoos’ contribution to sustainable tourism and species conservation (Frost, 2011). It is widely held that animals in zoos are “ambassadors” for animals in the wild and assist in communicating key messages to society on the conservation biodiversity. By presenting wildlife in simulated natural settings, visitors are encouraged to learn about conserving wildlife and be inspired to take actions to conserve the natural world (Barongi *et al.*, 2015). The trend for immersive exhibits, where visitors share the same environment as the animals, affords a multi-sensory experience and perceived intimacy with the natural world.

This promotes emotional learning and by creating an emotional connection to wildlife, research has found that visitors are more likely to support and donate to wildlife conservation, to change their behaviour and, perhaps, even become stewards and advocates of conservation (Barongi *et al.*, 2015).

#### *1.5.1 What is the message?*

Zoo education is not limited to species and habitat conservation or the natural history of animals in the collection, although these are important and common focuses. Zoo education now encompasses all visitors and environmental issues such as climate change, pollution, unsustainable fishing and like these to “green” actions such as recycling (Fa *et al.*, 2011). The education department is often consulted on the design of new exhibits because enclosures need to provide an environment, which is not only beneficial for the animals but also interesting, and thought-provoking for visitors. The use of signage, interpretative graphics, worksheets and presentations by staff increase awareness and knowledge for both children and adults, and result in a stimulating visit to the zoo. Education and interpretation will increasingly utilize modern information technology, allowing direct links to in situ conservation programmes which zoo visitors help to support (Andersen, 2003).

#### 1.6 The visitor experience

Once the foundation of a culture of conservation has been created, attention should be turned towards the visitors. Zoos worldwide are among the top recreational destinations, visited by a high percentage of the population (Fa *et al.*, 2011). WAZA states that over 600 million people visit zoos around the world each year (WAZA, 2005). Zoos naturally depend on visitors not only because entrance fees and other revenues generated during visits are an important



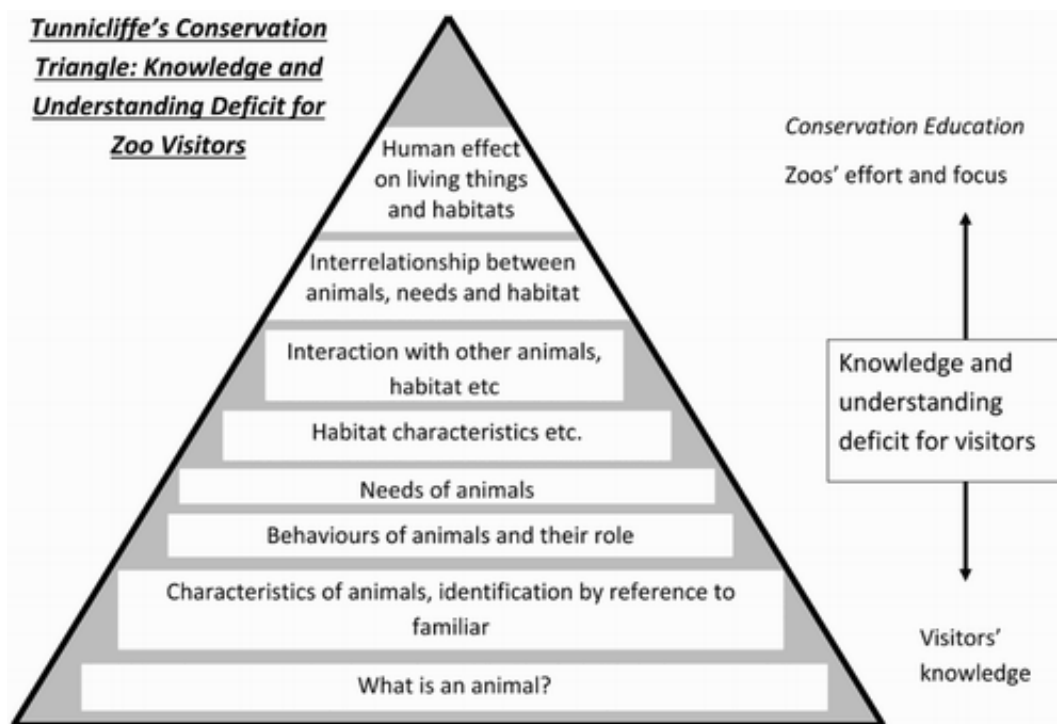
source of income, but also because the number of visitors gauge public perceptions and popularity of zoos (Davey, 2007).

### *1.6.1 Inspiring visitors*

Zoos should inspire and motivate their visitors to advocate for conservation. Institutional commitment to conservation should be apparent to visitors as they walk around the grounds; the identification of ways in which to engage visitors in actions that enforce their own awareness of not being wasteful will help them to achieve small conservation actions that develop into long-term conservation commitments (Barongi *et al.*, 2015). Zoo education programmes often aim to “inspire” and create a “sense of wonder” and tapping into visitors’ emotional response to animals may enhance the power of this messaging. However, simply repeating the message and facilitating uptake of conservation actions may not be enough (Fa *et al.*, 2011). Sterling, Lee and Wood (2007) advise that long-term behavioural change is underpinned by motivations such as commitment, altruism and intrinsic satisfaction, rather than simply reinforcement. Since most of zoos rarely undertake comprehensive studies of their visitors’ prior knowledge on conservation, assessing the level to pitch conservation messages is challenging. Tunnicliffe and Scheersoi (2009) suggest a step-wise model (Figure 1) for introducing the complex concepts of conservation biology, acknowledging the deficit in knowledge between many visitors and the conservation education content the zoo is trying to impart.

The model begins with simple concepts such as “what is an animal?” characteristics of animals and progresses to ecosystem-level interactions, culminating in the human effect on living things and habitats. Perhaps a further step could be “how humans can protect biodiversity” to include the interpretation of knowledge gained in the zoo into concrete actions for conservation. Tunnicliffe and Scheersoi (2009) also emphasise the importance of situational

cues, the development of an interest requires a situation-specific interaction between the person and the object (e.g. an animal or a topic). If the experience during the interaction is positive, situational interest occurs and if it endures, it becomes individual interest (Deci & Ryan, 1980; Bamberg, Coenenberg, Krapp & Krapp, 1992; Tunnicliffe & Scheersoi, 2009). It is this individual interest, which is the goal of all zoo educators since it is something valuable to an individual, which results in their on-going investment. Educators have a valuable role to play in the development of interest since they can influence the quality of the interaction between a visitor and the object (Tunnicliffe & Scheersoi, 2009).



*Figure 1* Tunnicliffe's conservation triangle. Zoos are in a unique position to provide environmental and conservation education to large numbers of people. However, this educational task is difficult. Visitors have a limited knowledge of the complex field of conservation biology and educators need to introduce them step by step to the issues to overcome their knowledge and understanding deficit. From Tunnicliffe & Scheersoi (2009).

## 1.7 Attitudes towards animals

Animals are incorporated into the tourism business in various ways; most tourist-wildlife interactions occur in environments with some degree of human-made elements. In addition to observing wildlife in their natural environment, animals can be viewed for various purposes in captive settings. In fact, visiting captive animals sites has become the central, and for most people, the only venue for observing and interacting with wildlife (Beardsworth & Bryman, 2001; Turley, 2001). Grounded on this notion, in recent years, many efforts have been directed towards establishing the relatively new field of anthrozoology, i.e. the study of relations between people and animals. Anthrozoology encompasses many fields of research and draws from a broad range of disciplines, such as psychology, political science, behavioural science and others (Schneider, 2005). In any case, the main focus of anthrozoologist studies is the examination of human attitudes towards animals. There are several reasons for researchers' growing interest in the public's attitudes towards animals. First, animals today are tightly incorporated into people's lives, particularly as companion animals (Frost, 2011). Secondly, some studies support the idea of a close link between caring for animals and caring for people (e.g. Henry, 2004; Taylor & Signal, 2005). Therefore, examining attitudes towards animals may have important implications for the fields of psychology and education. Finally, contemporary efforts towards conservation and preservation of wildlife and the natural environment have also led to the need to investigate the attitudes of the public at large towards animals. As a result of this and similar concerns, zoo biology has needed to develop theories and tools to capture and examine the public's attitudes. Consequently, in recent years, increasing research evidence confirms the physiological, psychological, and social benefits of interactions with animals (Walsh, 2009). The connections between humans and animals include the study of human attitudes towards animals; it is an extremely complex issue, involving a multitude of evolutionary, psychological, and cultural aspects (Serpell, 2004). Zoos have always had an influence on how people perceive animals. Many urban, and also rural, people

still receive their first exposure to live wild animals in zoos therefore public perception of wild animals can still be shaped by them. However, the zoo animal experiences are not universal; a zoo animal experience depends on the actual species that is being observed and the characteristics of the observing visitor. Attractive, charismatic, rare and endangered species are considered the favourite species among zoo visitors (Angulo, Deves, Saint Jalmes & Courchamp, 2009). These kinds of species are easily identified by the public and often stimulate an effective reaction (Dickie, Bonner & West, 2007). When experiencing a zoo animal a variety of feelings and cognitions are triggered, the question is whether we can identify and describe these feelings and cognitions and how they relate to wild animals and conservation (Marseille, Elands & Van Den Brink, 2012). Routman, Ogden, and Winsten (2010) believe that zoos are particularly well suited to create affective responses towards animals (i.e., affective transformation), which will assist in the development of a conservation ethic. Some studies have quantitatively measured human emotional responses, more specifically the arousal dimension, during a zoo activity or animal encounter and found there is a strong affective component to the experience (Myers, Saunders & Birjulin, 2004; Smith, Weiler & Ham, 2008). It has also been found that frequent zoo visitors have stronger naturalistic attitudes than the general population, but lower attitudes than those found in other nature groups, like nature hunters and bird-watchers (Frost, 2011). Animals can evoke strong positive or negative emotions in individuals, although there is a great variance in the quality and strength of the accompanying feelings (Jacobs, 2009). Such feelings can be experienced as positive (feelings of pleasure) or negative (feelings of displeasure) that are to some extent arousing or quieting (also known as “core affect”; see Barrett, Mesquita, Ochsner & Gross, 2007). Liking or disliking is a revelation of our capacity to respond emotionally to objects, events, or situations: generally, we like those objects that evoke positive emotions, and we dislike those objects that evoke negative emotions (Jacobs, 2009). When experiencing an animal, a zoo visitor for

example, could feel sadness and concern for the animal's welfare because of the evident limited space in its enclosure. The visitor emphasizes the value of the individual species (biocentric). Despite the limited space, a zoo visitor could also feel joy because the person is convinced that zoo-breeding programs will benefit the survival of the species (ecocentric). Another visitor can feel disappointment because of the animal's inactive behaviour resulting in less entertainment and joy (anthropocentric). Hence, mutual relationships between feelings, knowledge, and value orientations exist (Dayer, Stinchfield & Manfredo, 2007; Höyer, 2009). Through the display of semi-wild animals, the modern zoo aims to foster meaningful changes in people's conservation attitudes and actions (Marseille *et al.*, 2012). They can also offer conservation education, which stimulates visitors to connect personally to conservation issues (Patrick *et al.*, 2007). There are many reasons to be concerned with the affective experience of visitors at zoos and similar institutions. Dierking, Burtnyk, Büchner and Falk (2002), while reviewing primarily cognitive effects of zoo visits, noted the acute need to understand emotional dimensions as well, particularly the impact of these responses on learning. Zoos and aquariums are convinced that they provide positive experiences to visitors, not only in the emotional dimension, but also in terms of outcome. More broadly, the way we respond emotionally to animals is important, as an essential aspect of our varied relations with other species; as a foundation for educational efforts to foster positive attitudes towards animals and nature; and as an informative variant from human-human situations in the study of emotion itself (Myers *et al.*, 2004). Sentiments towards specific animals or animal-related topics may comprise much of the emotional experience of people; variables that may affect emotion include beliefs about the animal (Myers *et al.*, 2004). For our distant ancestors, from whom we inherited our genes, animals were crucial to survival, for example as sources of food or sources of danger. Therefore, we inherited an innate tendency to react emotionally to some animals (Öhman, 2007). The emotion of fear is a widespread phenomenon in relation to large carnivores

(Ericsson & Heberlein, 2003; Röskaft, Bjerke, Kaltenborn, Linnell & Andersen, 2003), so liking or disliking animals are manifestations of the general working or emotions, within a specific context. Emotion theory provides a good basis to unravel possible causes and mechanisms that bring about positive or negative feelings towards animals (Jacobs, 2009).

### 1.8 Communicating about animals

Media also provides a wide range of images, ideas, scenarios and messages that shape visitors' expectations of zoos. In a competitive attraction marketplace, zoos rely on the media to attract visitors. Their media market strategies combine both induced and organics methods, like celebrity animals, particularly baby animals, and celebrity zookeepers (Frost, 2011).

It is generally accepted that the media play a central role in public perception of the importance of individual issues (Frost, 2011). Wildlife images have been used to influence public thinking about a range of issues. As Newsome, Dowling and Moore (2005) argued, wildlife images, and particularly those presented on television, are a very popular way of communicating information about the natural environment and developing public awareness and environmental consciousness. Such images can also be used in a particularly poignant way to illustrate habitat loss or destruction and ecosystem collapse (Reser & Bentrupperbaumer, 2000). As Beardsworth and Bryman (2001) have also indicated, one of the most significant source of media images of wildlife in the early 21<sup>st</sup> century was television. Recently there has been a tendency for social media to become an increasingly important source of information, influencing the interactions between people and nature and becoming a powerful tool for nature conservation education (Toivonen, *et al.*, 2019; Darling, Shiffman, Côté & Drew, 2013). The major concern is the way that television portrays the roles of zoos today and, in particular, how the aforementioned roles of education, science and entertainment are presented (Frost, 2011). Champ (2002) claim that wildlife images have made a significant contribution to a shift in

public opinion, from animals being seen as merely serving the purposes of humans and being exploited accordingly, to a more protectionist view of wildlife. However, much programmes tend to anthropomorphise animals in zoos and in their attempt to provide entertainment as well as education for the audience, there is a danger that they may trivialize important topics.

### 1.9 Europe in focus

The evidence is increasingly pointing towards a significant global decline in biodiversity. The drivers of this decline are numerous, varied, and interact with each other. Although this loss of biodiversity is more visible in the biodiversity-rich areas of the globe, such as tropical rainforests and coral reefs, biodiversity is also being threatened in Europe, with the root cause invariably linked to some form of human activity. It has been estimated that biodiversity loss costs the European Union 3% of its gross domestic product (GDP) annually (Young *et al.*, 2005).

For about a century there has been a development of conservation movements and ideas at the national and regional level for the protection of species and the conservation of national nature reserves in order to mitigate the human impacts on nature caused by industrialisation. However, in spite of the good intentions within the field of nature conservation, the industrialisation of agriculture, restructuring of land use, the building of huge transport networks and metropolitan areas has caused a serious fragmentation of natural areas, destruction of ecosystems, loss of natural habitats and habitat structures, and extinction of species (Stanners & Bourdeaux, 1995). This is especially the case in the most densely populated areas of Europe (Jongman, Klvik, & Kristiansen, 2004). Therefore, it has been found that at least eight out of ten Europeans consider the various effects of biodiversity loss to be serious. More than half think they will be personally affected by biodiversity loss (EORG, 2002).

### *1.9.1 Conservation personalities in Europe*

The worries about biodiversity loss around Europe could shape the attitudes of Europeans towards conservation, species and zoo-related subjects. The central and eastern European countries (CEEC) (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia and the Slovak Republic) are relatively rich in biodiversity because of a range of geological, historical, and economic factors, resulting in features such as the primeval forests of Poland. Other European countries, such as Lithuania and Bulgaria, are rich in mammal biodiversity and subterranean fauna in Slovenia is as well very wide and important. All these features may help to form the “conservations personalities” among the Europeans (Young *et al.*, 2007). Further, ecological networks have been proclaimed to be a leading objective in the Pan-European Biological and Landscape Diversity Strategy conservation, enhancement and restoration of key ecosystems, habitats species and features of the landscape through the creation and effective management of the Pan-European Ecological Network (Council of Europe *et al.*, 1996). The importance of wider landscape for nature conservation has been recognised in the European Union’s Habitat Directive (EC 92/43), when referring to importance of landscape elements and structures for the favourable conservation status of habitats and species (Jongman *et al.*, 2004).

### *1.9.2 Development of ideas and practice*

All these strategies, in the great metropolitan areas in both the Eastern and Western Europe, had led to develop green-belt systems that interconnected the city and the nature areas or forest zones. Plans were developed in London as well as Moscow (Sepp & Kaasik, 2002). Similar systems were also created elsewhere, e.g. in Berlin, Prague and Budapest (Sepp &



Kaasik, 2002). In Copenhagen, a plan for a network of green paths was approved in 1936 (Jongman *et al.*, 2004). Such city plans of green belts or networks of green paths were mainly constructed to satisfy recreational needs of people crowded together in polluted cities. Although their function may be defined as recreational, they most probably made the way for what we know as ecological networks and greenways today, they facilitated the concepts (Jongman *et al.*, 2004). With over half of Europeans now residing in urban areas, it is no surprise that people have begun to lose the innate connection with the natural world, and with it, the relationship with the precious species with whom we share this planet. It is in this context that the role of Europe's zoos has never been more important than it is today.

### *1.9.3 Zoo conservation in Europe*

Grounded on this premises, the European Association of Zoos and Aquariums (EAZA) was formed in 1992, to facilitate cooperation within the European zoo and aquarium community towards the goals of education, research and conservation. The mission is to facilitate co-operation within the European zoo and aquarium community with the aim of furthering its professional quality in keeping animals and presenting them for the education of the public, and of contributing to scientific research and to the conservation of global biodiversity. It will achieve these aims through stimulation, facilitation and co-ordination of the community's efforts in education, conservation and scientific research, through the enhancement of co-operation with all relevant organisations and through influencing relevant legislation within the EU (EAZA Strategy 2013-2016). Zoos in Europe have the potential to educate and influence over 175 million visitors a year (Association of Zoos and Aquariums). The EAZA clearly stated that the developing of conservation learning and engagement for the future according to the Aichi target 1 is the major goal within the next years. In addition, as previously mentioned, because zoos are often in urban locations, they can inform a large and

diverse audience that more closely resembles the general population than other conservation education venues (Mony & Heimlich, 2008; Association of Zoos and Aquariums, 2016). The potential to educate is further evidenced by zoos' ability to attract large and diverse audiences, often from urban populations whose everyday lives are increasingly detached from the natural world (Miller *et al.*, 2004; Moss, Esson & Bazley, 2010). Re-connecting with nature and re-establishing the relationship with the world's species, to whom people owe the very existence, is essential if humanity are to overcome the many environmental and societal challenges ahead.

# OBJECTIVES MATERIAL AND METHODS

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This chapter present the objectives, materials, methods and techniques used.

## 2. Research objectives

This study focuses on different tasks regarding conservation - education that are stated in the zoo conservation strategy (Barongi *et al.*, 2015). It contributes to the developing field of visitor studies, that are invaluable for several reasons (Ament, 1994; Bitgood & Shettel, 1996; Maitland, 2000);

- they help to understand how visitors engage with the zoo environment and interact with animals,
- they identify people's needs,
- they aid planners in developing and evaluating appealing exhibits,
- they understand and promote utilization of exhibit areas,
- they try to attract a broad representation of audiences,
- they enable people to gain maximum benefits,
- they provide adequate amenities, and,
- they investigate the visitor market to aid the development of business and marketing strategies.

Investigating about what people know and think about conservation, threatened and non-threatened species and about zoos in general may contribute to conservation issues since it could indicate actions to be implemented in environmental education programmes. The study of these aspects is important because there is a lack of information on the effectiveness of zoos in educating the public (Dierking *et al.*, 2002). Thus, this study tries to comprehend how people react to certain issues related to zoo conservation - education questions.

The study identifies, through a questionnaire, differences in information sources, animal specific interests, as well as visitor attitudes towards conservation issues and zoos.

The research is, to my knowledge, the first broad cross-section of European countries attempting to analyse behaviours, beliefs and actions towards visiting zoos. It is important to understand people behaviours' to provide a foundation on which to build education programmes that refine and develop visitors' scientific understanding. A better understanding is needed to providing people the specific tools to improve visitor's predispositions towards nature.

The current study has three purposes, each covered in a result section of this document. In addition, each section starts from some working hypothesis that this study aims to verify.

**I.** In section 4, it will be check whether zoos are able to promote information about endangered species in Europe.

- HI-a: Zoos are used as information centres regarding threatened species information.

**II.** In section 5, it will be understand the interests, feelings, connections, and attitudes in zoo visitors and non-zoo visitors towards animals around Europe.

- HII-a: Animals - zoo and wild - elicit positive feelings more frequently in zoo visitors than in non-visitors.

**III.** Finally, in section 6, the conservation awareness, interest in animals and attitudes towards zoos will be measured quantitatively.

- HIII-a: Zoo visitors show a higher nature conservation awareness and interest in animals than non-visitors.
- HIII-b: People think that the most important task of zoos is to reintroduce species into the wild and to protect species.
- HII-c: Non-zoo visitors tend to think in a negative way about the role of zoos.
- HIII-d: The main purpose for visiting zoos is to be entertained.

## 3. Materials and Methods

### 3.1 *Conservation education in zoos: general methods*

#### 3.1.1 *Study sites*

In order to assess the validity of the working hypotheses listed in the previous section, we conducted a conservation survey. It was performed both to zoo visitors and non-visitors, aiming to examine their personal opinions and feelings about zoos and animal experiences. The survey has been conducted in two different study sites, inside the zoo and in diverse locations around the city (urban location), to include people that have not been in a zoo in the last 12 months. The study was conducted at nine larger (10 – 36 ha) zoos and the related cities, in seven different European countries: Sofia Zoo (Bulgaria), Yerevan Zoo (Armenia), Attica Zoological Park in Athens (Greece), the Zoological Garden Lyon, more commonly known as Lyon Zoo (France), Lithuanian Zoo, previously known as Kaunas' Zoo (Lithuania), Welsh Mountain Zoo near Colwyn Bay (Wales, Great Britain), South Lakes Safari Zoo near Dalton-in-Furness (England, Great Britain), Heidelberg Zoo and Opel-Zoo Kronberg, both in Germany. The selected study sites compromise a large range of European regions with their possible cultural differences.

#### 3.1.2 *Pre-test questionnaire*

Through an explorative pre-study, the comprehensibility of each question was tested to find out what improvements were needed. The survey was carried in March 2015 in Opel-Zoo Kronberg, in Germany, with a total of 56 respondents. The questionnaire has been improved based on the results. Changes made in the questionnaire included formal aspects as well as a better formulation of the questions.

### 3.1.3 Test questionnaire

The survey was constructed in order to examine the personal opinions and feelings about zoos and animal experiences. Questions were asked about emotional and perceptual reaction to animals, attitudes about protecting species, conceptions about zoos in general, and the main reasons for the zoo visit (Table 1, and *supplementary material*).

<b>Questionnaire items</b>	
<b>Personal information</b>	
1.1	What is your age?
1.2	What is your gender?
<b>Interest towards animals</b>	
1.11	Are you interested in domestic animals?
1.12	Are you interested in zoo animals?
1.13	Are you interested in wild animals?
<b>Conservation education behaviour</b>	
1.3	Have you ever informed yourself about endangered animals or species?
1.4	If yes, what source(s) of information did you use? Zoo / Print media / Television / Internet / Others (*multiple answer)
1.5	Are you part of a conservation, nature, or environmental group of any kind?
1.6	How many times do you think have you visited a zoo or aquarium in the last 12 months?
1.8	Have you ever heard about the IUCN Red List of Threatened Species before?
<b>Importance of species conservation</b>	
1.9	How important is conservation of species to you?
1.10	How important do you think is it to visit zoos for the conservation of species?
1.17	I would like to do something to help protect species in the wild
1.18	I feel zoos have an obligation to help protect species
1.19	The conservation of rare species is more important than economic assets
1.20	People should use nature for his benefit
<b>Attitudes and feelings towards conservation and animals</b>	
1.14	I wish I knew more about animals
1.15	I feel a sense of connection with animals
1.16	I would like to take care of animals
1.25	Animals in zoos make me feel Tense / Relaxed
1.26	Animals in zoos make me feel Sad / Happy
1.27	Animals in zoos make me feel Bored / Interested
1.28	Animals in the wild make me feel Tense / Relaxed
1.29	Animals in the wild make me feel Sad / Happy
1.30	Animals in the wild make me feel Bored / Interested
<b>Attitudes towards zoos</b>	
1.7	Do you think that by visiting zoos you can help save an animal species?
1.21	Animals do not belong in zoos
1.22	Zoos are unnecessary nowadays
1.23	What do you think is the most important task for zoos?
1.24	What do you think of when you think of the zoo?

*Table 1* Overview of the items of the questionnaire. Questions were about personal information, interest towards animals, conservation education, importance of species conservation, attitudes and feelings towards conservation and animals, and attitudes towards zoos.

The items were developed based on already existing questionnaires (Clayton, Fraser & Saunders, 2009; Moss, Jensen & Gusset, 2014; De Azevedo *et al.*, 2012; Lindemann-Matthies & Kamer, 2006) from the field of conservation and psychology. The questionnaire included



items pertaining to people's personal information (items 1.1, 1.2), interest towards animals (items 1.11, 1.12, 1.13), conservation behaviours (items 1.3, 1.4, 1.5, 1.6, 1.8), importance of species conservation (items 1.9, 1.10, 1.17, 1.18, 1.19, 1.20), attitudes and feelings towards conservation and animals (items 1.14, 1.15, 1.16, 1.25, 1.26, 1.27, 1.28, 1.29, 1.30), and attitudes towards zoos (items 1.7, 1.21, 1.22, 1.23, 1.24). The scale items were checked for reliability using Cronbach's alpha, an indicator of internal consistency. In this study, the subscales ranged 0.844, indicating a high degree of reliability. Questionnaires were prepared in English and German and afterwards translated to the other languages by local translators, so that the respondents were easily able to understand the questions.

#### *3.1.4 Data collection procedure*

Procedural and sampling guidance documents were produced for all participating institutions to promote consistency in data collection and organization at each site. However, given the diverse nature of participating institutions, some uncontrolled procedural differences likely occurred across sites. The survey was designed to be printed by participating institutions, distributed on paper by staff members, and self-administered by respondents. It was administered in two different places; at the zoo, and in different points around the city in order to have a non-zoo visitors pool. Potential survey respondents were selected randomly; once one survey response was completed, the next visitor to cross an imaginary line was selected as the potential next respondent. Staff members administering the surveys were instructed not to offer guidance to respondents completing the survey. Respondents were informed that the questionnaire would be completed individually. The answering of several persons was therefore excluded. Visitors generally took about 10 minutes to complete the questionnaire. Surveys were conducted from April 2015 to February 2016. After receipt of the completed

surveys by the researcher, the data were entered and analysed in the Excel spreadsheet program.

The statistical analysis were carried out using SPSS software.

### 3.1.5 Participants

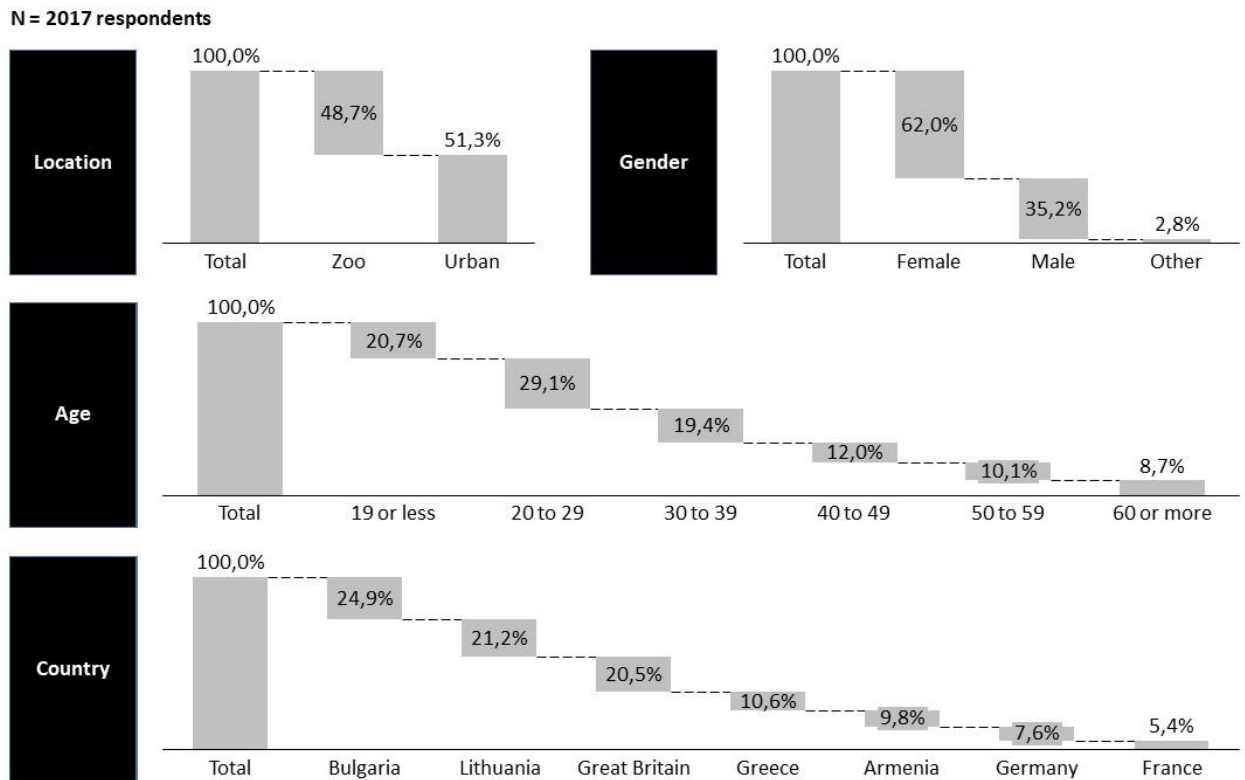


Figure 2: Participants of the study by age, gender, country and location of the questionnaire.

# CONSERVATION EDUCATION IN ZOOS

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This chapter introduces the experimental techniques used including the main results obtained during the thesis.

## 4 Zoos as information sources in the field of conservation biology

The purpose of this chapter was to analyse the reliability of zoos to promote information about endangered species in Europe. In this chapter, I start with a general discussion of classical and modern information sources. Then I introduce the zoos as information centres.

### 4.1 Background

The public has become more aware of environmental issues in recent decades; nonetheless, one of the fundamental barriers to this change is the lack of environmental literacy (Bickford, Posa, Qie, Campos-Arceiz, & Kudavidanage, 2012). There are still many people obtaining limited or oversimplified information about environmental issues from sources that may be biased (Bickford *et al.*, 2012; Ladle *et al.*, 2016). Compounding this, there is a widening gap between people and the natural world, especially in urban areas (Miller, 2005). However, we now live in the “Information Age” where a deluge of information is generated mainly from digital media (Bennett *et al.* 2013). Furthermore, the use of internet, and specially the use of social media, is increasing dramatically worldwide (Mayer-Schönberger & Cukier, 2013; Kwak, Lee, Park & Moon, 2010). Based on this assumption, that knowledge is essential to understand the importance of conservation, it is important to recognise which sources of information are used by people to inform themselves about environmental issues.

As conservational venues, zoos could also play an important role as information centres. They have undergone a transition over the past 40 years, moving the focus from entertainment to conservation-based education (Nygren, & Ojalammi, 2018; Ballantyne *et al.*, 2007; Patrick *et al.*, 2007; Wijeratne *et al.*, 2014). Furthermore, because zoos are often located in urban areas, they can educate a large and diverse audience that more closely resembles the general

population than other conservation education places (Mony & Heimlich, 2008; Association of Zoos and Aquariums, 2016). Being able to identify the different sources of information across countries may help also zoos to apply uniform sets of information sources within a group of countries.

#### 4.2 Data analysis

As it has been said, section 4 tries to check whether zoos are able to promote information about endangered species in Europe. In this context, the working hypothesis was to understand whether zoos are used as information centres regarding threatened species information. Therefore, the aim of this study was (1) to identify the sources of information used about endangered species depending on the frequency of zoo visits or the countries, and (2) to evaluate the willingness of people to inform themselves about endangered species in the different groups (European countries or visitors vs. non-visitors).

In the survey shown in previous section (*see Table 1*), the following items from the survey were included in this analysis:

*The willingness of people to inform themselves about endangered species, depending on the frequency of zoo visits or the country* (item 1.3). The willingness to inform about endangered species was assessed with a single yes/no item (item 1.3). The frequency of the zoo visit in the last twelve months was assessed with a single choice item (item 1.6).

*Information sources used depending on the frequency of zoo visits or the country* (item 1.4). The type of source of information used for the respondents was assessed in a multiple answer question naming different sources of information, e.g., zoo, print media, television and internet.

The frequency of the zoo visit in the last twelve months was assessed with a single choice item (item 1.6).

#### 4.3 Results

*4.3.1 Evaluation of people's willingness to inform themselves about endangered species depending on the country.*

European countries differed significantly in their willingness to inform themselves about endangered species ( $n = 1936$ ,  $X^2(6) = 52.1$ ,  $p < 0.001$ ). The subsequent post-hoc Mann-Whitney U test shows differences between some of the countries: Armenia – Bulgaria,  $n = 675$ ,  $z = -4.9$ ,  $p < .001$ ; Armenia – Germany,  $n = 347$ ,  $z = -4.9$ ,  $p < .001$ ; Armenia – Greece,  $n = 400$ ,  $z = -2.8$ ,  $p < .001$ ; Bulgaria – Great Britain,  $n = 861$ ,  $z = -5.6$ ,  $p < .001$ ; Bulgaria – Lithuania,  $n = 895$ ,  $z = -4.3$ ,  $p < .001$ ; Great Britain – Germany,  $n = 533$ ,  $z = -4.3$ ,  $p < .001$ ; Great Britain – Greece,  $n = 586$ ,  $z = -2.9$ ,  $p < .01$ ; Germany – Lithuania,  $n = 567$ ,  $z = -3.3$ ,  $p = .001$ , and Greece – Lithuania,  $n = 620$ ,  $z = -1.9$ ,  $p < .05$ .

Figure 3 shows the percentage of respondents reporting have informed themselves about endangered species, by country. In total, across all countries, 70.0% of the total respondents reported having informed themselves about endangered species. Respondents from Great Britain showed the lowest information rate (60.8%), along with Armenia (60.9%) and Lithuania (66.7%), whereas respondents from Bulgaria showed the highest rate (79.3%), together with Germany (78.7%) and Greece (74.4%). Of the total of respondents, 17.5% assumed they had not informed about endangered species. About not being sure of have informed about endangered species, 12.5% of the respondents were not sure about it, being Germany the less unsure country (2.0%).

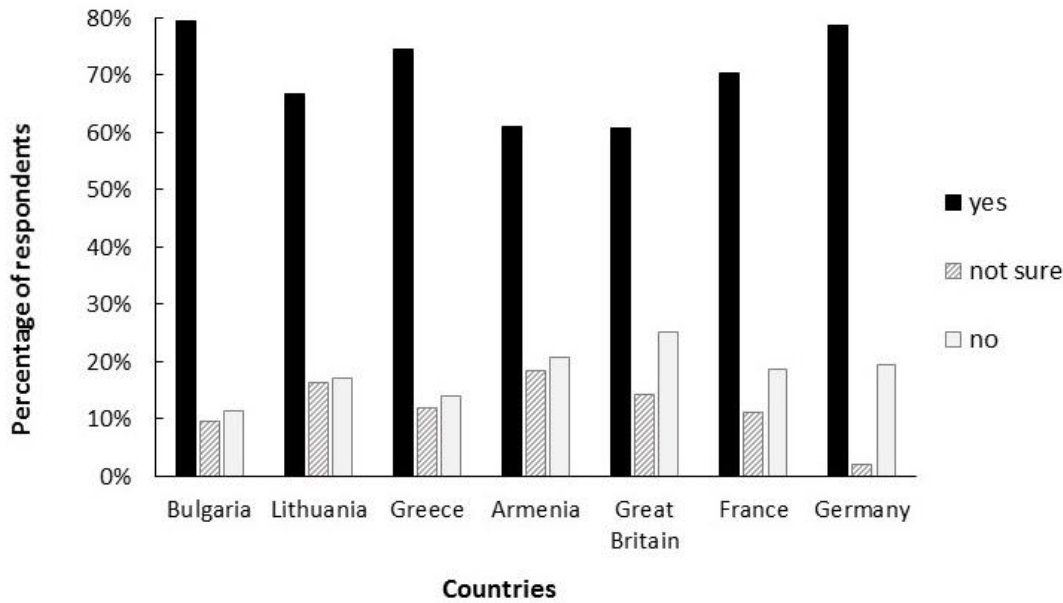


Figure 3 Percentage of respondents from each country answering the item 1.3 “Have you ever informed yourself about endangered animals or species?”

#### 4.3.2 Evaluation of people’s willingness to inform themselves about endangered species depending on the frequency of zoo visit.

I found statistical differences between the three zoo visitor groups concerning self-information about endangered species ( $n = 1920$ ,  $X^2(2) = 62.9$ ,  $p < 0.001$ , Figure 4).

The post-hoc Mann-Whitney U test showed differences between non- and occasional zoo visitors ( $n = 1407$ ,  $z = -4.8$ ,  $p < .001$ ), non- and regular zoo visitors ( $n = 961$ ,  $z = -7.8$ ,  $p < .001$ ), and occasional and regular zoo visitors ( $n = 1472$ ,  $z = -4.4$ ,  $p < .001$ ).

Figure 4 shows the percentage of respondents reporting have informed themselves about endangered species, by the frequency of the zoo visit. In total, 70.1% of the respondents reported having informed themselves about endangered species. Regular zoo-visitors showed the highest rates of self-information (81.3%), while occasional visitors and non-visitors showed lower self-information rates (70.0% and 57.4%, respectively). On the other hand, a 17.4% of the participants did not inform about endangered species at all. Lastly, only a 12.5% of the respondents were not sure about this question.

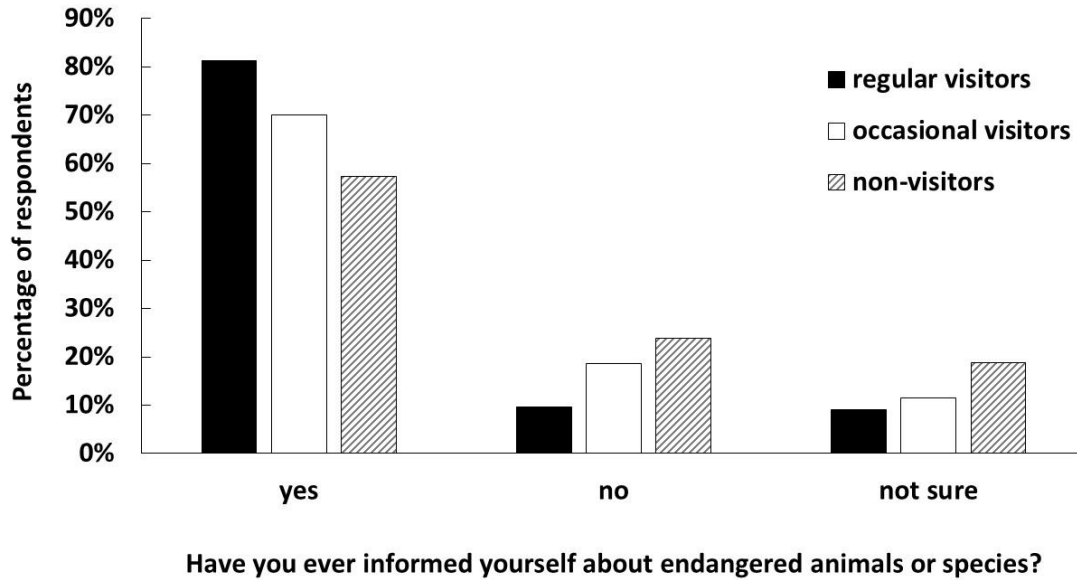


Figure 4 Percentage of respondents depending on the zoo visit frequency, answering the item 1.3 “Have you ever informed yourself about endangered animals or species?”

#### 4.3.3 Information sources used depending on the frequency of zoo visits or the country

Related to the countries, significant differences are observed in media sources (Table 2, and Figure 5). The Kruskal-Wallis test showed differences between countries related to the sources ( $n = 2017$ ) *Print media* ( $X^2(6) = 61.2, p < 0.001$ ), *Television* ( $X^2(6) = 62.3, p < 0.001$ ), *Internet* ( $X^2(6) = 102.6, p < 0.001$ ), and *others* ( $X^2(6) = 23.1, p = 0.001$ ). No differences were found between countries regarding the use of *zoo* as information source. The subsequent Mann-Whitney U test showed the differences between countries (Tables I – IV; see Appendix I).

	Zoo	Print media	Television	Internet
<b>UK</b>	35.8%	31.6%	44.9%	36.2%
<b>DE</b>	33.1%	44.2%	55.8%	42.2%
<b>FR</b>	39.8%	32.4%	27.8%	35.2%
<b>AR</b>	28.8%	22.7%	41.9%	46.0%
<b>LT</b>	31.6%	41.9%	50.1%	57.8%
<b>BG</b>	31.0%	49.3%	61.8%	61.0%
<b>GR</b>	35.2%	34.3%	46.0%	66.7%

Table 2 Percentage (%) of respondents from each country reporting the different sources of information to inform themselves about endangered species. UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece.



In France, digital media are used less frequently than in the other countries, whereas the zoo is more often utilised to inform about endangered species. Print media are popular in Bulgaria, Germany, and in Lithuania. Respondents from Greece, Bulgaria and Lithuania are more likely to use Internet as information source. Television, on the contrary, is more popular in Bulgaria, Germany, and in Lithuania. Lastly, the zoo is used equally frequently from respondents from all the countries.

Figure 5 shows also the percentage of respondents in each zoo visitor group and from each country using the different media sources of information about endangered species. There were significant differences in some media sources between the zoo visitor groups ( $n = 2000$ , *Internet*,  $X^2(2) = 43.1$ ,  $p < 0.001$ ; *Television*,  $X^2(2) = 8.2$ ,  $p \leq 0.01$ ; *Print media*,  $X^2(2) = 21.2$ ,  $p < 0.001$ ; *Zoo*,  $X^2(2) = 151.5$ ,  $p < 0.001$ , and *other media*,  $X^2(2) = 16.4$ ,  $p < 0.001$ ) (see Table V in Appendix I for results of post-hoc Mann-Whitney U Tests).

In total, across all countries, 33.0% of the total respondents reported used the zoo as a source of information. From the respondents, 13.5% of the non-visitors claimed to use the zoo as a source of information, although they were non-visitors (therefore, I have removed this group from the final figure), whereas 32.7% of the occasional visitors used the zoo as a source, and 50.2% of the regular visitors did so as well. Differences between groups are detailed analysed; from the occasional zoo visitors, 32.7% of respondents reported used the zoo as a source of information. Respondents from France showed the highest rate (> 40.0%), whereas respondents from Lithuania showed the lowest zoo information rate (30.0%). From the regular zoo visitors, 50.2% of total respondents reported used the zoo as a source of information. Regular visitors from Greece reported the highest rate (61.5%), while regular visitors from Armenia reported the lowest rate (30.6%).

Concerning to the use of Internet, 39.1% of the non-visitors argued to use Internet as source of information. Non-visitors from Greece showed the highest rate of Internet use (56.9%),

while non-visitors from Great Britain showed the lowest rate (13.8%). On the other hand, 53.7% of the occasional respondents reported the use of Internet as information source. Occasional respondents from Greece showed again the highest rate (72.5%), whereas occasional visitors from Great Britain showed yet again the lowest rate (34.3%). 59.3% of the regular visitors reported the use of Internet. Greece and France reported the highest and lowest rate respectively (70.8%, 29.4% correspondingly).

The use of Print media is different across the different groups and the countries. Lowest rate is seen in non-visitors from Great Britain (14.9%), while the highest rate is seen in regular visitors from Lithuania (56.6%).

Concerning the use of Television, all the respondents groups reported using it (> 44.0%). Lowest rate is seen in non-visitors from France (16.0%), whereas the highest rate is seen in occasional visitors from Bulgaria (63.5%).

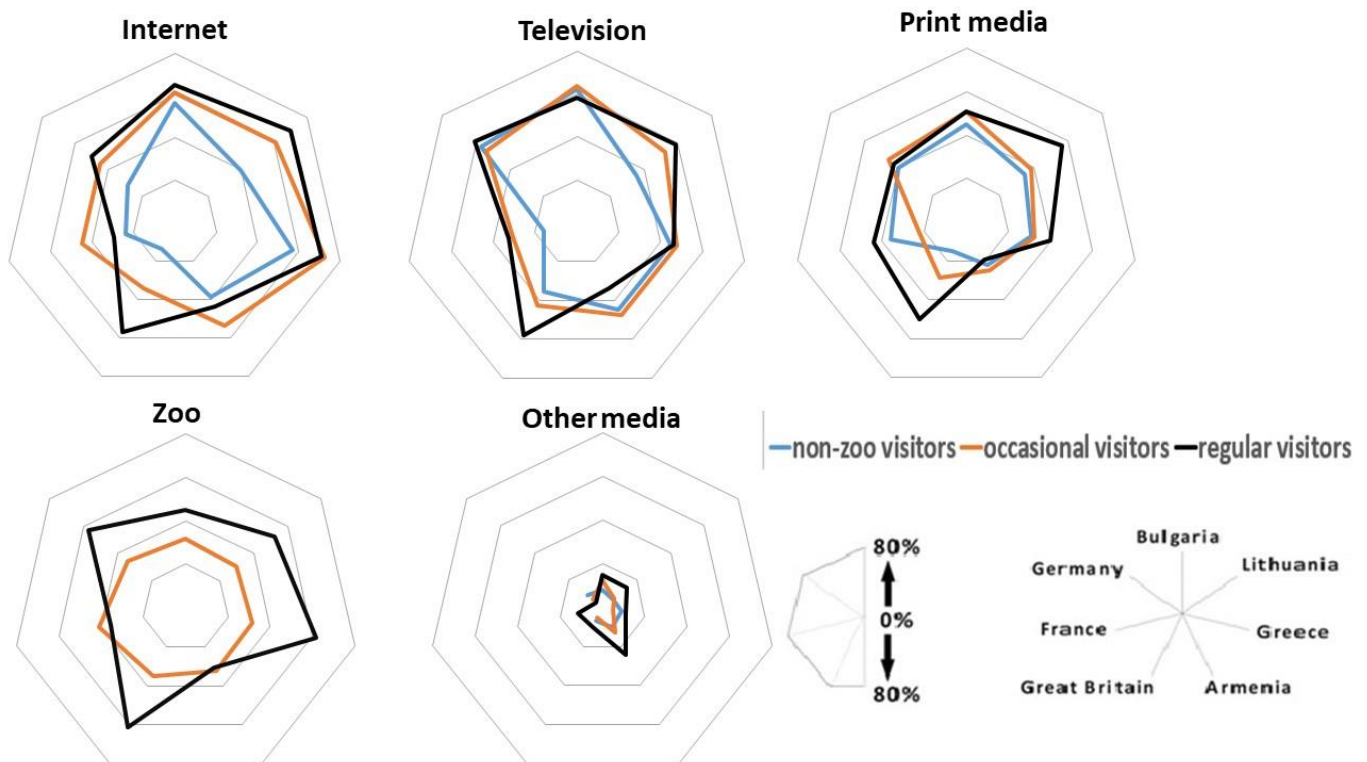


Figure 5 Percentage of respondents reporting the source of information used to be up-to-date about endangered species, by the frequency of the zoo visit and around the different European countries, (respondents could select more than one option).

# 5 Interests, feelings, connections, and attitudes of zoo visitors and non-zoo visitors towards animals

The purpose of this chapter was to understand which interests, feelings, connections and attitudes are within zoo - and non-zoo visitors towards animals around Europe.

## 5.1 Background

As the harmful consequences of environmentally destructive human behaviour have become more evident, people worldwide are expressing increased awareness and concern for environmental issues (Arnocky, Stroink & DeCicco, 2007). However, humans also tend to differ greatly in their level of interest or concern for the environment and biodiversity. Individual behaviour towards wildlife is usually driven by specific attitudes and these attitudes are directed by wildlife value orientations, which are ideologically and cultural shaped beliefs that orient and provide personal meaning to one's more basic values in relation to wildlife (Teel & Manfredi, 2010). Therefore, the connections between humans and animals include the study of human attitudes towards animals; and it is an extremely complex issue, involving a multitude of evolutionary, psychological, and cultural aspects (Serpell, 2004). Attitudes are defined as a feeling or opinion about a particular entity that is expressed by evaluating it with some degree of favour or disfavour, as well as a manner of thinking, feeling, or behaving that reflects this disposition. Feelings are an aspect of attitudes; this may be a feeling connected to a basic emotion (happiness, sadness, anger, etc.), or it may be a non-basic feeling, for example, a particular mixture of anger and fear, that is culturally acquired and applies to a particular context only. Feelings are often directed towards a situation, event, object, animal or person, which is seen as the immediate external cause of the feeling (Jacobs, 2009). In relation to this

topic, there is little research about how zoo- or non-zoo visitors, respond emotionally to the animals they experience or they imagine. That may be the reason why attitudes can also be crucial in the world of zoos, because through them, zoos can change the actions of their visitors. Through the display of wild animals, the modern zoo aims to foster meaningful changes in people's conservation attitudes and actions (Marseille *et al.*, 2012), promoting nature conservation and striving to educate their visitors about animals and nature conservation (Ojalampi & Nygren, 2018).

## 5.2 Data analysis

As it has been said, section 5 tries to understand the interests, feelings, connections, and attitudes in zoo visitors and non-zoo visitors towards animals around Europe. In this context, the working hypothesis are whether animals - zoo and wild - elicit positive feelings more frequently in zoo visitors than in non-visitors; and whether non-zoo visitors tend to think in a negative way about the role of zoos. Therefore, the aim of this study was to explore what kind of (1) interest, (2) feelings and (3) connections present the zoo and non- zoo visitors towards animals.

The scale items used in this question were checked for reliability using Cronbach's alpha. In this study, the subscales ranged 0.80, indicating a high degree of reliability. The following feeling – emotion items were included in the analysis: 1.11, 1.12, 1.13, 1.15, 1.16, 1.17, 1.18, 1.25, 1.26, 1.28, and 1.29.

*Interest in animals.* Interest in animals was assessed with items 1.11, 1.12 and 1.13. Participants rate their interest with statements on a five-point Likert-type scale (non-zoo visitors  $\alpha = .70$ , occasional zoo visitors  $\alpha = .72$ , regular zoo visitors  $\alpha = .72$ ).

*Feelings.* Two items each assessed feelings towards zoo - (items 1.25 and 1.26) and wild animals (items 1.28 and 1.29; scale: tense/relaxed and sad/happy); participants rate their

feelings with statements sets on a five-point Likert-type scale (non-zoo visitors  $\alpha = .62$ , occasional zoo visitors  $\alpha = .53$ , regular zoo visitors  $\alpha = .59$ ).

*Connection with animals and protection of them.* One item each examined if the respondents feel a special connection with animals (item 1.15), if they would like to care for animals (item 1.16), if they would like to do something to help protect species in the wild (item 1.17), and if zoos are obligated to help protect species (item 1.18). These items were on a five-point Likert-type scale (non-zoo visitors  $\alpha = .70$ , occasional zoo visitors  $\alpha = .72$ , regular zoo visitors  $\alpha = .71$ ). A Pearson product-moment correlation was run to determine the relationship between the items. Cronbach's alpha for the ten items were .78, .76 and .77, for each respondent group respectively.

A Kruskal-Wallis test and post hoc Mann-Whitney U test were used to test for differences between the visitor groups within each item.

### 5.3 Results

#### 5.3.1 Interest in animals depending on the zoo visit frequency

The three respondent groups differed significantly in their interest towards domestic ( $n = 1983$ ,  $X^2(2) = 46.2$ ,  $p < 0.001$ ), zoo ( $n = 1989$ ,  $X^2(2) = 165.8$ ,  $p < 0.001$ ) and wild animals ( $n = 1989$ ,  $X^2(2) = 100.4$ ,  $p < 0.001$ ). Pairwise statistical differences between the groups are shown in Table VI (*see Appendix I*).

Interest in all three animal groups increased with the frequency of zoo visits. However, it is striking that more than 10% of respondents are not interested in animals, no matter whether they are domestic, wild or zoo animals. Nevertheless, that is especially true for the non-zoo visitors group. Non-zoo visitors are equally uninterested in domestic and zoo animals (11.5%), while the uninterested rate is lower for the wild animals (7.4%). For the occasional zoo visitors, the lowest uninterested rate is seen in the zoo animals (3.0%), while the wild animals' rate is

higher (3.7%), and domestic animals' rate is the highest (4.9%). Finally, regular zoo visitors show the lowest uninterested rate in zoo animals (1.9%), while wild (3.2%) and domestic animals' (4.7%) rate are higher.

On the other part of the table, concerning the *very interested* rates, regular zoo visitors reported the highest interest percentage in animals. Regular zoo visitors reported the highest interest rate in wild animals (67.5%) along with zoo animals (61.4%), whereas they showed a slightly lower interest rate in domestic animals (55.2%). As far as occasional visitors concern, the rate are different. They showed more interest in domestic animals (47.0%), along with wild animals (45.1%), whereas their lowest rate was found in zoo animals (37.9%). Lastly, non-zoo visitors showed similar interest in domestic and wild animals (38.0% and 38.3% respectively) and lower interested rate in zoo animals (27.1%) (Table 3).

<b><i>1.11 Are you interested in domestic animals</i></b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Non-zoo visitors</b>	53 (11.5%)	31 (6.7%)	106 (23.0%)	96 (20.8%)	175 (38.0%)
<b>Occasional zoo visitors</b>	49 (4.9%)	56 (5.7%)	180 (18.2%)	240 (24.2%)	466 (47.0%)
<b>Regular zoo visitors</b>	25 (4.7%)	20 (3.8%)	69 (13.0%)	124 (23.4%)	293 (55.2%)
<b><i>1.12 Are you interested in zoo animals</i></b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Non-zoo visitors</b>	53 (11.5%)	29 (6.3%)	122 (26.5%)	132 (28.6%)	125 (27.1%)
<b>Occasional zoo visitors</b>	30 (3.0%)	47 (4.7%)	201 (20.3%)	338 (34.1%)	376 (37.9%)
<b>Regular zoo visitors</b>	10 (1.9%)	9 (1.7%)	53 (9.9%)	135 (25.2%)	329 (61.4%)
<b><i>1.13 Are you interested in wild animals</i></b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Non-zoo visitors</b>	34 (7.4%)	28 (6.1%)	91 (19.7%)	132 (28.6%)	177 (38.3%)
<b>Occasional zoo visitors</b>	37 (3.7%)	57 (5.8%)	158 (15.9%)	292 (29.5%)	447 (45.1%)
<b>Regular zoo visitors</b>	17 (3.2%)	11 (2.1%)	46 (8.6%)	100 (18.7%)	362 (67.5%)

Table 3 Interest in zoo and wild animals among the respondents groups, that is, non- zoo visitors, occasional visitors and regular visitors (n = 1989). The numbers 1 (uninterested) to 5(very interested) correspond to the Likert type scale items 1.12 and 1.13.

5.3.2 *Animals as triggers of feelings depending on the zoo visit frequency*

Since domestic animals showed a similar tendency to zoo animals, results are therefore focused on zoo and wild animals. In both animal groups and pairs of feelings, the zoo visitor groups differed significantly in the valence of feelings animals trigger (zoo animals sad/happy,  $n = 1925$ ,  $X^2(2) = 26.4$ ,  $p < 0.001$ , zoo tense/relax,  $n = 1926$ ,  $X^2(2) = 46.2$ ,  $p < 0.001$ , wild animals sad/happy,  $n = 1932$ ,  $X^2(2) = 27.5$ ,  $p < 0.001$ , and wild animals tense/relax,  $n = 1936$ ,  $X^2(2) = 13.8$ ,  $p < 0.001$ ). Pairwise statistical differences are presented in Table VII in *Appendix I*.

The degree to which zoo animals elicit positive feelings (happy, relaxed) increased with the frequency of zoo visits (Table 4). The percentage of respondents reporting positive feelings was higher in regular zoo visitors (happy 40.3%, relax 42.7%) than in occasional (happy 32.5%, relax 35.5%) and non-zoo visitors (happy 27.5%, relax 26.2%). As expected, there is a reverse tendency regarding negative feelings with regular zoo visitors reporting sadness and tension less frequently than the other two visitor groups.

<i>1.25 Animals in zoos make me feel tense/relax</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Non-zoo visitors</b>	36 (8.0%)	48 (10.7%)	160 (35.6%)	88 (19.6%)	118 (26.2%)
<b>Occasional zoo visitors</b>	46 (4.8%)	88 (9.2%)	297 (30.9%)	189 (19.7%)	341 (35.5%)
<b>Regular zoo visitors</b>	25 (4.9%)	22 (4.3%)	122 (23.7%)	126 (24.5%)	220 (42.7%)
<i>1.26 Animals in zoos make me feel sad/happy</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Non-zoo visitors</b>	55 (12.2%)	50 (11.1%)	146 (32.4%)	76 (16.9%)	124 (27.5%)
<b>Occasional zoo visitors</b>	95 (9.9%)	102 (10.6%)	279 (29.0%)	174 (18.1%)	313 (32.5%)
<b>Regular zoo visitors</b>	32 (6.3%)	50 (9.8%)	120 (23.5%)	103 (20.2%)	206 (40.3%)

*Table 4* Number and percentage of respondents reporting how animals in zoos make them feel: tense/relax ( $n = 1926$ ); sad/happy ( $n = 1925$ ), among the three respondent groups, visitors and non- zoo visitors. The numbers 1 to 5 correspond to the Likert type scale items 1.25 and 1.26.

Regarding wild animals, the percentage of regular zoo visitors associating wild animals with happiness is higher (69.8%) than the percentage of occasional visitors (58.3%) and of non-visitors (56.2%) (Table 5). These regular visitors were also more likely to respond that they were relaxed (52.9%) than the other two groups (43.7% and 43.8%, occasional visitors and non-visitors, respectively). Regarding negative feelings, the results are more similar among the groups. However, what is striking about both zoo and wild animals' data is that a high percentage of non-visitors also have positive feelings (zoo animals *relax* 26.2%, *happy* 27.5%, wild animals *relax* 43.8%, *happy* 56.2%) or a neutral attitude (zoo animals *relax* 35.6%, *happy* 32.4%, wild animals *relax* 26.7%, *happy* 20.7%). Finally, only a small percentage of the test persons had negative feelings (zoo animals < 13.0%, wild animals < 7.0%)

<i>1.28 Animals in the wild make me feel tense/relax</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Non-zoo visitors</b>	28 (6.1%)	34 (7.4%)	122 (26.7%)	73 (16.0%)	200 (43.8%)
<b>Occasional zoo visitors</b>	58 (6.0%)	62 (6.4%)	231 (24.0%)	191 (19.8%)	421 (43.7%)
<b>Regular zoo visitors</b>	33 (6.4%)	19 (3.7%)	99 (19.2%)	92 (17.8%)	273 (52.9%)
<i>1.29 Animals in the wild make me feel sad/happy</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Non-zoo visitors</b>	8 (1.8%)	10 (2.2%)	94 (20.7%)	87 (19.2%)	255 (56.2%)
<b>Occasional zoo visitors</b>	19 (2.0%)	30 (3.1%)	164 (17.0%)	189 (19.6%)	563 (58.3%)
<b>Regular zoo visitors</b>	9 (1.8%)	4 (0.8%)	55 (10.7%)	87 (17.0%)	358 (69.8%)

Table 5 Number and percentage of respondents reporting how animals in the wild make them feel: tense/relax (n = 1936); sad/happy (n = 1932), among the three respondent groups, visitors and non- zoo visitors. The numbers 1 to 5 correspond to the Likert type scale items 1.28 and 1.29.

### 5.3.3 Connecting, caring for and protecting animals

The zoo visitor groups differed significantly regarding to feel a sense of connection with animals (n = 1982,  $X^2(2) = 45.9$ ,  $p < 0.001$ ), the wish to take care for animals (n = 1973,  $X^2(2) = 81.9$ ,  $p < 0.001$ ), the wish to do something to help protect species in the wild (n = 1969,



$X^2(2) = 55.5, p < 0.001$ ), and in the opinion that zoos have an obligation to help protect species ( $n = 1978, X^2(2) = 30.4, p < 0.001$ ).

Table 6 includes the results of pairwise Mann-Whitney U Test, and shows descriptive results regarding those items. It can be seen, that in general, the higher the zoo visit frequency was, the higher the respondents answered on the Likert scale items. In any case, each item presented a mean  $> 3.5$ . With regard to the feeling of connection with animals, mean ranged from 3.56 in the case of non-zoo visitors to 4.11 for regular zoo visitors. Animal care also varied according to the frequency of the zoo visit, from 3.52 for non-visitors to 4.27 for the regular visitors. The desire to do something to help protect species in the wild must have been more attractive, since values ranged from higher numbers; non-zoo visitors mean was 3.89 to 4.41 for regular visitors. Finally, it is surprising that respondents clearly showed a high mean rate when they stated that zoos have an obligation to help protect species. Each group of respondent showed a mean  $> 4.1$ .

<i>1.15 I feel a sense of connection with animals</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>K-W</i>	<i>M-W</i>
<b>Non-zoo visitors</b>	459	3.56	1.36	$X^2(2) = 45.9$	
<b>Occasional zoo visitors</b>	989	3.91	1.2	$p < 0.001^{***}$	$z = -4.5, p < 0.001^{***}$
<b>Regular zoo visitors</b>	534	4.11	1.16		$z = -6.6, p < 0.001^{***}$
<i>1.16 I would like to take care of animals</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>K-W</i>	<i>M-W</i>
<b>Non-zoo visitors</b>	457	3.52	1.43	$X^2(2) = 81.9$	
<b>Occasional zoo visitors</b>	988	3.86	1.27	$p < 0.001^{***}$	$z = -4.1, p < 0.001^{***}$
<b>Regular zoo visitors</b>	528	4.27	1.1		$z = -8.7, p < 0.001^{***}$
<i>1.17 I would like to do something to help protect species in the wild</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>K-W</i>	<i>M-W</i>
<b>Non-zoo visitors</b>	454	3.89	1.22	$X^2(2) = 55.5$	
<b>Occasional zoo visitors</b>	983	4.09	1.13	$p < 0.001^{***}$	$z = -2.9, p = 0.004^{**}$
<b>Regular zoo visitors</b>	532	4.41	0.93		$z = -7.2, p < 0.001^{***}$
<i>1.18 I feel zoos have an obligation to help protect species</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>K-W</i>	<i>M-W</i>
<b>Non-zoo visitors</b>	460	4.15	1.2	$X^2(2) = 30.4$	
<b>Occasional zoo visitors</b>	986	4.23	1.04	$p < 0.001^{***}$	n.s
<b>Regular zoo visitors</b>	532	4.5	0.89		$z = -4.6, p < 0.001^{***}$

Table 6 Mean (M) and standard deviation (SD) among the attitudinal items, by the frequency of the zoo visit. K-W: results of Kruskal-Wallis test ( $X^2$ ), M-W: results of Mann-Whitney U test, *non-zoo visitors* as control group for the differences between the other visitors groups. n.s refers to no significant. \* $p \leq .05$ , \*\* $p \leq .01$ , \*\*\* $p \leq .001$ .

There was a weak, but significant, correlation between the frequency of zoo visits and these four different items ( $n = 2000$ ,  $r < 0.20$  for each item,  $p < 0.001$ ).

Feeling a sense of connection with animals and the wish to take care of animals were strongly correlated ( $n = 1983$ ,  $r = 0.6$ ,  $p < 0.001$ ). The wish to take care of animals and the wish to help protect species in the wild were also strongly correlated ( $n = 1967$ ,  $r = 0.53$ ,  $p < 0.001$ ), as well as feeling a sense of connection with animals and wish to help protect species in the wild ( $n = 1978$ ,  $r = 0.5$ ,  $p < 0.001$ ). Nevertheless, the wish to help protect species in the wild and the opinion that zoos have an obligation to help protect species were low correlated ( $n = 1973$ ,  $r = 0.3$ ,  $p < 0.001$ ). Finally, feeling a sense of connection with animals and wish to take care of animals were both weakly correlated with the opinion that zoos have an obligation to help protect species ( $n = 1984$ ,  $r = 0.3$ ,  $p < 0.001$ , and  $n = 1973$ ,  $r = 0.2$ ,  $p < 0.001$ , respectively).

Table 7 shows the global overview of the correlation relationship between the items.

		<i>1.15 I feel a sense of connection with animals</i>	<i>1.16 I would like to take care of animals</i>	<i>1.17 I would like to do something to help protect species in the wild</i>	<i>1.18 I feel zoos have an obligation to help protect species</i>
<i>1.15 I feel a sense of connection with animals</i>	Pearson N	1 1998	.60** 1983	.50** 1978	.30** 1984
<i>1.16 I would like to take care of animals</i>	Pearson N		1 1988	.53** 1967	.20** 1973
<i>1.17 I would like to do something to help protect species in the wild</i>	Pearson N			1 1985	.30** 1970
<i>1.18 I feel zoos have an obligation to help protect species</i>	Pearson N				1 1994

\*\* p ≤ .01

Table 7 shows the correlation between the different attitudinal items.

## 6 Conservation awareness, interest in animals and attitudes towards zoos.

The purpose of this chapter was to measure quantitatively the conservation awareness, interest in animals, and attitudes towards zoos among the respondents. So as to achieve, a principal component analysis (PCA), and a multiple linear regression model were performance.

### 6.1 Background

Since the 1980s, public and political concern in Western industrial societies over environmental issues has increased considerably (Gelissen, 2007). Nowadays, the confirmation towards a significant global decline in biodiversity is increasingly pointing. Conservation education plays an important role in working against this loss of biodiversity. Addressing conservation by zoos could incorporate proven social-science techniques to facilitate the uptake of pro-environmental behaviours that reduce human impacts on biodiversity activities.

This part of the study focused on identifying differences in conservation attitudes, self-motivations to visit zoos and beliefs towards these institutions, in seven European countries. I used a principal component analysis (PCA) to identify components reflecting (a) conservation awareness, (b) interest in animal species and (c) attitudes towards the role of zoos. These components may act as a useful tool in order to record and understand conservation and zoo-related behaviours.

### 6.2 Data analysis

As it has been said, section 6 will measure quantitatively the conservation awareness, interest in animals, and attitudes towards zoos. In this context, the working hypothesis were related to know whether zoo visitors show a higher nature conservation awareness and interest in animals than non-visitors; whether the main purpose for visiting zoos is to be entertained; and to know whether people think if the most important task of zoos are to reintroduce species into the wild and to protect species. Therefore, the aim of this study was to explore (1) the amount of conservation awareness, (2) interest in animals and (3) attitudes towards zoos within the respondent groups (European countries and visitors vs. non-visitors).

The following items from the survey were included in this analysis:

*Motivation for attitudes towards animals, nature conservation and zoos, depending on the frequency of zoo visits, or country:* Motivational attitudes towards animals, conservation and zoos were assessed with twelve items measured on a 5-point Likert-type scale (items used for this question are related to conservation - items 1.9, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17, 1.19 -, and zoo-related questions - items 1.18, 1.21, 1.22 -). As internal consistency reliability of all motivational items was found to be high ( $\alpha = .80$ ), all were included in the analysis (Table 8). Additionally, I recorded the demographic background of the respondents including age, sex, country and place of the survey (zoo or city) (items 1.1, 1.2). Finally, I included two items about the importance and task of zoos (items 1.23, 1.24).

<i>Motivational items</i>	<i>N</i>	<i>M</i>	<i>SD</i>
1.15 I feel a sense of connections with animals	1998	3.90	1.24
1.14 I wish I knew more about animals	2001	4.30	1.00
1.16 I would like to take care of animals	1988	3.90	1.30
1.17 I would like to do something to help protect species in the wild	1985	4.12	1.11
1.18 I feel zoos have an obligation to help protect species	1994	4.30	1.04
1.19 The conservation of rare species is more important than economic assets	1979	4.03	1.13
1.21 Animals do not belong in zoos	1987	3.20	1.40
1.22 Zoos are unnecessary nowadays	1974	2.12	1.32
1.9 How important is conservation of species to you	2009	4.41	.92
1.11 Are you interested in domestic animals?	1999	4.00	1.20
1.12 Are you interested in zoo animals?	2005	4.01	1.10
1.13 Are you interested in wild animals?	2006	4.12	1.10

Table 8 Descriptive statistic of the motivational items. N refers to the number of people responding the questions. The mean (M) and the standard deviation (SD). Note that items 1.21 and 1.22 are negative formulated.

*Comparing conservation awareness, interest in animal species and attitude towards zoos between respondent groups.* A PCA with Oblimin rotation was carried out. Initially, the factorability of 12 Likert-scale questionnaire items (Table 8) was examined. Several recognised criteria for the factorability of a correlation were used. Firstly, 12 of the 12 items correlated at least .3 with at least one other item, suggesting reasonable factorability. Secondly, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.86, above the recommended value of 0.6, and Bartlett's test of sphericity was significant ( $X^2(66) = 6974.8, p < 0.001$ ). Finally, the communalities were all above 0.3 (Table 9); further confirming that each item shared some common variance with other items. Given these overall indicators, PCA was conducted with all 12 items. Using PCA I was able to identify three components. The initial eigenvalues showed that the first factor explained 37.1% of the variance, the second factor 12.0%, and a third factor 9.0%. The three factor solution, which explained 58.0% of the total variance, was preferred because of its previous theoretical support, the 'levelling off' of eigenvalues on the screen plot after three factors, and the insufficient number of primary loadings and difficulty of interpreting the fourth factor and subsequent factors. The factor loading matrix after rotation is presented in Table 9.

	Factor 1: Conservation awareness	Factor 2: Interest in animals	Factor 3: Attitude towards zoos	Communality
I would like to do something to help protect species in the wild	<b>.733</b>	.326		.651
How important is conservation of species to you?	<b>.700</b>			.538
The conservation of rare species is more important than economic assets	<b>.668</b>			.479
I wish I knew more about animals	<b>.644</b>	.324		.526
I feel zoos have an obligation to help protect species	<b>.546</b>		-.335	.417
Are you interested in domestic animals?		<b>.807</b>		.653
Are you interested in zoo animals?		<b>.716</b>		.623
I would like to take care of animals	.337	<b>.700</b>		.612
I feel a sense of connection with animals	.435	<b>.602</b>		.557
Are you interested in wild animals?	.413	<b>.601</b>		.532
Animals do not belong in zoos			<b>.800</b>	.697
Zoos are unnecessary nowadays			<b>.776</b>	.668

*Table 9* Components of the principal component analysis (PCA). Factor analysis and communalities based on a principle components analysis with Oblimin rotation for 12 items from the questionnaire (n = 2016). Note that items 1.21 and 1.22 are negative formulated. Results < 0.3 are not described in the table; results between 0.3 and 0.5 are described in the table in order to see the factor tendency, and results > 0.5 are described in the table.

Internal consistency for each of the scales was examined using Cronbach's alpha. The alphas were moderate, 0.67 for "Conservation" (4 items), 0.80 for "Animals interest" (5 items), and 0.50 for "Attitude towards zoos" (2 items). No substantial increases in alpha for any of the scales could have been achieved by eliminating more items.

Thus, these three new components were further used to analyse differences between the countries, and between the frequencies of the zoo visit. A Mann-Whitney U test was conducted to determine statistical differences between both groups, - countries, and frequency of the zoo visit -.

*Zoo tasks and self-motivation to visit zoos.* What people think about zoos and which motivations drive people to visit them was evaluated with a two-multiple answer response set (items 1.23, 1.24). A Kruskal-Wallis test was also used to evaluate the differences between European countries.

*Conservation related model based on the planned behaviour model:* A multiple linear regression was run to predict conservation awareness from interest in animals, attitudes towards zoos and frequency of the zoo visit.

### 6.3 Results

#### *6.3.1 Motivation for attitudes towards animals, nature conservation and zoos, depending on the frequency of zoo visits.*

The results of the analysis of the components of the PCA (*see Table VIII, Appendix I*), attitudes towards animals, conservation and zoos, depending on the frequency of zoo visit, are presented in Figures 6 - 8. Results show the importance of conservation related themes among the three different groups (median > 4.0 Likert score). All zoo visitor groups show a high degree of conservation awareness, with the regular zoo visitors reporting high awareness most frequently (> 80.0% of the respondents within this group with a median  $\geq$  4.0 Likert; Figure 6).



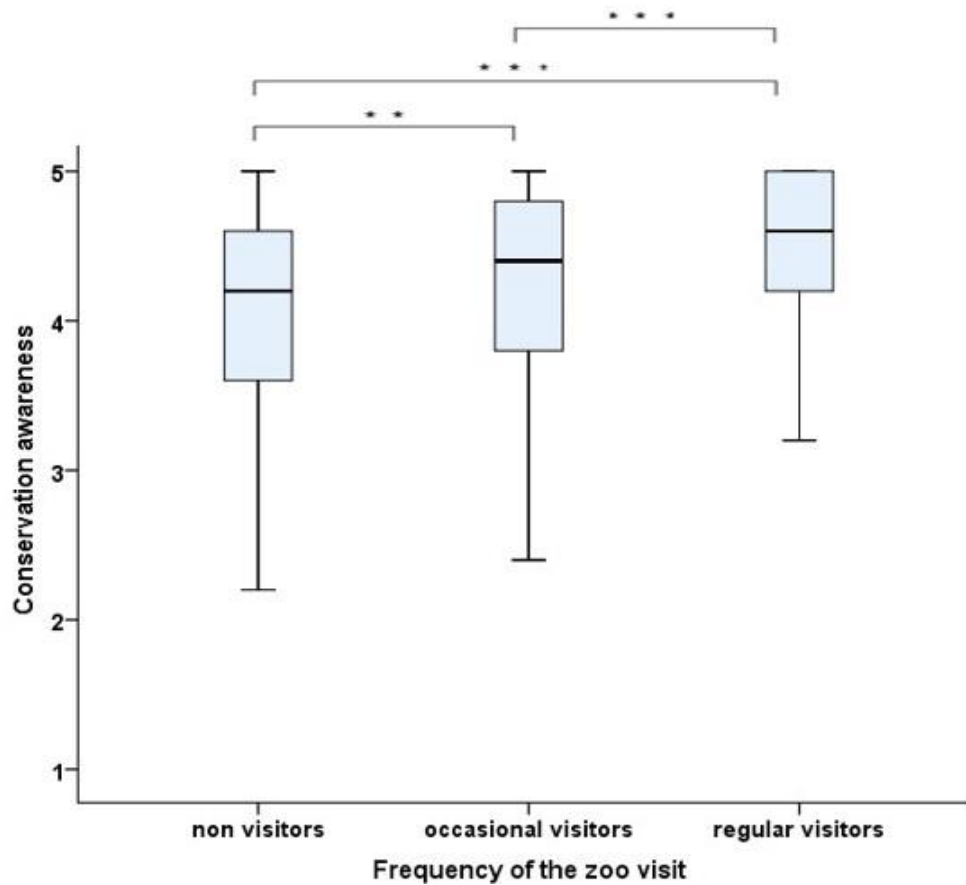


Figure 6 PCA component “conservation awareness”, by the frequency of the zoo visit.

Results show the importance of conservation related themes among the three different groups (> 4.0/5.0 Likert score). Centre lines represent the median, boxes delineate the 25% and 75% quartiles, and whiskers delineate the 5% and 95% quantiles. Outliers and asterisks are not represented. Responses were scored on a 1-5 scale, with a higher number indicating greater agreement. Significances between groups are indicated, \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . Mann-Whitney U test.

All visitors reported a high degree of interest in animals (median > 3.5 Likert score) with regular zoo visitors ranging at the top in this regard (> 75.0% of the respondents within this group with a median  $\geq 4.0$  Likert score; Figure 7).

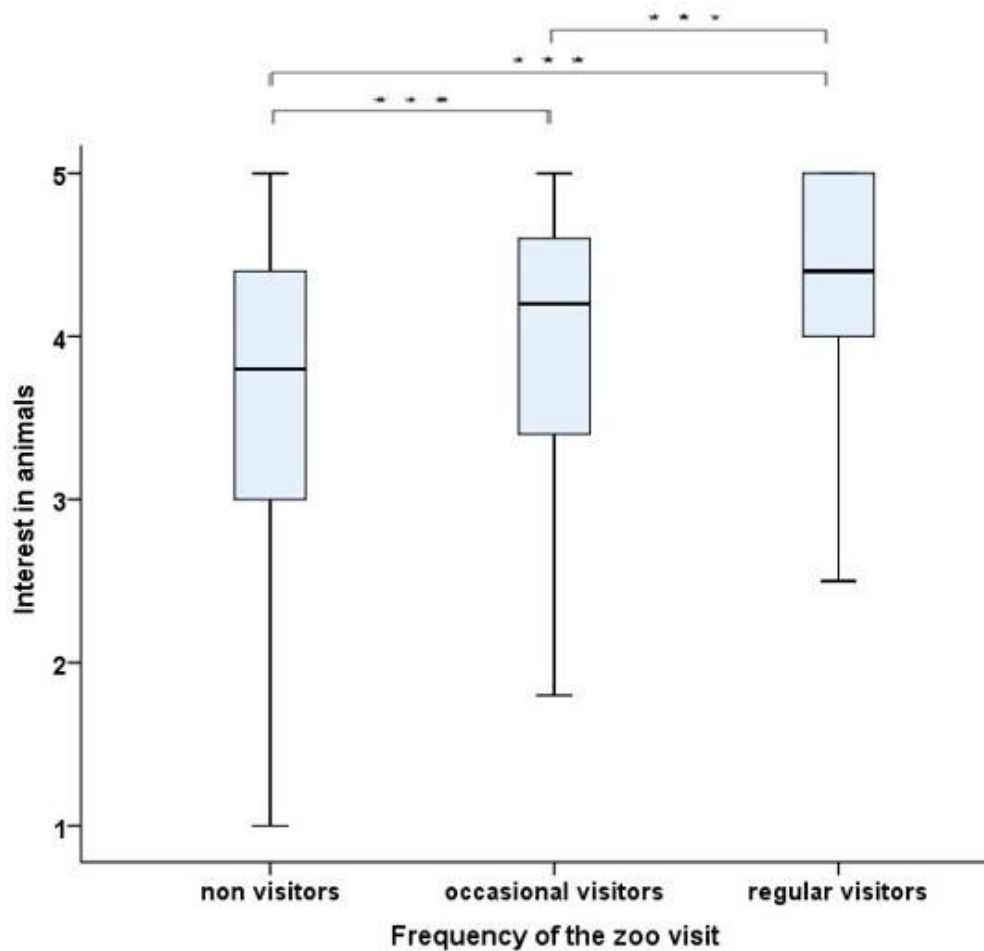


Figure 7 PCA component “interest in animals”, by the frequency of the zoo visit.

The majority of participants reveal a great interest in animals ( $> 3.5/5.0$  Likert score) in each group, especially among the regular zoo visitors. Centre lines represent the median, boxes delineate the 25% and 75% quartiles, and whiskers delineate the 5% and 95% quantiles. Outliers and asterisks are not represented. Responses were scored on a 1-5 scale, with a higher number indicating greater agreement. Significances between groups are indicated, \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . Mann-Whitney U test.

The results in Figure 8 show that most of the respondents have no negative attitudes towards zoos. In the case of non-visitors and occasional visitors, the median is near the neutral range (= 3.0 Likert score), and in the case of regular zoo visitors, the attitude is more positive (i.e. a rejection of the negatively formulated items occurred).

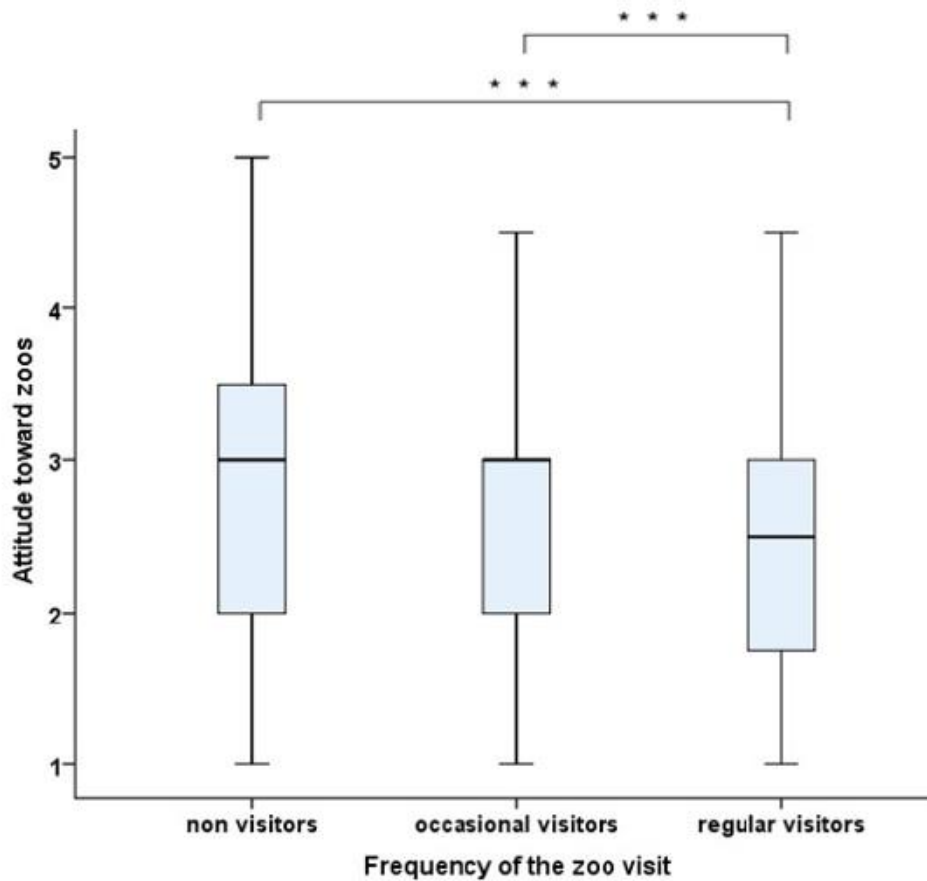


Figure 8 PCA component “attitudes toward zoos”, by the frequency of the zoo visit.

High scores in attitude towards zoos mean a strong disapproval concerning the work and significance of zoos. The weak attitude towards zoos among the respondent groups seem to be low ( $\leq 3.0/5.0$  Likert score). Centre lines represent the median, boxes delineate the 25% and 75% quartiles, and whiskers delineate the 5% and 95% quantiles. Outliers and asterisks are not represented. Responses were scored on a 1-5 scale, with a higher number indicating greater agreement. Significances between groups are indicated, \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . Mann-Whitney U test.

### 6.3.2 Motivation for attitudes towards animals, nature conservation and zoos, depending on the country.

Participants from all the countries revealed a high interest in animals (median  $> 3.8$  Likert score; Table 10), having Bulgaria the highest conservation awareness rate (4.44). The importance of conservation related themes was also very important in all countries (median  $> 4.0$  Likert score; Table 10) with southern and eastern countries expressing greater conservation awareness, i.e., Bulgaria, Greece and Lithuania, than any other country (median  $> 4.4$  Likert score; Table 10).

Lastly, the attitude towards zoos among the European countries is near the neutral range (medians between 2.0 and 3.0 Likert score; Table 10). High median rates would be related to a high zoo opposition, while low median rates would indicate a high zoo support.

Country	Conservation awareness				Interest in animals				Attitudes towards zoos			
	N	M	Me	SD	N	M	Me	SD	N	M	Me	SD
UK	411	3.90	4.00	0.92	412	3.70	3.80	0.97	408	2.40	2.50	1.01
FR	108	4.20	4.20	0.53	108	3.90	4.00	0.70	108	2.40	2.00	0.96
DE	154	4.20	4.20	0.60	154	4.01	4.20	0.73	154	2.50	2.50	1.05
AR	198	4.21	4.20	0.81	198	4.20	4.20	0.94	197	3.3	3.0	1.5
LT	427	4.32	4.40	0.60	427	4.22	4.40	0.74	423	2.50	2.50	1.03
BL	503	4.44	4.60	0.62	503	3.91	4.20	0.92	499	2.82	3.00	1.03
GR	212	4.30	4.40	0.73	212	4.02	4.20	0.90	210	2.70	2.50	0.94

Table 10 Descriptive statistics of PCA components describing the attitudes towards animals, conservation and zoos, by country. Number of respondents (N), mean (M), median (Me) and standard deviation (SD) of PCA components, by country. UK = Great Britain, FR = France, DE = Germany, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece.

### 6.3.3 Zoo tasks and self-motivation to visit zoos, by PCA component.

Figures 9A-C show the percentage of respondents reporting which tasks of zoos are most important depending on their score in the different PCA components.

Regarding the “conservation awareness” component (Figure 9A), the respondents showed two different tendencies. First, the item *to provide entertainment* in groups with a low conservation awareness (< 2.0 Likert score), was considerably higher than in other groups (> 3.0 Likert score) compared to other items. Secondly, all other items (*to teach visitors, to provide naturalistic exhibits, to protect species, to protect individuals, and to reintroduce species into the wild*) were represented in the groups with > 3.0 Likert score in a higher percentage.

However, it is remarkable that the respondents with highest conservation awareness ( $\geq 5$  Likert score) tended to show a decline in the items (to teach visitors, to provide naturalistic exhibits, to protect species, to protect individuals and to reintroduce species into the wild) comparing with the other two high groups (> 3, > 4 Likert score). Moreover, the highest

percentage within the uppermost conservation awareness group was *to reintroduce species into the wild*.

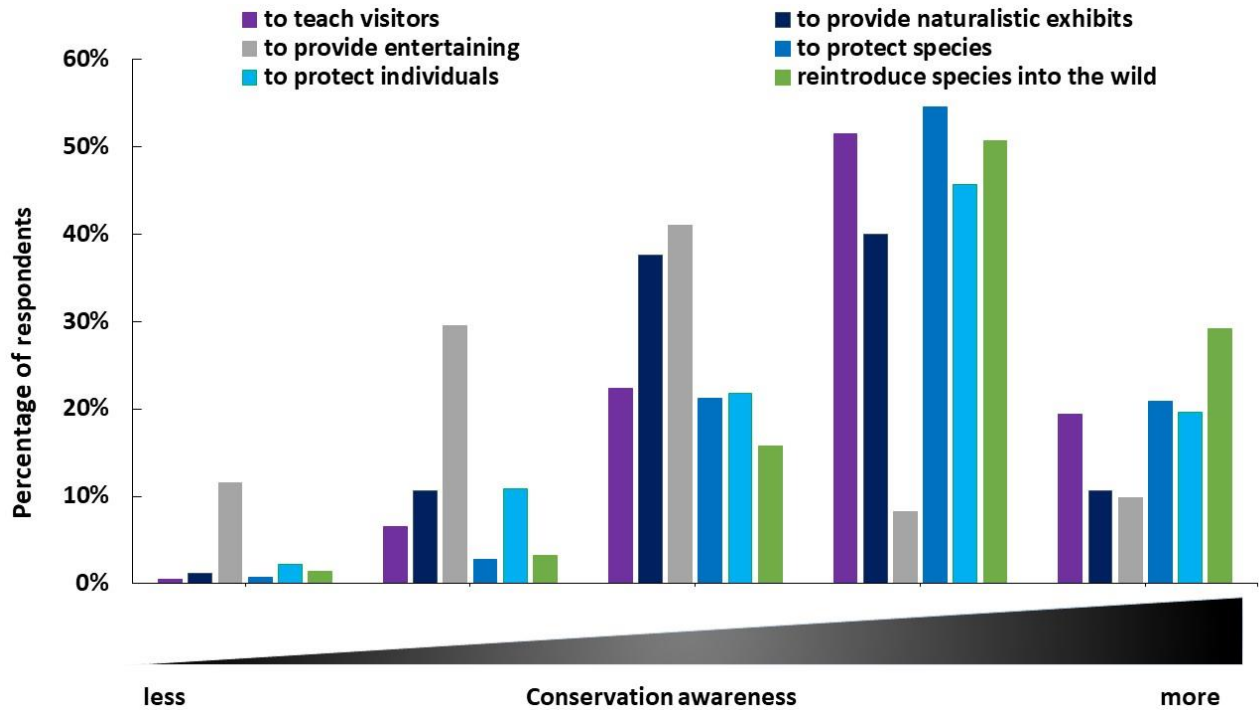


Figure 9A Percentage of respondents reporting which tasks of zoos are most important depending on their score in the PCA component “conservation awareness”. Responses were scored on a 1-5 Likert scale, corresponding the right part of the graphic to a greater conservation awareness. The five different groups correspond to the sum of each PCA group, being 1 (n = 18), 2 (n = 92), 3 (n = 311), 4 (n = 670), 5 (n = 278).

Regarding the PCA component “interest in animals” (Figure 9B), it is interesting to see, how some items increased with the growing interest in animals. That was the case of the items *to protect species* as well as *to reintroduce species into the wild*. That means that animal-oriented people were more likely to underline species-oriented zoo tasks. On the other hand, and following the same tendency reported above, other items decreased within the groups with high interest in animals (> 4.0 Likert score), such as *to provide entertainment*.

Though, after the tendency described above, it is remarkable that the respondents with the highest interest in animals ( $\geq 5$  Likert score) tended to show a decline in all the items comparing

with the other two high groups (> 3, > 4 Likert score). Moreover, the highest percentage within the uppermost interest in animals group was *to reintroduce species into the wild*.

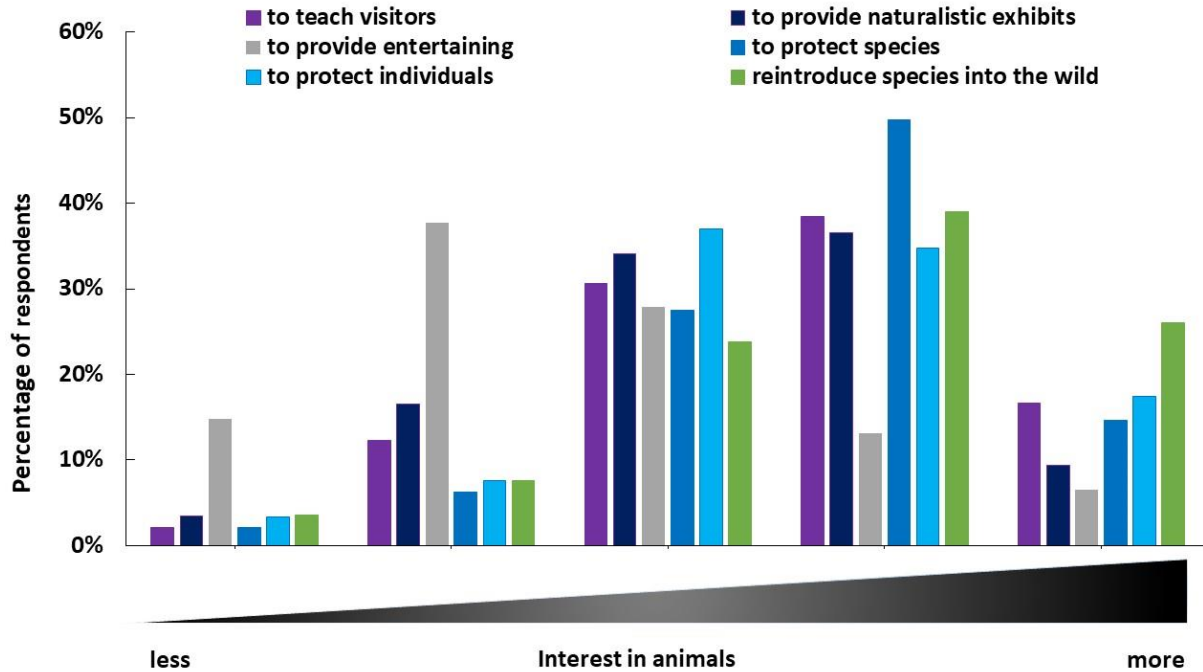


Figure 9B Percentage of respondents reporting which tasks of zoos are most important depending on their score in the PCA component “interest in animals”. Responses were scored on a 1-5 Likert scale, corresponding the right part of the graphic to a greater interest in animals. The five different groups correspond to the sum of each PCA group, being 1 (n = 42), 2 (n = 155), 3 (n = 402), 4 (n = 539), 5 (n = 231).

Regarding the PCA component “attitudes towards zoos” (Figure 9C), it can be seen that, respondents supporting zoos ( $\leq 2.0$  Likert score) emphasised the educational role of zoos, *to teach visitors* and the items *to protect species* and *to provide naturalistic exhibits*. These items, however, are almost imperceptible within the groups with negative attitude towards zoos ( $\geq 4.0$  Likert score). In general, there was a tendency outputting the majority of respondents with a high zoo opposition ( $\geq 4.0$  Likert score) stated that zoos should *reintroduce species into the wild* and *provide entertainment*. Moreover, negative attitudes towards zoos was related as the same way, with lower percentage in each item ( $< 25.0\%$ ).

Midway, respondents that were neutral (3.0 Likert score), though, were more likely to report a wider range of zoo tasks.

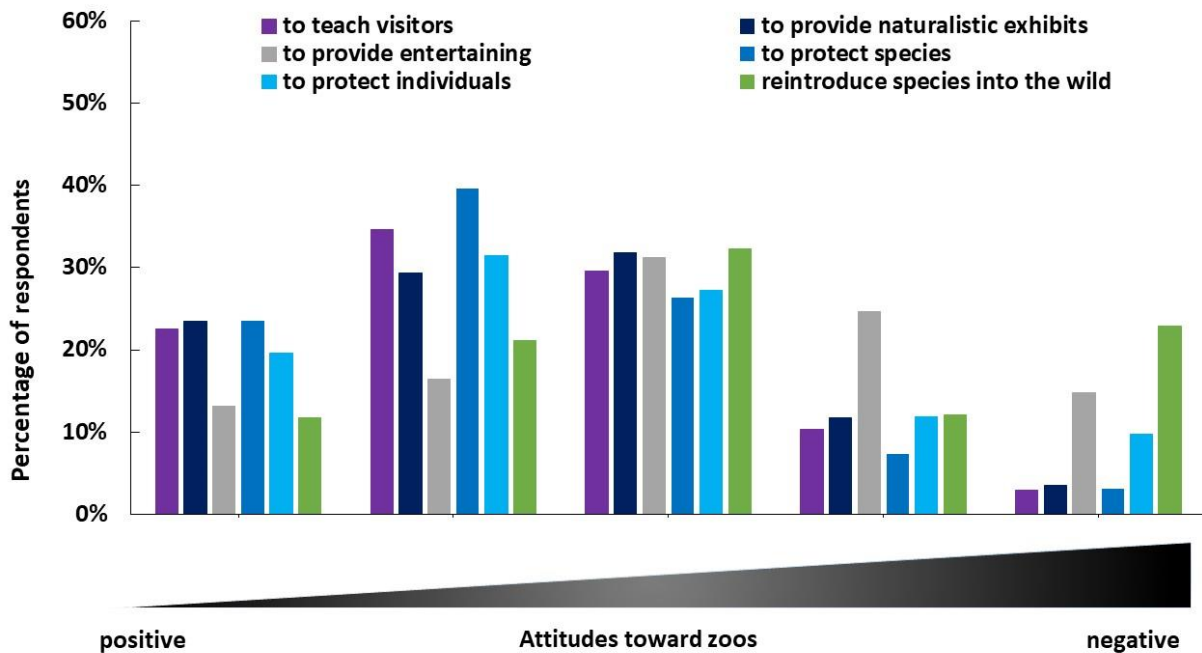


Figure 9C Percentage of respondents reporting which tasks of zoos are most important depending on their score in the PCA component “attitude towards zoos”. Responses were scored on a 1-5 Likert scale, corresponding the right part of the graphic to a higher negative attitude towards zoos. The five different groups correspond to the sum of each PCA group, being 1 (n = 279), 2 (n = 439), 3 (n = 402), 4 (n = 148), 5 (n = 99).

Finally, a Kruskal-Wallis test was conducted to determine whether there were statistical differences between countries regarding motivations to visit zoos. The test was significant for every single motivation, n = 2016, *have an outing with family and friends* ( $X^2(6) = 129.1$ ,  $p < 0.001$ ), *learn about animals* ( $X^2(6) = 69.1$ ,  $p < 0.001$ ), *to be entertained* ( $X^2(6) = 73.8$ ,  $p < 0.001$ ), *to see a particular exhibit* ( $X^2(6) = 255.9$ ,  $p < 0.001$ ), *to help protect species* ( $X^2(6) = 77.1$ ,  $p < 0.001$ ), and *to explore animals* ( $X^2(6) = 178.5$ ,  $p < 0.001$ ). The post-hoc Mann-Whitney U test showed which countries differed (Table IX – Table XIV, Appendix I).

Regarding the motivations to visit zoos (Figure 10), it can be seen that one of the highest item was *learn about animals*. Respondents from all the countries answered > 45.0%. *learn about animals*. The highest percentage was seen in Lithuania (74.9%), while the lowest rate was seen in Armenia (47.0%). Respondents from Greece almost equally answered *to learn about animals* and *to explore animals* (56.1%, 51.1%, respectively). Altogether, it was also

important from respondents for all countries *to have an outing with friends and family*, outlining the socialised role of zoos. This item was especially important for respondents from Bulgaria (60.0%), while respondents from Greece did not emphasised this item so much (23.6%). Although there were some differences between countries, it can be seen the “globalization” around Europe.

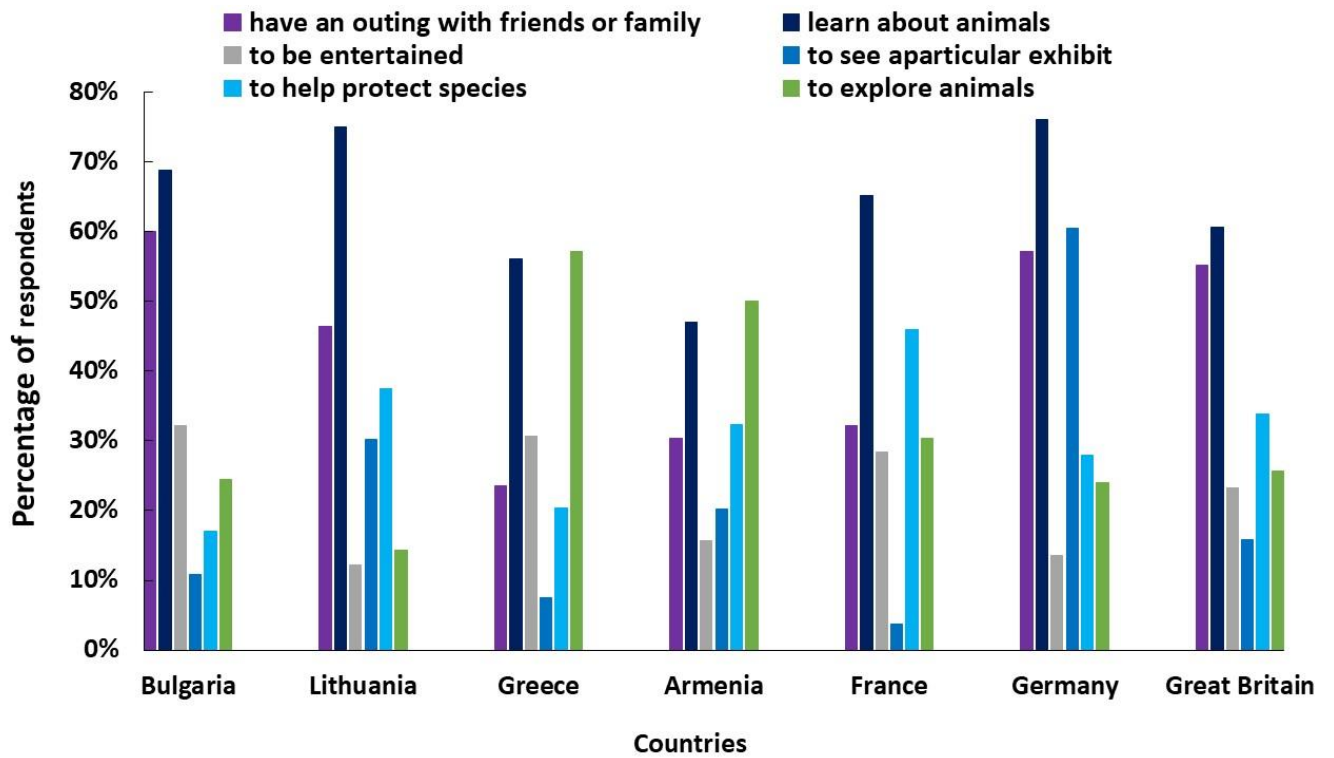


Figure 10 Percentage of self-reported motivations for visiting zoos in the different European countries (respondents could select more than one option).



#### 6.3.4 Conservation related model

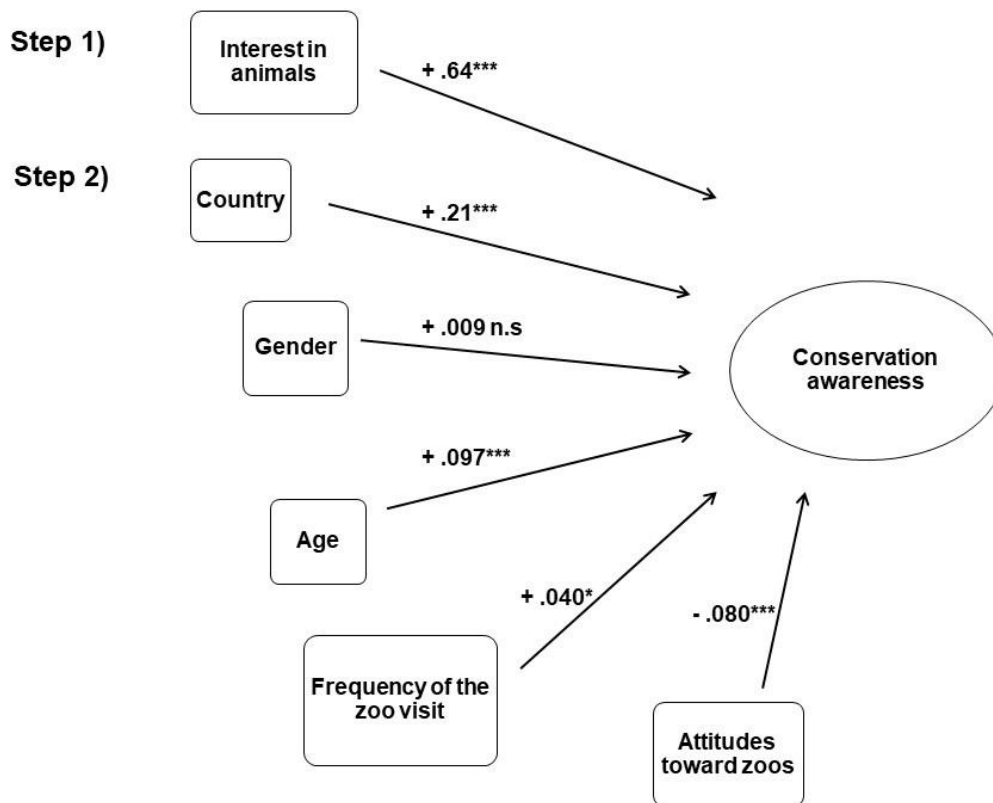
Prior to conducting a hierarchical multiple regression, the relevant assumptions of this statistical analysis were tested. Firstly, a sample size of 1925 with six independent variables to be included was sufficient for the analysis (Tabachnick & Fidell, 2001). The assumption of singularity was met, as the independent variables (*interest in animals*, *country*, *age*, *gender*, *frequency of the zoo visit*, and *attitudes towards zoos*) were not a combination of other independent variables. An examination of correlations revealed that no independent variables were highly correlated. The collinearity statistics were all within accepted limits, the assumption of multicollinearity was deemed to have been met (Coakes, 2005; Hair, Black, Babin, Anderson & Tatham, 1998). An examination of the Mahalanobis distance scores indicated multivariate outliers, extreme univariate outliers were identified in data screening and modified. Residual and scatter plots indicated the assumptions of normality, linearity and homoscedasticity were all satisfied (Hair *et al.*, 1998; Pallant, 2001). The variable *country* was coded in order to fit the model.

<i>Variable</i>	<i>B</i>	<i>SE B</i>	<i>β</i>
<b>Step 1</b>			
Interest in animals	.526	.015	.638***
<b>Step 2</b>			
Interest in animals	.506	.015	.613***
Country	.068	.006	.205***
Age	.047	.009	.097**
Gender	.014	.026	.009
Frequency of the zoo visit	.042	.018	.040*
Attitudes towards zoos	-.054	.011	-.080***

Table 11 Summary of hierarchical multiple regression analysis for variables predicting conservation awareness (n = 1925). Multiple regression analysis for the variables predicting conservation awareness. B = un-standardised beta coefficient, SE B = standard error,  $\beta$  = standardised beta coefficient. \*p ≤ .05, \*\* p ≤ .01, \*\*\*p ≤ .001.

The hierarchical multiple regression (Table 11; Figure 11) was calculated to predict *conservation awareness* based on *interest in animals*, *country*, *age*, *gender*, *frequency of the zoo visit* and *attitudes towards zoos*. The multiple regression revealed that at stage one, *interest*

*in animals* contributed significantly to the regression model, ( $F(1,1897) = 1300.0, p \leq .001$ ) and accounted for 41.0% of the variation in PCA component *conservation awareness*. Introducing the rest of the variables explained an additional 4.0% of variation in *conservation awareness* this change in  $R^2$  was significant,  $F(6,1892) = 262.1, p \leq .001$ . When all six independent variables were included in stage two of the regression model, *gender* was not a significant predictor of *conservation awareness*. The most important predictor of *conservation awareness* was *interest in animals*, which uniquely explained 41.0% of the variation in *conservation awareness*. Together the five independent variables accounted for 45.0% of the variance in *conservation awareness*.



*Figure 11* Final structure of the hierarchical conservation awareness model. Factors influencing the conservation awareness of the respondents. Interest in animals was the most important predictor of the dependent variable, *conservation awareness*, explaining 41.0% of the variation. The other five variables (*attitudes towards zoos*, *frequency of the zoo visit*, *age*, *gender* and *country*) explained 4.0%. Variables are represented in boxes. The numbers refer to the standardised beta coefficient ( $\beta$ ). Mathematical signs, positive (+) and negative (-), refer to the positive or negative contribution to the dependent variable *conservation awareness*. \* $p \leq .05$ , \*\* $p \leq .01$ , \*\*\* $p \leq .001$ . n.s no significant.

# GENERAL DISCUSSION

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## 7. DISCUSSION AND OUTLOOK

### 7.1 Zoos as information sources in the field of conservation biology.

#### 7.1.1 Are zoos used as source of information about endangered species in Europe?

With over 1300 institutions worldwide, and an estimated 140 million visits (Patrick *et al.*, 2007), zoos are uniquely positioned to foster conservation support on a global scale (Penning *et al.*, 2009; Gusset & Dick, 2011). Visiting a zoo can help people understand the importance of wildlife and increase their appreciation of it, especially of threatened species (Wilson & Tisdell, 2005). Based on these principles, an acceptance of zoos as a source of information on species protection and the degree of endangerment of zoo animals would be an important feature in the educational work of zoos. The results of this study showed that a high percentage of participants throughout Europe informed themselves about endangered animal species (*see section 4.3.1*). The detailed analysis regarding the frequency of zoo visits also showed that regular visitors informed themselves more frequently (*see section 4.3.2*; non-zoo visitors, 57.4%, occasional visitors, 70.0% and regular visitors, 81.3%). However, a comparison of media as sources of information reveals that the zoo is not the main source of information. Participants reported print media with the same frequency, and to a higher percentage, television and Internet, as the main sources of information (*see section 4.3.3*). Individuals are increasingly using online media to find information about animals or future scientific developments, such as trends in conservation biology (Brossard & Scheufele, 2013). It is, therefore, of crucial importance for zoos to communicate successes in educational work or conservational issues that are documented with empirical results. Furthermore, these research results should also be disseminated in scientific online communications. The fact-based representation of species protection for different zoo animal species is an important element

from the perspective of zoos to counteract the emotional debate of zoo critics. It should be noted that search engines or social media can, through their orientation and statements, lead to a bias in the presentation of facts and thus significantly influence the knowledge and attitude of the audience (Brossard & Scheufele, 2013; Happer & Philo, 2013). In this respect, it is clear that computers, Internet and social media enable anyone to publish content that is distributed instantly and globally (Hopf, Krief, Mehta, & Matlin, 2019). Information and the way it is presented strongly influence the attitude or motivation of people to deal with a subject (Scheufele & Krause, 2019). Especially in the field of nature and species conservation, a fact-based, differentiated discussion is an important basis for achieving long-term success and changes in pro-environmental attitudes. In this regard, the results of this work seem to indicate that the participants fall back on information from different media and thus a differentiated view appears probable. Due to the high number of zoo visitors and the associated potential of zoos to reach many people in their educational work, there is a responsibility to communicate species protection information during the zoo visit in a fact-based, target-oriented and effective way. In that sense, the educational role of zoos take another dimension to interpret living collections to attract, inspire and enable people from all lifestyles to act positively for species conservation (WAZA, 2005). However, this educational task can only succeed if zoos are regarded as credible institutions in all their facets. Thus, aspects such as transparency, reputation or responsible treatment of zoo animals are also part of the overall appearance of zoos (Hutchins, 2006). In addition, it makes sense for zoo accreditation organizations, such as the EAZA, to formulate clear educational claims and define priorities in the conservation work of zoos (Moss & Esson, 2013). The changing public perceptions of zoos requires acting together rather than independently when defining the overarching goal of zoo institutions (Carr & Cohen, 2011). The results of this study show that there is in general a high fundamental

interest in species protection in all countries and that a high percentage of the participants have already dealt with this topic (*see sections 4.3.1 and 6.3*).

Regarding the source of information within the countries, it is noticeable that print media are more often utilised to inform about endangered species in France than in any other country. This could possibly be because France has one of the largest print media industry within Europe (Power, 2011). Nevertheless, in the era of social media and globalization, it was consistent in all countries to have as a result that digital media were more frequently used than any other source.

## 7.2 Interests, feelings, connections, and attitudes of zoo visitors and non-zoo visitors towards animals

Interest can be conceptualised in a variety of ways, each of which reflects the theoretical orientation of the research questions being asked and methods being used. Interest is a phenomenon that emerges from an individual's interaction with his or her environment (Krapp, 1992). The cognitively represented environment consists of units that are delimited from one another more or less; each of these units is of individual significance to the person and can be registered and described based on the person's store of knowledge. These units are referred as objects. In light of this constructivist interpretation, an object represents a subjectively determined part of the environment that a person can distinguish from other parts of the environment and that he or she represents as a structured unit within his or her representational system. Objects not only refers in terms of inanimate, but also living things, general conditions, changes, events, contexts - in short: facts in the environment of a person about which knowledge can be acquired and exchanged (Prenzel, Krapp & Schiefele, 1986).

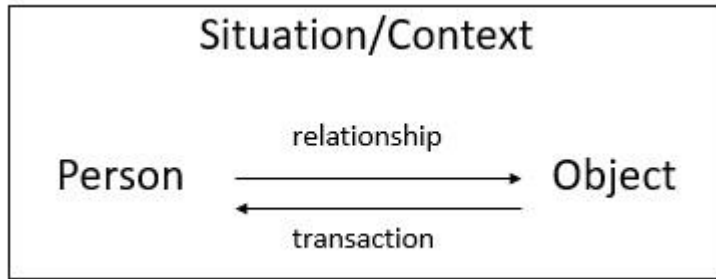


Figure 12 Interest model. Action of interest as a current relationship between person and object (Krapp, 1993).

Based on this theory, one of the primary goals of this study was to determine the differences in interest, emotions and attitudes, related to animals, in the non-zoo and zoo visitor groups (*see section 6.5*). One of the earliest attempts to measure public perceptions of zoo animals was a study by Rhoads and Goldsworthy (1979), in which subjects were asked to rate pictures of animals in three different settings. The results of Carr (2016) show that there are a variety of desirable characteristics mentioned by the public, such as whether animals are endangered, active and show intelligence. Among the animals that the public wants to see most, large mammals are the most common. In this respect, zoos offer optimal conditions, as large mammals dominate the collection. Reade and Waran (1996) interviewed zoo visitors within the zoo and compared them with a control group of people interviewed in the street. My study follows the trend of visitors' studies, but adding one further topic, separating the zoo visitor groups in two more specific groups: occasional and regular zoo visitors, and additionally the comparison with the non-visitors group, with the same items.

With regard to interest, my results indicate that visitors groups differed significantly in their interest towards zoo and wild animals (*see Table 3, section 5.3.1*). Moreover, regular zoo visitors reported interest in both animal groups most frequently, and significantly more frequently, than occasional and non-zoo visitors. Zoo audiences seem to be already highly receptive to engagement in animal interest. Therefore, the zoo experience can be a powerful catalyst of active engagement in pro -environmental behaviours. Zoos are necessary for the

discovery of wild animals, so by changing their approach, these institutions could be seen as essential places to see and discover wildlife. Having a positive emotional experience in the zoo could leave visitors interested in learning more about animals. On the other hand, non-zoo visitors were more interested in wild animals than in zoo animals. This indicates that, due to their attitude or unawareness, they do not perceive wild animals in zoos.

Related to the feelings, and consistent with previous research (Clayton *et al.*, 2009), my study demonstrates that zoo visits, especially regular zoo visits, are associated with feelings of relaxation and happiness towards the zoo animals. Zoo animals elicit positive feelings significantly more frequently in regular visitors than in the other two groups; as expected, there is a reverse tendency regarding negative feelings with regular zoo visitors reporting negative feelings, sadness and tension, less frequently than the other two visitor groups. Within the negative feelings, tension was mentioned the most for every group. Other studies (Hristienko & McDonald, 2007) explain, that by the fact that some large mammals, like bears and larger cats, can truly pose a threat to personal safety. It is also important to note that participants' views and perceptions of different types of animals could be influenced by whether they had personal experience of such animals. Many studies (Wells & Hepper, 1997; Paul & Serpell, 1993; Daly & Morton, 2003) have established that personal experience such as pet ownership is influential on our attitudes towards animal. Factors concerning the type of animal could likewise influence attitudes and feelings towards animals, e.g. animals perceived as attractive are more likely to evoke positive reactions, whilst animals perceived as less attractive are more likely to trigger negative feelings (Schlegel & Rupf, 2010). However, attractive animals kept in bad conditions could as well trigger negative feelings. A growing body of literature shows that emotional stimulation is influenced by the experiences of visitors and this seems to be important for learning and inspiring environmentally friendly behaviour (Powell & Bullock, 2014).



With regard to the attitudinal items connecting, caring for and protecting animals, my outcomes seem to confirm that regular zoo visitors feel more of a connection with animals compared to occasional and non-zoo visitors. They wish to take care of animals as well as doing something to help protect species in the wild, and they likewise think that zoos have an obligation to help protect species. These results agree with other studies (Clayton *et al.*, 2009; Luebke, Kelly & Grajal, 2014) reporting that most zoo visitors are already highly concerned about environmental and conservation issues. These visitors feel emotional connections with animals and perceive their visit as a socially supportive context for discussions about nature. Zoos provide experiences that can increase visitor concern for the well-being of the animals. My results were also consistent with other studies (Clayton *et al.*, 2009; Myers *et al.*, 2004) which proposed, that emotional reactions, and particularly a perceived sense of connection to the animal are interconnected aspects of zoo going. As such, I speculate that these nested relationships may have a causal link to the development of conservation attitudes that I will discuss in the next section.

### 7.3 Conservation awareness, interest in animals and attitudes towards zoos.

This part of the study describes the development of the Principal Component Analysis (PCA) as an instrument to identifying and characterising a series of behaviours related to conservation awareness, interest in animals and attitudes towards zoos, based on twelve Likert-scale items from the questionnaire. The items are a foundation to identify and characterized a series of behaviours related to conservation awareness, interest in animals and attitudes towards zoos.

This analysis guided the PCA development and now provides the theoretical basis for interpreting and reporting PCA results. This framework should also be useful for others interested in developing similar instruments. The uses of the new PCA variables are described,

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and include (a) conservation awareness, (b) interest in animal species, and (c) attitudes towards the role of zoos.

### *7.3.1 Evaluating attitudes towards conservation, animals and zoos, in the different zoo-visitor and non-visitor groups*

As disclosed in the previous discussion section, regular zoo visitors display characteristics that vary from those of the non-zoo and occasional visitors. It was therefore predictable that the regular zoo visitors would score higher in the PCA variables “conservation awareness” and “interest in animals”, and lower in the variable “negative attitudes towards zoos”.

From the view of zoos, conservation and education tend to be prominent themes, suggesting that these are important elements within zoo culture (Roe, McConney & Mansfield, 2014). The conjunction of both disciplines results in conservation education. Conservation education recognizes the central role of people in all nature conservation efforts, and it has been designed to affect the awareness, attitudes, and behaviours of people toward natural resources (Patrick *et al.*, 2007). Based on these concepts, my results (*see section 6.3.1*) showed that conservation awareness, interest in animals and to be supportive with the role of zoos were features related to a regular zoo visit. It seemed that regular visits to a zoo led to a greater amount of conservation awareness (> 80.0% scored  $\geq 4.0$  Likert), as well as an increased interest in animals (> 75.0% scored  $\geq 4.0$  Likert). As in the same way, regular visitors showed more support for the role of zoos (< 15.0% scored  $\geq 3.0$  Likert). In this regard, people’s experiences seem to have a previous relationship to their behaviour towards animals (as revealed by Deci, & Ryan, 1980).

The results seemed to be important from the point of view of zoos, since it has been expected that these institutions will fulfil a growing number of responsibilities, as well as the intention to influence visitors (Roe *et al.*, 2014). If it were the case, the results would prove

that regular visitors can be shaped, as they were shown to have higher amounts of conservation awareness and interest in animal species. Zoos have the capacity to create a culture of conservation in society (Clayton *et al.*, 2009; Barongi *et al.*, 2015).

### 7.3.2 *Evaluating attitudes towards conservation in different European countries*

Evidence is increasingly pointing towards a significant global decline in biodiversity. The drivers of this decline are numerous, including habitat change and overexploitation, rapid deforestation, pollution, exotic species and disease, and finally climate change as an emerging driver of biodiversity change (Nakamura, *et al.*, 2013; Hancocks, 2001; Pereira, Navarro & Martins, 2012). A growing body of evidence also indicates specifically that current species extinction rates are higher than the pre-human background rate, with hundreds of anthropogenic vertebrate extinctions (Ceballos *et al.*, 2015). Although this loss of biodiversity is more visible in the biodiversity-rich areas of the globe, such as tropical rainforests and coral reefs, biodiversity is also being threatened in Europe, with the root cause invariably linked to some form of human activity (Young *et al.*, 2005). This biodiversity loss around Europe could shape the attitudes of Europeans towards very different themes, such as, conservation, interest in animals and zoo-related subjects. In relation with the “conservation personalities” among the Europeans, features like the biodiversity richness of some areas, i.e., primeval forests of Poland, mammal biodiversity in Lithuania and Bulgaria, and subterranean fauna in Slovenia, are also important. All these features may help to form these “conservations personalities” among the Europeans (Young *et al.*, 2007).

With regard to conservation awareness, my results (*see section 6.3.2*) indicate that south-eastern and eastern countries, - Bulgaria, Greece and Lithuania-, appear to have greater amount of conservation awareness than any other country, possibly influenced by perceived links between environmental degradation and decreased quality of life (EORG, 2002, p. 12). In these

countries, a high percentage of participants show an increased amount in interest in conservation awareness. My data agree with Lorenzoni and Pidgeon (2006), which have also argued that southern European states are more worried about climate change, and they tend to have greater amount of interest in conservation subjects than the northern countries, even though it was always a feature more generally associated with northern ones. Additionally, it has been found (Gelissen, 2007) that habitants of nations with high levels of national wealth appear to be less willing to pay for environmental protection than the peoples of countries with low levels of national wealth. According to von Kimakowitz (2014), Europe's total wealth seem to be found in the large core countries Germany, France, the UK and Italy. This could have a direct influence on participants' responses to conservation awareness, and species interest, since support for environmental protection is directly, and negative, associated with national wealth (Gelissen, 2007). Nevertheless, there might be more factors determining attitudes towards conservation and interest in wildlife and zoo related themes in the different European countries. Therefore, better measurement to understand social, cultural and educational differences within Europe should be performed. Personal factors like childhood experiences, knowledge and educations, as well as social factors, like social class and resident areas, could be considered as key factors that influence pro-environmental concern and behaviour (Gifford & Nilsson, 2014).

### *7.3.3 Zoo tasks, by PCA components, and self-motivations to visit zoos.*

Zoos are considered to be one of the most important source of contact between people and animals in modern society. However, they are charged with the dual responsibility of caring for both animals and visitors (Morgan & Hodgkinson, 1999). Therefore, modern zoos are required to fulfil a number of responsibilities including scientific research, wildlife conservation, public recreation, and education (Roe *et al.*, 2014; Roe & McConney, 2015).

Given their desire to nurture community relations and educational opportunities, it is important to determine the most important activities, according to visitors' expectations, as well as which motivations move people to visit zoos.

Based on these concepts, my results (*see section 6.3.3*) focused on the visitors' outlooks regarding zoo tasks and the self-motivations to visit them. Concerning which tasks zoos should accomplished, from the respondents' point of view, my results found a coherence. With regard to the "conservation awareness" component, the results showed that the items related to conservation-oriented tasks - *to protect species*, *to protect individuals* and *to reintroduce species into the wild* -, were represented within the groups with  $> 3.0$  Likert score. Furthermore, the importance of the educational role of zoos - *to teach visitors about animals and conservation* -, was to be found as high as the other items within the groups with high amount of conservation awareness, remarking the zoos as educational centres. Continuing this trend, animal-oriented respondents were more likely to think about species-oriented duties - *to protect species* and *to reintroduce species into the wild*. That means that animal-oriented people were more likely to underline species-oriented zoo tasks. Likewise, high amounts of animals' interest were also related with the importance of zoo as educational centre. Nevertheless, my results similarly showed that respondents with the highest conservation awareness and animal interest ( $\geq 5$  Likert score) tended to show a decline in all the items comparing with the other two high groups ( $> 3$ ,  $> 4$  Likert score). In addition, the highest item within the highest conservation awareness and interest in animal groups was *to reintroduce species into the wild*. It seemed like respondents with the greatest amounts of conservation and interest in animals tended to "take animals out of the zoo" to reintroduce them to their habitat. This makes it seem that people with a high sense of conservation and interest in animals may think that zoos no longer fulfil a function.

Concerning the component “attitudes towards zoos”, there was a tendency for respondents supporting zoos, as well, emphasizing the educational role of them – *to teach visitors about animals and conservation*-. Therefore, from the results can be concluded (*see Figures 9A-C*) that education was mentioned within the three component groups. High rates of conservation awareness, interest in animals and support of zoos were related with the educational role of zoos. Likewise, other studies have found that visitors usually place high value on learning about actions they can take to help conservation efforts (Roe *et al.*, 2014), and they mention the theme of education more frequently than the theme of conservation (Patrick *et al.*, 2007). Clearly, zoo visitors see education as a zoo core mission. In contrast, low amount of conservation awareness and animals’ interest were related to the zoo as entertainment provider - *provide entertaining*. Besides, respondents with higher negative attitudes toward zoos were more likely to think about zoos as *species reintroduction centres* and *entertainment providers*. This seem to follow the trend found in other studies (Eaton, 1981), which suggest that zoo haters are usually disgusted over the poor zoo conditions and boredom of animals and widespread opinions that zoos should reintroduce wild animals into the wild, since they should not be confined.

Lastly, regarding which motivations move people to visit zoos, my results (*see section 6.3.3*) showed that people usually want to visit zoos *to learn something about animals*. It is an interesting trend, likewise found in other studies (Mann, Ballantyne & Packer, 2014; Clayton *et al.*, 2009; Falk, 2005; Mason, 2007), that revealed that, for most visitors, learning is one of the top reasons to visit zoos. Previously studies usually revealed that zoo visitors held predominantly social motives for their visit – wanting to share quality time with family or friends (Falk, 2005; Tomas, Crompton & Scott, 2003; Morgan & Hodgkinson, 1999). Similarly, my results showed that *have an outing with friends or family* was the second more frequently answer. Social motives for a visit are still an important motivation to visit a zoo, especially for people that are not focusing on conservation, or have a special interest in animals,

as it can be seen from my results. Nevertheless, these findings suggest that zoos are seen no longer merely as recreational centres, but as educational ones. People want to visit zoos to learn something about animals and conservation, and this could facilitate the delivery of pro-conservation learning and impact attitudes. Learning something new or interesting is a factor that makes zoo experiences memorable and enjoyable for visitors, and these results support arguments for the educational role of zoos (Woods, 2002).

#### 7.3.4 *A conservation related model*

The specific aim of conservation education is to develop lifelong knowledge and skills for conservation awareness and action. Conservation education recognizes the central role of people in all nature conservation efforts and is designed to affect the awareness, attitudes, and behaviors of people toward natural resources (Patrick *et al.*, 2007). Knowing the factors that inspiring positive attitudes is important to enhance the conservation objectives (Kideghesho, Røskaft, & Kaltenborn, 2007).

Based on these concepts, I have developed a model that might explain which factors affect the conservation awareness of the respondents. The magnitude of the resultant effects of each particular factor might be determined, likewise, by historical, political, ecological, socio-cultural and economic conditions, and this may call for different conservation strategies, for example, in zoos. Therefore, in this question, I examined how conservation awareness is shaped by the following factors: the PCA variables *interest in animals*, and *attitudes towards zoos*, the item *frequency of the zoo visit*, and socio-demographic factors, *age*, *gender* and *country*. The results (see section 6.3.4) indicated that *interest in animals* is the best predictor for the dependent variable, explaining 41.0% of the variation in *conservation awareness*. Four variables (*attitudes towards zoos*, *frequency of the zoo visit*, *age*, and *country*) explained 4.0%. *Gender* was not a significant factor.

### 7.3.4.1 Factors contributing to conservation awareness

In this section, the factors contributing to conservation awareness of the respondents are discussed. These factors entail interest in animals, country, age, attitudes towards zoos, and frequency of the zoo visit. On the other hand, the factor gender is similarly discussed. The conceptual model below (Figure 13) summarizes these factors and discussion for each factor follows.

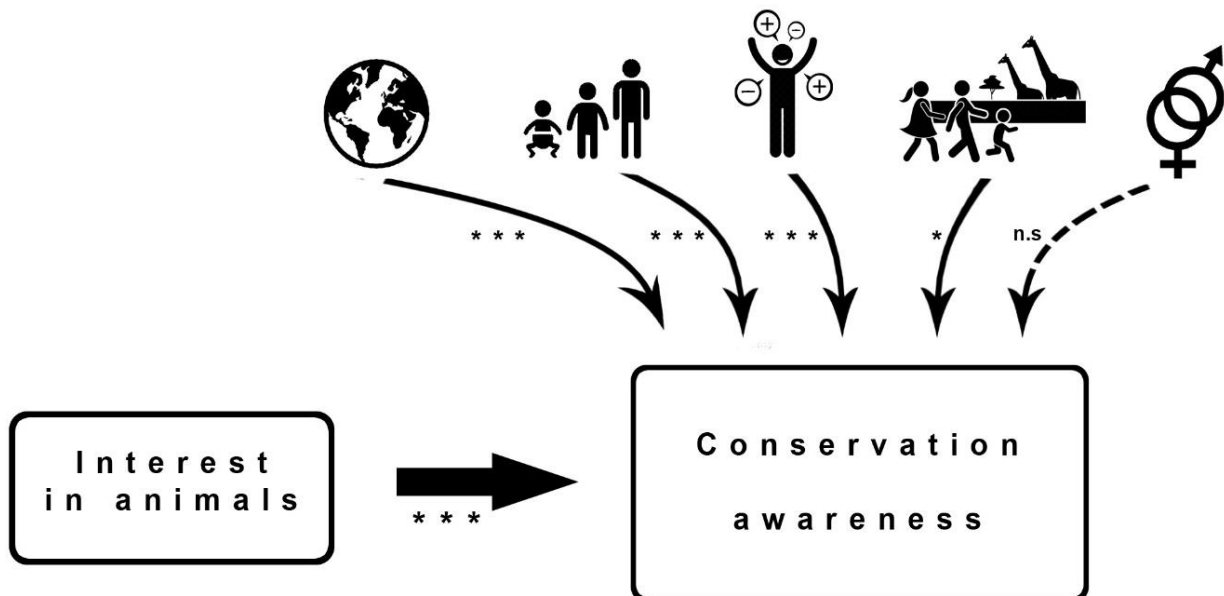


Figure 13 Conceptual model depicting the factors contributing to conservation awareness.

Factors influencing the conservation awareness of the respondents. Interest in animals was the best predictor for the dependent variable, explaining 41.0% of the variation. The other five variables (attitudes towards zoos, frequency of the zoo visit, age, gender and country) explained 4.0%.

*Interest in animals:* the variable interest in animals was the best predictor of the conservation awareness. More interest in animals led to an increased awareness of conservation issues. Likewise, interest in animals is influenced by other factors.

Firstly, social factors, like education level and area of residence, seem to have a direct relationship to people's interest in animals; people from urban larger communities and with high education level are more positive towards animals, whereas those who have lower



education level and reside in rural areas are more negative (Røskaft, Händel, Bjerke & Kaltenborn, 2007). Then, having pets at home is likewise associated with more positive attitudes to, and better knowledge of, both popular and unpopular animals (Prokop & Tunnicliffe, 2010).

Related to the zoo animals, one of the primary attraction to see animals is the attraction of the living animal, species that people would not normally see in their daily lives (Turley, 1999). In addition, the top six factors listed as “most liked” by the visitors, affecting interest in zoo animals are species size, activity, proximity to visitors (easy to see), intelligence, bright colours and ability to hold objects (Whitworth, 2012; Moss & Esson, 2010). Related to the taxonomic group, mammals are usually found to be significantly more popular than any other group (Moss & Esson, 2010). The figure below (Figure 14) summarizes these factors.

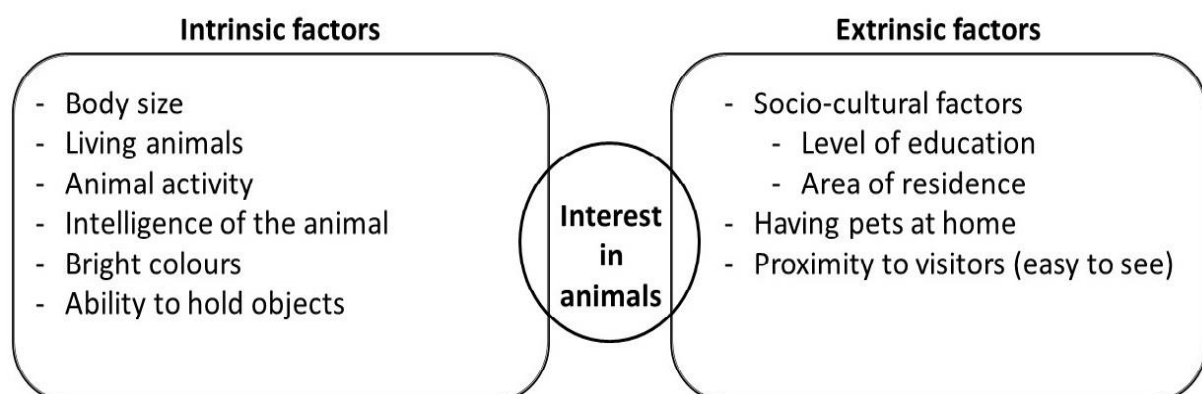


Figure 14 Intrinsic and extrinsic factors affecting interest in animals (zoo and general animals).

*Country:* As other studies have argued (Hills, 1993; Bourlakis, Bock & van Huik, 2007), the historical and cultural origins of Western attitudes towards animals and conservation suggest the presence of fundamental motivational forces, which may well provide a foundation for understanding the human-environment relationship. Social and economic factors, including law, environmental value orientation enforcement, political stability, political trust,

government effectiveness, and redistribution of goods and benefits will modulate attitudes toward conservation and nature in the different countries (Bourlakis, Bock & van Huik, 2007).

In addition, later conservation and environmental implementation frameworks in Eastern European countries, for instance, when compared to Germany and other Western European countries have modulated differences in awareness towards conservation in these countries (Mills & Schleich, 2012). However, cultural differences, together with government policies and level of education, may be the strongest modulators within the countries to highlight the differences in conservation awareness within Europe (Ressurreição *et al.*, 2012; Biesbroek *et al.*, 2010; Henle *et al.*, 2008; Young *et al.*, 2005; Jongman *et al.*, 2004).

Nevertheless, as I have said before, there might be more factors determining attitudes towards conservation related themes in the different European countries. Therefore, in the future would be necessary to profound in these socio-cultural differences to understand the key factors that influence a higher conservation awareness in the European inhabitants.

*Age*: this parameter have shown to be a predictor of the conservation awareness. My results suggest that levels of conservation awareness increase with the age (*see Figure 13*), and agree with other studies that have shown that middle-aged people showed more awareness of conservation due to have had more formal education than other age groups - youngest groups, or oldest groups – (Hariohay, Fyumagwa, Kideghesho, & Røskaft, 2018). However, other studies have shown that younger people seem to be more environmentally concerned (Buttel, 1979; Dunlap, Van Liere, Mertig & Jones, 2000), and that older generations of respondents presented lower conservation awareness related to species conservation and climate change subjects (Mutalib, Fadzly & Foo, 2013).

*Attitudes towards zoos*: conservation is generally considered to be the main role of the zoo today (Roe, McConney & Mansfield, 2014; Reade & Waran, 1996). Consequently, the zoo experience can be a powerful catalyst of active engagement in pro-environmental behaviours,

and then ensure growing levels of conservation awareness. Therefore, this variable explained that being against the role of zoos led to a weaker conservation consciousness. Most of the general public outside of the zoo environment usually have a number of negative perceptions of zoo animals (Reade & Waran, 1996), and this can lead to a lower conservation awareness.

*Frequency of the zoo visit:* As my results have shown (*see Figure 6*), regular zoo visitors have reported higher levels of conservation awareness than the other groups. Likewise, other studies have found that a zoo visit can play an important role in fostering a connection to wildlife and stimulating pro- conservation behaviors (Skibins & Powell, 2013; Clayton *et al.*, 2009).

*Gender:* Although it might be thought that gender would be a predictor of conservation awareness, my results (*see Figure 13*) showed that gender was not a significant factor of the conservation awareness. These results are consistent with other studies (Hariohay *et al.*, 2018; Wiidegren, 1998; Arcury & Christianson, 1993) that have suggested that the awareness of people toward wildlife and environmental concern was not related to the gender.

However, other studies have exposed gender differences in conservation, environmental issues and attitudes towards animals (Tong, Fan & Niu, 2017; Zelezny, Chua & Aldrich, 2000), suggesting that women expressed significantly greater environmental concern than men (Zelezny, Chua & Aldrich, 2000), and women, on average, showed higher levels of positive behaviors and attitudes towards animals (Herzog, 2007).

# CONCLUSIONS

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## 8. Conclusions

The main results obtained in the present thesis work about the capacity of zoos to influence and inspire positive conservation behaviours, and make important differences to conserve biodiversity, are summarized in the following points:

- A high percentage of participants throughout Europe informed themselves about endangered animal species; however, the zoo is not the main source of information. Television and Internet proved to be the main sources of information.
- Compared to non-zoo visitors, regular zoo visits elicit positive emotional reactions, a particularly perceived sense of connection to the animal, an increase in species interest, and a greater amount of conservation awareness and support of the role of zoos.
- South-eastern and eastern countries, - Armenia, Bulgaria, Greece and Lithuania -, present the greatest amount of conservation awareness and interest in animals. As the same way, but contrarily, these countries present the greatest zoo oppositions rates.
- Greatest conservation awareness rates are related to conservation-oriented tasks - *to protect species, to protect individuals and to reintroduce species into the wild*, as well as to the importance of the educational role of zoos - *to teach visitors about animals and conservation*. In the same way, greatest animal interest rates are related with species-oriented duties - *to protect species and to reintroduce species into the wild*, as well as with the importance of the educational role of zoos - *to teach visitors about animals and conservation*. The importance of the educational role of zoos is coherent with the main purpose of most zoo visitors, that is, *to learn something about animals*.
- Respondents with the highest conservation awareness and animal interest tended to “take animals out of the zoo” to reintroduce them to their habitat.

- Conservation awareness is influenced by the interest in animals, the interest in visiting zoos, and the attitudes towards these institutions. All these variables have a greater effect in the conservation consciousness of the participants.

## 9. Future Research: some suggestions

Conservation takes conservation between individuals, groups and countries. Zoos have the opportunity to help to make the important conservation happen. They are uniquely placed to interact with visitors, communities and society on conservation issues in an entertaining environment, and they are able to influence and inspire positive conservation behaviours. Zoos take direct action to conserve species through education and research. Through their presentation programmes, zoos can make visitors aware of and responsive to the zoos' contribution to sustainable tourism and species conservation.

Generally, it would appear that visitors' views on the role of zoos are becoming increasingly congruent with the mission of modern zoos. No longer, do visitors want to be only places of entertainment; both consider issues such as animal welfare, education and conservation to be vitally important. The challenge zoos have to face now is how to effectively engage more regular visitors and raise awareness and action for conservational attitudes. Gaining the attention of visitors, as well as non-zoo visitors, and appealing to their interest is necessary if zoos want to be successful in facilitating a deeper understanding of biodiversity conservation issues. The international nature of this research is important, however, given the complexity of visitors as well as the wide range of zoos around Europe, there remains much to be learnt in this field. Key focus areas for research include:

- Better measurement of long -term environmental learning after a visit to a zoo. This should encompass knowledge.
- The need to develop a validated tool that can be used by zoos to accurately measure visitors' environmental learning and subsequent environmental behavioural outcomes as a result of a visit.

- It is essential, to know more about the potential of research on human emotional responses to zoo animals and the importance of framing these studies.
- Better measurement to understand social, cultural and educational differences within Europe. Although some studies pointed out the “globalization” related to biodiversity and environment concern about Europeans, a better analysis need to be undertake.



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# APPENDIX I

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**Table I: Differences between countries related to *Internet* as source of information.**

Countries	UK	DE	FR	AR	LT	BG
<b>UK</b>						
<b>DE</b>	n.s					
<b>FR</b>	n.s	n.s				
<b>AR</b>	$z = -2.3, p = 0.02^*$	n.s	n.s			
<b>LT</b>	$z = -6.3, p < 0.001^{***}$	$z = -3.3, p = 0.001^{***}$	$z = -4.2, p < 0.001^{***}$	$z = -2.7, p = 0.006^{**}$		
<b>BG</b>	$z = -7.5, p < 0.001^{***}$	$z = -4.1, p < 0.001^{***}$	$z = -4.9, p < 0.001^{***}$	$z = -3.6, p < 0.001^{***}$	n.s	
<b>GR</b>	$z = -7.2, p < 0.001^{***}$	$z = -4.6, p < 0.001^{***}$	$z = -5.3, p < 0.001^{***}$	$z = -4.3, p < 0.001^{***}$	$z = -2.2, p = 0.03^*$	n.s

*Table I* shows the results from the Mann-Whitney U test related to *Internet* as information source, between countries. n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece.  $n = 2017$

**Table II: Differences between countries related to *Television* as source of information.**

Countries	UK	DE	FR	AR	LT	BG
<b>UK</b>						
<b>DE</b>	$z = -2.3, p = 0.02^*$					
<b>FR</b>	$z = -3.2, p = 0.001^{***}$	$z = -4.5, p < 0.001^{***}$				
<b>AR</b>	n.s	$z = -2.6, p = 0.01^{**}$	$z = -2.4, p = 0.01^{**}$			
<b>LT</b>	n.s	n.s	$z = -4.2, p < 0.001^{***}$	n.s		
<b>BG</b>	$z = -5.1, p < 0.001^{***}$	n.s	$z = -6.4, p < 0.001^{***}$	$z = -4.7, p < 0.001^{***}$	$z = -3.6, p < 0.001^{***}$	
<b>GR</b>	n.s	n.s	$z = -3.1, p = 0.002^{**}$	n.s	n.s	$z = -3.9, p < 0.001^{***}$

*Table II* shows the results from the Mann-Whitney U test related to *Television* as information source, between countries. n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece.  $n = 2017$ .

**Table III: Differences between countries related to *print media* as source of information.**

Countries	UK	DE	FR	AR	LT	BG
<b>UK</b>						
<b>DE</b>	$z = -2.7, p = 0.005^{**}$					
<b>FR</b>	n.s	n.s				
<b>AR</b>	$z = -2.3, p = 0.02^*$	$z = -4.3, p < 0.001^{***}$	$z = -1.8, p = 0.06^{**}$			
<b>LT</b>	$z = -3.1, p = 0.002^{**}$	n.s	n.s	$z = -4.7, p < 0.001^{***}$		
<b>BG</b>	$z = -5.4, p < 0.001^{***}$	n.s	$z = -3.1, p = 0.001^{***}$	$z = -6.4, p < 0.001^{***}$	$z = -2.3, p = 0.02^*$	
<b>GR</b>	n.s	n.s	n.s	$z = -2.6, p = 0.01^{**}$	n.s	$z = -3.7, p < 0.001^{***}$

Table III shows the results from the Mann-Whitney U test related to *print media* as information source, between countries. n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece.  $n = 2017$ .

**Table IV: Differences between countries related to *others* as source of information.**

Countries	UK	DE	FR	AR	LT	BG
<b>UK</b>	n.s					
<b>DE</b>	n.s					
<b>FR</b>	n.s	n.s				
<b>AR</b>	$z = -3.4, p = 0.001^{***}$	$z = -2.8, p = 0.004^{**}$	$z = -3.1, p = 0.002^{**}$			
<b>LT</b>	n.s	n.s	n.s	$z = -2.8, p = 0.005^{**}$		
<b>BG</b>	$z = -2.5, p = 0.01^{**}$	$z = -2.2, p = 0.03^*$	$z = -2.5, p = 0.01^{**}$	n.s	n.s	
<b>GR</b>	n.s	n.s	n.s	$z = -2.1, p = 0.04^*$	n.s	n.s

Table IV shows the results from the Mann-Whitney U test related to *others* as information source, between countries. n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece.  $n = 2017$ .

**Table V: Differences between non-zoo visitors and visitors in the information sources.**

<i>Internet</i>		<i>M-W</i>	
	Non- zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non- zoo visitors		$z = -5.1, p < 0.001^{***}$	$z = -6.3, p < 0.001^{***}$
Occasional zoo visitors			$z = -2.1, p = 0.03^*$
Regular zoo visitors			
<i>Television</i>		<i>M-W</i>	
	Non- zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non- zoo visitors		$z = -2.6, p = 0.01^{**}$	$z = -2.6, p < 0.01^{**}$
Occasional zoo visitors			n.s
Regular zoo visitors			
<i>Print media</i>		<i>M-W</i>	
	Non- zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non- zoo visitors		$z = -2.3, p = 0.02^*$	$z = -4.5, p < 0.001^{***}$
Occasional zoo visitors			$z = -3.0, p < 0.003^{**}$
Regular zoo visitors			
<i>Zoo</i>		<i>M-W</i>	
	Non- zoo visitors	Occasional zoo visitors	Regular zoo visitors
Occasional zoo visitors			$z = -6.7, p < 0.001^{***}$
Regular zoo visitors			
<i>Other media</i>		<i>M-W</i>	
	Non- zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non- zoo visitors		n.s	$z = -3.2, p = 0.001^{***}$
Occasional zoo visitors			$z = -3.6, p < 0.001^{***}$
Regular zoo visitors			

Table V shows the results of pairwise Mann-Whitney U test (M-W) between the different non-visitors and visitor groups, related to the information sources. (n non-zoo visitors/occasional visitors = 1462; n non-zoo visitors/regular visitors = 1003; n occasional visitors/regular visitors = 1535). n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ .

\*From the zoo, non-visitors have been remove, since they cannot use the zoo as a source of information if they do not go.

**Table VI: Differences in animal interest between non-zoo and zoo- visitors.**

<i>Domestic animals</i>		<i>M-W</i>	
<i>N = 1983</i>	Non-zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non-zoo visitors		$z = -4.6, p < 0.001^{***}$	$z = -6.6, p < 0.001^{***}$
Occasional zoo visitors			$z = -3.3, p = 0.001^{***}$
Regular zoo visitors			
<i>Zoo animals</i>		<i>M-W</i>	
<i>N = 1989</i>	Non-zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non-zoo visitors		$z = -6.4, p < 0.001^{***}$	$z = -12.3, p < 0.001^{***}$
Occasional zoo visitors			$z = -9.0, p < 0.001^{***}$
Regular zoo visitors			
<i>Wild animals</i>		<i>M-W</i>	
<i>N = 1989</i>	Non-zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non-zoo visitors		$z = -3.2, p < 0.001^{***}$	$z = -9.5, p < 0.001^{***}$
Occasional zoo visitors			$z = -8.2, p < 0.001^{***}$
Regular zoo visitors			

Table VI shows the results from Kruskal-Wallis test (K-W) and post-hoc Mann-Whitney U test (M-W) in domestic, zoo and wild animals between the non-zoo visitors and zoo visitor groups. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ .

**Table VII: Differences in set feelings related to wild and zoo animals**

<i>Zoo animals</i>		<i>M-W</i>	
<i>1.26 Sad/happy</i>			
	Non-zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non-zoo visitors		$z = -2.2, p = 0.03^*$	$z = -5.1, p < 0.001^{***}$
Occasional zoo visitors			$z = -3.6, p < 0.001^{***}$
Regular zoo visitors			
<i>1.25 Tense/relax</i>			
	Non-zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non-zoo visitors		$z = -3.8, p < 0.001^{***}$	$z = -6.8, p < 0.001^{***}$
Occasional zoo visitors			$z = -3.9, p < 0.001^{***}$
Regular zoo visitors			
<i>Wild animals</i>		<i>M-W</i>	
<i>1.29 Sad/happy</i>			
	Non-zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non-zoo visitors		n.s	$z = -4.7, p < 0.001^{***}$
Occasional zoo visitors			$z = -4.6, p < 0.001^{***}$
Regular zoo visitors			
<i>1.28 Tense/relax</i>			
	Non-zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non-zoo visitors		n.s	$z = -3.3, p = 0.001^{***}$
Occasional zoo visitors			$z = -3.3, p = 0.001^{***}$
Regular zoo visitors			

Table VII shows the differences between each feeling set, sad/happy and tense/relax, related to zoo and wild animals, between the three visitor groups (non-zoo visitors, occasional zoo visitors and regular zoo visitors). M-W (Mann-Whitney U test). n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ .

**Table VIII: Differences in PCA component, by frequency of zoo visit.**

<i>PCA component “conservation awareness”</i>		<i>M-W</i>	
	Non- zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non- zoo visitors		$z = -3.0, p = 0.003^{**}$	$z = -8.9, p < 0.001^{***}$
Occasional zoo visitors			$z = -7.8, p < 0.001^{***}$
Regular zoo visitors			
<i>PCA component “interest in animals”</i>		<i>M-W</i>	
	Non- zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non- zoo visitors		$z = -6.1, p < 0.001^{***}$	$z = -11.1, p < 0.001^{***}$
Occasional zoo visitors			$z = -7.7, p < 0.001^{***}$
Regular zoo visitors			
<i>PCA component “attitudes towards zoos”</i>		<i>M-W</i>	
	Non- zoo visitors	Occasional zoo visitors	Regular zoo visitors
Non- zoo visitors		n.s	$z = -3.9, p < 0.001^{***}$
Occasional zoo visitors			$z = -3.6, p < 0.001^{***}$
Regular zoo visitors			

*Table VIII* shows the results of pairwise Mann-Whitney U test (M-W) between the non-zoo and zoo visitors groups, related to the PCA components “interest in animals”, “conservation awareness”, and “attitudes towards zoos”. (n non-zoo visitors = 465, n occasional visitors = 996; n regular visitors = 537). n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ .



**Table IX: Differences between countries related to *have an outing with family and friends* as motivation to visit zoos.**

Countries	UK	DE	FR	AR	LT	BG
UK						
DE	n.s					
FR	z = -4.2, p< 0.001***	z = -3.9, p<0.001***				
AR	z = -5.8, p< 0.001***	z = -5.1, p<0.001***	n.s			
LT	z = -2.5, p = 0.01**	z = -2.3, p = 0.02*	z = -2.6, p = 0.009**	z = -3.8, p<0.001***		
BG	n.s	n.s	z = -5.2, p<0.001***	z = -7.1, p<0.001***	z = -4.1, p< 0.001***	
GR	z = -7.5, p< 0.001***	z = -6.5, p<0.001***	n.s	n.s	z = -5.5, p< 0.001***	z = -8.9, p< 0.001***

Table IX shows the results from the Mann-Whitney U test related to *have an outing with family and friends* as motivation to visit zoos, between countries. n.s refers to no significant. \*p ≤ .05, \*\* p ≤ .01, \*\*\*p ≤ .001. UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece. n = 2016.

**Table X: Differences between countries related to *learn about animals* as motivation to visit zoos.**

Countries	UK	DE	FR	AR	LT	BG
UK						
DE	z = -3.4, p = 0.001***					
FR	n.s	z = -1.9, p = 0.05*				
AR	z = -3.2, p = 0.001***	z = -5.5, p<0.001***	z = -2.9, p = 0.003**			
LT	z = -4.4, p< 0.001***	n.s	z = -2.1, p = 0.03*	z = -6.8, p< 0.001***		
BG	z = -2.6, p = 0.01**	n.s	n.s	z = -5.4, p< 0.001***	z = -2.1, p = 0.03*	
GR	n.s	z = -3.9, p<0.001***	n.s	n.s	z = -4.8, p<0.001***	z = -3.2, p = 0.001***

Table X shows the results from the Mann-Whitney U test related to *learn about animals* as motivation to visit zoos, between countries. n.s refers to no significant. \*p ≤ .05, \*\* p ≤ .01, \*\*\*p ≤ .001. UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece. n = 2016.

**Table XI: Differences between countries related to *be entertained* as motivation to visit zoos.**

Countries	UK	DE	FR	AR	LT	BG
<b>UK</b>						
<b>DE</b>	$z = -2.5, p = 0.01^{**}$					
<b>FR</b>	n.s	$z = -3.1, p = 0.003^{**}$				
<b>AR</b>	$z = -2.2, p = 0.03^*$	n.s	$z = -2.7, p = 0.007^{**}$			
<b>LT</b>	$z = -4.1, p < 0.001^{***}$	n.s	$z = -4.1, p < 0.001^{***}$	n.s		
<b>BG</b>	$z = -3.02, p = 0.003^{**}$	$z = -4.5, p < 0.001^{***}$	n.s	$z = -4.4, p < 0.001^{***}$	$z = -7.1, p < 0.001^{***}$	
<b>GR</b>	$z = -2.02, p = 0.04^*$	$z = -3.8, p < 0.001^{***}$	n.s	$z = -3.6, p < 0.001^{***}$	$z = -5.6, p < 0.001^{***}$	n.s

Table XI shows the results from the Mann-Whitney U test related to *be entertained* as motivation to visit zoos, between countries. n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece. n = 2016.

**Table XII: Differences between countries related to *see a particular exhibit* as motivation to visit zoos.**

Countries	UK	DE	FR	AR	LT	BG
<b>UK</b>						
<b>DE</b>	$z = -10.5, p < 0.001^{***}$					
<b>FR</b>	$z = -3.6, p < 0.001^{***}$	$z = -9.5, p < 0.001^{***}$				
<b>AR</b>	n.s	$z = -7.7, p < 0.001^{***}$	$z = -4.2, p < 0.001^{***}$			
<b>LT</b>	$z = -4.9, p < 0.001^{***}$	$z = -6.6, p < 0.001^{***}$	$z = -5.9, p < 0.001^{***}$	$z = -2.6, p = 0.009^{**}$		
<b>BG</b>	$z = -2.2, p = 0.03^*$	$z = -12.8, p < 0.001^{***}$	$z = -2.6, p = 0.009^{**}$	$z = -3.2, p < 0.001^{***}$	$z = -7.4, p < 0.001^{***}$	
<b>GR</b>	$z = -2.9, p = 0.003^{**}$	$z = -10.9, p < 0.001^{***}$	n.s	$z = -3.7, p < 0.001^{***}$	$z = -6.4, p < 0.001^{***}$	n.s

Table XII shows the results from the Mann-Whitney U test related to *see a particular exhibit* as motivation to visit zoos, between countries. n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece. n = 2016.

**Table XIII: Differences between countries related to *help protect species* as motivation to visit zoos.**

Countries	UK	DE	FR	AR	LT	BG
<b>UK</b>						
<b>DE</b>	n.s					
<b>FR</b>	$z = -2.2, p = 0.02^*$	$z = -2.9, p = 0.004^{**}$				
<b>AR</b>	n.s	n.s	$z = -2.3, p = 0.02^*$			
<b>LT</b>	n.s	$z = -2.1, p = 0.03^*$	n.s	n.s		
<b>BG</b>	$z = -5.8, p < 0.001^{***}$	$z = -2.9, p = 0.003^{**}$	$z = -6.4, p < 0.001^{***}$	$z = -4.4, p < 0.001^{***}$	$z = -7.01, p < 0.001^{***}$	
<b>GR</b>	$z = -3.5, p < 0.001^{***}$	n.s	$z = -4.7, p < 0.001^{***}$	$z = -2.7, p = 0.006^{**}$	$z = -4.4, p < 0.001^{***}$	n.s

Table XIII shows the results from the Mann-Whitney U test related to *help protect species* as motivation to visit zoos, between countries. n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece. n = 2016.

**Table XIV: Differences between countries related to *explore animals* as motivation to visit zoos.**



Countries	UK	DE	FR	AR	LT	BG
<b>UK</b>						
<b>DE</b>	n.s					
<b>FR</b>	n.s	n.s				
<b>AR</b>	$z = -5.9, p < 0.001^{***}$	$z = -4.9, p < 0.001^{***}$	$z = -3.3, p = 0.001^{***}$			
<b>LT</b>	$z = -4.1, p < 0.001^{***}$	$z = -2.8, p = 0.006^{**}$	$z = -3.9, p < 0.001^{***}$	$z = -9.5, p < 0.001^{***}$		
<b>BG</b>	n.s	n.s	n.s	$z = -6.5, p < 0.001^{***}$	$z = -3.9, p < 0.001^{***}$	
<b>GR</b>	$z = -7.7, p < 0.001^{***}$	$z = -6.3, p < 0.001^{***}$	$z = -4.5, p < 0.001^{***}$	n.s	$z = -11.3, p < 0.001^{***}$	$z = -8.4, p < 0.001^{***}$

Table XIV shows the results from the Mann-Whitney U test related to *explore animals* as motivation to visit zoos, between countries. n.s refers to no significant. \* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$ . UK = Great Britain, DE = Germany, FR = France, AR = Armenia, LT = Lithuania, BG = Bulgaria, and GR = Greece. n = 2016.

# SUPPLEMENTARY MATERIAL

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# 1. Survey

EvaSys	Conservation Biology_Personal Information_EU	
Goethe-Universität		
Biowissenschaften	Personal Information	

Bitte so markieren:      Bitte verwenden Sie einen Kugelschreiber oder nicht zu starken Filzstift. Dieser Fragebogen wird maschinell erfasst.  
 Korrektur:      Bitte beachten Sie im Interesse einer optimalen Datenerfassung die links gegebenen Hinweise beim Ausfüllen.

## Personal Information

- 1.1 What is your age?  19 or less  20-29  30-39  
 40-49  50-59  60 or more
- 1.2 What is your gender?  male  female
- 1.3 Have you ever informed yourself about endangered animals or species?  yes  no  not sure
- 1.4 If yes, what source(s) of information did you use? (multiple answers are possible)  
 zoo  print media (books, magazines...)  television  
 internet  others
- 1.5 Are you part of a conservation, nature or environmental group of any kind?  yes  no  not sure
- 1.6 How many times do you think have you visited a zoo or aquarium in the last 12 months?  never  1-2  3 or more
- 1.7 Do you think that by visiting zoos you can help save an animal species?  yes  no  not sure
- 1.8 Have you ever heard about the IUCN Red List of Threatened Species before?  yes  no  not sure
- 1.9 How important is conservation of species to you? unimportant      very important
- 1.10 How important do you think is it to visit zoos for the conservation of species? unimportant      very important
- 1.11 Are you interested in domestic animals?? uninterested      very interested
- 1.12 Are you interested in zoo animals? uninterested      very interested
- 1.13 Are you interested in wild animals? uninterested      very interested

## To what extent do you agree or disagree with the following statements?

- 1.14 I wish I knew more about animals disagree      agree
- 1.15 I feel a sense of connection with animals disagree      agree
- 1.16 I would like to take care of animals disagree      agree
- 1.17 I would like to do something to help protect species in the wild disagree      agree
- 1.18 I feel zoos have an obligation to help protect species disagree      agree
- 1.19 The conservation of rare species is more important than economic assets disagree      agree
- 1.20 People should use nature for his benefit disagree      agree
- 1.21 Animals do not belong in zoos disagree      agree
- 1.22 Zoos are unnecessary nowadays disagree      agree



**[Fortsetzung]**

1.23 What do you think is **the most important task** for zoos? (only one answer is possible)

- |   |   |  |  |
|---|---|--|--|
| <input type="checkbox"/> to teach visitors about animals and conservation | <input type="checkbox"/> to provide naturalistic exhibits | <input type="checkbox"/> to provide entertaining exhibits  |  |
| <input type="checkbox"/> to protect species                               | <input type="checkbox"/> to protect individual animals    | <input type="checkbox"/> reintroduce species into the wild |  |

1.24 What do you think of when you think of the zoo? (multiple answers are possible)

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> have an outing with friends or family | <input type="checkbox"/> learn about animals     | <input type="checkbox"/> to be entertained  |
| <input type="checkbox"/> to see a particular exhibit           | <input type="checkbox"/> to help protect species | <input type="checkbox"/> to explore animals |
| <input type="checkbox"/> others                                |  |   |

Please explain briefly

- |                                       |       |                          |                          |                          |                          |                          |                          |            |
|---------------------------------------|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------|
| 1.25 Animals in zoos make me feel     | tense | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | relaxed    |
| 1.26 Animals in zoos make me feel     | sad   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | happy      |
| 1.27 Animals in zoos make me feel     | bored | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | interested |
| 1.28 Animals in the wild make me feel | tense | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | relaxed    |
| 1.29 Animals in the wild make me feel | sad   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | happy      |
| 1.30 Animals in the wild make me feel | bored | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | interested |



# GENERAL STATISTICS

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## 2. QUESTIONNAIRE

### 1.1 What is your age?

	19 or less	20 - 29	30 - 39	40 - 49	50 - 59	60 or more
Bulgaria	14.9	38.0	19.7	15.5	7.4	4.6
Lithuania	32.5	40.7	9.2	7.8	6.6	3.3
Greece	33.5	13.2	31.6	14.6	5.2	1.9
Armenia	29.8	12.1	20.2	13.6	14.1	10.1
Great Britain	14.8	21.1	21.3	13.8	13.1	16.0
France	2.8	24.1	31.5	3.7	21.3	16.7
Germany	6.5	38.3	14.3	7.1	14.3	19.5
Total	20.7	29.2	19.3	12.0	10.1	8.7

Table 1.1 shows the percentage of respondents in each age group

### 1.2 What is your gender?

	male	female
Bulgaria	36.1	63.9
Lithuania	25.7	74.3
Greece	39.2	60.8
Armenia	38.9	61.1
Great Britain	41.4	58.6
France	46.7	53.3
Germany	37.9	62.1
Total	36.2	63.8

Table 1.2 shows the percentage of respondents in each gender group

### 1.3 Have you ever informed yourself about endangered animals or species?

	yes	no	not sure
Bulgaria	79.3	11.3	9.4
Lithuania	66.7	17.0	16.3
Greece	74.4	13.8	11.8
Armenia	60.9	20.8	18.3
Great Britain	60.8	20.8	18.3
France	70.4	18.5	11.1
Germany	78.7	19.3	2.0
Total	70.0	17.5	12.5

Table 1.3 shows the percentage of respondents from question 1.3



**1.4 If yes, what source of information have you used? (multiple answers are possible)**

	zoo	Print media (books, magazines)	television	internet	others
Bulgaria	31.0	49.3	61.8	61.0	11.9
Lithuania	31.6	41.9	50.1	57.8	8.2
Greece	35.2	34.3	46.0	66.7	8.9
Armenia	28.8	22.7	41.9	46.0	15.7
Great Britain	35.7	31.6	44.9	36.2	7.0
France	39.8	32.4	27.8	35.2	3.7
Germany	33.1	44.2	55.8	42.2	5.8
Total	33.0	38.6	50.0	51.6	9.3

Table 1.4 shows the percentage of respondents reported the sources of information used

**1.5 Are you part of a conservation, nature or environmental group of any kind?**

	yes	no	not sure
Bulgaria	10.0	87.4	2.6
Lithuania	8.8	86.5	4.8
Greece	7.7	89.9	2.4
Armenia	36.1	41.2	22.7
Great Britain	21.0	73.3	5.7
France	11.1	86.1	2.8
Germany	11.7	88.3	0.0
Total	14.5	80.1	5.4

Table 1.5 shows the percentage of respondents from question 1.5

**1.6 How many times do you think have you visited a zoo or aquarium in the last 12 months?**

	never	1 - 2	3 or more
Bulgaria	20.6	52.6	26.8
Lithuania	23.9	52.7	23.4
Greece	31.0	38.1	31.0
Armenia	25.1	43.1	31.8
Great Britain	21.2	50.5	28.3
France	23.1	45.4	31.5
Germany	22.7	59.1	18.2
Total	23.3	49.9	26.9

Table 1.6 shows the percentage of respondents in each visitor or non-visitor group

**1.7 Do you think that by visiting zoos you can help save an animal species?**

	yes	no	not sure
Bulgaria	37.8	26.4	35.8
Lithuania	52.4	19.1	28.5
Greece	43.6	20.9	35.5
Armenia	37.6	29.9	32.5
Great Britain	54.9	13.3	31.8
France	56.7	11.1	23.1
Germany	53.9	16.4	29.6
Total	47.7	20.4	31.9

Table 1.7 shows the percentage of respondents from question 1.7

**1.8 Have you ever heard about the IUCN Red List of Threatened Species before?**

	yes	no	not sure
Bulgaria	84.5	7.2	8.4
Lithuania	94.3	3.3	2.4
Greece	27.0	66.4	6.6
Armenia	60.3	21.6	18.0
Great Britain	29.9	54.8	15.3
France	41.7	46.3	12.0
Germany	84.1	13.9	2.0
Total	64.7	26.3	9.0

Table 1.8 shows the percentage of respondents in each age group

**1.9 How important is conservation of the species to you?**

	unimportant				very important
Bulgaria	1.2	0.6	4.0	13.3	80.9
Lithuania	0.5	0.2	11.3	29.4	58.6
Greece	1.4	3.3	8.5	19.4	67.3
Armenia	9.1	0.5	9.6	3.6	77.2
Great Britain	3.9	7.3	20.2	22.9	45.7
France	0.0	0.0	15.7	31.5	52.8
Germany	0.0	0.0	8.4	37.0	54.5
Total	2.2	2.1	10.9	21.2	63.7

Table 1.9 shows the percentage of respondents in the Likert scale question 1.9

### 1.10 How important do you think is it to visit zoos for the conservation of the species?

	unimportant				very important
Bulgaria	10.4	12.6	39.3	15.8	21.8
Lithuania	8.8	12.1	34.6	24.2	20.4
Greece	6.2	11.0	27.3	23.9	31.6
Armenia	18.8	2.5	7.1	3.0	68.5
Great Britain	5.9	8.0	29.8	29.0	27.3
France	0.9	3.7	30.6	39.8	25.0
Germany	7.2	17.1	38.8	24.3	12.5
Total	8.8	10.3	31.4	21.8	27.7

Table 1.10 shows the percentage of respondents in the Likert scale question 1.10

### 1.11 Are you interested in domestic animals?

	uninterested				very interested
Bulgaria	5.6	4.0	21.1	19.9	49.4
Lithuania	2.1	3.8	13.0	28.8	52.4
Greece	7.2	6.2	17.7	23.0	45.9
Armenia	14.8	1.0	5.6	4.6	74.0
Great Britain	8.8	9.0	23.5	25.7	33.0
France	2.8	5.6	25.9	41.7	24.1
Germany	5.2	8.4	16.9	21.4	48.1
Total	6.4	5.4	17.9	23.1	47.2

Table 1.11 shows the percentage of respondents in the Likert scale question 1.11

### 1.12 Are you interested in zoo animals?

	uninterested				very interested
Bulgaria	6.4	7.0	25.3	27.1	34.3
Lithuania	1.9	2.1	14.4	36.8	44.8
Greece	3.8	4.3	13.8	29.5	48.6
Armenia	11.7	2.0	9.6	3.6	73.1
Great Britain	4.9	5.4	17.6	34.9	37.3
France	0.0	0.0	26.9	43.5	29.6
Germany	1.3	4.6	26.1	37.9	30.1
Total	4.6	4.3	18.8	30.4	41.9

Table 1.12 shows the percentage of respondents in the Likert scale question 1.12

**1.13 Are you interested in wild animals?**

	uninterested				very interested
Bulgaria	4.2	7.4	22.2	22.4	43.9
Lithuania	1.9	3.1	11.3	33.2	50.6
Greece	2.8	6.1	9.9	23.6	57.5
Armenia	16.8	2.0	5.1	3.6	72.6
Great Britain	4.4	6.1	16.7	27.0	45.8
France	0.0	2.8	14.8	44.4	38.0
Germany	1.3	1.3	15.6	38.3	43.5
Total	4.4	4.8	14.9	26.3	49.6

Table 1.13 shows the percentage of respondents in the Likert scale question 1.13

**1.14 I wish I knew more about animals**

	disagree				agree
Bulgaria	0.6	1.4	9.6	12.2	76.3
Lithuania	1.4	1.7	8.3	24.5	64.2
Greece	0.5	1.4	16.2	18.6	63.3
Armenia	12.2	2.0	7.6	2.0	76.1
Great Britain	4.9	6.8	26.6	25.6	36.1
France	0.0	1.9	25.0	33.3	39.8
Germany	1.3	1.3	23.3	42.0	32.0
Total	2.8	2.6	15.1	20.6	58.8

Table 1.14 shows the percentage of respondents in the Likert scale question 1.14

**1.15 I feel a sense of connection with animals**

	disagree				agree
Bulgaria	4.8	7.8	23.7	17.7	46.0
Lithuania	2.6	4.7	16.1	25.1	51.5
Greece	4.8	7.7	27.4	22.1	38.0
Armenia	18.7	2.0	8.6	1.0	69.7
Great Britain	12.7	11.0	23.7	24.6	28.0
France	6.5	7.4	18.5	38.9	28.7
Germany	0.7	3.9	19.6	32.0	43.8
Total	7.1	6.9	20.4	21.7	43.9

Table 1.15 shows the percentage of respondents in the Likert scale question 1.15

**1.16 I would like to take care of animals**

	disagree				agree
Bulgaria	7.2	7.4	19.3	16.5	49.6
Lithuania	3.1	6.4	11.6	22.3	56.5
Greece	3.9	9.4	22.2	22.2	42.4
Armenia	15.2	0.5	6.6	2.0	75.8
Great Britain	14.5	13.7	19.9	20.8	31.1
France	6.5	5.6	32.7	24.3	30.8
Germany	2.6	7.2	27.5	28.1	34.6
Total	7.9	7.9	18.2	19.1	47.0

Table 1.16 shows the percentage of respondents in the Likert scale question 1.16

**1.17 I would like to do something to help protect species in the wild**

	disagree				agree
Bulgaria	0.6	4.0	11.6	20.0	63.8
Lithuania	2.1	5.2	15.1	24.1	53.4
Greece	1.4	5.3	13.9	26.8	52.6
Armenia	16.2	0.5	6.6	5.1	71.6
Great Britain	7.7	6.2	24.2	24.4	37.4
France	2.8	0.0	29.0	42.1	26.2
Germany	4.7	7.4	23.0	31.1	33.8
Total	4.4	4.5	16.4	23.0	51.6

Table 1.17 shows the percentage of respondents in the Likert scale question 1.17

**1.18 I feel zoos have an obligation to help protect species in the wild**

	disagree				agree
Bulgaria	4.4	4.0	14.1	18.9	58.6
Lithuania	1.4	2.1	13.7	22.2	60.6
Greece	2.4	4.8	6.7	21.0	65.2
Armenia	13.3	2.6	9.2	2.0	73.0
Great Britain	2.2	4.9	17.4	21.6	53.8
France	0.0	0.0	21.3	25.0	53.7
Germany	0.7	2.6	14.5	27.6	54.6
Total	3.5	3.4	13.8	19.7	59.6

Table 1.18 shows the percentage of respondents in the Likert scale question 1.18

**1.19 The conservation of rare species is more important than economic assets**

	disagree				agree
Bulgaria	2.4	3.6	20.2	19.0	54.8
Lithuania	2.4	3.8	20.5	28.8	44.6
Greece	6.8	6.3	17.5	27.7	41.7
Armenia	16.3	3.1	8.7	3.6	68.4
Great Britain	7.8	6.3	29.3	21.5	35.1
France	0.0	1.9	23.1	30.6	44.4
Germany	0.7	2.0	13.1	41.8	42.5
Total	5.1	4.2	20.3	23.3	47.1

Table 1.19 shows the percentage of respondents in the Likert scale question 1.19

**1.20 People should use nature for their benefit**

	disagree				agree
Bulgaria	28.6	15.6	26.6	4.9	24.3
Lithuania	27.3	28.0	27.5	6.4	10.8
Greece	21.6	17.8	18.3	11.5	30.8
Armenia	39.0	2.1	11.3	5.6	42.1
Great Britain	22.1	17.3	30.5	13.2	17.0
France	27.8	14.8	32.4	9.3	15.7
Germany	13.4	18.8	18.8	18.1	30.9
Total	26.1	17.7	24.9	8.9	22.4

Table 1.20 shows the percentage of respondents in the Likert scale question 1.20

### 1.21 Animals do not belong in zoos

	disagree			agree	
Bulgaria	10.1	7.1	25.1	14.1	43.6
Lithuania	17.5	15.4	36.7	17.1	13.3
Greece	8.6	7.7	35.9	20.1	27.8
Armenia	30.8	2.6	14.9	3.1	48.7
Great Britain	19.5	18.2	40.1	12.8	9.4
France	15.7	28.7	32.4	19.4	3.7
Germany	17.8	18.4	34.2	17.1	12.5
Total	16.4	12.8	31.9	14.5	24.5

Table 1.21 shows the percentage of respondents in the Likert scale question 1.21

### 1.22 Zoos are unnecessary nowadays

	disagree			agree	
Bulgaria	58.5	12.7	16.3	4.2	8.3
Lithuania	47.5	18.3	23.6	5.5	5.1
Greece	54.6	17.1	19.0	6.3	2.9
Armenia	34.5	5.2	5.2	5.2	50.0
Great Britain	42.5	25.4	19.8	7.7	4.7
France	34.3	34.3	17.6	11.1	2.8
Germany	42.4	19.9	26.5	8.6	2.6
Total	47.6	17.9	18.6	6.2	9.7

Table 1.22 shows the percentage of respondents in the Likert scale question 1.22

### 1.23 What do you think is the most important task for zoos? (only one answer is possible)

	to teach visitors about animals and conservation	to provide naturalistic exhibits	to provide entertaining exhibits	to protect species	to protect individual animals	reintroduce species into the wild
Bulgaria	49.5	3.6	2.6	4.6	10.6	29.0
Lithuania	52.4	7.9	1.7	22.7	5.2	10.0
Greece	51.5	5.4	3.1	23.8	6.2	10.0
Armenia	25.3	4.0	8.7	22.7	8.0	31.3
Great Britain	47.7	7.0	7.6	21.6	5.3	10.8
France	21.4	4.9	3.9	55.3	4.9	9.7
Germany	53.2	12.6	1.8	23.4	4.5	4.5
Total	45.2	6.2	4.5	21.1	6.7	16.3

Table 1.23 shows the percentage of respondents for each task

**1.24 What do you think of when you think of the zoo? (multiple answers are possible)**

	have an outing with friends or family	learn about animals	to be entertained	to see a particular exhibit	to help protect species	to explore animals	others
Bulgaria	60.0	68.8	32.2	10.9	17.1	24.5	2.6
Lithuania	46.4	74.9	12.2	30.2	37.5	14.3	3.5
Greece	23.6	56.1	30.7	7.5	20.3	57.1	4.2
Armenia	30.3	47.0	15.7	20.2	32.3	50.0	9.6
Great Britain	55.1	60.6	23.2	15.9	33.8	25.6	1.7
France	32.4	64.8	28.7	2.8	45.4	30.6	
Germany	57.1	76.0	13.6	60.4	27.9	24.0	1.9
Total	47.7	65.3	22.7	19.9	29.0	28.8	3.3

Table 1.24 shows the percentage of respondents reported the main thinking about zoos

**1.25 Animals in zoo make me feel**

	tense				relaxed
Bulgaria	3.3	5.3	21.7	22.5	47.1
Lithuania	7.7	14.5	35.2	19.8	22.9
Greece	2.5	5.4	22.2	27.6	42.4
Armenia	14.7	3.7	9.4	0.0	72.3
Great Britain	3.9	9.1	39.0	24.7	23.4
France	0.0	0.9	43.5	33.3	22.2
Germany	7.3	11.9	45.7	19.2	15.9
Total	5.5	8.1	29.9	21.0	35.4

Table 1.25 shows the percentage of respondents in the Likert scale question 1.25

**1.26 Animals in zoo make me feel**

	sad				happy
Bulgaria	12.1	9.8	23.4	14.5	40.2
Lithuania	12.1	14.0	27.1	21.8	24.9
Greece	6.4	10.4	27.2	21.3	34.7
Armenia	11.8	3.6	8.2	4.1	72.3
Great Britain	5.7	11.5	31.3	23.2	28.2
France	0.9	2.8	50.9	31.5	13.9
Germany	9.3	14.7	49.3	16.0	10.7
Total	9.4	10.5	28.2	18.5	33.5

Table 1.26 shows the percentage of respondents in the Likert scale question 1.26

**1.27 Animals in zoo make me feel**

	bored		interested		
Bulgaria	2.1	1.3	11.5	20.3	64.9
Lithuania	1.0	1.0	7.4	22.7	68.0
Greece	1.0	2.0	11.4	21.9	63.7
Armenia	7.7		8.2	6.6	77.6
Great Britain	3.2	5.8	20.9	24.3	45.8
France	0.0	0.9	23.1	28.7	47.2
Germany	0.7	1.4	36.3	39.7	21.9
Total	2.3	2.0	14.6	22.3	58.7

Table 1.27 shows the percentage of respondents in the Likert scale question 1.27

**1.28 Animals in the wild make me feel**

	tense		relaxed		
Bulgaria	5.5	5.5	22.0	19.1	47.9
Lithuania	6.7	7.7	22.5	17.3	45.8
Greece	3.4	4.9	19.9	17.5	54.4
Armenia	20.3	2.5	7.6	3.6	66.0
Great Britain	2.9	7.3	33.7	21.1	35.0
France	0.9	3.7	36.1	30.6	28.7
Germany	4.0	6.0	20.1	24.2	45.6
Total	6.2	5.9	23.4	18.4	46.2

Table 1.28 shows the percentage of respondents in the Likert scale question 1.28

**1.29 Animals in the wild make me feel**

	sad		happy		
Bulgaria	1.6	1.6	14.9	19.6	62.3
Lithuania	0.0	1.9	10.6	20.9	66.7
Greece	1.5	1.0	12.7	19.1	65.7
Armenia	7.7	1.5	9.7	3.1	78.1
Great Britain	1.6	4.0	25.1	17.2	52.1
France	0.0	2.8	27.8	36.1	33.3
Germany	2.6	3.3	18.4	21.7	53.9
Total	1.8	2.3	16.2	18.8	60.9

Table 1.29 shows the percentage of respondents in the Likert scale question 1.29

**1.30 Animals in the wild make me feel**

	bored		interested		
Bulgaria	1.2	2.0	9.6	16.3	70.9
Lithuania	0.5	0.5	8.1	14.1	76.8
Greece	1.0	0.0	8.7	13.6	76.7
Armenia	7.2	0.5	10.3	2.1	80.0
Great Britain	1.1	3.4	21.7	20.1	53.7
France	0.0	1.9	18.5	34.3	45.4
Germany	0.0	2.0	29.3	30.0	38.7
Total	1.4	1.6	13.6	16.9	66.5

Table 1.30 shows the percentage of respondents in the Likert scale question 1.30



