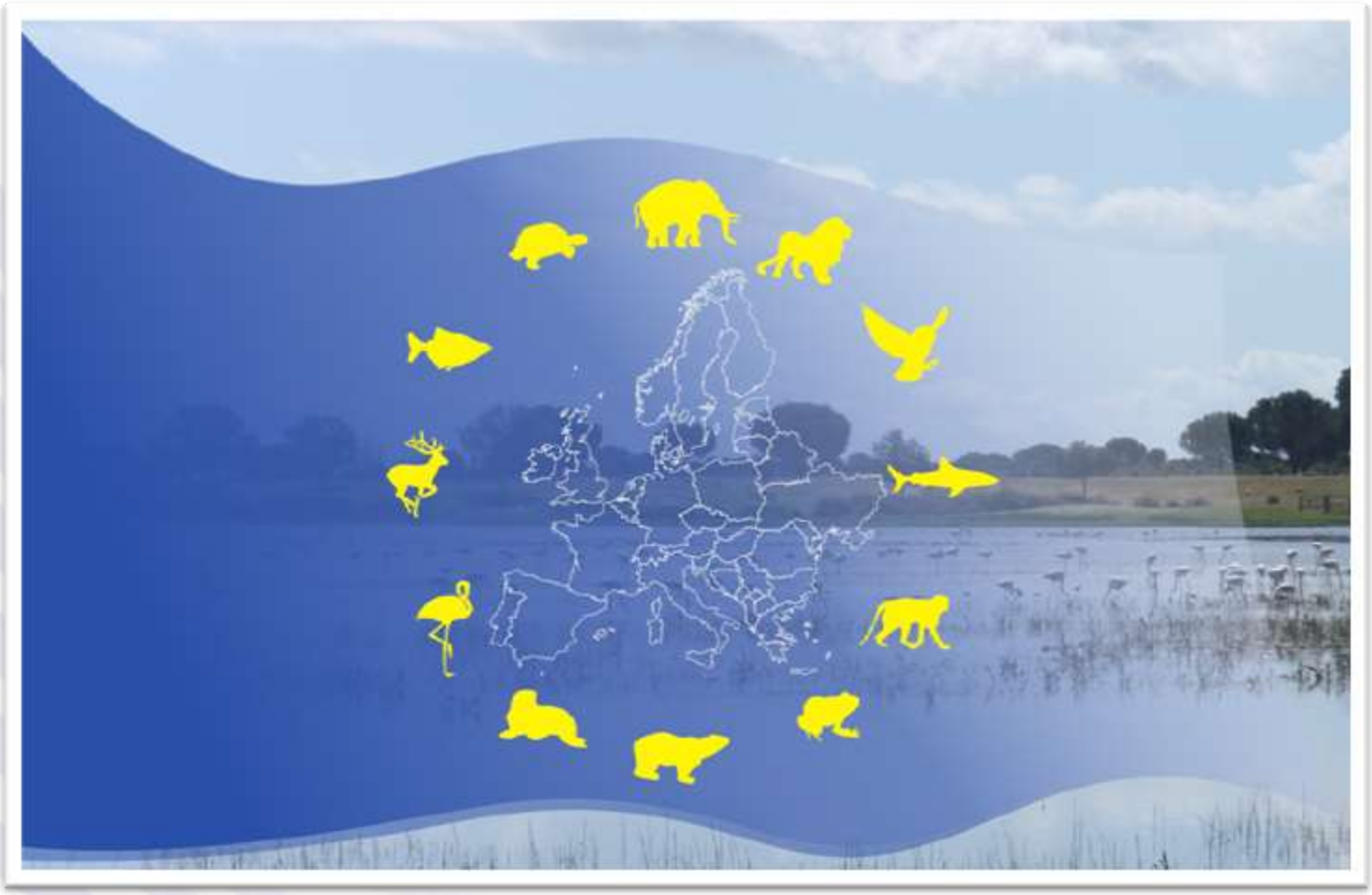

# EU Zoos Directive
# Good Practices Document

July – *2015*

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# Acronyms and Abbreviations

| | |
|---|---|
| ARKS | Animal Records Keeping System |
| ASZK | Australasian Association of Zoo Keepers |
| Awin | Animal welfare indicators |
| AZA | Association of Zoos and Aquariums |
| BIAZA | British and Irish Association of Zoos and Aquariums |
| CBD | Convention on Biological Diversity |
| CBSG | Conservation Breeding Specialist Group (IUCN) |
| CEC | Commission on Education and Communication (IUCN) |
| CEPA | Communication, Education and Public Awareness (IUCN) |
| CITES | Convention on International Trade in Endangered Species of Wild Flora and Fauna |
| DAISIE | Delivering Alien Invasive Species Inventories for Europe |
| DEFRA | Department for Environment, Food and Rural Affairs (UK) |
| EAAM | European Association for Aquatic Mammals |
| EARS | European Alliance of Rescue Centres and Sanctuaries |
| EAZA | European Association of Zoos and Aquaria |
| EAZWV | European Association of Zoo and Wildlife Veterinarians |
| EEP | European Endangered Species Programme (EAZA) |
| EU | European Union |
| FAO | Food and Agriculture Organization of the United Nations |
| FSC | Forest Stewardship Council |
| GFAS | Global Federation of Animal Sanctuaries |
| IAS | Invasive Alien Species |
| ICP | Institutional Collection Plan |
| ICZ | International Congress of Zookeepers |
| IPM | Integrative Pest Management |
| ISB | International Studbooks |
| ISIS | International Species Information System |
| IUCN | International Union for the Conservation of Nature |
| IZE | International Zoo Educators Association |
| MSC | Marine Stewardship Council |
| NGO | Non-governmental organisation |
| OIE | World Organisation for Animal Health |
| SCA | Special Conservation Areas |
| SEAL | Social and Emotional Aspects of Learning |
| SSC | Species Survival Commission (IUCN) |
| SSP | Species Survival Programs (AZA) |
| STB | Studbook |
| TAG | Taxon Advisory Group |
| WAZA | World Association of Zoos and Aquariums |
| WCS | Wildlife Conservation Society |
| WZACS | The World Zoo and Aquarium Conservation Strategy |
| ZIMS | Zoological Information Management System |
| Zoos Directive | Council Directive 1999/22/EC |
| ZSL | Zoological Society of London |

ES

# Purpose of this Good Practices Document

The greatest efforts for the conservation and sustainable use of biodiversity need to focus on measures in the wild. This is the primary focus of EU level action through the Birds and Habitats Directives, the EU Biodiversity strategy, the Regulation on Invasive Alien Species and EC wildlife trade regulations implementing CITES, all of which contribute to achieving objectives of the Convention on Biological Diversity & other international agreements.

Ex situ' conservation is also required for biodiversity conservation. In this context the Zoos Directive (Council Directive 1999/22/EC) was adopted to promote wild animal species protection and conservation by strengthening the role of zoos in the conservation of biodiversity. This is to be achieved by Member States adopting measures for the licensing and inspection of zoos in order to ensure that zoos respect the foreseen conservation and protection measures including appropriate accommodation of the animals.

Member States are responsible for applying the provisions of the Zoos Directive and ensuring their necessary enforcement. . There is a very limited EU role in implementation as the Directive does not foresee the need for a committee or reporting obligations to the Commission. However, a lot of good practice approaches have been developed to assist the role of Zoos in strengthening the contribution to biodiversity conservation, through initiatives such as those of the European Association of Zoos and Aquaria (EAZA).

Building on this experience the Commission launched a study contract with a view to promoting the sharing of experience and of good practice for the implementation of the Zoos Directive aimed at supporting practitioners and Member States in implementing the spirit and requirements of the Zoos Directive. This has involved consultation with experts and practitioners in different Member States and with different representative bodies concerned with Zoos. This included a dedicated expert workshop, which took place in Brussels in November to share draft results of the study.

The document reports on the findings of this study and aims to to summarise the current state of knowledge and highlight good practices to support practitioners and Member States with a view to helping them achieve the overall objective of strengthening the role of zoos in the conservation of biodiversity.

## Structure of the Document

The document is made up of three main chapters:

**Chapter 1** provides a historical summary of the evolution of zoos and places them in the context of evolving biodiversity conservation policy.

**Chapter 2** examines the five conservation measures set out in Article 3 of the Directive that zoos are required to put into practice. Detailed information, examples and open access tools are presented for the benefit of Member States and stakeholders.

**Chapter 3,** examines relevant implementation and enforcement provisions set out in Articles 4 - 9 of the Directive, and provides good practice examples for development and operation of zoo inspection systems.

The Document is complemented by annexes that give additional information on specific issues. This includes relevant case studies and examples of good practices in European countries. A bibliography is included with references to the sources used during the development of this document.- A glossary of terms is provided and some definitions are also inserted within the text to facilitate the use of the document. All of the definitions are taken

from recognised regional or international legal instruments and/or institutions (CBD and UICN) or from acknowledged authors and scientific/professional sources.

Chapter 1

# 1 Background

## 1.1 Introduction.

Council Directive 1999/22/EC relating to the keeping of wild animals in zoos (the Zoos Directive) was adopted with the objective of protecting and conserving wild fauna by strengthening the role of zoos in the conservation of biodiversity.

The Zoos Directive introduces a legal framework for biodiversity conservation in zoos, for implementation by the Member States through the adoption of a licensing and inspection system to ensure that zoos implement conservation and protection measures included in article 3. Article 3 establishes a set of requirements for zoos focussed on promoting conservation programmes, public education and awareness, wellbeing of animals, the prevention of escapes and ecological risks, and adequate record keeping of collections.

Key independent organisations, such as the European Association of Zoos and Aquaria (EAZA) and the British and Irish Association of Zoo and Aquaria (BIAZA) in Europe, and the Association of Zoos and Aquariums (AZA) in America, have produced guidelines to help improve husbandry standards and professional competence in zoos, as well as contributing to scientific research and to the conservation of global biodiversity. Additionally, non-governmental organizations (NGOs) concerned about the wellbeing of the animals kept in zoos have provided significant information, such as through the independent EU Zoos inquiry 2011,[1] pointing out the need to improve the implementation and enforcement of the Zoos Directive.

As Member States have responsibility for the implementation of the Directive, the Guide is intended to help improve compliance with the requirements of the Directive through the sharing of experience and good practice. It has a clear focus on biodiversity conservation as this is the focus of the Zoo Directive.

With the objective of supporting the Member States and practitioners in the implementation of the Zoos Directive, this document aims to present the current state of knowledge on good practices with particular regard to the provisions set out in Article 3 of the Directive.

In accordance with the structure of the Zoos Directive the document is laid out in three main chapters:

Chapter 1. Background, aim and scope of the Zoos Directive

Chapter 2. Requirements applicable to zoos

Chapter 3. Implementation and enforcement

[1] An initiative of Born Free Foundation.

## 1.2 A short history of zoos

The various functions of zoos have evolved over time. The word zoo originated in the mid-19th Century as an abbreviation of zoological garden, which was a specific reference to that in Regent's Park in London. The Oxford English Dictionary defines a zoo as "an establishment which maintains a collection of wild animals, typically in a park or gardens, for study, conservation, or display to the public."

The origins of the zoological garden or ménagerie can be traced back as far as 3500 BC, to Hierakonpolis in Egypt. However it is only in contemporary times that the concept of a zoo and its role in society has been a subject for debate transforming profoundly the purpose of zoos.

***Image**: Egyptian relief at the British Museum (London, UK)*

In ancient times the keeping of exotic animals, exclusively in private collections was for their symbolic value representing power and wealth. The expansion of the Greek Empire, around the third Century BC, brought a new interest in nature as a science and a desire to study animals began to flourish, leading to a more profound study and classification of the species. This led to the establishment of the first 'ménagerie' open to the public in Alexandria.

Another important landmark for zoos was the discovery of the Americas in 1492, with its grand variety of new species. This interest in new species as well as a dramatic increase in the number of menageries was bolstered by the flourishing international trade in the 17$^{th}$ Century. During the 18$^{th}$ and 19$^{th}$ Centuries, a number of more modern zoos developed in Europe, placing increased importance on the study of animal behaviour and nature in general. Linking animals and plants to create a more naturalistic habitat for each species gave rise to the concept of the zoological garden and it was London Zoo, at Regent's Park, that most clearly defined the educational and scientific importance of these centres rather than their attraction as exhibition centres. By the mid-19$^{th}$ century entrance to London Zoo was granted to the public and zoos throughout Europe began to follow suit, allowing the general public to come into contact with species they had never seen before. Given the dramatic number of species threatened at the beginning of the 20$^{th}$ century, there was increased concern about the need to protect and conserve the planet's biodiversity. This intensified during the 1970s, with the growing influence of environmental organisations, when the first criticisms of zoos were voiced and the concept of zoos was questioned. The concept of zoos as a place purely for the exhibition of species began to shift towards considering the animals' needs and welfare.

Despite their long history it is only very recently that the functions of zoos have become subject to legislation. A growing social consciousness and understanding about the need to protect wild animals and their habitats, and concern about animal welfare, has led to a fundamental change in the role expected of modern zoos. Their potential as centres of conservation and education is important given their reach to the wider public and their ability to influence attitudes, as well as their capacity to contribute to the conservation and protection of biodiversity through *in situ* and *ex situ* projects.

At the same time as civil society's awareness grew, culminating with the Earth Summit in Río de Janeiro in 1992, the zoo sector was already evolving in this same direction. In 1993 the International Union of Directors of Zoological Gardens (now WAZA), together with the CBSG, IUCN and WWF published "The World Strategy for Conservation in Zoos and Aquaria", the first strategy of its kind, which reflected the common objectives and practices that zoos should follow in conservation. It noted the evolution of zoos from their role as living museums to one of modern conservation centres, where education, research and captive breeding and reintroduction programmes are undertaken, over and beyond purely recreational activities.

The zoo sector is still in the process of adapting to the requirements of the Zoos Directive. Improvement has already been made towards meeting the demands of the legislation even though changing the role of zoos presents important challenges. However there is little doubt that if all zoos, in collaboration with other institutions, fulfil their mission towards global biodiversity conservation the rewards would be invaluable

## 1.3 Framework of the Zoos Directive

According to its preamble, **Council Directive 1999/22/EC relating to the keeping of wild animals in zoos** (Zoos Directive) aims "to provide a common basis for Member States' legislation with regard to the licensing and inspection of zoos, the keeping of animals in zoos, the training of staff and the education of the visiting public". This common basis is considered necessary "to ensure that zoos adequately fulfil their important role in the conservation of species, public education, and/or scientific research" and, in this way, to contribute to the implementation of the EU legislation on conservation of wild fauna.

Thus, the Zoos Directive is framed in its preamble by the following EU legislation:

- Council Directive 79/409/EEC (Birds Directive);
- Council Directive 92/43/EEC (Habitats Directive);
- Council Regulation (EEC) No 338/97.

The preamble notes that action at EU level is required so that zoos contribute to the conservation of biodiversity in accordance with Article 9 of the Convention on Biological Diversity (CBD).

The United Nations Convention on Biological Diversity (CBD) (1992) pursues "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources…"

Under Article 9 of the CBD, zoological parks in the EU can play a valuable role in the conservation of biodiversity, especially in relation to the measures to be adopted regarding *ex situ* conservation. This Article outlines the *ex situ* conservation measures that each contracting party of the CBD (EU amongst others) shall adopt, (see text box). Zoos can contribute specifically to measures (b), (c) and (d). (See also section 2.2.2).

**Relevant Definitions**

The Convention on Biological Diversity refers to '***ex situ* conservation'** as the conservation of components of biological diversity outside their natural habitats.

**Article 9, Convention on Biological Diversity - *Ex situ* Conservation**

Each Contracting Party shall, as far as possible and as appropriate, and predominantly for the purpose of complementing *in situ* measures:

(a) Adopt measures for the *ex situ* conservation of components of biological diversity, preferably in the country of origin of such components;

(b) Establish and maintain **facilities for *ex situ* conservation of and research on** plants, **animals** and micro-organisms, preferably in the country of origin of genetic resources;

(c) Adopt **measures for the recovery and rehabilitation of threatened species and for their reintroduction into their natural habitats** under appropriate conditions;

(d) Regulate and **manage collection of biological resources from natural habitats for *ex situ* conservation purposes** so as not to threaten ecosystems and *in situ* populations of species, except where special temporary *ex situ* measures are required under subparagraph (c) above; and

(e) Cooperate in providing financial and other support for *ex situ* conservation outlined in subparagraphs (a) to (d) above and in the establishment and maintenance of *ex- situ* conservation facilities in developing countries.

At the European level, Council Regulation (EEC) No 338/97 on the protection of species of wild fauna and flora by regulating trade embraces all of the provisions of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES, 1975). Its purpose is to prevent international trade in wild plant and animal species posing a critical risk for their survival, with varying degrees of protection and control. The European Union has introduced legislation imposing even more stringent conditions on foreign trade[2] than those included in CITES. According to this EU regulation, in relation to the keeping and exhibition of [indigenous or non-indigenous] wild animals in zoos there should be "evidence of the availability of adequate facilities for the

[2] Further guidance in the current version of the Reference Guide – EU Wildlife Trade Regulations (2013) that covers Council Regulation (EC) No 338/97 and Commission Regulation (EC) No 865/2006, as amended.

accommodation and care of live specimens of a great many species before their importation into the Community is authorized". Furthermore, it prohibits "the display to the public for commercial purposes of specimens of species listed in [its] Annex A thereof unless a specific exemption was granted for education, research or breeding purposes".

Both Council Directive 79/409/ECC on the conservation of wild birds and Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora aim to contribute to the conservation of biodiversity in Europe through legislation that protects wild species and their habitats. Whilst the Birds Directive provides for the long term conservation of all wild bird species in the European Union, the goal of the Habitats Directive is to protect all those wild species listed in its annexes and their habitats through the establishment of a network of special conservation areas (SCAs). Also embracing Special Protection areas classified under the Birds Directive this network is known as *Natura 2000*. The acquisition and/or use of certain listed species are conditional on compliance with purposes of research and education, repopulation, reintroduction or breeding.

Lastly, it is also noted in the preamble to the Zoos Directive that, "a number of organisations [have] produced guidelines for the care and accommodation of animals in zoos", naming the European Association of Zoos and Aquaria[3], "which could, where appropriate, assist in the development and adoption of national standards."

**SUMMARY 1 - PRECEDENTS OF THE ZOOS DIRECTIVE**

Convention on Biological Diversity (UN, 1992), Article 9:
- *ex situ* conservation measures shall be adopted complementing *in situ* conservation measures

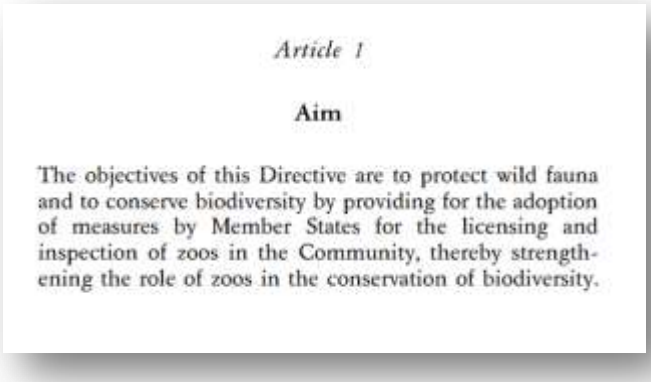
Council Directive 79/409/EC (the Birds Directive) and Council Directive 92/43/EC (the Habitats Directive):
- anticipate exceptions to the prohibition to capture, keep and trade a certain number of species for research, education and conservation

Council regulation (EC) 338/97 on the protection of species of wild fauna and flora by regulating trade:
- animal exhibition to the public is prohibited unless justified for purposes of education, research or captive breeding (Article 8)

European Association of Zoos and Aquaria Guidelines for the accommodation and care of animals in zoos (1994):
- guides the conditions of animal care at European zoos.

## 1.4 Aim and scope of the Zoos Directive

### 1.4.1 Article 1 - Aim



*Article 1*

**Aim**

The objectives of this Directive are to protect wild fauna and to conserve biodiversity by providing for the adoption of measures by Member States for the licensing and inspection of zoos in the Community, thereby strengthening the role of zoos in the conservation of biodiversity.

[3] EAZA Guidelines for the accommodation and care of animals in zoos (1994). New version (2005), currently under review.

The main objectives of the Zoos Directive are to protect wild fauna and to conserve biodiversity. For this purpose, Article 1 states that Member States shall adopt measures for licensing and inspection of zoos in order to strengthen the role of zoos in the conservation of biodiversity.

**Relevant Definitions**

**Conservation of biodiversity** is the management of human interactions with genes, species and ecosystems so as to provide the maximum benefit to the present generation while maintaining their potential to meet the needs and aspirations of future generations; encompasses elements of saving, studying and using biodiversity. (Convention on Biological Diversity)

Important EU conservation policies and legislation are in place to protect and conserve biodiversity. These include Natura 2000, described as the centrepiece of EU nature and biodiversity policy, a network of nature protection areas established under the 1992 Habitats Directive.

*Ex situ* conservation and the conservation of natural habitats (*in situ* conservation) are two of the principal tools with which to conserve biodiversity. *Ex situ* conservation actions are designed to conserve the genetic diversity and populations of species outside their natural habitats. Through the Habitats Directive, EU Member States have committed themselves to achieve a 'favourable conservation status' for species and habitats of European conservation concern. They have also committed themselves to achieve good conservation status of wild birds under the Birds Directive. *Ex situ* conservation measures complement *in situ* conservation measures and can contribute to ensuring the viability of some threatened wild populations and prevent extinctions. Further information in section 2.2.4.1.

***Ex situ* collections** include plant or animal collections, zoos, botanical gardens, wildlife research facilities, and germplasm collections of wild and domestic taxa.

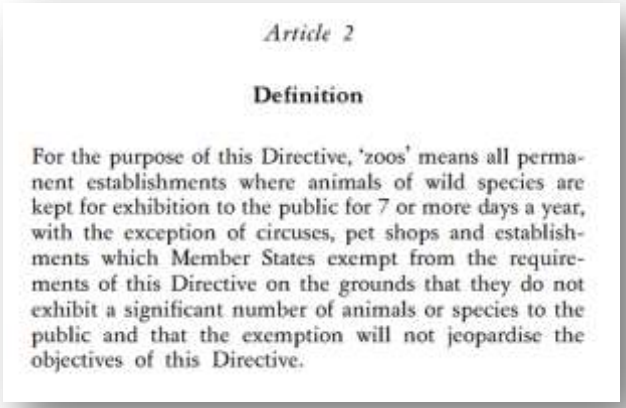
Many zoos have already recognised their commitment towards the protection of wild fauna and the conservation of biodiversity as defined in successive World Association of Zoos and Aquaria's Strategies since 1993; and which reflect the common objectives and practices that zoos should follow in conservation of biodiversity. The 2005 World Zoo and Aquarium Conservation Strategy (WZACS - currently under review) emphasises that the primary goal of modern zoological parks and aquariums is "conservation" as "the long term maintenance and protection of populations of species in natural habitats and ecosystems". The 2009 Global Aquarium Strategy for Conservation and Sustainability encourages aquariums to contribute to the research, conservation and sustainability of marine species and habitats.

In 2010, the international community at the 10th Conference of the Parties (COP) of the Convention on Biological Diversity (CBD) reaffirmed biodiversity loss as a major threat and proposed the Aichi biodiversity targets to monitor progress on biodiversity protection worldwide, with the aim of halting biodiversity loss by 2020. Zoos can also contribute considerably to the EU Biodiversity Strategy to 2020 and the CBD Aichi Biodiversity Targets through their role and visible public profile, which attracts large numbers of visitors. This provides them with a unique opportunity to educate and raise awareness about the need to protect the environment and its biodiversity (See section 2.3).

In conclusion, regarding their potential to help conserve biodiversity, zoos occupy a strategic position and hold a significant responsibility as one of the few places where most people actually come close to many different wild species. At the same time, society has become more sensitive to animal welfare and the purely recreational role of zoos; visitors may be more open to zoos as a place to learn about conservation. Well-managed zoos can play an important role both in educating the public about wild fauna and their habitats as well as participating in activities that help conserve biodiversity and specifically protect threatened wildlife.

To support the practical implementation of the Zoos Directive, chapter 2 of this guide examines the specific requirements set out in Article 3 of the Directive. Relevant good practice is provided to assist both Member States and zoos in the conservation of biodiversity.

## 1.4.2 Article 2 - Scope of the Zoos Directive



*Article 2*

**Definition**

For the purpose of this Directive, 'zoos' means all permanent establishments where animals of wild species are kept for exhibition to the public for 7 or more days a year, with the exception of circuses, pet shops and establishments which Member States exempt from the requirements of this Directive on the grounds that they do not exhibit a significant number of animals or species to the public and that the exemption will not jeopardise the objectives of this Directive.

### *1.4.2.1 Definition of "zoo"*

The Zoos Directive defines "zoo" as a **permanent establishment where animals of wild species are kept for exhibition to the public for seven or more days a year.** […]".

The legal definition of zoo ["for the purpose of this Directive"] sets the conditions to be assessed by Member States' competent authorities in order to determine whether a establishment shall be included in the scope of this Directive or not and therefore require them to comply with the provisions of Article 3. Such a wide variety of establishments keep animals of wild species and the circumstances under which these animals are exhibited to the public are so different that, in order for competent authorities to make an appropriate decision, particular attention to the following aspects of the definition is recommended:

- 'Permanent establishment'
- 'Animals of wild species'
- 'Kept for exhibition to the public […]

**'Permanent establishment'**

It is already determined in Article 2 that when the animals are exhibited to the public for "seven or more days a year" the establishment should be considered a zoo. Complementarily, it can be useful to look at the type of construction (provisional or permanent facilities), which may help Member States consider the provisional or stable nature of the establishment, in terms of the duration of its activity. However, this should not be used as an excuse for any establishment to remain open with temporary facilities where animals are exhibited for a long time, thus avoiding the application of the Zoos Directive. In these cases, the competent authorities might give utmost consideration to the fact of the continuous exhibition of animals and not to the characteristics (temporary or permanent) of the construction of the establishment, ensuring, in this way, compliance with the objectives of the Zoos Directive.

**Relevant Definition**

**Wild species:** Organisms captive or living in the wild that have not been subject to breeding to alter them from their native state. (CBD, CEPA Toolkit Glossaries)

'**Animals of wild species'**

Zoo collections are mostly composed of wild species, both indigenous and exotic, although they may also include domestic animals or domesticated species (production animals).

It is necessary to mention the similarities and differences between "zoos" and "**aquariums**" given the historical use of the two terms together in the zoo field. The distinction is due to the different conditions required for the keeping of wild aquatic and marine species. However, a "zoo" is defined in Article 2 as an establishment where animals of wild species are kept for exhibition to the public. This definition includes aquariums where wild aquatic and marine species are kept. Aquariums are therefore included within the scope of the Zoos Directive.

"Protection of **wild fauna**" is one of the objectives of the Zoos Directive together with "conservation of biodiversity". Article 3 specifies the conservation measures that Member States shall require from zoos in order for them to fulfil these objectives. The conservation measures refer to *ex situ* conservation activities, which are complementary to *in situ* conservation activities in accordance with articles 8 and 9 of the Convention of Biodiversity. Therefore, both animals of wild species kept in zoos and those living in the wild may be target animals and/or species on which to focus and apply the conservation measures in general as well as for specific protection measures.

With regard to animals of **domestic and/or domesticated species** that form part of the zoo collection, notwithstanding any other international, EU or national legislation that may apply to their conditions and protection, Member States' competent authorities may consider applying to these the requirements related to accommodation and animal husbandry established in Article 3 of the Zoo Directive.

**'Kept for exhibition to the public […]':**

The definition requires that zoos are open to the public, with or without an entrance fee, and that visitors can view the animals exhibited even though some individuals may temporarily or permanently be out of view due to welfare, conservation or security issues.

Evaluating what should be considered "public" in the definition (in terms of number of visitors, the kind of public or frequency of visits) may be a task for Member States' competent authorities in some cases (e.g. private collections regularly visited by friends of the owner, rescue centres that receive restricted scheduled visits, etc.). In this respect, the Zoo Licensing Act 1981 Guide (by the UK Department of Environment, Food and Rural Affairs) provides valuable guidance in its Annex B (see box of example below).

In any case, Member States should be aware that an establishment that keeps animals of wild species but is not open to the public (e.g. private collections, rescue centres, sanctuaries…), although not under the scope of the Zoos Directive, are regulated by other EU and/or national legislation (e.g. health and sanitary regulations). Further information in section 2.4.4.2.

All collections and/or establishments with the characteristics detailed in the definition of article 2 are considered to be included within its scope, regardless of:

- The denomination or the name (e.g. Biological Park, Marine Park, Nature Centre, Wildlife Park…)
- The public or private nature (e.g. municipal zoos, private foundations, etc.)
- The type of species exhibited (e.g. aquaria, dolphinaria, bird gardens, butterfly collections)
- Other activities offered to the public (e.g. entertainment, purchases, restaurants, animal's rescue and rehabilitation, training courses, accommodation, etc.) together with the exhibition of wild animals.

However, in some cases competent authorities may face certain difficulties when evaluating whether establishments fall within the scope of the Zoos Directive, e.g. public parks where wild species live, the exhibition of a few animals in restaurants, shows or performances in establishments that are not circuses, collections of animals with only one or two species, a small aquarium at a dentist's office.

In order to clarify these and other "grey areas" and further specify the definition of "zoo", some Member States' national zoo legislations have regulated the scope of the Zoos Directive in more detail. See Annex 6.4.

In some cases a direct and comprehensive approach has been implemented to categorize different establishments depending on the number of animals or species or the level of protection of the species or animals kept in the zoo. Other countries have also regulated certain exceptions to the scope of the Zoos Directive based on the possibility given to Member States in Article 2, as explained below.

**Example** of good practices:
The Zoo Licensing Act 1981 Guide, published by the Department of Environment, Food and Rural Affairs (DEFRA) of UK in 2012, provides in its Annex B, guidance to UK competent authorities for deciding whether collections fall within the scope of the zoo legislation, e.g. evaluating some unusual cases called "grey areas" (pet shops with disproportionately large exhibit areas, collections where animals are only viewed by web-cam).

#### *1.4.2.2 Exceptions to the scope of the Directive*

Article 2 (last part) refers to two specific exceptions within the scope of the Directive, "circuses" and "pet shops", as well as to the possibility for Member States, exercising their competence, to exempt certain establishments under the criterion based on the "significant number" of animal or species, although by legal definition they should be considered under the Zoos Directive.

**Circuses and pet shops are excepted** from the application of the Zoos Directive on the basis that these activities (merely entertainment and commerce of animals for profit) fall under areas that are irreconcilable with its objectives. Ideally attention should focus on those establishments whose main activity is to put on shows using wild animals which are open to the public. By applying the adequate definitions of 'zoo' and 'circus' (see glossary of *terms*) authorities may better understand whether some of these establishments are purely circuses (which usually do not have permanent installations) or zoos, offering animal demonstrations. In the case of the latter, the Zoos Directive applies.

**Member States may exempt other establishments** "on the grounds that they do not exhibit a significant number of animals or species to the public and that the exemption will not jeopardise the objectives of this Directive".

Ideally, competent authorities will publish judgement criteria to assist operators in knowing what comprises a zoo. Member States are empowered to decide which establishments, besides circuses and pet shops, could be exempted from the application of the Zoos Directive. When a Member State evaluates what "significant number of animals or species" exhibited to the public is, the principal criterion to take into account is that the exemption of those establishments does not jeopardise the objectives of the Zoos Directive. Once again, conservation of biodiversity and protection of wild fauna are the essential goals to bear in mind.

Assessing the meaning of "significant number" may involve considering both quantity and quality aspects. This criterion is related to the conservation status of the species established and designated by international conventions and EU legislation, as well as by national and regional regulations on fauna protection, but specifically those species of wild fauna of Community interest under the Habitat and Birds Directives.

**Example**

Establishments whose collections comprise a number of animals of just one species which are of great conservation value as recognised by international instruments or by a high level of protection at regional, national or local conservation levels are recommended to be included in the scope of the Zoos Directive,

In their transpositions of the Zoos Directive into national zoo laws in Europe, some different approaches have been taken by Member States in order to determine what is a "significant number of animal or species" and decide which establishments will be excluded from the scope of the Directive. See examples in Annex 6.4.

Possible exceptions to the scope of the Zoos Directive:

- Circuses

- Pet shops
- Establishments that do not exhibit a significant number of animals or species to the public (the exemptions made by Member States competent authorities will not jeopardise the objectives of the Directive)

The Zoos Directive is the primary regulation for establishments defined as zoos under its Article 2. Without prejudice to other national or EU legislation (e.g. governing animal health, security) applying to these establishments, zoos are required to play a role in the conservation of biodiversity in compliance with the requirements of Article 3.

**SUMMARY 2 – AIM AND SCOPE OF THE ZOOS DIRECTIVE**

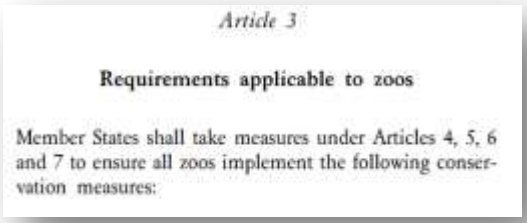
- Conservation of biodiversity and protection of wild fauna are the principal objectives of the Zoos Directive.
- Zoos are required to play a role in the conservation of biodiversity by protecting wild fauna and participating in conservation activities.
- Member States shall adopt measures for licensing and inspection to ensure that zoos comply with the conservation measures under Article 3.
- Zoos are defined in Article 2 of the Zoos Directive as 'permanent establishments where animals of wild species are kept for exhibition to the public for 7 or more days a year', with certain exceptions.
- The Zoos Directive does not regulate circuses or pet shops.
- Member States are competent to exempt certain establishments if they consider they do not keep and exhibit "a significant number of animals or species" to the public.
- The exception of any establishment from the scope of the Zoos Directive should not jeopardise its conservation objectives.

Chapter

2

# 2 Requirements applicable to zoos

## 2.1. Introduction – Conservation measures (Article 3)



*Article 3*

**Requirements applicable to zoos**

Member States shall take measures under Articles 4, 5, 6 and 7 to ensure all zoos implement the following conservation measures:

Article 3 contains the requirements for zoos of the Zoos Directive: relating to different conservation measures. Reference is made to the following articles (4, 5, 6 and 7), which ensure the implementation of Article 3.

The requirements under Article 3 are termed "conservation measures" as they are all interrelated and seek to achieve the overarching aim of the EU Zoos Directive, which is to conserve biodiversity.

The first indent of Article 3 articulates the conservation activities *per se*, which contribute directly to the conservation of biodiversity, which is the overall objective of the Zoos Directive.

The second indent concerns public education and awareness actions related to the conservation of biodiversity. The quantity and complexity of the activities to be undertaken will depend on the capacity and capability of individual zoos.

The extent of a zoo's conservation and educational activities may be determined in proportion to its size, resources and the diversity and conservation interest of its collection. Similarly, conditions attached to licences can be tailored to reflect the size and nature of individual zoos.

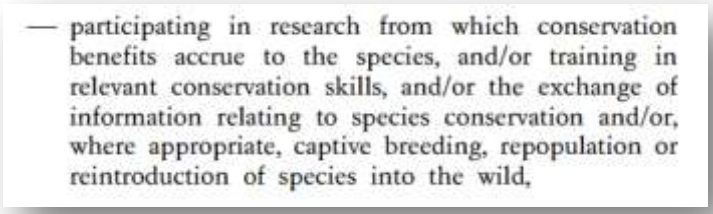
The third indent is related to the quality of the living conditions of zoo animals and specifically expresses how to achieve animal care and husbandry standards that meet conservation and biological needs of the species.

The fourth indent underlines the ecological risk from escape of animals and the health risk to the zoo animals from intrusion of pests and vermin. This is to be avoided and consequently, as with the previous requirement, clear conditions attached to licences are necessary for enforcement.

The fifth indent reflects the need to keep an accurate control over the zoological collection. Keeping up-to-date records allows the use of data for conservation purposes as well as providing evidence that the management of the collection is being conducted according to the objectives of the Zoos Directive.

The following sections give more detailed information on each of the five conservation measures, illustrated with good practices and methodologies and also describing useful tools and criteria that Member States can employ to assess their implementation.

## 2.2. Article 3 - first indent - Conservation, research and training


— participating in research from which conservation benefits accrue to the species, and/or training in relevant conservation skills, and/or the exchange of information relating to species conservation and/or, where appropriate, captive breeding, repopulation or reintroduction of species into the wild,

### 2.2.1. Scope

Article 3 (first indent) contains the conservation measures that contribute actively (both directly and indirectly) to the protection of wild fauna and the conservation of biodiversity. It requires that zoos should participate in one or more of the following:

- research from which conservation benefits accrue to the species, and/or;
- training in relevant conservation skills, and/or;
- the exchange of information relating to species conservation, and/or;
- where appropriate, captive breeding, repopulation or reintroduction of species into the wild**.**

These actions are embedded in *ex situ* and *in situ* conservation projects in order to contribute effectively to conservation.

Captive breeding, repopulation and reintroduction of species into the wild are complex techniques, core to *ex situ* conservation methodologies and typically applied within the framework of collaborative conservation projects.

The use of the word “participating” implies a collaborative nature to the measures. Projects undertaken by zoos on their own can satisfactorily comply with the requirements of Article 3 and can be valuable contributions to conservation. However, in order to be effective and successful, the types of direct conservation measures specified usually require the participation of several actors (e.g. governments, local communities, universities, conservation organisations). Thus, zoo conservation activities and projects become part of the toolbox of effective conservation work and embedded in the wider applied conservation community.

The specified research, training and information exchange measures are expressed as being complementary but also as alternatives (and/or). The Article does not impose a minimum number of measures, activities or projects in which each zoo is required to participate. This is a consideration of the huge diversity and considerable differences found among zoos. It would not be reasonable to expect the same type, volume or complexity of conservation activities to be undertaken by zoos of different size and nature.

The term “where appropriate” applied to captive breeding, repopulation and reintroduction into the wild acknowledges that these are complex activities requiring suitable scientific, legal and collaborative conditions to be beneficial and effective conservation measures. In recognition of this, IUCN revised its guidelines on reintroduction in 2012 (IUCN Guidelines on conservation translocations). .

The conservation actions and examples described throughout this section are not exclusive and are to be considered as contributing to the overall conservation activities undertaken by the zoo, not as each potentially fulfilling the conservation requirement on its own. Member State Competent Authorities have the discretion to evaluate whether the combination of the actions undertaken is adequately proportional to the nature and capabilities of zoos and therefore fulfils the requirements of Article 3 (first indent).

**Important points concerning Article 3 (first indent) are:**

- it specifies the types of active conservation actions for zoo participation;
- measures are quantifiable direct (and indirect) contributions to the conservation of species;
- measures are directed towards species conservation, which may include their habitats; thus they may involve both captive and wild animals (independently of whether the species is in the collection) and may take place within zoo grounds (e.g. ex situ conservation) as well as at natural habitats (in situ conservation);
- the word ‘participating’ indicates the specified measures may be undertaken in collaboration with other actors;

- exchange of information can be a conservation measure benefiting two or more parties; zoos can produce valuable information, which might be shared through publication, reporting or otherwise made available;
- all zoos are required to participate in at least one of the specified measures;
- it does not state minimum requirements. It is up to Member States to establish conditions through legislation and/or licensing and inspection arrangements.

### 2.2.2. How zoos actively contribute to the conservation of biodiversity

Article 3 (first indent) of the Zoos Directive lays out actions which can be undertaken both *ex situ* and *in situ*, with the only exception of captive breeding.

*In situ* and *ex situ* conservation activities are increasingly becoming integrated with each other and most conservation initiatives encompass a combination of the techniques and activities laid out in Article 3 (first indent) and often also those of Article 3 (second Indent), for them to be complete and effective conservation projects. Zoos may focus on achieving positive conservation results, i.e. striving for "conservation success", "integrated conservation" or "working on the quest of alignment [of human and biodiversity conservation interests][4]".

The crucial questions are how can zoo professionals guide their institutions towards the best course of action to fulfil stated conservation aims and how can zoo inspectors evaluate whether a zoo is meeting conservation requirements?

In this regard, there are several important points to bear in mind:

- Member States legislation (i.e. the transpositions of the Zoos Directive) can provide further details of the number, type and other specifications of the conservation measures described under Article 3 (first indent) (See Annex 6.4: Member State zoo legislation).
- Communication between Member State authorities responsible for biodiversity and zoos can help identify areas where their collaboration may be most effective. For example, zoos may become active partners in the implementation of the Natura 2000 network conservation of protected areas (see Member State' Natura 2000 webpages), all the way up to the targets stated in the EU Biodiversity Strategy to 2020 and CBD Aichi Biodiversity Targets.
- Careful planning is required to make the best contributions to conservation and maximise the conservation benefit of a zoo's work. Planning tools can be used to help develop conservation activities; from basic applications that help with defining objectives and reporting outcomes and progress, to more sophisticated approaches such as integrated species conservation planning assisted by international conservation bodies such as IUCN's SSC (Species Survival Commission) Species Conservation Planning Sub-Committee.
- Zoos may usefully demonstrate their continuous commitment to conservation. Effective conservation actions are on-going, ambitious, measurable, assessable, objective-driven, forward looking and often collaborative in nature. Member State zoo inspection questionnaires, conservation reports, project documents or correspondence with others involved in conservation activities will all help demonstrate a zoo's active contribution to conservation.
- As mentioned above, zoos in the EU are very diverse, but the contributions they can make to conservation are equally varied. Effective contributions will vary with the structure and resources of each zoo. For example, small institutions may concentrate on actions at the local level, collaboration with local wildlife authorities, protected areas, NGOs and universities; medium size zoos may establish such connections at the national level or become specialised depending on the composition of their animal collections and large institutions may be involved in conservation actions also at the international level. National zoo associations and EAZA assist their members in many aspects connected with these objectives.

### 2.2.3 Conservation measures

#### *2.2.3.1 Research from which conservation benefits accrue to the species*

Article 3 (first indent) of the Zoos Directive specifically mentions participating in research from which conservation benefits accrue to the species. This means research that is in some meaningful way connected to conservation objectives.

[4] Calibrating conservation: new tools for measuring success (Kapos *et al*., 2008); WZACS (2005); Key topics in conservation biology (Macdonald *et al*., 2007).

Some research undertaken at zoos may relate to basic processes (such as health, husbandry, animal behaviour), which are very important for the integration of zoos within the scientific community and to continuously improve the welfare of animals in human care. Published research contributes to the exchange of information requirement (see section 2.2.3.3 below). In some cases however, these types of research may not be connected to conservation objectives and therefore may not be considered as fulfilling this requirement.

Research may be subject to Member State regulations. Research quality needs to be assured by following existing protocols that are used by collaborating academic institutions, by adhering to professional association standards (i.e. from national associations or EAZA Research Standards) or creating institutional standards.

Zoos participating in research will benefit from developing written research plans with evaluation criteria and specific goals related to the conservation objectives of the institution. The EAZA Research Strategy (2008) provides essential information and guidelines for developing zoo research.

**Examples**

Research *"from which conservation benefits accrue to the species"* will often encompass an applied component and may be undertaken as part of *ex situ* conservation or *in situ* projects. It may include a wide variety of topics, such as:

- Use of zoo data to create demographic projections, advance metapopulation management possibilities and study the viability of captive populations.
- Further knowledge on research methodologies and technology to apply in the field (e.g. camera trapping, non- invasive hormone and genetic make-up determination, telemetry systems). E.g. Budapest Zoo "tested" some intracoelomic radiotelemetry devices in zoo vipers before using them in the reintroduced Hungarian meadow vipers as part of its collaboration with a LIFE+ project.
- Research pertaining to the health of wild animals which may directly contribute to that of their wild counterparts.
- Research to determine basic physiological parameters that can be used (or need to be calculated) to make proper interpretation of field data and to be used in mathematical models (e.g., isotopic fractionation indexes, metabolic rates, basal metabolism, etc.).
- Research on genetic and behavioural adaptations to captivity and how to overcome them (e.g. stimulating species typical behaviours, advancing soft release and pre-release techniques)
- Reproductive technologies (assisted reproduction and contraception). This and other types of delicate research may sometimes be undertaken using "surrogate species", i.e. taxonomically similar non-endangered species, instead of the often few individuals available from endangered species.
- Conservation medicine research (e.g. epidemiology, parasitology of wild vs. captive populations).
- Invasive Alien Species (IAS) research. Case Study: Combating the threat of IAS at Latgales Zoo (Latvia).
- Experimental wildlife conflict mitigation and management techniques, e.g. research on carnivore deterrent systems (as long as it does not cause an excessive disturbance to the individual animals), or attraction systems for census or monitoring purposes.
- Research on solving sustainability issues. For example, biomimicry research uses biological systems knowledge to solve (often ecological) problems, and the controlled conditions of zoos might be ideal sources of information for this type of research (e.g. Biomimicry Europa, Biomimicry 3.8 Institute, Zurich Zoo and San Diego Zoo participate in biomimicry research).
- Research on the two relatively new fields or integrated concepts of "conservation psychology" (which explores connections between the study of human behaviour and the achievement of conservation goals, (e.g. Conservation psychology and zoos, Litchfield & Foster, 2009) and "conservation welfare", which calls for a better integration of these disciplines, both in *ex situ* and *in situ* situations (e.g. Conservation welfare, Walker, 2012; Animal welfare and conservation: Working towards a common goal, WILDCRU, 2010)

Research may be undertaken by zoos on their own (provided properly qualified staff are involved in the design and supervision of the projects) or in collaboration with academic institutions, public or private research centres or non-governmental organisations (NGOs). The latter might be a better option for smaller institutions which may lack the resources to undertake their own research projects, however in that case it may be appropriate to appoint a member of staff as research liaison and coordinator.

Results may be divulged and published, preferably in peer-reviewed publications when appropriate, but also through events such as conferences, general interest publications, zoo professional publications, web publications and on institutional Web pages. (See Annex 1.1: Publications featuring zoo research).

### *2.2.3.2 Training in relevant conservation skills*

The training element under Article 3 (first indent) concerns the provision of conservation training for zoo professionals, as well as the provision of opportunities for experience based training for other recipients at zoos.

Knowledgeable staff will make conservation-conscious decisions and contribute ideas. Student training increases connections with other institutions and research output. Collaboration in the training of zoo inspectors contributes to appropriate law enforcement and closer communication between zoos and environmental authorities. Open training events can bring revenue, prestige and new contacts.

**Staff training:**

- Newly-contracted staff members need to have the proper qualifications and/or experience for the job. In addition, it would be advisable for anyone entering a relevant position of responsibility within a zoo to undertake an introduction on the role of zoos in conservation, the conservation objectives of the institution and their particular role within that mission.
- Management staff (staff entering positions of responsibility over important areas of overall zoo activity) may have educational backgrounds un-related to zoos or conservation. It is therefore advisable that they undertake training on the requirements of the Zoos Directive, relevant Member State legislation and general zoo conservation concepts and methods.
- Animal care staff may be directly responsible for the accommodation and husbandry conditions of the animals in their charge. Accommodation requirements continuously evolve due to their species-specific and even enclosure-specific nature. Consequently, it is advisable that animal care staff undergo initial and periodic (e.g. annual) training to maintain up-to-date knowledge concerning animal accommodation and handling, particularly with regard to the species under their care.
- The International Congress of Zookeepers (IZC) provides contact with national zookeeper associations, which often produce relevant documentation in a number of languages (ABWAK -UK-, AFSA -France, AICAS -Spain/Portugal-, BdZ -Germany-, De Harpij -Netherlands-). IZC and national zookeeper organisations also organise events to share information and encourage zookeeper conservation initiatives (e.g. “green teams” develop and undertake many interesting initiatives on-site).
- EU and National zoo associations and other zoological organisations (list on Annex 1.9) hold training events, meetings and produce documentation to exchange and develop best practice.
- The EAZA Academy offers specialised training in a wide variety of topics within zoo professional roles. EAZA and the national organisations also run sustainability working groups to share best practice.
- The European Association of Zoo and Wildlife Veterinarians (EAZWV) summer school for veterinarians and veterinary students offers courses run by zoo veterinarians on the latest developments in the field.
- At least basic training in conservation and wildlife research skills would be highly beneficial to the whole animal management team in order to contribute more actively, promote and share conservation initiatives and skills. This type of training can be arranged through collaboration with local universities, NGOs or research institutions.
- Training on issues related to Invasive Animal Species (IAS) such as relevant research, control or eradication methods, prevention and specific local and Member State strategies (further information in Section 2.5).
- Further information on the capabilities involved in the areas related to Article 3 conservation measures can be found on Annex 6.5: Human Resources and more information on training in Annex 1.3.

Zoo collections, experience and facilities can provide the training grounds for the next generation of wildlife professionals. Student and volunteer training fosters highly productive connections with academic institutions and the local community.

- **Student training:** University student projects can contribute to the research output of zoos. Collaboration with universities and other academic institutions can provide opportunities for young biologists, veterinarians, environmental scientists and educators to undertake suitable coordinated projects and internships.
- **Volunteers:** Many zoos count on the help of volunteers for specific conservation initiatives or as part of their public outreach programmes. Providing volunteering opportunities is one of the most direct ways to promote public education and involvement in the conservation of biodiversity and is to be encouraged. Volunteering is often regulated within state legislation, which would therefore have to be taken into account. Volunteers will have to follow the same internal safety regulations as zoo personnel and additional safety provisions.
- **Sharing skills:** Exchange programmes for experienced zoo staff between zoos with more and less resources helps support the wider implementation of the Zoos Directive. *In situ* initiatives also benefit from the direct contribution of skilled zoo staff in capacity building. EU zoo professionals can be excellent active contributors and liaisons for *in situ* and *ex situ* conservation projects in areas with less conservation expertise such as developing countries.

#### *2.2.3.3 Exchange of information related to species conservation*

Article 3 (first indent) includes a set of activities and techniques that enable zoos to achieve quantifiable conservation results or at least outputs. Conservation needs to be strongly based on sound scientific evidence. The exchange of information related to species conservation emphasises the benefit of using and sharing conservation information, particularly to complement *in situ* and *ex situ* conservation programmes. The sharing of conservation, education and husbandry skills is to be encouraged at all levels.

The ability to exchange accurate and useful information can depend on a correct evaluation and report of the activities undertaken.

**Exchange of information related to species conservation**

Zoos gather species conservation data through research, experience and conservation project lessons. The exchange of information could take place at many levels, such as:

- Publishing research. Research results will only be useful if disseminated (see Research section 2. 2. 3.1).
- Some zoos may become highly knowledgeable in the biology and husbandry of certain species, which is vital for the success of breeding programmes. This information can be disseminated by compiling and openly sharing husbandry manuals.
- Openly reporting the progress, results and lessons learned during conservation projects (including which actions failed and why) contributes to improved planning of similar initiatives.

Record keeping is a requirement by itself, but it also contributes to the exchange of information when databases containing accurate data are openly shared and used for conservation purposes (e.g. using records data for specific research, sharing data with biodiversity authorities, compiling open national inventories and databases, etc.). Further information in section 2.6 (Record keeping).

Exchanging information also relates to using accurate and up-to-date scientific evidence, particularly for decision making regarding conservation activities. Day-to-day management of the collection is also most efficient when based on the best available knowledge on each subject.

This conservation measure can also be a reminder of the importance of collaboration in conservation initiatives. Being members of professional associations (e.g. the World Association of Zoos and Aquariums [WAZA], EAZA, national associations, zoo educator associations, zoo keeper associations) provides zoos with opportunities to exchange information (e.g. through meetings of specific committees).

Collaborations and partnerships with actors outside the zoo community, such as biodiversity authorities, academic institutions or conservation organisations are highly beneficial for conservation. Zoos are encouraged to take the lead and open up these kinds of collaboration opportunities, particularly when they hold expertise in specific taxa or conservation techniques.

**Example**

Long-term partnering related to protected areas in need of support is one of the most beneficial conservation strategies for the species and habitats involved and often translates into dedicated exhibits (e.g. Masoala Hall in Zurich Zoo works with the Masoala National Park in Madagascar, African Hunting Dogs exhibit in Chester Zoo supports conservation in Mkomazi, Kenya). Case study: The Madagascar Fauna Group.

### 2.2.4. Conservation in action

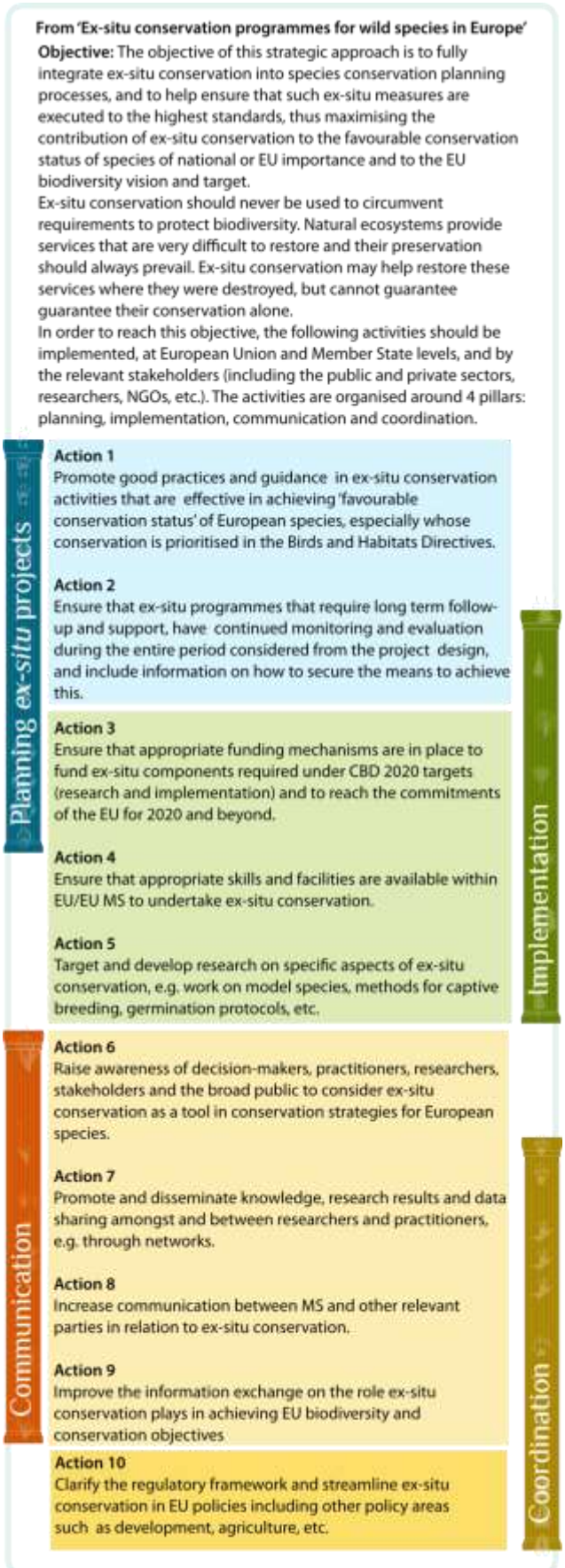
#### *2.2.4.1. Ex situ conservation*

Breeding animals in captivity (*ex situ)* is not a conservation action in itself. *Ex situ* conservation breeding applies to programmes of cooperative breeding of threatened species (as stated in a recognised source such as a national database of species at risk of extinction or the International Union for the Conservation of Nature IUCN Red List). Breeding in zoos may attend to other considerations (Further information in Zoo conservation planning section 2.2.4.4 below).

The capture, keeping and display of species on strict protection lists is regulated by applicable legislation (CITES, EU Wildlife Trade, EU Habitats and Birds Directives, other applicable Conventions – see figure 2- and Member State legislation) to ensure they participate in suitable *ex situ* conservation programmes.

Captive breeding is probably the conservation activity in which zoos hold the most experience and expertise amongst the conservation community. Sharing *ex situ* conservation skills and promoting collaboration between experienced zoos and *in situ* breeding centres can amount to very effective contributions to species recovery programmes. E.g. Black-footed ferret.

In Europe, *ex situ* conservation of native species often takes place through national or EU projects (e.g. LIFE+). Member States and EU bodies develop conservation strategies for native endangered species, which in some cases include *ex situ* conservation and re-introduction components (for example within the frame of Natura 2000 active conservation actions). Zoos may participate in these initiatives through direct collaboration with the project. A study on 'Ex-situ conservation programmes for wild species in Europe', carried out on behalf of the European Commission provides detailed information on *ex situ* conservation strategies and methodologies including the actions detailed in figure 1.




IUCN Guidelines provide fundamental information on the management of *ex situ* populations, re-introduction, translocation and other species conservation issues. Also, the IUCN Species Survival Commission (SSC) includes specialist groups of experts, who provide research and information on a wide variety of topics from those related to specific taxa to animal health or conservation *in situ*. Particularly, the Conservation Breeding Specialist Group (CBSG) provides tools, information and communication to facilitate integration of *ex situ* and *in situ* activities.

The revised 'IUCN SSC Guidelines on the Use of Ex Situ Management for Species Conservation' (not yet published) detail a five-step decision process to define the role, nature and feasibility of *ex situ* management within an integrated approach to species conservation planning. With the same objective, the CBSG proposes the One Plan approach which takes into account all populations (both in the wild and under all conditions of *ex situ* management), all the actors involved and all potential resources available to achieve a truly integrated approach from the start of any species conservation initiative[5].

Zoo association conservation-breeding programmes are coordinated at the regional level. In Europe, EAZA coordinates two levels of managed conservation breeding programmes: the European Endangered species Programmes and the European Studbooks (EEPs and ESBs). A further lower level Monitor status is used to gather information on a species in captivity. Collections participating in managed breeding programmes participate actively in the activities of the corresponding Taxon Advisory Group (TAG).

[5] WAZA Magazine 14: Towards Integrated Species Conservation

TAGs develop regional collection plans (RCP), promote *in situ* conservation projects and are an important source of information on captive management. Globally, WAZA is establishing Global Species Management Plans (GSMP) to coordinate breeding efforts between regions all over the world and maintains International Studbooks (ISB).

Participation in EEP and ESB programmes is only open to EAZA member institutions. However, non-members may participate if EAZA via its EEP committee believes that the participation by a non-member would benefit the programme.

**Figure 1.** Objectives and summary of actions from the study 'Ex-situ conservation programmes for wild species in Europe',

**Example**

Conservation breeding can play an essential role in sudden extinction crises, such as the emergency state in which many amphibian species have fallen in recent years. The rapid coordinated response carried out through the Amphibian Ark initiative is a great example of collaborative conservation breeding in action stopping species extinction.

The effectiveness of *ex situ* conservation for saving species from extinction will depend on a number of interacting and complex factors (e.g. correct projections, sufficient founder population, breeding success, keeping genetic diversity, avoiding genetic and behavioural adaptations, overcoming threats to natural habitats, achieving successful reintroductions), which are also connected to *in situ* conservation knowledge and actions.

Carrying out *ex situ* conservation measures appropriately and successfully requires attention to:

- the continuation of scientific research throughout the whole process with particular regard to including *ex situ* conservation measures in the species action plan developed by the zoo and other involved organisations;
- follow the signed plans and protocols, and;
- becoming increasingly integrated with field conservation.

Establishing close links between captive and wild populations to collaborate in species management, exchange knowledge, compile data and thus achieve an integrated approach to species conservation is an important role that zoos can currently undertake, e.g. European Mink conservation at Tallinn Zoo (Estonia).


***Figure 2*** *.Key legislation, sources of information and programmes for ex situ conservation. International agreements relevant to the Zoos Directive (light blue boxes) are to be implemented by all Contracting Parties. The guidelines and programmes referred are examples of good practices.*

### *2.2.4.2. Repopulation and reintroduction of species into the wild*

Conservation translocation is possibly the most technically complex and financially demanding type of conservation action to undertake successfully and it is only a necessary conservation measure for a small number of species. Zoos may provide captive bred animals and technical or financial assistance to conservation translocation projects, but they are not usually the main initiators, funders or managers of these projects.

**Repopulation and reintroduction of species into the wild**

- Conservation translocation is the deliberate movement of organisms from one site for release in another. It must be intended to yield a measurable conservation benefit at the levels of a population, species or ecosystem, and not only provide benefit to translocated individuals.
- Conservation translocations consist of (I) **reinforcement** and **reintroduction** within a species' indigenous range, and (II) **conservation introductions**, comprising assisted colonisation and ecological replacement, outside indigenous range.
- Translocation is an effective conservation tool but its use either on its own or in conjunction with other conservation solutions **needs rigorous justification**. Feasibility assessment should include a balance of the **conservation benefits** against the costs and risks of both the translocation and **alternative** conservation actions.

Source: IUCN/SSC (2013). Guidelines for reintroductions and other conservation translocations

Repopulation and reintroduction projects require close collaboration between a variety of actors (e.g. governments, conservation organisations, providers of founder stock, local communities), long-term planning and funding, and extensive research and monitoring throughout the whole process. Zoos have made important contributions to successful examples of reintroduction projects (Case study 3: Przewalski's horse).

One of the consequences of climate change is that species' ranges are shifting geographically and more species will need support in order to reach suitable habitats. 'Assisted migrations' are translocations designed to aid in this process, but their potential impacts and benefits have to be researched extensively before any proposals are made. The EU Guidelines on Climate Change and Natura 2000 address assisted migrations and other important strategies concerning biodiversity and climate change.

#### *2.2.4.3. In situ conservation*

*In situ* conservation essentially operates by halting or mitigating the effects of the threats and processes which drove the concerned habitats or species into decline and working on their restoration to a "favourable conservation status". There are a number of well-known threats to biodiversity, which Diamond (1989) described as human-induced 'evil quartet' extinction drivers: habitat loss, alteration and fragmentation; overexploitation; introduced species and extinction cascades. More recently, Brook *et al.* (2008) proposed adding a further two 'evils': global change and extinction synergies resulting from the additive effects of combining several of these factors (see Annex 4.1).

The most important instruments for *in situ* conservation in the EU are the Natura 2000 network and the strict species protection system provided by the Birds and Habitats Directives. Member State biodiversity authorities and zoos are encouraged to collaborate in active conservation initiatives coordinated under these well established frameworks. These activities may entail for example focused actions to stop threats and ensure protection, to ascertain population status or to restore habitats and species of both fauna and flora.

Depending on their size, resources and objectives, zoos may undertake and participate in *in situ* conservation projects on a range of scales from on-site to international. Large zoos are able to make direct contributions to *in situ* conservation at all scales. Smaller institutions can become more specialised (e.g. in native species conservation, developing advanced knowledge of a few species or taxa) and develop stronger ties at local or national levels, both within the zoo community and the wider conservation community.

The following sub-sections under this heading describe actions that may be taken at different scales.

**Example**

Specialisation, increased communication and awareness of issues related to local or collection species will allow for small zoos to make more effective direct contributions to *in situ* conservation. See Case study: Jerez Zoo (Spain).

##### 2.2.4.3.1 On-site *in situ* conservation

Taking measures to continuously improve the sustainability of zoo operations can be beneficial to conservation and one of the best ways to set examples for public education and awareness; further information in Section 2.3, Article 3 (second indent). These actions can be acknowledged and beneficial within the scope of the EU Zoos Directive, but they are not conservation measures as such. See Annex 1.5 for examples and documentation on how to improve the sustainability of zoo operations.

**Example**

Some conservation actions to be undertaken on-site could be:

- Promoting and monitoring the establishment of free-living native species in zoo grounds by, for example, providing bird boxes, nesting poles, artificial bat roosts, untrimmed vegetation areas, butterfly gardens. (e.g. Barcelona Zoo herons)
- Encouraging visitor and local community participation in activities promoting sustainable habits within zoo grounds.

#### 2.2.4.3.2 Local scale *in situ* conservation

One of the conservation activities in which the role of zoos has been considered increasingly important is their collaboration in the management of protected areas and endangered species in the wild. Zoos may assume actions towards this objective at all scales, but any zoo regardless of its size can show awareness of and look for lines of collaboration with geographically close protected areas, particularly Natura 2000 network areas where strategies might already be in place and collaboration may be most effective and focused.

**Zoo participation in local-scale conservation activities**

At the local level, zoo participation in this role may entail, for example:

- Collaborating in the release and monitoring stages of local or national captive breeding projects. Zoo participation may include: collaborative research, recording of whole-project data, volunteer and staff training, promoting local awareness or fundraising.
- Collaborative management and monitoring of threatened wild populations in local protected areas.
- Collaboration in natural area restoration and wildlife re-colonisation projects.
- Promotion of activities taking place at local protected areas.
- Participating in seasonal or permanent native wildlife rehabilitation activities organised by the zoo or in collaboration with local authorities or NGOs (note that these are highly specialised activities and the zoo should count on the necessary knowledge and human and material resources to undertake them). See Case Study: Hungarian Association of Zoos
- Personnel and knowledge exchange with local wildlife rescue and rehabilitation centres.
- Promoting and participating in local environmental policy development and implementation.
- Activities directed at combating the threat of Invasive Alien Species (IAS), for example:
  - Participation in the removal of invasive species from the wild (both plants and animals).
  - Participation in research on ways to control invasive species.
  - Assess the receipt of (wild) exotic pets to decrease potential introductions in natural habitats
  - Participate in restoration projects of species of flora and fauna whose cause of decline are IAS.

#### 2.2.4.3.3 National scale *in situ* conservation

Many of the local-scale activities can also be applied to national level actions in collaboration with national authorities, larger protected areas, professional associations, field conservation organisations and scientific institutions. Knowledge of national conservation strategies and close contact with these actors will facilitate zoo participation in projects at this level, as well as further their integration in the wider conservation community.

**Example**

National scale field projects may include, for example, conservation of endangered native species from the National Red List, research, restoration or management of Natura 2000 sites, IAS management strategies or implementation of EU LIFE+ projects. Case study: Latgales Zoo (Latvia) LIFE+ HerpetoLatvia

National zoo associations run projects and campaigns with the participation of their members. They also provide information and expertise on all zoo related topics. Belonging to a zoo association helps improve zoo conservation performance. However, small zoos may initially have difficulties to afford membership fees. It would be advisable for professional zoo associations and larger zoos to create collaboration frameworks in order to help smaller centres to improve their conservation skills and contributions.

#### 2.2.4.3.4 Regional scale *in situ* conservation

At the European level, it is important that zoos keep up-to-date with EU Biodiversity policies and knowledge base (e.g. Biodiversity Information System for Europe BISE, European Environment Agency EEA, European Environment Information and Observation Network EIONET). In particular, the EU biodiversity strategy to 2020 provides information and targets to ensure the protection of native habitats and species. These targets are

excellent guides to set conservation objectives at different scales and which work towards common regional aims.

**Example**

As a regional zoo association, EAZA facilitates, promotes and coordinates the development of *in situ* conservation links.

#### 2.2.4.3.5 International scale *in situ* conservation

EU zoos may contribute to international conservation on their own, through coalitions, or under national associations, EAZA or WAZA. Large zoos have the capability and resources to participate in international *in situ* conservation projects. The participation may take different forms, such as providing specialised staff or training, undertaking and setting up research, supporting policy development and implementing or developing long-term partnerships with protected areas or local conservation organisations.

The effectiveness and eventual success of international *in situ* conservation initiatives will depend on factors such as:

- Science-based priorities.
- Planned time scales. The best outcomes at the international scale come from long-term commitments. Ideally, links to a project or area are maintained and strengthened over time, until the project becomes self-sustaining.
- Continuing collaboration with local partners, communities and authorities.
- Continuous evaluation of progress and results to provide feedback and improve effectiveness.

E.g. Zoological Society of London (ZSL) International projects; Durrell Wildlife Conservation Trust International projects

### *2.2.4.4. Tools: Planning and reporting zoo conservation*

Careful planning is key to achieving effective conservation results. Conservation results or the impact of conservation activities can be difficult to evaluate, but outcomes can be reported. This section presents tools to assist zoos with conservation planning and reporting. Tools are explained here for use by any zoo and assessment by Member State Competent Authorities.

#### 2.2.4.4.1 Conservation objectives

A clear conservation mission statement and defined conservation objectives help to focus a zoo's activities on conservation. Zoos are often led by a clear conservation mission statement as well as a set of conservation objectives, in line with the characteristics, capabilities and aspirations of each institution.

The mission statement inspires. It gives both inner purpose to the zoo and defines itself to the outside world. A mission statement describes a vision picturing an aspirational ultimate goal and a mission highlighting the path the institution takes to achieve it.

The institutional objectives define the final outcome to be achieved by the activities undertaken within the scope of the Zoos Directive: conservation action, research, training, information exchange, education and high standards of animal accommodation.

The mission statement and the institutional objectives reflect the zoo's commitment, through its own unique aspirations and plans, to the strengthened role in the conservation of biodiversity expressed in the Zoos Directive. (See Annex 1.6: Mission statements)

#### 2.2.4.4.2 How to develop a conservation strategy

A conservation strategy includes the details of how a zoo plans to undertake conservation actions including the Article 3 (first indent) conservation measures.

Choosing the conservation priorities in which to invest funds and efforts is a central issue in the field of conservation. Scientific information is available to assist zoos in deciding priorities, which is particularly important to apply when zoos want to make an effective contribution to global conservation. The IUCN Species Conservation Planning subcommittee is dedicated to assist organizations in species conservation planning. The British and Irish Association of Zoos and Aquariums -BIAZA has recommended examples on how to assess the impact of field conservation measures, as well as some of the tools used in conservation planning and project management (See Annex 1.7: Choosing priorities and conservation planning). Zoos may choose their

objectives at different levels by evaluating how their particular capacities can contribute to international, EU, National and local conservation strategies and needs.

Designing a conservation strategy involves laying out a plan of how conservation objectives are going to be met. Figure 3 shows an example of how to design a conservation strategy. It consists of possible sections to be included in the conservation strategy (boxes numbered 1, 2 and 3) and a spreadsheet (box 4) which may be used to develop conservation objectives into actions. This is an example of a simple system which can be applied and adapted to the needs of zoos of any technical capacity.

A zoo's strategic planning documentation (See Annex 1.8) contains all the information necessary to understand the functioning of a zoo. Conservation focused planning is based on the institution's conservation objectives and would comprise the different strategies (amongst other documentation) the zoo plans to implement in order to fulfil its objectives (in accordance with the Zoos Directive conservation measures).

Proportional application and assessment may be needed in regards to planning, for example, smaller institutions may use just one comprehensive conservation strategy and related documentation, whereas larger institutions may have their own range of relevant documentation. Member State legislation may require specific plans on application or for inspection purposes (e.g. See Annex 6.4)

Focusing on effectiveness, plans and strategies may include amongst other elements:

- Specific goal of each activity
- Time frames
- Personnel responsible (see Annex 6.5: Human Resources)
- Evaluation systems
- Reporting systems

The institutional collection plan (ICP) is a tool used to keep control of the collection and plan movements of animals. The ICP may also be used log other relevant information which may include whether they have assigned conservation roles or links to specific programmes. Annex 1.8 further clarifies this and other useful tools.

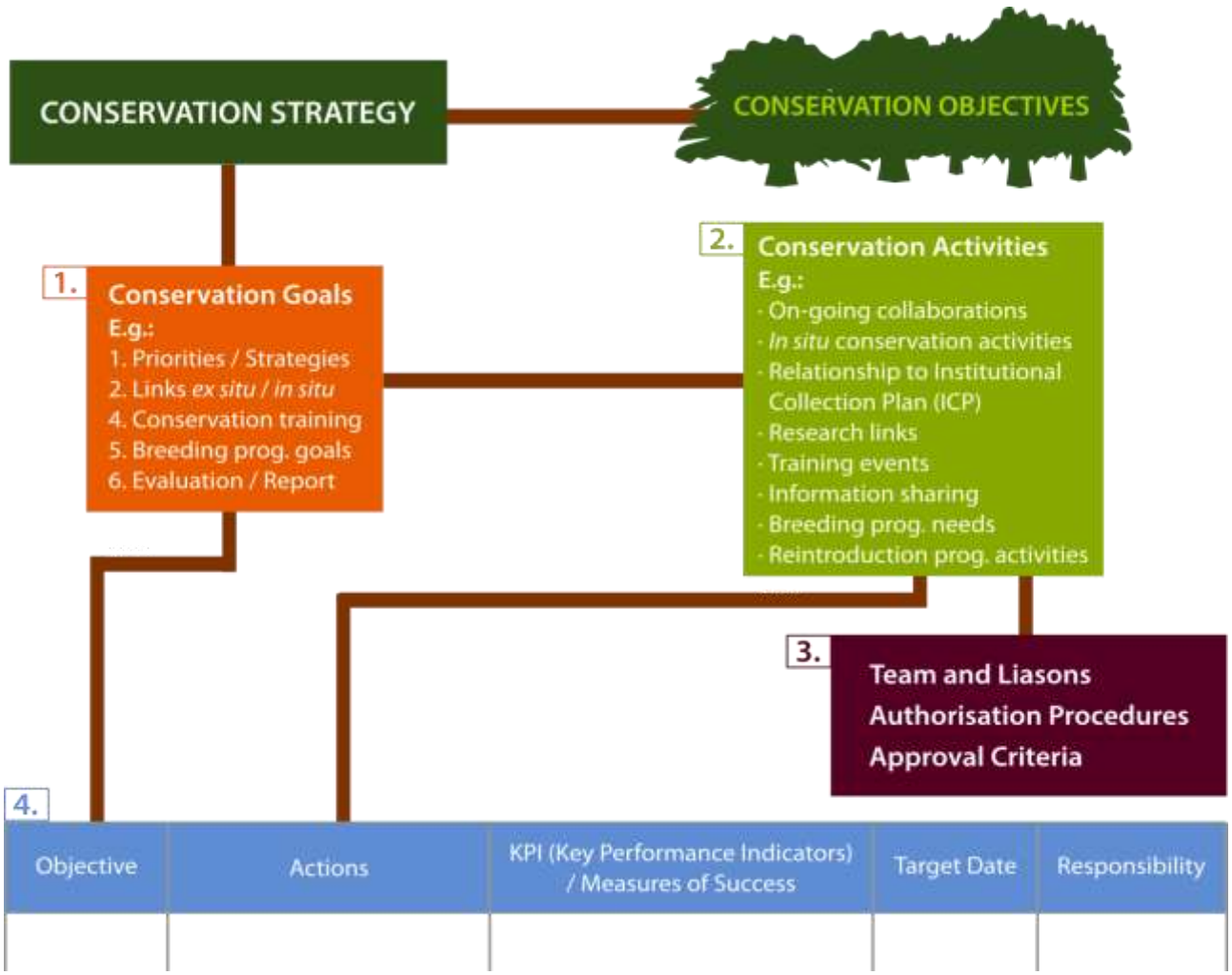



***Figure 3**.Potential elements of a conservation strategy framework.* [6].

#### 2.2.4.4.3 Zoo collection planning

Collection planning with conservation objectives may involve several considerations, including:

- Animal transactions, or trade, requires well considered and appropriate procedures. For example, Secretary of State's Standards of Modern Zoo Practice (DEFRA -UK-) recommends the use of BIAZA Animal Transaction Policy as well as Ethical Review Processes for this and other instances of zoo operation.
- Particularly, the acquisition of animals from the wild is to be discouraged other than within managed *ex situ* conservation programmes which ensure compliance with the applicable legislation (see also *ex situ* conservation section 2.2.4.1 above). In the case of animals of wild origin belonging to species on lower protection lists, CITES Non-Detriment Findings may be of interest.
- Licensing and zoo inspection are the main tools for the implementation of the Zoos Directive and therefore policies on animal transfers between zoos may need to ensure the licensing status of the receiving institution.
- It is advisable that breeding programmes strive to maintain self-sustainable populations with appropriate genetic diversity (e.g. the colour morph selective breeding of animals such as Albino chameleons and snakes many of which have a wide range of inherited defects, would go against conservation aims).

Further information in section 2.4.4.4 Management of the collection.

#### 2.2.4.4.4 Reporting of conservation activities

Given the complexity of choosing conservation priorities and carrying out effective conservation projects, it is fundamental that any institution understands the actions required to deliver conservation benefits and how to attempt to assess their impact.

[6] Adapted from the Zoological Society of London (ZSL) Research Strategy.

For example, WAZA has made available a Project Conservation Impact Summary Form, developed by Chester Zoo (UK) and based on the methods outlined by the Zoo Measures Group[7]. The form is a tool to guide adaptive project management, summarise achievements towards conservation objectives and assess conservation impact in a standardised manner.

Conservation activities being carried out by zoos or other conservation organisations are difficult to assess in terms of conservation impact. However, if the conservation strategy assigns evaluation systems to each activity undertaken, outputs can be summarised in the zoo's conservation report. Conservation reports may be adapted to the institution's needs, for example, large zoos may employ more scientific approaches to evaluation whereas smaller zoos may focus on progress as a benchmark.

Member State Competent Authorities may require that the conservation report be provided to them as part of their zoo inspection procedures or incorporating relevant questions about reporting of conservation activities on their inspection questionnaires.

Article 3 (first indent) specifies a set of activities and techniques that enable zoos to achieve quantifiable conservation results or at least outputs. Compliance with the Article can be assessed by making an evaluation and report of the activities.

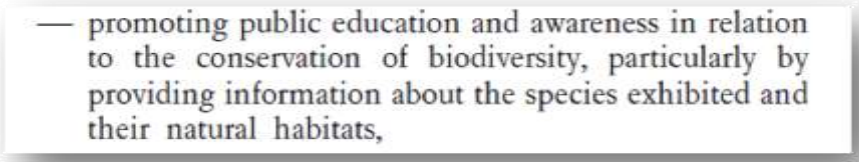
Zoos are able to benefit from the use of various tools to plan actions and monitor the results of their conservation activities. The tools presented in this section and the Annexes 1.7 and 1.8 are free and open-access for anyone to use. Zoos that also act as funding bodies for conservation projects are encouraged to use these tools as an aid to deciding and planning how to invest their resources, as well as assessing impact of their conservation actions.

**SUMMARY 3 – ARTICLE 3 (FIRST INDENT) CONSERVATION, RESEARCH AND TRAINING**

- Article 3 (first indent) conservation measures are active, measurable, direct (and indirect) contributions towards the aim of the Zoos Directive: the conservation of biodiversity.
- The activities and techniques described are focused on species conservation and cover conservation measures undertaken by zoos both *ex situ* and *in situ.*
- Effective conservation often has a collaborative nature.
- Research may be subject to Member State legislation and can be best developed by following recognised standards.
- Training applies both to continuous professional development of zoo staff in conservation skills as well as providing specialised training to external recipients.
- Similarly, exchange of information relates to both disseminating knowledge and experience by zoos, and making use of up-to-date information available from other zoos and zoo professionals concerning conservation activities.
- Captive breeding, repopulation or reintroduction are complex actions and are best undertaken within suitable scientific and legislative frameworks as appropriate.
- The use of tools, guidelines and methodologies developed by zoo professional organisations (e.g. National zoo associations, EAZA, WAZA), conservation organisations (e.g. IUCN) and applied in field conservation can effectively contribute to the development of the specified conservation measures.

[7] Mace, *et al.*, (2007) Measuring conservation success: assessing zoos' contribution. In: Zoos in the 2first Century: Catalysts for Conservation?

## 2.3 Article 3 - second indent - Public education and awareness


— promoting public education and awareness in relation to the conservation of biodiversity, particularly by providing information about the species exhibited and their natural habitats,

### 2.3.1 Scope

The measures of Article 3 (second indent) highlight the role of zoos in educating the visiting public and in raising awareness on biodiversity conservation issues. The measures directly relate to the CBD Aichi Target 1:*"By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably".*

Article 3 (second indent) has a general focus and a specific focus. The general focus –"promoting public education and awareness in relation to the conservation of biodiversity," - lays out an approach to the social education role of zoos. In this regard, zoo education activities may involve:

- Undertaking **public education programmes** directly related to conservation of **biodiversity issues**.
- Promoting the environmental, economic, cultural and intrinsic **values** of biodiversity.
- Promoting awareness of the **impact** of everyday habits on the conservation of biodiversity.
- Educating the public on "***the steps they can take to conserve and use [biodiversity] sustainably".***
- Educating the public on adopting appropriate types of **behaviour** towards wildlife so as to contribute to the conservation of biodiversity.

**Relevant Definitions**

**Education:** Organised and sustained communication designed to bring about learning. Context: Communication in this context requires a relation between two or more persons involving the transfer of information (messages, ideas, knowledge, strategies, etc.). Organised means planned in a pattern or sequence with established aims or curricula and which involves an educational agency that organises the learning situation and/or teachers who are employed (including unpaid volunteers) to consciously organise the communication. Sustained means that the learning experience has the elements of duration and continuity. Learning is taken as any change in behaviour, information, knowledge, understanding, attitudes, skills, or capabilities which can be retained and cannot be ascribed to physical growth or to the development of inherited behaviour patterns. (UNESCO, OECD, 2001)

**Public awareness** brings the issues relating to biodiversity to the attention of key groups who have the power to influence outcomes. Awareness is an agenda setting and marketing exercise helping people to know what and why this is an important issue, the aspirations for the targets, and what is and can be done to achieve these. (CBD CEPA Toolkit Glossaries)

The education and information that zoos provide become a social reference of the relationship between humans and animals, and our attitude towards nature. This comes with responsibility, which is not limited to the zoo's educational activities but includes every instance animals are used to convey messages. Zoos have a responsibility concerning the image they portray of animals, which should be realistic, respectful and avoid promoting any inappropriate behaviour towards wildlife.

Article 3 (second indent) provides a specific focus: "particularly by providing information about the species exhibited and their natural habitats". This information may be displayed at each exhibit. As a guide, basic information might include:

- Accurate **species information**, i.e. correct common and scientific names, basic ecology, conservation status (i.e. IUCN Red List category and in the case of native species also the national equivalent) and conservation threats. Information may also be provided on whether the animals exhibited are included in any conservation measures under Article 3 (first indent).
- Information on the **natural habitats** of the species present, i.e. geographical range of the species, habitat description and threats.

For some species supplementary information might be added for the education and awareness of the public, for example:

- in cases where the species is listed as an Invasive Alien Species (IAS) or in any other relevant EU or Member State legislation.
- in cases where the specimens come from seizures or rescue;
- in cases where the behaviour of the public can have a direct impact on the conservation of the species (e.g. if the pet trade is a threat to the species);
- in cases where keeping the species as a pet results in a conservation problem due to conservation resources being redirected to animal seizure or rescue;
- in cases where the species may be used for wildlife souvenirs or illegal wildlife products.

Other information might include as appropriate:

- 'What you can do to help' information on subjects such as: volunteering, donations to zoo in situ projects or other organisations, campaign activities, or changes in everyday habits that can have a positive impact in conservation.

As with conservation activities, it is the overall set of education and awareness actions that is important in terms of meeting the requirements of Article 3 (second indent). Similarly, evaluators have the discretion to consider the scope and extent of actions that are adequately proportional to the nature and capability of each zoo.

### 2.3.2 How do zoos promote public education and raise awareness

Public education and raising awareness on biodiversity, conservation and sustainability issues have been recognised by the CBD, WAZA, EAZA and all National Zoo Associations as essential contributions that zoos can make to achieve the Aichi Target 1 of the United Nations Strategic Plan for Biodiversity 2011-2020.

Zoos have a valuable resource available to them in their efforts to protect biodiversity: live animals. The innate attraction humans feel for animals draws millions of visitors to zoos annually, which provides a considerable potential for public education and raising awareness in relation to the conservation of biodiversity.

**Inspiring the public:**

"Biodiversity is the world's most elaborate scientific concept, but also, potentially, its greatest story. Love of nature for most people is about awe, wonder and joy; not habitats, ecosystem services or extinction." (Communicating biodiversity. Communication, Education and Public Awareness – CEPA- IUCN CEC. CBD)

"If conservationists wish to convince a wide public that it is important to protect even those species which seem furthest from the protection of the utilitarian umbrella then their best hope is to reveal fascination and beauty" (Macdonald *et al*., Key topics in conservation biology, 2007)

In terms of guidance, the Zoos Expert Committee Handbook -DEFRA, UK- provides illustrated examples of how to implement and assess compliance with Article 3(second indent) in the UK. EAZA Education Standards and BIAZA Education Policy give further detailed information on how zoos can go beyond basic requirements.

**Example**

Zoo educational activities provide an excellent opportunity to communicate and gather public support for EU nature conservation activities under the Birds and Habitats Directives and specially for the Natura 2000 network (e.g. Artis Zoo (Netherlands) Natura 2000 activities presentation; summary)

### 2.3.3 Zoo education in action

The following aims are relevant for the development of zoo education strategies:

- To connect people to nature.
- To inspire curiosity, empathy, respect and awe for the natural world.
- To communicate effectively conservation, environmental and human-animal relationship issues.
- To raise the awareness of people to feel and undertake our role as stewards of nature.
- To provide information, experiences and opportunities to encourage positive changes of behaviour.
- To demonstrably educate and inspire visitors to make changes in their behaviour that contribute to the conservation of biodiversity.

In terms of good practice, all zoos should ideally have:

- At least one person with the appropriate skills who is responsible for the education programme. See Annex 6.5: Human Resources)
- A written education strategy and evolving education programmes (e.g. revised yearly through evaluation tools and re-adapted accordingly)
- At least one space dedicated to education activities/resources.
- Their own specific materials and resources designed to implement the education programme.
- Signs should provide accurate information about species including at least: common and scientific names; natural habitat and geographic range; conservation status (i.e. IUCN category) and threats; whether it participates in an *ex situ* programme; if applicable *"*what can you do to help?*"* section (e.g. animal adoption, volunteering, donations to zoo *in-situ* projects or other organisations, campaign activities)

Zoo educational activities may include both formal and informal methods.

#### *2.3.3.1 Formal education programme*

The formal education programme may include:

- **School groups*:*** day visits, outreach programmes, overnight activities (providing animals' rest is not disturbed) and camps. Zoo education programmes dedicated to schools may consider:
  - Links to state education curricula - for activity design, developing programmes based on the requirements of national curricula for different levels. Fostering connections with education authorities may assist in developing programmes that provide continuity with the school learning agenda.
  - Number of students per educator – this ratio is often stipulated in state education policies and consequently would apply to zoo activities. Furthermore, given the interactive nature of many student zoo activities, smaller groups might be advisable.
  - Activities could be designed with the specific characteristics of each developmental stage in mind (e.g. opportunities for motor or sensory learning, exploration and discovery, creation and reinforcement of values, discussion, and may provide connections to other subjects such as science, arts, language, technology).
  - Outreach activities promoting a broader exposure to zoo learning such as providing pre- and post-visit materials to teachers, zoo staff visits to schools or video-conference sessions.
  - Student activities may be connected to zoo conservation or research initiatives providing direct insight and participation in the zoo's conservation actions.
- **Higher education:** Zoos and universities often collaborate at several levels, formal education opportunities stemming from these partnerships may include:
  - Curriculum-adapted seminars featuring zoo expertise subjects (e.g. animal husbandry, exotic animal medicine, conservation, invasive alien species [IAS], ethology, zoo research).
  - Some zoos participate throughout whole degree modules providing specialised talks and practical sessions.
  - Whole MSc courses have also been developed through collaboration between universities and zoos (e.g. MSc in Conservation Science from Imperial College London, Durrell Wildlife Conservation Trust, Zoological Society of London [ZSL] and Kew Gardens)
- **Teacher training:** Some zoos offer specialised training for teachers on-site and on-line, covering environmental and conservation subjects, teaching methodologies or linking zoo activities to education curricula (e.g. Dublin zoo, Newquay zoo, Wildlife Conservation Society [WCS])
- **Open seminars:** Many zoos offer specialised seminars and courses open to the public.

#### *2.3.3.2 Informal education*

Informal education is aimed at raising the awareness of the public during self-directed visits to the zoo. Current trends in exhibit interpretation are moving from immersion displays to more interactive styles of conveying messages through staff-led talks and animal encounters, and an increased use of technology. Animal presentations and encounters are used to attract and focus visitor attention to education messages most appropriately by showing natural animal behaviour.

Messages can be better targeted to the audience at each institution by undertaking visitor surveys. Positive messages using visitor-friendly language (e.g. 'protecting nature' instead of 'conserving biodiversity') that

highlight successful conservation efforts and instil hope are more likely to hold the attention of visitors. Ambassador animals, exhibits and themed campaigns amongst other methods effectively link conservation and education actions. Case study: London Zoo (UK) education devices.

Websites, newsletters and other online resources as well as a presence in social media (i.e. Facebook, Twitter) and zoo mobile phone apps provide autonomous access to more detailed information and encourage longer-lasting relationships and interactions between the zoo and its audience. See Annex 4.1 for more information.

#### *2.3.3.3 Messages promoting the conservation of biodiversity*

Conservation action messages that are clear, concise, use simple language and highlight how 'easy' actions can have far reaching positive consequences stimulate the public to undertake positive changes in everyday habits that contribute to the conservation of biodiversity,

To promote public education and awareness in relation to the conservation of biodiversity, zoos can be a source of information on:

- What is biodiversity?
- Why is biodiversity essential to human well-being?
- Why is biodiversity at risk?
- What individual behaviour has a negative impact on biodiversity?
- What individual behaviour has a positive impact on biodiversity?

**Example - conservation messages**

Edinburgh Zoo Green Tips and Advice:

*What YOU can do at home:*

- Switch your TV off standby when you are not using it. If everyone in the UK did this over £50 million could be saved each year!
- When you make a cup of tea or coffee only boil the amount of water you need. If everyone did this just for one day we could save enough energy to light every UK street light the next night!
- Recycle all the items you can, from cardboard and plastic bottles to glass and cans
- Save water by turning off the taps when you are brushing your teeth
- Why not switch to a green renewable energy supplier?
- Choose Fairtrade products whenever you can
- Try out eco shopping – buy locally produced food and items with less packaging around them
- Take the bus or walk or cycle rather than taking your car for short journeys
- If you enjoy eating fish, look out for the Marine Stewardship Council (MSC) tick on the packaging of the fish. This means that the fish have been caught sustainably and in a way which doesn't harm other marine life.
- Plant bee-friendly flowers in your garden
- Help reduce your water consumption by placing a brick or hippo water saver in your toilet cistern
- Rainforests are being cut down to grow palm trees to get palm oil for food and cosmetics. Make sure the food and cosmetics you buy containing sustainable palm oil
- Look out for the Forest Stewardship Council (FSC) logo on wood and paper products

Zoos provide an obvious and direct connection to wildlife and animals in general. Some of the visiting public may already be sensitive to animal issues, but others may lack knowledge on how to behave towards wildlife in a variety of situations.

**Attitudes towards wildlife**

Zoos provide an opportunity to promote appropriate behaviour towards wildlife, such as:

- Do not remove animals from the wild. Wild animals are not pets, native fauna is protected and it is forbidden to keep them in most EU countries.
- Do not to approach or feed animals in the wild.
- Give instructions on what to do if an injured animal is found.
- Encourage the relaying of offences against wildlife to the authorities.
- Discourage keeping (wild) exotic species as pets. Relate to the difficulty in providing care, the problems of black markets, illegal breeding and IAS (Invasive Alien Species).
- Encourage getting to know animals through professional-led zoo activities.

- Encourage appropriate choice and care of pets.
- Discourage the purchase of wildlife-related souvenirs abroad.

### 2.3.4 Tools: zoo education

#### *2.3.4.1 Zoo education methodologies*

Social science research has shown that just learning facts may not be enough to produce the desired awareness and changes in behaviour of the public. New strategies and techniques are arising as zoo educators increasingly apply knowledge from the field of learning theory.

The emotional response that animals evoke in people has always been considered as the main conductor of zoo education and an asset which differentiates zoos from other education institutions. Humans (and specially children) have strong innate emotional responses to animals; we are naturally drawn, fascinated and sometimes fearful or repulsed by them (as E.O. Wilson described it through the Biophilia hypothesis).

Education methodologies can be useful in focusing such emotions towards positive behaviour regarding the conservation of biodiversity. However, in order to take advantage of this intense connection to increase empathy, focus attention, encourage learning and modify habits, education methodologies need to be able to drive the whole process.

**Behavioural change**

The objective of educating the public in relation to the conservation of biodiversity is not just providing biological information, but to inspire changes in behaviour that contribute to the conservation of biodiversity. Behavioural change is not brought about by information alone, but also from motivating and empowering people to act.

The following tools and resources might be helpful in the design of zoo educational activities:

**Examples – methodological approaches**

Bringing the wider conservation community and zoos closer, the IUCN Commission on Education and Communication (CEC) recommends the application of the Communication, Education and Public Awareness (CEPA) toolkit to zoo education.

EAZA has started exploring the use of Social and Emotional Aspects of Learning (SEAL) techniques, which are being employed in the development of school curricula in the UK (e.g. SEAL, National Strategies, UK). EAZA is also looking at frameworks for fostering sustainable behaviour such as Community –Based Social Marketing -CBSM- which deploys a five step process (selecting behaviours, identifying barriers & benefits, developing strategies, conducting a pilot, and broad scale implementation).

Another topic being explored is the importance of the core values people hold, the relationships between these values, and how to best use this knowledge to change attitudes and behaviours. This work is being carried out by Common Cause.

Zoos Victoria (Australia) have developed a behaviour change model to apply to their educational activities. The model describes a process to: identify the threats to biodiversity to be tackled and the most adequate "ambassador" species or exhibit to illustrate them ("connect"); the best opportunities within zoo educational activities to explain the issues ("understand"), and the most appropriate changes in behaviour to empower visitors to make an impact ("act"). (Facilitating behaviour change, Lowry & Grey, 2009). Well designed targeted and executed campaigns can make zoos powerful advocates for biodiversity, e.g. Zoos Victoria Conservation Campaigns.

The International Zoo Educators Association (IZE) provides very useful theoretical and practical resources as well as communication and organisation of workshops and seminars for practitioners. E.g.: Abstracts of the IZE Conference 2012.

The WAZA Resource Centre also provides links to education and training guidelines and documentation.

National zoo associations can provide links and materials to public awareness campaigns and to conservation organisations as well as organise environmental education training schemes. E.g.: Case study 7: DWV (German Association of Wildlife parks) Initiative for an Environmental Education Qualification.

### *2.3.4.2 Elements for a zoo education strategy*

Zoo education strategies connect conservation and education objectives. The framework depicted in figure 4 (below) shows elements that can be included in an education strategy, examples of each category and how to organize them for the management and evaluation of specific programmes. Zoo education strategies may be adapted to the institution's needs, for example, large zoos may employ more scientific approaches whereas smaller zoos may focus on their own progress as a benchmark to continuously improve their results.

A written zoo education programme or strategy helps the zoo to focus on achieving educational results, targeting different audience groups and evaluating the success of the activities undertaken. A zoo education programme or strategy may include:

- activities included in formal and informal education plans;
- objectives of each activity - clear, achievable and measureable learning outcomes for each activity and target group;
- descriptions of activities, including the human (staff responsible and involved) and the material resources necessary, and how the collection will be used;
- time frames from initiation to evaluation;
- evaluation systems;
- reporting systems.

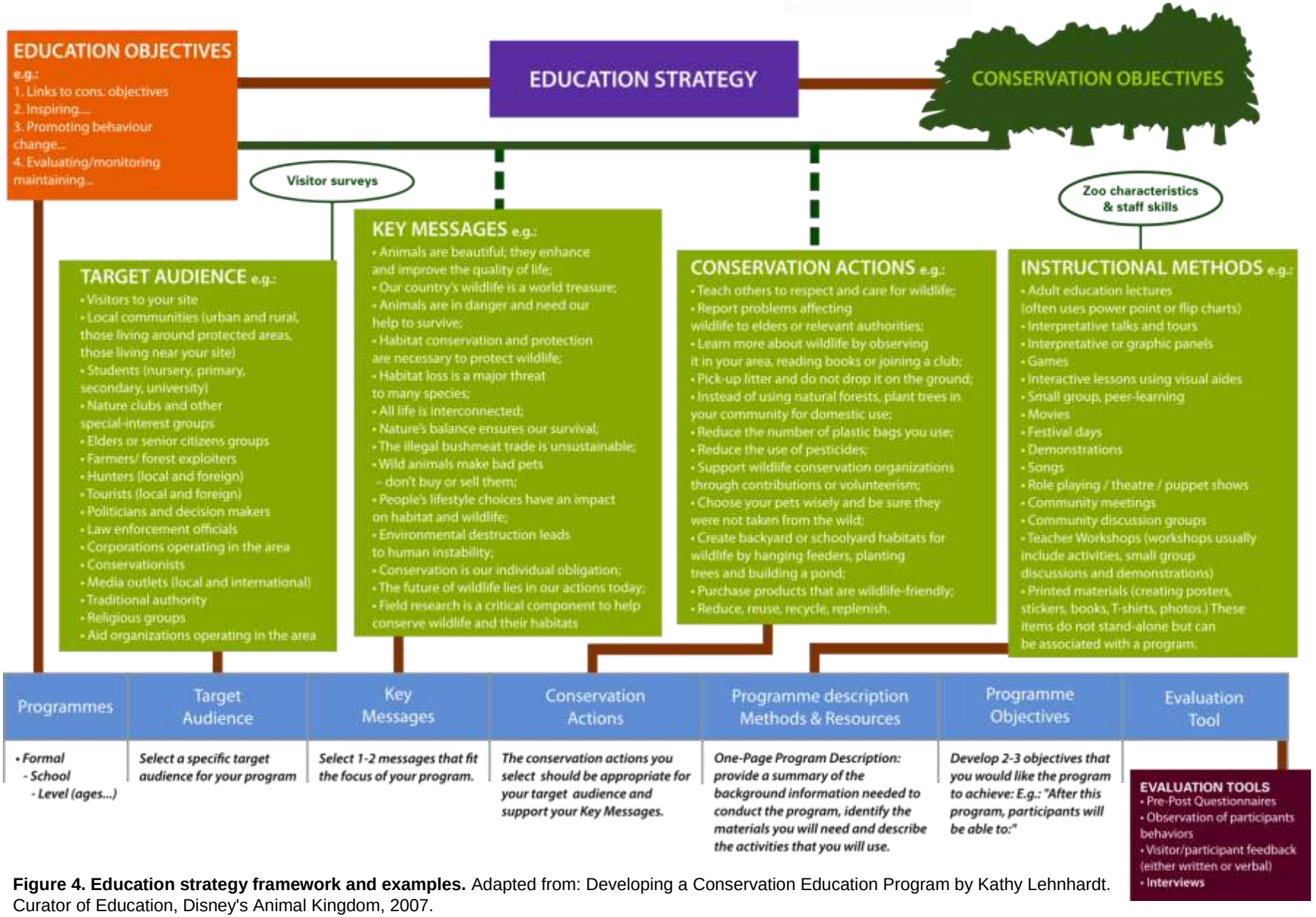
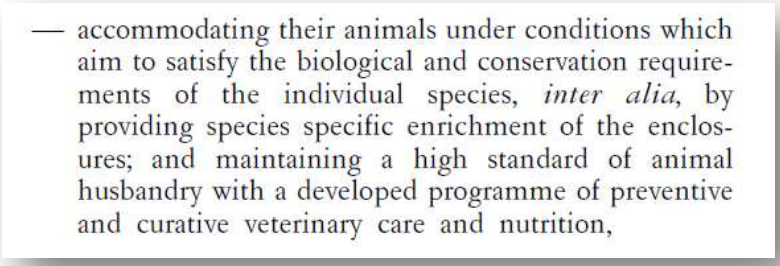



**Figure 4. Education strategy framework and examples.** Adapted from: Developing a Conservation Education Program by Kathy Lehnhardt. Curator of Education, Disney's Animal Kingdom, 2007.

**SUMMARY 4 – PUBLIC EDUCATION AND AWARENESS**

- Article 3 (second indent) requires zoos to promote public education and awareness on the conservation of biodiversity and to provide information about the species exhibited and their natural habitats, which relates directly to CBD Aichi Target 1.
- The requirement applies to formal and informal educational activities as well as to other types of communication that zoos undertake with the public.
- Learning methodologies can be used to help design, develop and evaluate educational activities that increase public knowledge of conservation of biodiversity and provide motivation towards positive attitudes and behaviour.

## 2.4 Article 3 - third indent - Accommodating animals



— accommodating their animals under conditions which aim to satisfy the biological and conservation requirements of the individual species, *inter alia*, by providing species specific enrichment of the enclosures; and maintaining a high standard of animal husbandry with a developed programme of preventive and curative veterinary care and nutrition,

### 2.4.1 Scope

Article 3 (third indent) requires zoos to accommodate animals under conditions that satisfy their biological needs and ensures the conservation of different species.

The aim of Article 3 (third indent) is to ensure that animals are well and healthy, as described in the OIE Terrestrial Animal Health Code (2013), so that they can contribute to the role of zoos in the conservation of biodiversity. This article includes examples of relevant requirements such as species-specific environmental enrichment in the enclosures as well as a high standard of animal husbandry, veterinary care and nutrition.

The approach to accommodating animals in zoos is developed in further detail in guidelines produced by a number of zoo professional associations, of which EAZA and its Minimum Standards for the Accommodation and Care of Animals in Zoos and Aquaria is referred in the preamble to the Zoos Directive[8]. These guidelines can assist, where appropriate, in the development and adoption of national standards, but they are also used to conduct inspections to the facilities for membership and accreditation at regional or European level.

This section identifies conservation measure relevant to satisfying zoo animals' physical, behavioural and psychological needs and which thus provide for their biological requirements. These and other relevant provisions have underlying animal welfare principles, in accordance with relevant sources (e.g. OIE definition of animal welfare; FAWC's five freedoms framework; Welfare Quality project). Biological requirements can be assessed both through evaluation of environmental provisions (inputs) and animal responses (outputs). (See Annex 3.4)

**Conservation requirements**

Conservation requirements include protection of ecological processes and life support systems, their sustainable utilisation and maintenance of genetic diversity. It involves the individual's ability to contribute successfully to the conservation of its species. For example through its participation in a conservation breeding programme, as part of a programme of re-introduction of the species to the wild or as an educational ambassador for its species. All of these roles require the species to be physically and psychologically fit, with good physical and behavioural health, and an ability to adapt, cope and learn in a stimulating environment.

Source: WAZA - Building a future for wildlife: the World Zoo and Aquarium Conservation Strategy.

### 2.4.2 Accommodation

Appropriate environment and husbandry practices require a good knowledge of both species-specific and individual needs which is, to date, absent for many species. However, many taxon specific husbandry manuals based on natural history or on experience from captive husbandry exist and can be used (See Annex 3.1. for relevant websites).

[8] An updated version of EAZA's standards is due in April 2014. Many other standards are nowadays available, most of which can be consulted online (see Annex 3, list of useful websites)

Decisions on species for which husbandry manuals are still non-existent are often based on analogies between closely related species. This approach is practical, and frequently useful, but care must be taken, even with some very closely related species that nevertheless have distinct ecological needs and therefore may require different provisions and husbandry procedures (See also Annex 3.3.1: case-study 7 and 8).

#### *2.4.2.1 Enclosures*

In zoos, appropriate environments are those that allow animals of all ages to express their behaviour in such a way that their needs are satisfied to the largest possible extent.

The definition of minimum requirements in terms of enclosure design, space or furnishing may not be the best method as these features are difficult to validate and seldom cover needs of all specimens at all times.

##### 2.4.2.1.1 Enclosure design (including tanks and aquaria)

A good design of enclosure allows animals to express patterns of natural behaviour as well as enabling appropriate husbandry procedures and providing an attractive but non-invasive public experience (see Annex 3.5 and section 2.3). It is important to create species-specific behavioural opportunities and a certain degree of control and choice by the animals in a particular enclosure.

##### 2.4.2.1.2 Enclosure size, furnishing, surfaces and substrate

It is important to decide space in combination with the furnishing that allows animals to exhibit their natural behaviour at all stages of their growth in all dimensions of the available space. This requires the provision of opportunities to shelter, nest, climb, fly, bath, dig, etc.

Space also depends on the social group size and dynamics. For species with larger home ranges, like carnivores, space, combined with environmental variability, may be a critical factor[9]. For aquaria, appropriate space requirements are a function of water quality, group density and other factors. More guidance on aquatic mammals is provided by the European Association of Aquatic Mammals (EAAM).

**Types of enclosure**

Is the kind of space provided relevant to the species concerned?

Species-specific space requirements is a difficult concept to define when it is not analysed together with species-specific behavioural opportunities. For example, arboreal species, like most guenons, require climbing opportunities and tree-dwelling space so providing these species with large grassland does not respond to their behavioural requirements.

The Animal Protection Ordinance of Switzerland (Tierschutzverordnung) (2008) is an example of legislation that takes as a priority the species-specific behavioural opportunities as a means to regulate quality of enclosures.

Enclosure furnishing can provide complexity, and allows a more three-dimensional use of the space, providing opportunities and accommodating specific biological and conservation needs.

**Example – Enclosures and the reintroduction of Golden Lion tamarins**

Reintroduction of Golden Lion tamarins in the 1990s was delayed as the primates were used to climbing only on static branches in zoo enclosures. Upon translocation to a wild habitat, the inexperienced tamarins fell out of trees and risked injury as they were not experienced in climbing and moving between natural branches, which moved with the wind. By modifying the zoo enclosure to include natural trees, the tamarins were better able to cope with reintroduction into the wild

It is important that surfaces allow for good drainage and are both durable and comfortable for the species. Different degrees of abrasiveness or softness of the floors may be recommended for different species. Soil, sand, pebbles, vegetation, woodchip, bark, or other kinds of substrate have to be adjusted to the behavioural requirements of the species.

[9] Clubb, R. and Mason, G. (2003) Captivity effects on wide-ranging carnivores. Nature 425, 473–474

Enclosures with different kinds of surfaces and substrate will enlarge the behavioural choice and respond to different needs within the same species and individuals. A good balance between preferred surfaces and substrates and hygiene requirements is important.

**Why is substrate so important**

Sand flooring has been successful for foot health, skin health and birthing behaviour in many species (e.g. elephants, rhinos). This is important because unhygienic, abrasive and/or unnatural floor materials have proven to be uncomfortable and responsible for many foot and skin diseases. Deep litter bark or straw systems are both hygienic and biologically appropriate for many species (e.g. primates) as they stimulate natural foraging behaviour important for locating food in the wild.

#### 2.4.2.1.3 Aquatic areas

It is desirable that the dimensions and shape of aquatic areas allow expressions of natural aquatic behaviour of terrestrial, semi-aquatic or aquatic species. Factors to be considered are the avoidance of competition for space and drowning risk, particularly in corners or specific areas.

It is important that access to water is safe with suitable edges, slopes and materials for the species concerned. In fully aquatic species, it is paramount to prevent incidental escapes from the water. Marine mammals require smooth floor in beaching areas to avoid body damage while beaching. Aquatic areas with variable water-flows (e.g. promoted by waterfalls) are needed for some species.

#### 2.4.2.1.4 Walk and drive-through enclosures

Visiting rules are advised for walk and drive-through enclosures explaining potential hazards for safety and from zoonoses. Visiting rules may include, for example, rules for: the number of visitors allowed in the enclosure; feeding the animals; awareness of potential problem should animals be allowed to escape, and chasing and handling animals that freely move through the enclosure. Regular monitoring of non-hazardous species enclosures and constant surveillance of hazardous species will help to minimise any problems.

### *2.4.2.2 Environment*

Environmental conditions that satisfy the needs of species, individuals and their particular life stages may not be possible in some geographical areas or in some seasons. In general, whenever natural conditions of the enclosures are different from those in which species evolved and/or are able to adapt, artificial mechanisms may compensate for these differences. In such cases routine monitoring is essential in case of failure of the mechanisms.[10]

**Environment**

Ecological tolerance of species needs to be taken into account in planning environments.

A species highly tolerant for temperature variations has a more flexible adaptation to areas with wide variations of temperature. Conversely, a species with lower ecological tolerance for a given environmental parameter has a narrower ability to cope with variations and thus the environment needs to be much more stable (e.g. many species of reptiles, fish and amphibians have a narrow tolerance for temperature and humidity).

#### 2.4.2.2.1 Temperature

In many cases, appropriate temperature levels are only attained through the use of thermostats attached to heaters or coolers. Many species may benefit from localised and well-protected sources of heat (e.g. lamps).

The thermal needs of species are best addressed when planning the collection as it may be very difficult to meet thermal needs of some species in certain geographical areas (e.g. polar bears in hot climates). Whereas it is

[10] This section was mainly based on the numerous publications reviewed by Morgan, K. N. & Tromborg, C. T. 2007. Sources of stress in captivity. *Applied Animal Behaviour Science*, 102, 262–302; and by Hosey, G., Melfi, V. & Pankhurst, S. 2010. Zoo Animals: Behaviour, Management and Welfare. Oxford: Oxford University Press. Other sources of information are part of the reference list for this section.

important to keep certain species in indoor areas due to thermal concerns (e.g. many reptiles), the same is not good practice for many other species, which are kept indoors in certain times of the year due to the weather.

**Temperature**

Allowing animals a free choice to move amongst different thermal spots is a good practice. Thermal and humidity ranges can be extended through the use of plants and water sprays for penguins, tigers, parrots and many other species; 'hot spots' for, for example, amphibians and reptiles; and pools and shade also for many species.

#### 2.4.2.2.2 Ventilation and humidity

Temperature, humidity and ventilation are all equally important for health and are very much related to each other. Ventilation helps dissipate excessive temperatures and humidity levels, contaminants and odours. It is important that ventilation does not compromise air temperature, but can be used to create relevant humidity gradients in the enclosure. Maintenance of air humidity may not be done at the expenses of poor ventilation.

#### 2.4.2.2.3 Lighting

Natural light or full spectrum sources are essential for many diurnal and nocturnal species. Exposure to ultraviolet (UV) light is particularly important. Glass windows are only partially transparent to UV light. UV light levels need to be controlled periodically in order to be kept within the required range of the species concerned and bulbs of the appropriate spectrum should be replaced when appropriate. Additionally, the needs of most species for dark periods should also be taken into account and respected.

Ideally aquatic environments will be constructed to allow natural UV and visual light levels in order to reduce ophthalmic problems associated with glare. Animals under fully artificial regimes may benefit from a smooth transition from dark to light periods and vice-versa. Good natural or artificial lighting is necessary to allow appropriate monitoring of animals.

**Lighting**

Many reptiles and amphibians, tropical birds marsupials and primates, especially those species kept permanently indoors, require supplementary UV lighting. Some species are very sensitive to disruptions of their natural photoperiod and the needs of nocturnal species can be accommodated and adjusted for exhibition (e.g. by reversal of lighting schedules).

#### 2.4.2.2.4 Noise

Repetitive and especially sudden noise levels as well as infrasound and ultra-sound noises can be a source of disturbance for many species of zoo animals. This is despite the fact that many animals can adapt to unusual noise without apparent disturbance. It is therefore important to identify sources of potentially disturbing sound effects, such as nearby equipment, taking into consideration species differences, such as different hearing ranges. With an understanding of how the animals may be adversely affected, the sounds can be minimised as much as possible.

#### 2.4.2.2.5 Odours

Chemical cues from distressed conspecifics or from predators can be a source of chronic stress in captivity. However, chemical communication is frequently an important channel of communication between conspecifics and interference to this channel (e.g. by routine cleaning) may disrupt social behaviour and become a source of stress. However, certain odours can also be used as an environmental enrichment technique. Since there are also potential aversive odours related to bedding, substrate or other material, it is important to monitor the existence of avoidance behaviour that may be associated with it.

#### 2.4.2.2.6 Quality of aquatic life systems

In all kinds of aquatic environments, water quality is maintained by an appropriate and well-controlled filtering system. Daily monitoring, an efficient correction system and recording of relevant parameters (e.g. temperature, salinity, chlorine, ozone/redox, halogen ions, pH, nitrites, ammonia, oxygen) is essential. Periodic monitoring depends on the parameters used and on the dynamics of the aquaria. Recently established aquaria require closer

monitoring than more stable environments. Inappropriate water quality or excessive disinfection agents may cause skin and eye lesions.

Water salinity levels have to take into account the ecological needs (freshwater, brackish or sea-water) of the species concerned. Where appropriate, aeration may be attained by an efficient mechanism appropriate to the size of an aquarium and animal density.

#### 2.4.2.2.7 Weather extremes

Permanently accessible indoor areas, shelters and shade where animals may find protection from weather extremes such as excessive sunlight, rain, wind, draughts and floods are advisable in enclosures where their natural characteristics do not provide for appropriate natural sheltering (e.g. trees, burrows, caves, perches, etc.).

#### 2.4.2.2.8 Equipment

Backup systems, alarms and periodical checks are important to prevent interruption of life-support systems (especially in aquaria) or deterioration in environmental quality as a consequence of system failure.

### 2.4.3 Environmental enrichment

**Relevant Definition**

**Environmental Enrichment -** The husbandry provision of species-specific opportunities within an animal's environment to enable it to express a diversity of desirable and natural behaviours.

#### *2.4.3.1 Promotion of natural behaviour*

Zoo animals may not be able to express the whole range of their normal behaviour in captivity, sometimes losing some patterns and developing others. Changes in the behavioural repertoire may have a variable impact on welfare, depending on the kind of behaviour involved. For example, animals may exhibit behaviour signalling frustration and their welfare may become compromised if behavioural needs are restricted.

**Relevant Definition**

**Natural Behaviour -** Behaviour that animals have a tendency to exhibit under natural conditions, because it promotes biological functioning and may be perceived as pleasurable. See also definition of normal behaviour in the glossary.

Changes in behavioural repertoire are not desirable for conservation programmes because they compromise survival in natural conditions. For these reasons, it is important that every effort is made to keep and promote - as far as it is legally and ethically possible - the expression of species-specific behavioural repertoires.

Natural behaviour can be achieved by creating enclosures, husbandry and feeding routines, social groups and species-specific environmental enrichment programmes that meet species' natural physiological and behavioural needs.

**Relevant Definition**

**Behavioural need -** Behaviour that is largely motivated by internal factors, in that its performance may not depend on external stimuli nor on the attainment of a specific goal, being rewarding in itself. Preventing animals to perform this kind of behaviour may cause them to suffer. Species-specific behavioural needs are not easy to understand and need to be interpreted with caution, but they are likely to be very important to animals' welfare.

#### *2.4.3.2 Environmental enrichment*

Appropriate variability and satisfaction of specific needs of animals can be achieved through environmental enrichment**.** It may replace natural challenges, promote time occupation, increase desirable and natural activities,

reduce undesirable behaviour (e.g. stereotypes) and keep or develop physical, behavioural, cognitive and/or social abilities (Annex 3.6).

On the other hand, environmental enrichment should be effective and not lead to unnatural behaviour, disrupt social interactions, over-stimulate individuals or create distress. Zoos are advised to implement environmental enrichment programmes through a daily calendar, which ensures enrichment changes on a daily basis (See Annex 3.6.2 and Annex 3.3.2: case-studies 9 and 10).

**Example – environment enrichment**

A successful environmental enrichment programme needs to be planned and evaluated. S.P.I.D.E.R. is an example of a managing framework suggested by the American Zoo and Aquarium Association (AZA) which describes the following steps: Setting goals, Planning, Implementing, Documenting, Evaluating, Re-adjusting behavioural goals.

Prevention of habituation to environmental enrichment strategies may be achieved by introducing unpredictability (e.g. different intervals of time between enrichments, different combination of approaches). Enrichment approaches less prone to habituation are those that:

- present a challenge from the cognitive point of view;
- stimulate behaviour that animals are already highly motivated to do;
- offer a connection between behavioural performance and a reward.

#### *2.4.3.3 Social groups*

In natural conditions, the composition of social groups may vary according to the ecological conditions as well as the social circumstances.

In zoos, animals in unusual social groups may adapt even if the group structure does not follow strictly natural patterns. The level of adaptation will depend on the species and the particular individuals.

Preferably, all species will be accommodated in accordance to their needs, integrating individuals to groups of appropriate sizes, sex ratios and age composition. When it is unavoidably necessary to form unnatural social groups (such as bachelor groups in species that do not form such groups in the wild), monitoring of the behaviour is important to safeguard health and welfare. It is important that removal of individual animals from an established social group considers the impact on the individual and on the remaining group.

Some species are solitary in the wild due to territorial behaviour or due to shortage of resources. In zoos, if enough resources are provided and distributed so that inter-individual distances can be maintained to prevent conflicts, social grouping may provide a valuable enrichment, but care and close monitoring is advised.

If separation of social specimens has to occur for management reasons, an attempt to keep partial contact (e.g. adjacent enclosures) may reduce separation distress. Some males may become dangerous during breeding seasons and a plan for their appropriate management is important to keep the welfare and safety of the whole group. When social isolation is necessary for management reasons, this should be kept to a minimum period in social species. If zoos do not have the appropriate facilities to manage a species, this can be taken into account when planning the collection.

#### *2.4.3.4 Mixed species exhibits*

Mixed species exhibits can promote enrichment and provide variation for the animals, but can also be a source of chronic stress. Interspecific groups can easily become unpredictable, and therefore close monitoring and readiness to adjust to changing circumstances is necessary. Natural prey and predator species in some form of contact (e.g. in adjacent enclosures) may become chronically stressed.

**Example – Mixing of species**

In large aquaria it may be difficult to keep predators and prey apart. Prey can be provided with opportunities to flee, hide or avoid predators through appropriate space allowance and availability of visual barriers like plants, rocks, etc. Close monitoring is advised.

## 2.4.4 Animal husbandry

### *2.4.4.1 Human-animal relationships*

#### 2.4.4.1.1 Keeper-animal relationships

Professional animal management relies on trained zoo staff who are consistent and positive in their interactions with their animals. Keepers with an aggressive, unpredictable or inconsistent approach to animal husbandry may be a source of stress. It is important that keepers recognize the animals' individuality and behavioural profiles (Annex 3.8 and case-studies 11 and 12).

#### 2.4.4.1.2 Animal Training

Training of animals is increasingly more common in zoos for reasons related to particular aspects of husbandry and veterinary management, and also to provide positive keeper-animal interactions, cognitive enrichment and public education.

It is appropriate that training methods are based on positive operant conditioning, but other forms of training can also be adopted (e.g. shaping - where animals become familiar with a stimulus through successive and increasing exposure). (See Annex 3.7).

Competent trainers have a good understanding of anatomical, behavioural and cognitive abilities of animals, never using objects, restraining or training methods (e.g. negative reinforcement, punishment) that compromise their welfare. Food used during training sessions should be part of the daily allowance. A good training plan will include measures to avoid over-stimulating animals, promoting unnatural behaviour or making them working beyond their capacity.

#### 2.4.4.1.3 Routine observations

A good monitoring programme involves, at least, a daily routine of observing behaviour and health signs, followed by recording by the responsible keeper.

Responding rapidly to signs of stress, sickness or injury will prevent more serious problems developing. Indicators for remedial action or closer monitoring might include: evidence of unusual behaviour, recently formed social groups, changes in environment, breeding seasons, high visitor numbers (see visitor effect, below).

When the monitoring of animals through direct observation is difficult, alternate systems can be put in place (e.g. closed-circuit television).

#### 2.4.4.1.4 Presentations, exhibitions and public-animal contact

Respect for animal health, natural behaviour, physical integrity and appropriate control of physical restraint is essential for the general welfare of animals before, during and after presentations and exhibitions (See Annexes 3.7 and 3.8).

When direct contact of the animals with the public is practised, a risk assessment is essential for health, welfare and safety reasons related to both humans and animals. It is also desirable to establish internal rules for presentations and human-animal contacts.

#### 2.4.4.1.5 Visitor effect

Animals react in different ways to visitors (see Annex 3.8). Some species or specimens show signs of stress in the presence of visitors, whilst others seem to approach and even seek human contact. For many species, however, the relationship with visitors is still not entirely clear. In these cases, solutions to reduce visitors' potential adverse influence are especially recommended (see Annex 3.8.2.). In dealing with the visitor effect, it is important to recognise the impact on particular groups of animals and plan strategies to promote the best possible balance.

#### 2.4.4.1.6 Capture, handling and transport

Capture, handling and transport may be some of the most complex and lengthy procedures that animals undergo. Species-specific husbandry manuals as well as a number of international agreements usually provide the best guidelines.

It is important the capture and handling is conducted safely and with minimal disturbance by experienced and authorised staff. The welfare of the individual, its group and of the staff should be considered when choosing the most appropriate restraint method for any medical or husbandry procedure.

For many species chemical restraint may be less stressful and safer for both animals and humans than physical restraint. For others, a physical restraint chute may be more appropriate (e.g. hoof stock). Some species may calm down quicker in darker environments. Care may be taken to ensure the working environment is quiet and organised during any procedures.

Pre-movement training and familiarisation with transport vehicles and equipment can reduce risks and distress with advantages for both animals and humans. Stress reduction measures include the consideration of species-specific needs and physiological requirements (thermoregulation, provision of water and food, etc.). Careful planning helps to keep transit periods and stress to the minimum.

**Managing behaviour during handling and transport**

Understanding and managing behaviour for handling, capture and transport will facilitate the procedures:

- Is the species prone to attack or to escape?
- What are its hiding patterns?
- What are the species-specific flight distances?
- What's the effect of moving into darker spaces?
- What's the ability to move up or down slopes for loading/unloading?
- What's the effect of contact with unfamiliar individuals?

#### 2.4.4.1.7 Psychological needs

Animals experience a range of positive or negative emotional states that may affect their ability to cope with their environment. Examples of emotional states include boredom, fear, pain, frustration, distress, contentment and playfulness.

##### *2.4.4.1.7.1 Managing emotional states*

Boredom can arise from barren, under-stimulating and excessively predictable environments. Boredom is regarded as a first stage of a path to apathy and depression. Frustration is very often triggered by natural behavioural restriction. Anxiety, fear and distress can be due to particular aspects or events in the captive environment e.g. chronic social tensions, an excess of unpredictable situations and over-stimulation.

Improvement of enclosure design, appropriate environmental enrichment including social stimulation or other husbandry practices may all contribute to reducing these negative emotional states and promoting positive mental states.

**Minimising negative emotional states**

Appropriate environmental challenges that allow animals to exercise their natural tendencies to patrol, explore, forage and survey changes in the surroundings all help to minimise negative emotional states, such as boredom, fear and frustration.

**Maximising positive emotional states**

Encouraging appropriate mental stimulation, behavioural diversity and the expression of animals' natural behaviour leads to positive mental states, such as contentment, comfort, vitality and playfulness. Positive emotional states can be further strengthened through variability, appropriate complexity and environmental control and choice.

*2.4.4.1.7.2 Managing the perception of animals*

Managing the perception of animals can promote less negative and more positive emotional states. Gradual instead of sudden presentation of stimuli, or predictable instead of unpredictable negative events can reduce stress.

In the same way, the organisation of the animals' response to the events can be manipulated to promote wellbeing. Animal's control over the environment is one of the most important, as well as opportunities to express important behaviours or dispel frustration.

**Example - How the perception of animals can be manipulated**

- A sudden increase in room temperature promotes a higher arousal in rhesus monkeys than a gradual increase.
- Predictable confinement causes less distress in a cichlid fish than if it is unpredicted.
- Transport is less stressful to forest reindeer if they have the social support of familiar counterparts travelling with them.
- Subordinate animals may provide outlets for frustration, as may elements of the environment or the performance of stereotypes. Repetitive behaviour may have deleterious consequences, such as bears biting bars until the mouth is injured. However in some cases repetitive behaviour can help to decrease other signs of distress.

**Relevant Definition**

**Stereotypic behaviour -** An abnormal repetitive behaviour, which may be induced by frustration, repeated attempts to cope with environment or by a central nervous system malfunction.

In certain cases, exhibition of abnormal behaviour may be related to past conditions and not so much with the present ones. In any case, provision of appropriate behavioural opportunities can successfully reduce the incidence of these patterns in various species. Stereotypes can be oral (e.g. licking in giraffes), locomotory (e.g. perch circling in parrots) or involve other body movements like swaying in elephants.

### *2.4.4.2 Veterinary care*

Good knowledge, good facilities and good equipment are the three pillars that support veterinary care in zoos. Without any of these three elements, the quality of the veterinary care will be substandard. Veterinary care in zoos involves curative care, preventive medicine, proper record keeping and biosecurity measures to keep both the animals and the people that are in contact with the animals free of injury and disease.

Council Directive 92/65/EEC (Balai Directive) outlines annual disease surveillance plans for approved establishments (under Article 13t) as well as animal transfer and quarantine procedures for transfer of animals between approved and non-approved establishments.[11] This guidance is useful for all zoos, and the requirements outlined below should be seen as complementary. See also case-study 13 (see Annex 3.3.4.).

#### 2.4.4.2.1 Preventive health programmes

The zoo veterinarian is responsible for the development and execution of preventive health programmes, which include health monitoring, parasite control and vaccination.

Health monitoring generally includes regular veterinary advisory visits, daily observations by zoo keepers, routine weight monitoring, full physical examinations, dental examinations, routine faecal examinations, periodic reviews of diets and record keeping.

The protocols for routine screening for diseases and for vaccination will depend on the species and individual concerned, the nature and prevalence of disease in the zoo, the epidemiological status of the region and the population, and on national regulations.

[11] See also Transmissible Diseases Handbook, European Association of Zoo and Wildlife Veterinarians, chapter VI

Additionally, identifying and assessing the risk of zoonotic infection will help to determine the appropriate preventive actions and control measures to minimise the risk for visitors and zoo staff. (See section 2.4.4.2.5 on biosecurity). Examinations and treatments may be required for reasons of animal health or public health, or both.

#### 2.4.4.2.2 Veterinary facilities

Zoos need facilities to capture, restrain, transport, examine, treat and isolate animals. A zoo should have appropriate facilities to undertake post-mortem examinations or have an arrangement with an appropriate external laboratory. All facilities should be easy to clean and disinfect.

Aquaria also need facilities and resources for water quality testing, analysis and maintenance of tanks and water systems.

Veterinary drugs and capture equipment must be secured in a lockable area or room with restricted access. The use of veterinary drugs must comply with relevant regulations.

#### 2.4.4.2.3 Quarantine

Animal health considerations may require that animals arriving at a zoo are kept in bio-secure quarantine to prevent the introduction of pathogens into the resident populations.

The zoo veterinarian is the appropriate professional to determine the exact quarantine period in compliance with prevailing regulations (such as Council Directive 92/65/EEC) and according to the species, the origin of the animal, and any tests and treatments that may have been carried out prior to movement.

Animals will normally be inspected on arrival to screen for injuries, disease and general condition (e.g. weight). Procedures to be carried out during quarantine may include physical examinations; laboratory tests; animal health treatments (e.g. for injuries, disease and parasites); vaccinations; determination of age and sex; examination of teeth, and; marking for identification.

Isolation of sick or injured animals from the zoo in a separate area is also important. Isolation may be necessary when there is a risk of spreading infection, or for intensive care or supervision. If there is no risk of spreading infection, isolation may be only physical or visual without the need to be bio-secure.

#### 2.4.4.2.4 Veterinary record keeping

Comprehensive veterinary records are an important element of veterinary care. Veterinary records should accompany animals when they are transferred to a new keeper.

Record keeping is addressed in section 2.6 below.

#### 2.4.4.2.5 Biosecurity

A proper policy on biosecurity minimises the spread and introduction of infectious diseases, including zoonoses. For the design of a zoo-specific biosecurity protocol, knowledge is required on the routes for disease and pathogen introduction and spread in the facility (further information on preventing escape in section 2.5).

**Relevant Definitions**

**Hazard -** A biological, chemical or physical agent in, or a condition of, an animal or animal product with the potential to cause an adverse health effect (Terrestrial Animal Health Code – OIE).

**Risk -** The chance, high or low, that somebody could be harmed by any hazards, together with an indication of how serious the harm could be. (Health and Safety Executive, UK)

Risk assessment methodology can be used to identify biosecurity risks and hazards, and to develop a biosecurity protocol. Zoo biosecurity includes (but is not limited to): cleaning and disinfection, pest control, good sanitation, quarantine of newly arrived and sick animals and waste disposal. It is established practice that zoos use risk assessment methodology to develop biosecurity protocols and contingency plans.

**How can zoos use risk assessment methodology to assess biosecurity risks?**

An appropriate risk assessment may consist of the following steps[12]:

1 Describe the relevant activities

2 Identify the hazards

3 Assess the risks

4 Control the risks

5 Regularly review, evaluate and update

It is prudent to pay particular attention to activities where the public is in direct contact with the animals and to take into account animal welfare and the impact on non-target flora and fauna.

To ensure proper implementation of the outcomes of the risk assessment, awareness of the significance of biosecurity issues is advisable. Also important is that the zoo management and staff working with animals has an understanding of the major routes for disease and pathogen movement and implement practices which minimise the risk of disease and pathogen movement. It is a good practice to inform the public of possible risks and precautions.

#### 2.4.4.2.6 Curative care

All treatments are recommended to be executed under supervision of a suitably qualified veterinarian. However, it is possible to train zoo staff to carry out certain applications or treatments. The responsible veterinarian should be approved by and under the control of the competent authority and is expected to be proficient in medicine, surgery and husbandry of the species with which they work.

The zoo veterinarian is responsible for the reporting of any suspect deaths or the presence of any other symptom suggesting that animals have contracted a notifiable disease to the Competent Authorities.

#### 2.4.4.2.7 Euthanasia

A defined policy and protocols on euthanasia, addressing medical, ethical and animal welfare aspects of the decision-making process, are recommended for all zoos.

#### 2.4.4.2.8 Post mortem procedures

After the death of an animal, zoos are advised always to consider post mortem examinations. The responsibility for that decision normally lies with the zoo veterinarian. To facilitate high quality of post mortem examinations, rapid retrieval, storage, contact with a specialized pathologist, disposal and record keeping are good practices. The safety of staff in contact with the dead animals is relevant for inclusion in the protocol for post mortem procedures.

### *2.4.4.3 Nutritional programme*

Appropriate and well-balanced feeding and drinking can only be attained with a good knowledge of the species' specific feeding ecology and nutritional requirements at any stage of their life history. There are still many species for which little or no information on specific nutritional needs is known, and provision of diets based on wild food items can still be difficult for logistical reasons (sourcing and shipping). See also case-study 13 (Annex 3.3.4.).

#### 2.4.4.3.1 Nutritional programme

An appropriate nutritional programme provides quantitative and qualitative balanced diets adjusted to species, sizes and ages of animals, as well as to seasonal, particular external conditions or physiological status of individuals (e.g. pregnant or lactating females, sick or geriatric animals).

[12] Risk Assessment Annex, Zoo Animal Health Network and Zoos Expert Committee Handbook, UK Department for Environment, Food and Rural Affairs (2012), chapter 7.

Use of supplements may be advisable in some cases or for particular species. Caution and the direction of a qualified person are recommended in the use of supplements.

It is important that the nutritional plan is supervised by a nutritionist, a veterinarian or other specialist. Expert advice can be sought if the zoo is too small to justify employing a qualified professional. Changes to the plan can be recorded and discussed with the supervising professional.

**Example - nutrition**

Nutritional diseases such as calcium deficiency in large cat, reptile or bird species, leading to bone fractures or seizures, are avoidable problems associated with inadequate husbandry. Need of supplements is common in piscivorous species, not only for replacement of thiaminase, but also where feeding of thawed frozen fish does not provide appropriate nutrition alone.

#### 2.4.4.3.2 Water

It is important to provide clean, fresh available drinking water at all times to all animals in indoor and outdoor enclosures. De-chlorination of drinking water or specific distribution strategies may be required for some species. A separate source of drinking water is advisable for bathing species or reptiles.

**Example - water**

Chameleons will only drink water dripping from vegetation. Rabbits preferentially drink from bowls rather than water bottles or nipple drinkers.

#### 2.4.4.3.3 Feeding by the public

Feeding of animals by the public is generally discouraged. In cases where it is allowed, it may be done under the supervision of responsible staff and in a way that diets remain balanced and within the daily allocated ration, so animals do not ingest inappropriate items and are not over-fed. Feeding by the public may also be randomized and carefully managed to prevent animals developing abnormal begging behaviour.

#### 2.4.4.3.4 Facilities and equipment

Separate rooms for storage and preparation of food are always advisable, as well as refrigeration to store perishable food. It is good practice that the storage and preparation of food occurs under strict hygiene standards, free of contamination or deterioration, and with receptacles, equipment, utensils and surfaces washed and disinfected.

The use of separate utensils for preparation of meat and vegetables is advisable. In defrosting frozen products, particularly fish, the loss of nutritional value can be limited by defrosting in a chill room or fridge and then allowing it to reach the appropriate temperature followed by prompt feeding. Pest control may be needed.

It is important that feeding receptacles, when necessary, are designed to encourage natural feeding, easy cleaning, safety and to minimize contamination from soiling and competition. The same applies to automated devices for self-feeding and self-drinking.

**Example – feeding facilities**

Nectar feeding birds benefit from food from feeders that encourage their natural positioning and foraging skills.

Predatory animals may be offered meat and whole carcasses chained to the ground or hung from trees or poles to exercise their natural mental and physical abilities.

#### 2.4.4.3.5 Feeding behaviour

In the wild, the majority of species spend much time foraging, hunting or manipulating food items. In zoos, it is important that feeding methods increase time spent on feeding and that can promote as wide a range of species-specific natural feeding behaviour as possible.

A safe distribution of food is important for both animals and keepers. Accommodating natural feeding behaviour provides physical activity and mental stimulation and exhibits natural behaviour to the visiting public, and as such it is a form of environmental enrichment.

**Example – feeding behaviour**

To encourage natural feeding behaviour food could be distributed: as whole-food rather than chopped; in different areas around the enclosure that vary each day; as part of specific environmental enrichment programmes.

#### 2.4.4.3.6 Seasonality

Seasonality has important impacts on the feeding behaviour of many species, particularly those that hibernate.

Animals need to prepare for hibernation with a period of abundant food availability, especially an increase in protein and fat. For this reason, it is good to reduce diet only when an animal starts to voluntarily reduce its feed intake, with water being available at all times.

It is advisable to check animals daily, without disturbing them, during hibernation or dormancy. Some species may wake from hibernation intermittently especially during warm periods of the winter and fresh food and water should be available so that animals can feed and drink before resuming hibernatory behaviour.

### *2.4.4.4 Management of the collection*

The European Association of Zoos (EAZA) has recommended that Zoos only acquire, manage and exhibit species in a planned and ethical way and for which they have the necessary facilities, resources and skilled staff to ensure that they can provide for the biological and conservation requirements of the species (e.g. EAZA's Code of Ethics (2009) and Annex 3.9). With this purpose, it is advisable to carry out a cost-benefit analysis to inform decisions (see UK Zoos Expert Committee Handbook (2012).

Important aspects for consideration that have been identified include:

- Transfer of stock to other collections: ensuring that the receiving zoo is able to provide for the stated requirements.
- Captive breeding and population control: planning and managing according to the best available methods in the given context (e.g. contraception, temporary separation, control of hybridisation, culling and as much as possible considering for the animals' social needs.
- Animal identification: avoiding pain, disturbance of social behaviour and/or behavioural restriction.
- Surplus animals: avoiding their occurrence as much as possible and, if needed, disposing of them in a humane and ethical way.
- Acquisition of wild-born specimens to the collection: taking into consideration the conservation and welfare impact (e.g. capture methods) of the acquisition.

### SUMMARY 5 – ACCOMMODATING ANIMALS

- Accommodating animals in a way that satisfies their biological requirements is an important contribution to meeting the conservation objective of zoos.
- Standards of good practice and species-specific husbandry manuals are available and are important sources of information to keep zoo animals in good conditions.
- Assessments of environmental provisions, physiological state and behaviour can be used to determine whether animals' biological requirements are being met.
- Housing design, furnishing, surfaces, substrate and environment (e.g. temperature, humidity, light) are key aspects for meeting accommodation requirements in zoos.
- Environmental enrichment promotes natural and desirable behaviour in animals, occupying their time and encouraging physical, social and mental activity.
- Human-animal interactions, both in relation to keepers and to visitors, can be significant to animal welfare.
- Suitable health programmes are required to ensure good animal health.
- Well-balanced nutritional programmes take into account individual and seasonal requirements. Coordination with environmental enrichment programmes helps to satisfy species-specific behavioural requirements. Free access to good quality water is always important.

## 2.5 Article 3 - fourth indent - Preventing escape and the intrusion of pests and vermin

— preventing the escape of animals in order to avoid possible ecological threats to indigenous species and preventing intrusion of outside pests and vermin,

### 2.5.1 Scope

The requirement of the Zoos Directive, Article 3 (fourth indent) is in line with the Convention on Biological Diversity (CBD), which stresses that "each Contracting Party shall, as far as is possible and appropriate … prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species".

At the European level, Council Directive 79/409/EEC on the conservation of wild birds establishes under Article 11 that "Member States shall see that any introduction of species of bird which do not occur naturally in the wild state in the European territory of the Member States does not prejudice the local flora and fauna".

Regulation (EEC) No 338/97, as amended, embraces all the provisions of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), and allows for the inclusion in its annexes of those species whose introduction into the European Union could represent an ecological threat for indigenous species. Its application is controlled through periodically updated regulations, whereby suspensions are established for the introduction of certain species into the European Union.

**Relevant Definitions**

**'alien species'** means any live specimen of a species, subspecies or lower taxon of animals, plants, fungi or micro-organisms introduced outside its natural range; it includes any part, gametes, seeds, eggs or propagules of such species, as well as any hybrids, varieties or breeds that might survive and subsequently reproduce;

**Invasive alien species** means an alien species whose introduction or spread has been found to threaten or adversely impact upon biodiversity and related ecosystem services

Source: Regulation 1143/2014 on invasive alien species

In November 2014, the European Union published Regulation 1143/2014 on invasive alien species The Regulation establishes a coordinated EU-wide framework for action to prevent, minimise and mitigate the adverse impacts of IAS on biodiversity and ecosystem services, and limit their damage to the economy and human health.

The Regulation includes three distinct types of measures, which follow an internationally agreed hierarchical approach to combatting IAS:
• Prevention: a number of robust measures are foreseen to prevent new IAS from entering the EU in the first place, either intentionally or unintentionally.
• Early warning and rapid response: Member States must put in place an early warning system to detect the presence of IAS as early as possible and take rapid measures to prevent it from becoming established.
• Management of already established invasive alien species: some IAS are already well established in the EU territory, concerted action is needed to manage them so that they do not spread any further and to minimise the harm they cause.

The implementation of the Regulation is supported by a Committee made up of representatives of all Member States. Furthermore, advice on scientific questions related to the implementation of the Regulation is provided through a Scientific Forum with representatives of the scientific community appointed by the Member States.

Although not all alien species are invasive, eradication is often impossible once an alien species becomes established, and mitigation and control are difficult and expensive. Preventing their introduction is the primary and most cost-effective measure to avoid future harm.

Zoos shall, therefore, **prevent** the escape of their animals in order to avoid possible ecological threats to indigenous species as well as prevent the intrusion of outside problem species. The word "**prevent**" used in the text of this Directive stresses the anticipatory nature of the measures to be taken. It is not acceptable to await until an animal escape has occurred or pests are present in the zoo before taking measures.

The measures under Article 3 (fourth indent) [preventing the escape of animals and the intrusion of pests and vermin] are complementary to the other conservation measures in Article 3 as they aim to maintain a healthy animal collection by minimizing infection from outside species while indigenous species outside the zoo's boundaries are not exposed to any threat from the animal collection.

The scope of this conservation measure requires clarification in two aspects:

- Preventing the escape of zoo animals and the intrusion of problem species in the zoo grounds will inevitably have a beneficial effect on people (both zoo visitors and staff), by protecting them from potential physical harm caused by escaped animals or disease transmission by outside species. However, the target of protection in this Directive as specified under Article 1 is the biodiversity in general and wild fauna in particular, not people *per se*. Although people will benefit from the application of the abovementioned measures, human safety/security is not specifically addressed under this or any other section of the present legislation and, therefore, such safety/security measures (e.g. barriers preventing visitors from falling into a moat or actions to mitigate the risk of injuries when attending a free-flying bird show) need to be addressed by the zoo according to local, national and regional legislation in place regarding this matter.
- Many of the plants and algae used for ornamental purposes in zoos are not indigenous to the area where the zoo is located and represent a potential threat to the environment. However, the EU Zoos Directive, by specifying "animals" in its text leaves other alien species, such as plants or algae, beyond the scope of this Directive. In this regard, a number of international agreements are in place regarding NIS which include provisions to prevent their introduction as well as to control or eradicate IAS. For instance, Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora requires Member States " to ensure that the deliberate introduction into the wild of any species which is not native to their territory is regulated so as not to prejudice natural habitats within their natural range or the wild native fauna and flora and, if they consider it necessary, prohibit such introduction" (Art.22b). Similarly, Article 11, paragraph 2.b, of the Bern Convention requires Contracting Parties "to strictly control the introduction of alien species".

### 2.5.2 Preventing the escape of animals

Zoos hold many animal species, most of these are alien species (although some zoos specialise on indigenous fauna). Zoo escapes have been reported worldwide, placing zoos as potential sources of alien species if the animals escaped. Although the importance of zoos in introducing IAS is low compared to other activities, such as horticulture or the pet trade, zoos must take every measure necessary to prevent the escape of their animals.

#### *2.5.2.1 Do all animal escapes represent an ecological threat?*

Not all species in a zoo represent an actual threat to the ecosystem if they escape. Even if an animal (or animals) escaped its enclosure, it can still be intercepted in the zoo grounds before escaping the zoo. It can also be recaptured and recovered after escaping the zoo grounds but before causing harm to indigenous species, and even if it achieved complete freedom, it needs to become established and spread within the new ecosystem to become invasive.

#### *2.5.2.2 Reaching a new ecosystem*

- Scientific data indicate that, in general, when a species is transported and released (intentionally or unintentionally) in a different habitat, most organisms die in transit or soon after release.
- In the case of escapes, the success of any given animal or species in achieving complete freedom depends on its particular physical features and behaviour. For example, it could be expected that physically large-bodied species will be less likely than smaller animals to succeed in escaping as they are more conspicuous to people and therefore easier to detect.
- Hazardous species are probably less likely to succeed in reaching the wild as the danger they represent to the public means that more effort will be put into their recapture.
- The species locomotion pattern also plays an important role in the escape, both in terms of speed and fashion; Flying animals are more likely to succeed in their escape, because they are harder to catch and recover

#### *2.5.2.3 Species' ability to establish and spread in a new ecosystem: assessing the risk of biological invasion*

Evaluating the risk of biological invasion requires an in-depth assessment of:

- the potential for the species to establish itself, increase numerically and spread, as well as its scope for having undesired ecological roles in the areas where it is introduced;
- the potential to cause undesired effects on the biodiversity or ecosystem;
- the area immediately affected by the possible escape and also the area of possible expansion in the medium to long-term. The complex and interacting negative effects of an IAS may only become evident decades after introduction;
- the species' ability to spread geographically (motility, dispersal by the wind, dispersal in freshwater or marine environments, etc.);
- the area potentially affected by the escape.

#### *2.5.2.4 Species hazardousness: ecological versus human hazard*

Member States need to ensure that their zoos have satisfactory security measures against escape. This applies not just for species hazardous to humans, but also for species that represent a potential threat (i.e. NIS and/or IAS) to indigenous species outside the zoo.

For instance, the European Association of Zoos and Aquaria (EAZA) as well as other national/regional professional zoo associations often have a list of species dangerous to people in their accommodation and husbandry standards to ensure that every institution knows the hazardousness of their animal collection and appropriate safety measures are taken.

A similar list for species hazardous to the environment would raise the security for alien species and IAS, and increase awareness amongst zoo personnel. Staff members need to be aware of the importance of security measures for species potentially hazardous to the environment as they are for those species considered hazardous to humans.

**Example**

Many of the non-native species that have succeeded in invading new ecosystems in Europe were former pets that were released or escaped into the wild (e.g. green iguanas, *Iguana iguana* or red-eared sliders, *Trachemys scripta).*

It is important to highlight that most IAS are not directly harmful to humans. For example, none of the species - other than a few jellyfish - listed in "the 100 worst invasive species for Europe" published by DAISIE (Delivering Alien Invasive Species Inventories for Europe) are directly hazardous to humans.

Hence, security is important for some species as they are a threat to humans and for others as they are a threat to the environment.

**How to know which species are NIS or IAS in a given country**

DAISIE is a project funded by the sixth framework programme of the European Commission that provides a 'one-stop-shop' for information on biological invasions in Europe.

With direct access to national knowledge bases throughout Europe, data on which species are invasive or potentially invasive in particular habitats can be easily obtained.

Data has been collated for vertebrates, invertebrates, marine and inland aquatic organisms as well as plants from up to 97 countries/regions (including islands) in the wider Europe. Over 248 datasets have been assembled and verified by experts, representing the largest database on invasive species in the world. Access to this resource is provided through three main search facilities:

- search for information on one of the 12 122 alien species occurring in Europe;
- search for one of the 839 experts on biological invasions in Europe;
- search regions to explore the alien species threats across Europe, for 81 countries/regions (including islands) and 57 coastal and marine areas.

#### *2.5.2.5 The European Code of Conduct on zoological gardens and aquaria and invasive alien species*

The European Code of Conduct on zoological gardens and aquaria and invasive alien species is a document elaborated by the Council of Europe together with the Invasive Species Specialist Group of the IUCN and EAZA. It identifies five recommendations to ensure that animal collections in European zoos do not represent a source of IAS, and that the overall commitment and engagement of these institutions in relation to their role in conservation, research and education increases with regards to invasive species.

The five recommendations are:

- Adopt effective preventative measures to avoid unintentional introduction and spread of IAS.
- Take into account the risks of IAS introductions in all wildlife and habitat management projects.
- Proactively engage in awareness raising and outreach activities focusing on IAS and their impacts.
- Adopt best practices for supporting the early warning and rapid response system for IAS.
- Be aware of all relevant regulations concerning zoological gardens and aquaria and IAS.

The recommendations above can be considered as a first step needed to encourage voluntary initiatives for zoos in compliance with the principles of the *European Strategy on IAS*. They have been developed with the objective of ensuring that zoo collections do not represent a threat to the environment by becoming a source of IAS.

#### *2.5.2.6 How to prevent animal escape in the zoo*

##### 2.5.2.6.1 First line of action: secure enclosures against animal escape

Preventing zoo animals escaping their enclosures (if they are housed in one) or the park's grounds depends on two basic factors:

- The animal cannot surpass the enclosure barrier - because it is built with the right materials, the right design, it is properly maintained and regularly checked.
- Visitors cannot set the animals free either directly - by extracting the animal from its enclosure and taking it - or indirectly, by facilitating its escape.

Given the growing role of plant collections in many institutions (including those used for food, like birds seeds, environmental enrichment, exhibit/tank design and environmental education), it is important to acknowledge that the use of invasive plants may result in the spreading to adjacent natural areas. As an alternative, non-invasive, possibly native, plants that are aesthetically and horticulturally suitable in the region can be identified and used to replace known or potential IAS.

Enclosures need to be designed to prevent the escape of housed animals and plants, their propagules, their parasites and pathogens or any other organisms with potentially deleterious impacts on the environment. The design will vary according to the species. As a general rule however, the type of enclosure, the materials used in its construction and the design of the physical barrier should take into account the physical strength, behaviour, and cognitive abilities of the animals housed.

Three components of an enclosure are crucial to keep the animals contained and secure:

- Physical barrier
- Gates and doors
- Drainage system

**The physical barrier**

Barriers need to be designed, constructed and maintained to contain animals within enclosures making sure that vegetation, climbing structures or other items are maintained in such a way as to not aid escape. Barriers must also be strong enough to resist unexpected weather conditions (snowfall, strong wind, etc.). The best way to ensure regular maintenance of all containment infrastructures, such as cages, aviaries, fences, barriers, etc. is to establish an assessment procedure involving responsible and regular monitoring and inspection of the facilities (e.g. to identify damages to fences, etc.). Particularly when electric fencing is used for animal containment, the system should be checked daily and have back-up power in case of a power cut.

**Example**

Fish netting dyed black to reduce ultraviolet degradation has been used as a secure barrier for bird exhibits, allowing large enclosing spans without the obstruction of intermediate supports.

Given the wide variety of taxa found at zoos, an equal variety of enclosure types is needed. For example, burrowing animals require an artificial 'floor' at a certain distance underground (such distance depending on the digging patterns of the species) as a barrier that will allow digging but prevent escape.

For those species that can climb or jump, the minimum recommended heights of barriers as stated in national or international zoo community standards (e.g. EAZA, ASZK husbandry guidelines) need to be taken into consideration. When the species is so agile that alternate barriers are not practical, complete enclosures of mesh may be necessary.

The design and construction of enclosures needs to take full account of the risks associated with the strength, behaviour and cognitive abilities of the animal. Specific provisions will need to be made for animals that are capable of jumping, climbing or burrowing, for example:

- a roof of adequate strength over the entire enclosure;
- fencing of appropriate height, which may include internal overhangs for additional security;
- downward extensions into the ground coupled with horizontal returns, of adequate width, back into the enclosure.

When designing the enclosure barriers it is necessary to consider whether the visiting public will be allowed to come into physical contact with the animals, either through the protective barrier or inside the enclosure. Human-animal contact represents a potential physical harm for both the person and the animal and may facilitate the transmission of zoonoses. See section 2.4.4.2.5 (Biosecurity)

**Example**

Viewing panels used in enclosures must be able to withstand attacks by animals. Where glazing is subjected to extreme or repeated force, as in the case of gorillas, heavy duty (e.g. 25 mm or more) ballistic glass may be necessary. The framework supporting the glass must be of sufficient strength and durability. Where glass is used it must be marked or incorporate design features so as to make it clearly visible.

*Should Member States allow zoos to have any species of their animal collection moving freely in the zoo grounds?*

Before making a decision regarding species moving freely throughout zoo facilities (e.g. in the case of free-flying psittacine birds or birds of prey in flying displays) the zoo should undertake specific assessments to evaluate whether such species might represent a threat to native species, habitats and ecosystems (also in relation to the spread of diseases) in the event of escape.

Species with proven invasive potential in the country where the zoo is located (as well as neighbouring countries, depending on the dispersal capabilities of the species under consideration) present a high risk if allowed to move freely in the zoo grounds.

Effective techniques can be adopted to reduce the invasive potential of species in open displays, for example, by releasing only males, fitting tracking devices on the animals, or by restricting permanently or temporarily the ability

of birds to fly (whenever feasible and appropriate, in accordance with animal health and welfare regulations and best practices).

If free flying birds are allowed, whether used for shows or for ornamental purposes (e.g. peacocks), zoos may encourage them to remain on site by providing roosting areas, nest boxes, and feeding points. However, the safer option is to avoid free-ranging behaviour, whether as part of a demonstration or ornamental birds moving around the park.

**Gates and doors**

Gates and doors must be strong and effective in containing the animals. This includes preventing animals from lifting them from their hinges or unfastening the securing device. Gates and doors to enclosures must be securely locked so as to prevent unauthorized opening.

For enclosures that allow entry to the public (whether pedestrian or closed vehicle drive-through), it would be beneficial to have one entrance and one exit, whose supervision should be at a level appropriate to the exhibit. If these enclosures house flying (e.g. insects, birds, chiropters) or climbing (e.g. primates) species, they should be double-gated to prevent accidental escape. The space between the gates needs to be sufficient as to allow complete closure - front and rear - during the entry of persons or vehicles.

Door and gate design considerations include allowing for any lock, latch or bolt to be easily operated from the inside by zoo staff, but not animals. Inner doors and gates need to be kept closed when workers are in the enclosure to prevent animals entering the transit area. Hanging the gate or door so that it opens inwards (into the enclosure) avoids having to close it against the weight of an animal.

**Drainage system**

In general, any part of the overall structure of waste water drainage and filtration systems could lead to an unintentional release of animals. For this reason, it is advisable that zoos with aquaria, particularly those located near coastlines, observe strict safety precautions in this regard.

Screening of water from enclosures and aquaria (or any other water body included in the zoo) will reduce the likelihood of animals being released into the natural environment.

**Example**

*Caulerpa taxifolia* is an invasive alga that is causing serious environmental problems in the Mediterranean Sea. A cold water strain of this alga was selected by aquarium managers in 1980. In 1984, this strain of *Caulerpa* was accidentally released by a European aquarium into the Mediterranean Sea, where it established itself. Currently, *Caulerpa* has colonized thousands of hectares of sea bottom in the Mediterranean and it is found from France to Croatia, while its range in the Mediterranean will likely expand. The invasive strain of *Caulerpa* in the Mediterranean Sea smothers other algal species, sea grasses and sessile invertebrate communities. Large meadows of *Caulerpa* have vastly reduced native species' diversity and fish habitat. Native fish which are able to eat *Caulerpa*, such as Mediterranean bream, accumulate caulerpenyne toxins in their flesh which makes these fish unsuitable for human consumption.

#### 2.5.2.6.2 Second line of action: the perimeter boundary

A perimeter barrier around the zoo is the most obvious means of preventing animal escape from a zoo. Barriers (including access points) need to be designed, constructed and maintained to discourage unauthorized entry and, as far as is reasonably practical, to prevent escape of animals (including via drainage pipes or other water lines).

**Example**

Unattended zoo access points (e.g. service gates) might be equipped with automatic closure mechanisms, CCTV surveillance, and/or an alarm system.

#### 2.5.2.6.3 Third line of action: Security measures in case of accidental animal escape

Zoos are strongly encouraged to have an emergency plan for animal escape in case of security failures or other unforeseen events (e.g. natural catastrophes, fires). Animal escapes may represent a hazard to both humans and the environment.

Considering IAS in the zoo emergency plan would help to minimise the risk of introducing alien species into the environment, assuming all other security measures (barriers, doors/gates and drainage system) are in place and effective.

As a precautionary measure and as far as it is reasonably feasible, it is desirable to retrieve (alive or dead) any escaped animals. To that end, appropriate equipment (e.g. nets, weapons, anti-venoms, etc.), training and appropriate licenses in the use of such equipment should be in place.

Lists of IAS and potential IAS for the region can be used to help prioritise the species that present most biological risk if they escape.

An emergency plan with the protocols and actions (animal capture, public protection, perimeter lock-down, police notification, etc.) to be taken in case of escape and the chain of responsibilities for these actions is strongly encouraged. When an escape could present a threat to a neighbouring country, there should be a communication mechanism to inform the competent authorities.

Aspects to be considered for inclusion in emergency procedures in the event of an animal escape (whether classified as dangerous or non-dangerous):

- Nominating a person and deputy to take charge of the situation and make important decisions;
- Raising the alarm and reporting incidents to appropriate personnel as quickly as possible;
- Communications with entrances/exits; allocating responsibilities for closure where necessary;
- Arrangements for the evacuation or safe confinement of people in the zoo, ensuring that those situated away from buildings receive appropriate assistance as quickly as possible;
- Managing crowds safely in an emergency situation and the giving of directions;
- A strategy for recapture appropriate to the types of animal kept;
- Liaison arrangements with senior zoo personnel, vets etc. for the recapture plan, including the use of radios, equipment, vehicles, firearms, and identifying essential employees;
- Briefing staff as to their roles and responsibilities during a recapture operation, including the recapture of animals escaped beyond the perimeter of the zoo;
- Arrangements to locate the escaped animal;
- Arrangements to keep the animal under observation while recapture plans are being formulated, and movement of key personnel to the area once the escapee has been located;
- The provision and location of the necessary capture equipment (e.g. nets, firearms, darting equipment); torches are invaluable for night escapes and should be located in a designated area;
- Alerting external emergency services and police, where necessary;
- Stand-down arrangements on the completion of the recapture operation, including notifying all relevant personnel and external organizations involved.
- Zoo staff should be properly trained in emergency plans, and such plans should be regularly practised to be effective.

### 2.5.3 Preventing the intrusion of outside pests and vermin

The Zoos Directive requires Member States to ensure that zoos take measures to prevent the intrusion of outside problem species that could risk human or animal health.

Control of such species is a critical aspect of preventive medicine at zoological parks. Prevention of pests and pathogen intrusion relies on strict bio-safety protocols (e.g. quarantine, waste disposal) to reduce the risks, as well as appropriate contingency plans to pre-empt such risks. (See section 2.4.4.2: Veterinary care).

**Pests** are vectors or reservoirs of disease that can adversely affect zoo animals.

Zoos should consider establishing and maintaining a safe and effective programme for the control or deterrence of pests and vermin and, where necessary, predators. Although there are limits as to what can be done for prevention, obvious measures such as fox proof fencing, and rodent and insect control within the zoo may be considered. Also, where possible, control and prevention measures outside the zoo can be encouraged within the locality. (See section 2.4.4.2.5: Biosecurity).

#### *2.5.3.1 Pest management programmes*

A successful pest management programme combines a thorough knowledge of both the biology of the pests in question and the effects of any proposed control methods on the pests, and on the zoo's animal collection, employees, visitors, as well as other non-target animals not part of the zoo's animal collection but present on zoo grounds.

The most successful control programmes at zoos use integrated pest management (or IPM) as a pest management strategy, wherein natural processes (natural pest mortality factors, pest-predator relationships, and genetic resistance) can be manipulated to maximize their effectiveness. Commonly, chemical controls are used only when natural processes of control as well as other methods have failed, and in a way that minimises economic, health, and environmental risks. The goal of IPM is to reduce pests to a tolerable level through methods that are least disruptive to the environment. Whatever the method employed, welfare of all animals should be carefully considered, including that of non-target species.

**Definition**

**Integrated Pest Management** is the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. IPM encourages natural pest control mechanisms (adapted from FAO)

Key pest management issues at zoos are rat and mice control, stray cats, insect (primarily cockroach) control, effects on non-target animals, and identification of non-chemical alternatives. A zoo poses particular problems because it is necessary to control pests without harming exhibit specimens. Both the primary toxicity of the materials used as well as relay toxicity should be considered (e.g. zoo animals consuming insects and dead rodents contaminated with pesticide).

Because of these risks, trapping is preferred over baiting for removal of vertebrate pests, unless there is severe rodent overpopulation. Fogging and fumigation needs to be strictly controlled and only certified, experienced applicators should be used. A pest management programme should be the responsibility of senior management personnel (limited to a very few people) who are knowledgeable about pest management principles.

Aspects of a pest management programme to be reviewed and discussed prior to implementation include chemical storage, inventories, safety procedures, application techniques and legal aspects (e.g., adherence to environmental protection agency pesticide and state or local rules and requirements for certified applicators, restricted-use pesticides, and application concentrations).

Personnel directly responsible for a pest management programme need to be knowledgeable in all areas of pest management operations and regularly reinforce their training in professional pest management. However, many zoos nowadays rely on professional external services (i.e. a licensed pest control company) that designs, manages and implements the pest control program.

A successful IPM programme at a zoo includes several steps to control, reduce, or eliminate pests; these may include inspection, exclusion and habitat management, sanitation, trapping, baiting, repellents, and other methods. As a preventive measure routine inspection of animal facilities may identify a pest problem before it develops into an infestation. Physical barriers (e.g., fencing, netting, and roofing) provide a first line of defence against pest infestation. Habitat management is intended to reduce the attractiveness of an animal enclosure to the pest.

Sanitation and proper storage and removal of solid waste (bedding, feed, enrichment items, dirt, and debris) are important steps in pest management. Appropriate food storage bins that are well sealed will reduce potential pest

problems. Cleaning and disinfecting food and water containers should occur routinely. Public areas (e.g., walkways, concession areas) should be cleaned regularly, and the public should be discouraged from feeding animals. National or regional regulations might contain specific sanitisation requirements for certain animals in captivity (e.g. indoor primary enclosures for primates).

Physical (trapping), chemical (baiting, repellents, and fumigation), and biological controls (predators, contraceptive vaccines, species-specific disease) may be required for more severe pest infestations. Trapping of pests reduces the risk of relay and non-target toxicity that may occur in zoos, and is generally preferred except in the cases of severe rodent infestation.

**Example**

Biological controls may be used in very specific situations when carefully monitored, for example, the use of an oral contraceptive agent (viral vectored immunocontraception) for the control of feral rabbits and red fox.

Chemical use should be considered a last resource for pest management because of toxicity concerns. Intoxication from chemicals used in zoos has been reported many times. Pesticide use at zoos is a concern because of potential impacts on animal health. It is recommended that zoo managers undertake a risk assessment to non-target species before using any pesticides or rodenticides. Their review of suitability of products should also consider the welfare of the pest species as well as ethical considerations.

Second-generation anticoagulant rodenticides have been associated with toxicity and in some circumstances death in several bird species, for example, white-winged wood duck, turkey vultures, kookaburra, von der Decken's hornbill and crested wood partridge.

### SUMMARY 6 – PREVENTING ANIMAL ESCAPE AND THE INTRUSION OF OUTSIDE PESTS AND VERMIN

- Invasive Alien Species (IAS) are thought to be the second most destructive human influence on biodiversity after habitat loss and landscape fragmentation.
- Zoo escapes have been reported worldwide, placing zoos as potential sources of Alien Species.
- Avoiding animal escape in zoos is the first and most cost-effective measure to avoid ecological threats.
- Most IAS are not directly harmful to humans. Many of the non-native species that have succeeded in invading new ecosystems in Europe were former pets released or escaped into the wild.
- DAISIE provides a comprehensive inventory of IAS for every European country.
- The three lines of action to avoid animal escape are:
  - a perimeter boundary that aids to the confinement of all the animals within the zoo perimeter;
  - animal enclosures that have been designed, built and maintained taking into account the physical strength, behaviour, and cognitive abilities of the animals housed;
  - an emergency plan that acknowledges IAS.
- Pests are vectors or reservoirs of disease that can adversely affect zoo animals. All the appropriate actions need to be in place to avoid pests and vermin in a zoo.
- Key pest management issues at zoos are rat and mice control, insect (primarily cockroach) control, concerns about non-target animals, and identification of nonchemical alternatives.

## 2.6 Article 3- fifth indent - Record keeping

— keeping of up-to-date records of the zoo's collection appropriate to the species recorded.

### 2.6.1 Scope

Under the scope of the Zoos Directive, animal records serve two well-defined functions: i) they are a source of information for competent authorities during inspection and authorization, and; ii) they are essential for a zoo when planning and executing conservation, education and veterinary care programmes. Conservation activities depend on good animal records.

Internally, animal record databases assist animal management staff in caring for their animals as well as the management of the species at a population level. An up-to-date animal registry is important for administration, monitoring and control of the animal collection, as well as for animal welfare.

Externally, accurate records facilitate information exchange with other zoos, and are a valuable source of information for scientists and researchers (e.g. demographic parameters, survival rates) in the conservation field.

Four terms in Article 3 (fifth indent) define the scope covered by the text:

- **Up-to-date** refers to the most recent available information of the specimen under consideration. Updating records is a continuous routine task in any zoo.
- A **record** includes information about an individual animal or groups of animals. An individual animal record may contain information about its provenance, history, daily care and health condition. Examples of animal records are: transaction documents (including proof of legal ownership, purchase contracts, permits or certificates from authorities like CITES, etc.), identification information, reports of collection changes (including in-house moves), pedigrees/lineages, veterinary information, including images, test results, etc., nutrition and body condition information, information on sampling and parts/products distribution, etc.
- The Zoos Directive requires records for the **zoo's animal collection**. The zoo's animal collection **includes all animal species** maintained by the zoo and **under its responsibility**, while **excluding animals** in the zoo grounds **that are not part of the zoo's animal collection**, e.g. feral cats.
- The text reads that animal records must be **appropriate to the species recorded**. Different information may be kept according to the species, as long as records are complete, accurate, and organized in a logical manner in order to be useful regarding compliance with the other conservation measures as well as with the general objectives of the Zoos Directive.

Previous studies point out to the lack of complete and appropriate records as the most common transgression of the five conservation requirements under the Zoos Directive.

### 2.6.2 Which records should the zoo have regarding its animal collection?

In addition to records on individual animals a zoo can have **collection records**: information, evidence, rationalisations about its animal collection as a whole that may supplement or explain information contained in an animal record.

Zoo collection records may include: documentation of collection decisions and changes; evidence of structural change at the institution, evidence of building name changes and documentation of institution or unit level husbandry protocols and changes.

Examples of documents that might be included in collection records that complement or explain an individual animal record are: collection plans, permits, annual inventories (which include reconciliation with the previous year), area journals/notebooks (including information to/from/between other animal care staff), keeper reports, etc.

Finally, an annual inventory or **census record** is a useful tool**.** An inventory answers the question of "How many?" for each species in the collection on a specific date. An inventory provides an "account-balancing" from the previous inventory, i.e., the number of animals at the beginning of the current inventory will be the same as that at the end of the previous inventory, where discrepancies are recorded with an explanation. In the case of group records instead of individual records (further information in section 2.6.4.1), census records can only be approximate.

**Example – census record**

| Common name[1] | Scientific name[1] | Group at 01/01/2013[2] | Arrived[3] | Born[4] | Died[5] | Departed[6] | Group at 31/12/2013[7] |
|---|---|---|---|---|---|---|---|
| South China tiger | *Panthera tigris amoyensis* | 2.1.1 | 0.2.1 | 0.0.2 | 1.0.0 | 0.1.0 | 1.2.4 |
| … | … | … | … | … | … | … | … |

[1]common and scientific names of the species; [2]total in the collection at first January (1.2.3 indicates one male, two females and three unsexed); [3]number of arrivals into the collection from all outside sources during the year; [4]number of births or hatchings within the collection during the year; [5]number that died including culls; [6]number that departed the collection, including sales, breeding loans, etc.; [7]total remaining in the collection at 3 December.

Census records may include, but are not limited to:

- Number of individuals of each species on the start date.
- Number of births/hatches for each species during the report period.
- Number added by other means (non-birth acquisitions) for each species during the report period.
- Number of deaths for each species during the report period.
- Number removed by other means (dispositions) for each species during the report period.
- Number of individuals of each species on the end date.

Animal records are crucial for captive breeding programmes. They represent an invaluable database for scientific research (both basic research and conservation) and they are the basis of proper animal husbandry.

### 2.6.3 The importance of keeping complete, accurate and up-to-date records

One of the consequences of inadequate animal records may be that a zoo is unable (directly or indirectly) to fulfil other conservation measures required by the Zoos Directive. For example:

- Genetic risks of inadvertent inbreeding due to uncertain (or incorrect) parentage may include: increased birth defects, lowered infant survival and lowered reproduction.
- Unnecessary moves (thus incurring shipping costs and risks) or incorrect recommendations against breeding (given that cooperative management programmes rely on data derived from zoo records).
- Management may be hindered if husbandry history, particularly veterinary or behavioural information is not carefully documented.
- Legal citations for incomplete or inaccurate records can lead to costly fines and embarrassing suspensions of permits.
- Poor record keeping hinders improvements in animal management and husbandry.
- Animal welfare might be negatively impacted.

Cooperative management plans (including captive breeding programmes) depend on accurate and reliable data to formulate recommendations.

### 2.6.4 Information that an animal record may include

Animal records can contain as much information as required by the zoo management. Some Member States have specific requirements regarding their animal records (e.g. Spain[13]). In others without specific legislation, it may be zoo inspectors that determine the requirements.

Relevant information to be included in an individual animal record for conservation purposes under the Zoos Directive might include:

- species (scientific and common name)
- specimen/group ID number (assigned by the zoo)
- sex of the specimen
- date of birth or estimated age
- birth type (i.e., wild, captive, unknown)
- place of birth (unless captured wild)
- parentage (if captive bred)
- species invasiveness (whether the species represents a threat to the environment)
- previous locations and ID numbers, if any
- all transactions (with dates and names of other parties) which involve the specimen, including the information recorded at past locations, if known
- identification information such as tag, brand, tattoo, and/or transponder numbers, their locations and dates of application, and identifying marks or physical features
- permits relating to the specimen
- studbook number(s), if registered
- animal health information, including details and dates of tests, medication, vaccinations and other treatments as well as information on the health of the animal
- date of death (when applicable) and the result of any post-mortem examination
- other information as is reasonably required and practical

Individual animal records may be modified as 'appropriate to the species recorded'.

#### *2.6.4.1 Individual versus group records*

Individual animal records are not appropriate for all species. Individual records require individual identification and recording with unique numbers. This is not feasible for very small animals, such as some invertebrates whose life span is a matter of weeks and where it is not possible to distinguish individuals. Individual recording is also more work, which may not be justifiable for some species.

As an alternative, a **group record** can be created, where a record file is created for a species or groups within a species having common characteristics. For example, in the case of asexually reproducing invertebrates, each pod (eggs cemented together in a mass, particularly in Orthoptera) could be counted as one specimen. As institution policy allows, a single number may be assigned to an entire litter or colony when specimens cannot be positively and consistently distinguished, or there is no tangible benefit in doing so.

Accuracy in individual records takes priority over accurate group records. However, group records are preferable to incomplete or inaccurate information in an individual record.

Because group data entry is awkward and provides less accurate records, it is only appropriate under certain circumstances. Group records are recommended when:

- Specimens from the same species are moved and cared for as a whole.
- Individual identification is not possible.

[13] LAW 31/2003, of 27 October, on the conservation of wild fauna in zoological parks. Art. 6: Species and specimens registry: "(…) registry shall include, at least, the entry and exit dates of animals, deaths and cause of death, births, origin and destination of animals, and the information required for animal identification and localization"

- Group size may only be a rough estimate.
- Fecundity and mortality are typically high.

These characteristics commonly apply to groups of tank-housed animals such as fish or frogs, or with large clutches of hatchlings until they are old enough to be treated individually. However, single animals from a group may be individually accessioned and assigned new (replacement) ID numbers when they become individualised. A note in the group history can indicate the new ID number assigned and the individual's new record may include - in addition to other required information - a note that the specimen was moved from a specified group (e.g., "from group #123"). Also, including a note as to the reason for the change in accession is recommended (e.g., "to be paired with #456").

The reverse of this process is also possible: several individual records (of the same species) can be combined to form a group record if the individual identities of the specimens have been lost. In this case, the individual records need to contain notes about why the individuals are being combined and what the new (group) ID number is. Ideally the new group record would contain the previous individual ID numbers and notes about the origin of these individuals.

Groups need also to be subjected to censuses at regular intervals, ideally no longer than one inter-birth interval. Censuses may provide as much detail as possible by recording numbers in distinctive life stages or categories, such as new-born, immature, male or female. If it becomes possible to individually identify a member of the group, then its records will be better served by creating an individual accession for that specimen.

**Example**

Cotton-top tamarin International Studbook #3565 is the same animal as European Regional Studbook #474, London Zoo ID #1287, and Barcelona Zoo #1098. Each number needs to reference the other numbers in the record file; a note of the studbook numbers and London ID # are all part of Barcelona's record for specimen #1098.

#### *2.6.4.2 Accession numbers*

A specimen will most likely have several identifying numbers during its lifetime, but these numbers each refer to different aspects of the animal's history. A specimen will have a different accession number at each institution where it is held. The individual also may have International Studbook and Regional Studbook numbers, each assigned by the respective Studbook Keeper.

Numbers must be copied exactly whenever possible. Since zero is a numeral, it has value in any place in an accession number. It is recommended that leading zeroes are not ignored or dropped, as 00011 is not the same as 11. Also, the letter O must be distinguished from the numeral zero (0), which is much more commonly used. Hyphens, slashes, etc. should be copied when encountered, but may need to be sacrificed. Thus 1234/AB might become 1234AB when only six spaces are available. In such cases, contact the institution to determine the essential characters. It is strongly recommended not to duplicate accession numbers within an institution.

For examples on how to create accession numbers, please see Annex 5.3.

**Example**

The accession number can give information about itself:

- Some institutions use a sequential numeric system (e.g., 123456).
- Others use letters or designated numbers in selected parts of the ID number to refer to class of animal (e.g., 112345 or M12345 - where the first character indicates mammals).
- Specific parts of the number may also be reserved for year of accession (e.g., 910123 or 91M123 - where the first two characters are the year).
- Letters used in accession numbers increase the available range of possibilities, though some letters can be confused with numbers (e.g., 0 and O, 1 and I, 2 and Z).

### 2.6.5 Record keeping systems

It is advisable that record keeping is accorded with the appropriate resources for the size and scope of the collection, and it is strongly recommended to establish a single animal records database as the official record.

Developing standards to guide institutional records keepers in the creation and maintenance of permanent, unambiguous records keeping databases that are readily interpretable by others is strongly recommended. For ease of interpretation, it would be convenient if the format for recording data was consistent within an institution and, ideally, between all institutions. This standardisation facilitates the understanding of another facility's records. Standardisation would also help avoid inconsistencies and improve reliability within and among institutions.

It is important each record stands alone and all information is kept in one place. When the reader must consult another file, concise reference needs to be given to the location of the other information.

It is important that copies of all correspondence, agreements, and permit applications are filed, as the institution must frequently reference previous correspondence and occasionally resubmit or document applications. Finally, the specimen ID number (or the group ID number in the case of group records) needs to be on all documents.

#### *2.6.5.1 Records and databases formats*

It is advisable to store both individual and group record files in physical and/or electronic formats that enable rapid data access. ISIS (International Species Information System) is a non-profit membership organisation which maintains computerised animal data - obtained from participating institutions - on animals held in captivity internationally. It combines institutional databases into a single global database of animal records. ISIS has developed several standardised software packages, such as ARKS (Animal Records Keeping System), MedARKS (for medical records) or most recently ZIMS (Zoological Information Management System). Other companies or organizations (i.e. ASPE) provide similar packages.

ARKS (Animal Record Keeping System): a specialized computer program developed by ISIS for collecting, reporting and analysing animal data within an individual institution. ARKS has been recently replaced by ZIMS (Zoological Information Management System), a new and improved version of the former software.

Although not mandatory, the use of standardised software packages is recommended, as it promotes standardised records within an institution and facilitates the exchange of information between institutions. Whatever the system used, the zoo should have complete and up-to-date records for every individual or group, depending on the circumstances.

**Example**

In Germany the company ASPE developed a software package based on the existing software used by state authorities. With this software the user receives all tools for record keeping as in AKS or ZIMS. A further advantage is the indication of all legal issues within the yearly update, making the zoo's database compatible with the inspecting authority.

### 2.6.6 Security

Hazards such as vermin, fire, flood, light, erasure, and vandalism must be taken into account. Additionally, the integrity of the data needs to be ensured. To safeguard against such hazards the following measures are recommended:

- When maintaining paper files, the use of archival quality materials is an advantage. Fireproof files and dry/cool storage away from direct sunlight is recommended.
- For computerized records it is important to maintain regularly up-dated back-ups on CDs or external hard drives in at least two different and physically separated locations. Heat, moisture, magnetism and physical damage should be avoided. Cloud computing can be used as additional back up, but preferably not as a single file

keeping system as security is still a major concern. Moreover, a single breakdown at the centre can irretrievably damage materials.
- In addition to duplicate CDs/hard drives, hard copies (printouts) of specimen reports also should be made at regular intervals and safely maintained with other paper records. For large animal collections this may prove impractical, making electronic back-ups a better option.
- Electronic archives may need maintenance after several years, and therefore a scheduled file maintenance procedure would be beneficial.
- Only authorized personnel should be able to make, change, or delete information.
- Additional precautions that can be taken include the use of indelible ink for hand-written records and computer access limited by the use of a password.

### 2.6.7 Animal identification

The identification of the animals comprising the zoo collection is necessary with regard to record keeping. The identification systems employed should be appropriate for the species identified and take into account animal welfare, as well as national/regional regulations.

If specific legislation exists, the system must be the one prescribed by law, and by no means use an identification method that is forbidden by its local/national legislation, even if it is commonly accepted in other countries or by the zoo community. The inspector should make sure such regulations are taken into account and followed by the zoo. (For a detailed description of the available identification methods in different taxa see Annex 5.4).

Certain specimens of species listed in Council Regulation (EC) No 338/97 have to be uniquely marked or labelled, for example, for internal EU trade control purposes (e.g. live animals listed in Annex A). These marking requirements have been developed to prevent fraud and to curtail illegal trade in specimens and products that are controlled by the EU Wildlife Trade Regulations. For example, the details of the mark, such as the unique number code, have to be provided on the permit or certificate and this helps to ensure that the specimens being traded are in fact the ones referred to in the accompanying documents. A summary of relevant legislation regarding ID and marking in the EU can be found here.

All live vertebrates (mammals, birds, reptiles, amphibians and fish) listed in Annex A that are exempt from the prohibition on commercial use [Art. 8.3 of Council Regulation (EC) No 338/97], for example captive-bred specimens, must be uniquely marked in accordance with Art. 66 of Commission Regulation (EC) No 865/2006 before an internal trade certificate can be granted for their commercial use. The full details of the mark have to be provided on the permit or certificate of the specimen (Art. 68.2 of Commission Regulation (EC) No 865/2006).

**SUMMARY 7 – RECORD KEEPING**

Good records maintain and transmit accurate information about the animal collection that:

- Documents a complete history of each animal or group of animals owned by or kept at a zoo. The inclusion of identification numbers at former and subsequent institutions links every specimen records to those of other institutions, expanding the known history of that specimen and assuring its traceability.
- Provides meaningful archive material for the future. Data accumulated on many individuals is more useful than information on a single individual of a species. By maintaining comprehensive information about all specimens held, meaningful analyses are possible.
- Provides legal documentation, including proofs of title and reports for permits. Complete records and files of correspondence, permits, and agreements corroborate justification of actions or aid defence during legal proceedings.
- Provides genetic history (pedigree) and basic demographic information used in local and global species management. With species disappearing daily, zoological institutions and aquariums need up-to-date records to maintain stable captive populations with the genetic material needed for future release of animals into their native habitats.
- Provides data for research and husbandry. Research depends on data and records can provide information for developing and improving husbandry practices.

ISIS (International Species Information System) and other companies or organisations offer very

Chapter

3

# 3 Implementation and enforcement

## 3.1 Introduction - Member State competences

In order to accurately apply the Zoos Directive, a system of licensing and inspection for zoos is fully described in Articles 4 to 8. By enforcing this procedure Member States are able to "ensure all zoos implement the conservation measures" of Article 3 and meet the objectives of the Zoos Directive.

In accordance with Article 7, Member States shall designate competent authorities for the purposes of this Directive. Member States may establish public administrative departments with the functions that they consider competent in order to deal with the implementation of the Directive. Bearing in mind that the objectives of the Zoos Directive are mainly related to environmental issues, ideally those authorities with specific functions regarding biodiversity conservation and wildlife protection would be involved in the licensing procedure.

The following sections are dedicated to providing Member States with information and examples about licensing and inspection tasks carried out by competent authorities, including the circumstances regarding the closure of zoos.

Principally, the licensing and inspection system entrusted to Member States seeks to enforce the requirements set out in Article 3 that zoos must fulfil and, thereby, strengthen their role in the conservation of biodiversity.

Regarding its implementation, the Zoos Directive establishes in Article 9.1 that "Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this directive not later than 9 April 2002..". Countries joining the EU after this date must apply the Directive from the date of their Accession to the EU.

The Zoos Directive provided for a four-year adaptation period (Article 4.2), during which existing zoos should bring their facilities and practices into compliance with the new conservation measures and obtain a new license. For this purpose, competent authorities are encouraged to regulate and carry out an inspection procedure (Articles 4.3 and 4.4) that serves to monitor the compliance of zoos with these conservation measures and to verify whether the conditions of the license are met.

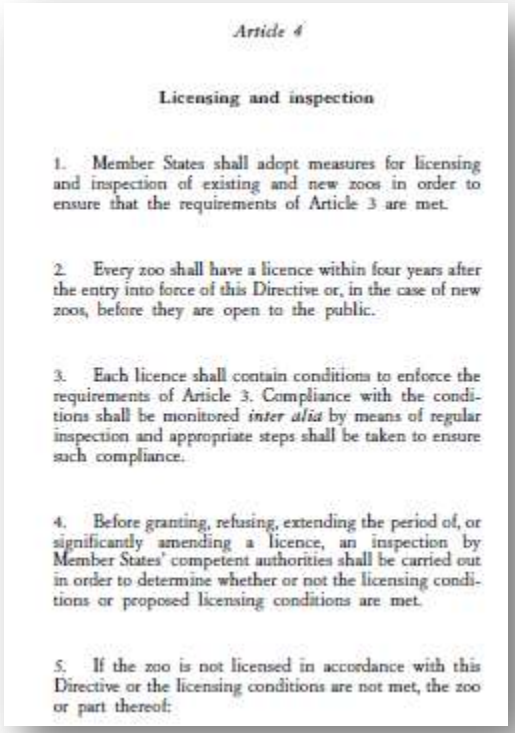
In cases of non-compliance, the competent authorities are able to extend the period for a zoo's compliance by a maximum of two years (Article 4.5) or to close the zoo to the public and ensure that the animals concerned are properly cared for (Article 6).

Finally, to complete the licensing regime, each Member State is requested to define a set of penalties to be applied in case of infringement of national regulations under the Zoos Directive (Article 8).

According to Article 9 of the Zoos Directive, "Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this directive" in order to ensure that its objective and the conservation measures of Article 3 are met, by means of:

- An adequate licensing and inspection regime (Article 4 and 5)
- A procedure for the closure of zoos in cases of non-compliance (Articles 4.5 and 6)
- A system of effective, proportionate and dissuasive penalties for breaches in compliance (Art. 8).

## 3.2 Licensing and inspection regime



*Article 4*

**Licensing and inspection**

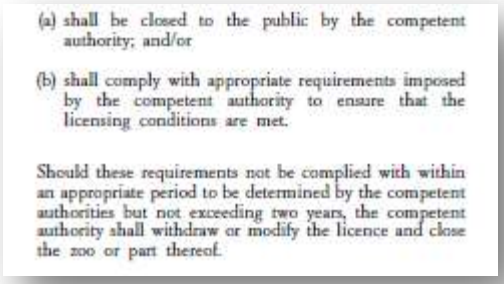
1. Member States shall adopt measures for licensing and inspection of existing and new zoos in order to ensure that the requirements of Article 3 are met.

2. Every zoo shall have a licence within four years after the entry into force of this Directive or, in the case of new zoos, before they are open to the public.

3. Each licence shall contain conditions to enforce the requirements of Article 3. Compliance with the conditions shall be monitored *inter alia* by means of regular inspection and appropriate steps shall be taken to ensure such compliance.

4. Before granting, refusing, extending the period of, or significantly amending a licence, an inspection by Member States' competent authorities shall be carried out in order to determine whether or not the licensing conditions or proposed licensing conditions are met.

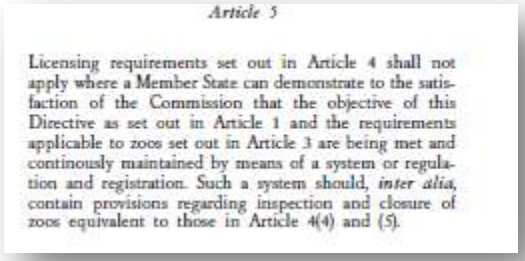
5. If the zoo is not licensed in accordance with this Directive or the licensing conditions are not met, the zoo or part thereof:



(a) shall be closed to the public by the competent authority; and/or

(b) shall comply with appropriate requirements imposed by the competent authority to ensure that the licensing conditions are met.

Should these requirements not be complied with within an appropriate period to be determined by the competent authorities but not exceeding two years, the competent authority shall withdraw or modify the licence and close the zoo or part thereof.



*Article 5*

Licensing requirements set out in Article 4 shall not apply where a Member State can demonstrate to the satisfaction of the Commission that the objective of this Directive as set out in Article 1 and the requirements applicable to zoos set out in Article 3 are being met and continously maintained by means of a system or regulation and registration. Such a system should, *inter alia*, contain provisions regarding inspection and closure of zoos equivalent to those in Article 4(4) and (5).

The specific licensing and inspection procedures (including closure) as detailed in Articles 4 and 5 enable Member States to ensure that zoos implement and maintain the conservation measures.

All zoos need a license according to the Zoos Directive (Article 4):

- new zoos: before they open to the public
- existing zoos: need a license preceded by an inspection in any case

In order to determine whether a zoo complies with the conservation requirements of Article 3, two types of inspections are contemplated under the following circumstances:

- Under Article 4.4 an inspection shall be carried out before:
  - first licensing of a zoo
  - refusing of a license

- extending the period of a valid license
- significantly amending a valid license

- Under Article 4.3 regular monitoring inspections shall be carried out to enforce the requirements of Article 3 and ensure that appropriate steps are carried out to maintain compliance.

The Zoos Directive does not establish the frequency of regular inspections, which Member States are able to specify in their national legislation. Through these inspections, the competent authorities will ensure that zoos implement with the conservation measures.

The Zoos Directive does not specify the duration of licenses. However Article 4.4 requires that an inspection is carried out before extending the period of a license. Member States are responsible for establishing the licensing period in their national regulations in order to determine the frequency of the regular inspections.

**Articles 4.3** and **4.4**: Licensing a zoo always requires a prior inspection in order to determine whether or not the licensing conditions or proposed licensing conditions are met. Regular inspections are required to monitor that a zoo maintains the licensing conditions.

Article 5 allows Member States to enforce the conditions of the Article by means of an equivalent system of regulation and registration of zoos. The two conditions to be met for Member States to use this option are:

- Member States will demonstrate to the Commission that the objective of the Zoos Directive (Article 1) and the requirements applicable to zoos (Article 3) are being met and maintained.
- Member States will implement a system of regulation and registration, which contains (*inter alia*) provisions regarding inspection and closure of zoos equivalent to Articles 4.4 and 4.5.

Therefore, if the Member State can ensure that the objective of the Zoos Directive is being met, the equivalent system does not require the issue of a new license for zoos. However it should include prior inspections to determine compliance with the conditions and enable the closure of zoos if the conditions are not met.

**Article 5**: Member States choosing this alternative system of regulation and registration shall demonstrate to the Commission that zoos in their countries are meeting the objectives of the Directive: to protect wild fauna and to conserve biodiversity

### 3.2.1 Zoo Inspection Systems

Based on good practice experience the following sections are aimed to assist Member States in regulating, designing and organizing zoo inspection systems that fits their specific needs. For more information, Annex 6.2 describes the different characteristics of two zoo inspection systems including links to their guidance and resources available online.

#### *3.2.1.1 Zoo inspection process*

The licensing and inspection process might entail three stages for which the employment of several tools and procedures is suggested, as listed below and illustrated in figure 5:

- Pre-inspection:
  - Pre-inspection questionnaire
  - Zoo's documentation
  - Previous inspection report
  - Further information (e.g. complaints)
- Inspection:
  - Visit/visual inspection
  - Meetings with zoo staff
- Post-inspection:

- Inspection report
- Licensing conditions / sanctions
- Recommendations

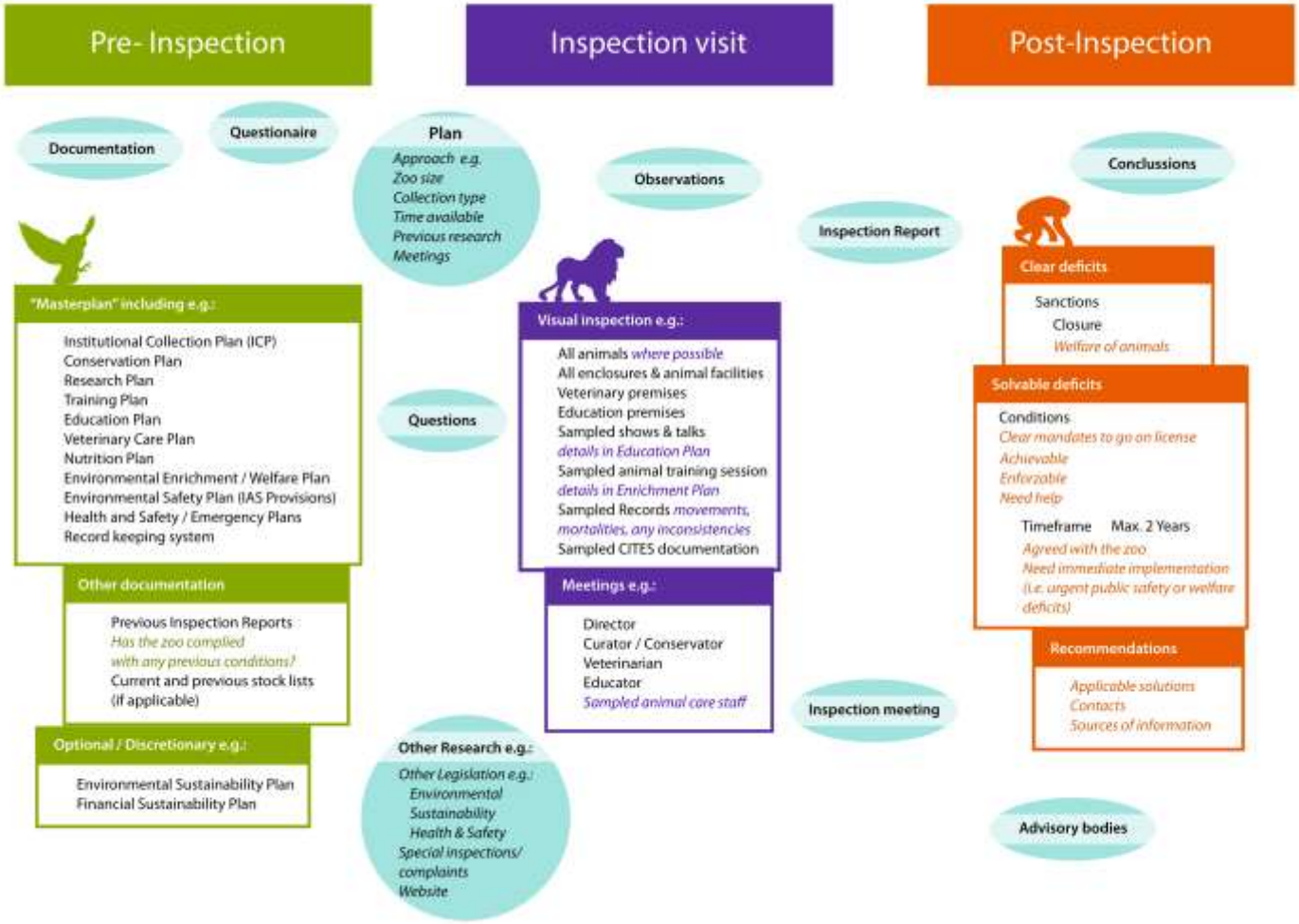



***Figure 5. Compiled by the author.*** *Zoo inspection stages. Tools and procedures that may be used at each stage.*

The zoo inspections can contribute to answering two major questions:

1. Is the aim of the Zoos Directive being met?

Zoo inspectors are recommended to bear in mind that the objectives of the Zoos Directive are to protect wild fauna and conserve biodiversity by the adoption of conservation measures and through licensing and inspection systems.

To address the question of whether the aim of the Zoos Directive is being met, an overview of the collection and its activities might be taken at the pre-inspection stage. The documentation can be used to determine how the zoo's day-to-day activities relate to its conservation objectives and the aim of the Zoos Directive.

Some important questions to consider would be:

- Does the zoo have specific conservation objectives?
- Does it have a long-term conservation plan/strategy in order to achieve those objectives?
- Does the conservation plan/strategy consider where appropriate EU and Member State nature conservation goals and instruments?
- Do the movements of animals in the ICP reflect steps towards achieving conservation objectives?
- Do any other recorded changes (e.g. in infrastructure, personnel) reflect steps towards achieving those objectives?
- Has there been progress in line with the objectives since the last inspection?

2. Are the requirements of Article 3 being appropriately met?

Some basic aspects regarding the assessment of the requirements of the Zoos Directive are discussed below. The "Inspection boxes" for each requirement are aimed to help Member State Competent Authorities to identify how to target their inspection tools, procedures and protocols.

For further information Annex 6.5 includes details of human resources related to each requirement.

**Article 3 (first indent):**

The conservation measures laid out in Article 3 (first indent) are the zoo's active contributions to the conservation of biodiversity. These are complex actions which are initially best assessed at the pre-inspection stage by reviewing the zoo's documentation and/or questionnaire.

It is therefore advisable that either or both of the following initial steps are taken:

- Member States could consider asking zoos to present a conservation plan/strategy and reports of the conservation activities for the previous period;
- a questionnaire may be used to evaluate the most important aspects of the implementation of the measures under Article 3 (first indent), e.g. planning, justification, resources, performance, outputs, evaluation/self-assessment, progress.

At the inspection stage:

- during the visual inspection of the zoo's facilities, the task of the inspectors is to verify the information previously communicated to the authorities in relation to the Article 3 (first indent) activities and to observe the methodology implemented at the zoo;
- during the arranged meetings, discuss Article 3 (first indent) activities with the person responsible.

***Inspection Box 1 – Relevant issues on conservation, research and traing to consider (Article 3 first indent)***

Article 3 (first Indent) conservation measures need to be assessed both in terms of quantity and quality. Different Member States may require a specific number or type of projects to be undertaken in order to comply with the requirement. To ascertain whether both the quantity and the quality are adequate some of the most important points zoo inspectors need to consider are:

**Conservation**

- The zoo's institutional objectives (e.g. are they in line with the conservation purposes of the EU Zoos Directive? Do they reflect the strategies the zoo plans to follow in order to achieve conservation objectives?
- The conservation strategy (e.g. Does it seem appropriate for the zoo's characteristics, size and resources? Does it include clear conservation goals, time scales and evaluation systems? Does it consider where appropriate EU and Member State nature conservation goals and instruments? )
- The conservation report (e.g. Does it clearly lay out the zoo's conservation outputs? Does it describe all the conservation activities the zoo participates in and the extent of its participation? Does it evaluate and extract lessons from the activities undertaken?)
- The ICP (e.g. Do the previous and planned movements of animals reflect the pursuit of the conservation objectives and strategy?)
- Has there been suitable progress in the quantity, quality or outputs of the conservation actions reported since the last inspection?
- Are the human and material resources devoted to conservation actions adequate for the zoo's capabilities?

**Research**

- Do the zoo's research activities adhere to appropriate standards and applicable legislation?
- Are the human and material resources devoted to research adequate for each project?
- Are the conservation benefits to the species (or surrogate) accounted for?
- Have the research results been published or disseminated?

**Training**

- Have staff members undertaken conservation-related training?
- Is the staff training adequate for the characteristics of the collection and the conservation activities reported?
- Does the zoo undertake other types of training? Is it adequately supervised?

**Exchange of information**

- Has the zoo published or made available specific pieces of information relating to species conservation?
- Does the zoo's conservation strategy reflect the use of current relevant conservation information to make decisions and support the initiation and planning of activities?
- Does the zoo have active connections and collaborations with conservation authorities or institutions?

**Captive breeding, repopulation and reintroduction**

- Is the zoo involved in collaborative captive breeding programmes?
- Are the programmes chosen appropriate for the zoo's characteristics and skills?
- Are the relevant pieces of legislation, guidelines and protocols of the programmes being appropriately followed?
- Are the programmes tied to any *in situ* activities?
- Are the programmes tied to any education activities?

***In situ* conservation**

- Is the zoo involved in independent or collaborative *in situ* conservation activities?
- Is the participation in *in situ* conservation activities reported adequately proportional to the zoo's capabilities?
- Are the *in situ* conservation actions tied to any education activities?

**Article 3 (second indent):**

The evaluation might start by reviewing the zoo's documentation, education report or questionnaire (depending on Member State Legislation requirements) in a similar way to the evaluation of Article 3 (first indent).

At the inspection stage, inspection of all educational materials and facilities; inspectors may attend a selection of the zoo's animal presentations to review their educational content. Full details of the accompanying messages and the training techniques used for the presentations - to be evaluated against Article 3 (third indent) measures - may be in either the zoo's educational documentation or ascertained through the questionnaire.

***Inspection Box 2 – Relevant issues on Public education and awareness to consider (Article 3 second indent)***

Compliance with Article 3 (second indent) entails undertaking education activities, providing the required information and assuring the adequacy and quality of both. Some of the most important information that may be available for zoo inspectors to evaluate this requirement would be:

- The zoo's institutional objectives (e.g. Are they in line with the education purposes of the EU Zoos Directive? Do they reflect the strategies the zoo plans to follow in order to achieve education for conservation objectives?)
- The education strategy (e.g. Does it seem appropriate for the zoo's characteristics, size and resources? Does it include clear education goals, time scales and evaluation systems? Are the messages transmitted appropriate to the zoo's characteristics and the purposes of the EU Zoos Directive? Does it consider where appropriate EU and Member State nature conservation education goals and instruments?)
- The education report (e.g. Does it clearly lay out the zoo's education outputs? Does it describe all the education activities the zoo undertakes and appropriate details of the information provided through them? Does it evaluate and extract lessons from the activities undertaken?)
- Has there been suitable progress in the quantity, quality or outputs of the education activities reported since the last inspection?
- Are the education messages communicated appropriate to the zoo's characteristics and target audiences? Are the messages in line with EU and Member State nature conservation education goals and instruments?
- Are the exhibits labelled correctly? Are the signs and other educative material in an appropriate state of maintenance?
- Are the education activities directly involving animals appropriately justified and executed from an education and awareness point of view? Are they undertaken following appropriate high standard husbandry techniques?
- Do the zoo's education and communication activities promote an appropriate image of animals?

**Article 3 (third indent):**

At the pre-inspection stage:

- review documentation considered relevant and/or questionnaire section regarding animal care and husbandry;
- evaluate whether the human and material resources allocated are appropriate for the conformation of the collection.

At the inspection stage:

- visual inspection of all animal facilities in and out of view (including food preparation premises and other animal keeper facilities);
- visual inspection of all animals if possible (e.g. nursing or resting animals may be hidden out of sight and disturbing them may be detrimental);
- any questions arising from the visual inspection of animals are best answered by both the primary animal keepers and the person responsible for animal accommodation and care.

***Inspection Box 3 – Relevant issues on animal accommodation, husbandry and care to consider (Article 3 (third indent)***

Evaluation of animal accommodation in conditions that satisfy their biological and conservation needs requires consideration of provisions for specimens of all ages and biological status. The conditions should provide opportunities to express natural, well-adapted behaviour. These provisions can be directly observed and/or enquiries can be made to zoo staff. Thus, an inspection procedure may include:

Preparatory phase:

- previous access to a zoo map of the enclosures and relevant facilities;
- access to a detailed list of the collection species and specimens;
- review of other documentation and records that can assist to evaluate specific topics (e.g. health, occasional behavioural problems, breeding data) of a chosen sample of animals.

During the visit:

a) Observation of general animal provisions:

- **Housing and environment:** Are physiological and ecological needs of the individuals and species met? Are there appropriate species-specific behavioural opportunities (e.g. digging, flying, perching, nesting)?
- **Environmental enrichment**: Is there a plan in place? Does it occupy time for the animals and promote natural and desired behaviours? Are there signs of negative effects (aggression, boredom, injuries)? If applicable, how are training procedures carried out?
- **Human-animal relationships**: Are relationships with keepers positive and appropriate to the species? Is there a routine monitoring in place? Are there provisions to control visitor effects over animals (viewing areas, noise, interactions, feeding)?
- **Programme of veterinary care**: Is there a programme of veterinary care (e.g. preventive plan including bio-security measures), facilities and a system of veterinary records? Are there policies for the management of the collection (e.g. animal disposal, euthanasia)?
- **Nutritional programme**: Is the nutritional programme adjusted to the needs of individuals (including seasonal aspects)? Is there an appropriate distribution of drinking water? Do feeding strategies take into consideration the behavioural needs of animals?

b) Observation of animals' responses to the environment. It is important to highlight that an inspection can only capture a snapshot of behaviour and that needs to be complemented with information provided by the relevant staff:

- **General behavioural activity**: Do the animals show natural patterns of behaviour (e.g. including grooming, feeding, resting and foraging/exploratory activities)? Do the animals use the space available to them?
- **Social behaviour**: Do the animals exhibit typical social relationships (e.g. grooming, low levels of overt aggression)? Do keepers report prolonged or excessive aggression within the group? Do the animals escape or protect themselves from other animals?
- **Animal-human interactions**: Do the animals interrupt their activity flow due to visitors? Do they show approach or avoidance behaviour towards viewing areas or in interaction contexts? Are they able to hide? How is the relationship between animals and their keepers?
- **Abnormal behaviour**: Do the animals appear to be bored and/or restricted to a specific area of the enclosure? Are there animals showing some kind of abnormal behaviour?
- **Body condition and health**: Do the animals look well? How is the state of the animals' coat or feathers? Are the animals free of injuries? Does locomotion appear to be normal? Do the animals show any self-directed protective behaviour (pain symptoms)?

c) Relevant questions on accommodation and husbandry that, on a case-by-case basis, can help complementing the observed information.

d) Observation and assessment of support facilities, such as quarantine, treatment rooms or areas for food preparation, in accordance to the recommended provisions.

**Article 3 (fourth indent)**

At the pre-inspection stage:

- review emergency escape plans and any special provisions for IAS, including risk assessments;
- ascertain whether the staff has received any training or received information on IAS/alien species.
- check if there have been any reports or complaints in the surrounding area related to the presence of IAS/alien species.

At the inspection stage:

- during the visual inspection of animal enclosures, establish whether they are suitably constructed to avoid any escapes;
- check that any additional security systems (e.g. electric fencing) are in working order and appropriately maintained.

***Inspection Box 4 – Relevant issues on preventing escape to avoid ecological threats and intrusion of pest and vermin to consider (Article 3 fourth indent)***

The construction criteria for enclosures to house a zoological collection may vary greatly. Regardless of the design and construction materials chosen, asking the following questions can be highly useful in evaluating the safety of an enclosure:

- Is there a complete physical barrier, sufficient to prevent escape of the animals housed in the enclosure (including through waste water drainage systems, water filtration systems, and generally any orifice, opening or valve forming part of the overall structure)? Physical strength, behaviour, and cognitive abilities of the animals housed should be taken into account when assessing the security of an enclosure.
- Does the enclosure house a species capable of flying (or can be transported by the wind), harmless to the public (especially if they are apparently naive, like former pet species), small sized or satisfy all the criteria listed above? If so, special attention should be taken to the security of the enclosure, as such species are harder to retrieve if escaped.
- Is security against escape appropriate not only for those species potentially hazardous to humans, but also for those species potentially hazardous to the environment (Alien Species and/or IAS)? It is important to remember that most IAS are harmless to people.
- Do enclosures housing flying (e.g., insects, birds, chiropters) or climbing (e.g., primates) that allow entry by the public (whether pedestrian or closed vehicle drive through) have double gates to prevent accidental escape?
- Could the public come into direct physical contact with the animals, either through the protective barrier or inside the enclosure?
- Regarding water from enclosures and aquaria (or any other water body included in the zoo), is it being adequately screened and/or treated (e.g. sterilized) as necessary? Inspectors should refer to local and national legislation in place regarding water treatment and/or disposal.
- When electric fencing is used for animal containment, is the system checked daily? Do the facilities have back-up power in case of a power cut?
- Could the animals in the enclosure be set free by the public? Animals can be released either deliberately (e.g., capture and removal from the enclosure) or inadvertently (e.g., opening of unlocked doors or windows not under staff supervision, dismantling of mesh, fencing, or other contention systems; etc.).
- Does the zoo perform regular monitoring and inspection of the facilities (e.g. to identify damages to fences)? Inspectors might ask for an assessment procedure involving responsible and regular maintenance of all containment infrastructures, e.g. cages, aviaries, fences, barriers.
- Are zoo personnel, from the chief director (or other positions involved in decision-making) to zookeepers, aware of the potential threat to biodiversity of accidentally released (i.e. escaped) Alien Species to the environment?
- Does the zoo have an emergency plan in case of animal escape? And are all members of staff familiar with it? The inspector can recommend the zoo to specifically address IAS in the emergency plans; a list of IAS for that region, as well as those species with high chances of succeeding in establishing themselves if released would help to prioritise which species the zoo should by no means let go in case of escape.

Regarding the control of problem species in zoo grounds:

- Is there a routine inspection of animal facilities that would allow to identify a pest problem before it develops into an infestation?
- Are animal enclosures properly cleaned (e.g. Sanitation and proper storage and removal of solid waste such as bedding, feed, enrichment items, dirt, and debris)?
- Is food properly stored in kitchen and storage facilities? Well-sealed containers will reduce potential pest problems.
- Are food and water containers cleaned and disinfected routinely?
- Are public areas (e.g., walkways, concession areas) cleaned regularly?
- Is the zoo complying with national or regional regulations regarding specific sanitisation requirements for certain animals in captivity (e.g. indoor primary enclosures for primates)?

**Article 3 (fifth indent)**

A representative sample of the zoo's records may be inspected in order to evaluate that they are:

- providing adequate information;
- up-to-date;
- entered correctly and completely

***Inspection Box 5 - Relevant issues on Record keeping to consider (Article 3 fifth indent)***

A good way to establish if a zoo has complete, accurate and up to date records for all the individuals in their zoological collection is to randomly choose a number of species (e.g. 10 or 20) that covers all main animal groups present in the zoo collection (e.g. mammals, birds, reptiles, amphibians, fish and invertebrates) and formulate the following questions:

- Is the species actually present in the zoo?
- Does the animal (or group of animals, depending on the species) have complete, up-to-date records? If so, do such records reflect accurate information?
- Does each animal (or group of animals, depending on the species) have an individual accession number?
- Is the accession number included in all the documentation related to that record?
- Are the scientific name and common name correctly spelt, corresponding with each other and to the animal being recorded?
- Is the animal (or group of animals) properly identified according to local/regional legislation?

**Post-inspection stage:**

- Observations may be discussed with the zoo to obtain further information
- Recommendations can be made to improve observed mild deficits or the general implementation of the Zoos Directive.
- Subject to Member State legislation:
  - Severe deficits may result in zoo closure (Article 6) or imposition of penalties.
  - Penalties, according to Article 8, “shall be effective, proportionate and dissuasive”. Proposal of immediate solutions may be necessary to solve severe deficits.
  - Other deficits may result in the proposal of licensing conditions. Conditions may be most effective if drafted clearly and specifically, including a time-frame for their implementation. Expertise and sources of information and advice that the zoo inspectors can provide may be most helpful for licensing conditions enforcement.

#### *3.2.1.2 Zoo inspectorate*

To be effective the zoo inspectorate should ideally be comprised of educated professionals from a range of both zoo (e.g. familiarised with practical aspects of zoo operation) and other relevant backgrounds (e.g. providing Member State/EU nature conservation, biodiversity conservation, scientific, education, or other relevant

knowledge). Multidisciplinary teams provide complementary skills in order to assess every aspect of the implementation of the Zoos Directive.

Member State competent authorities may choose to assemble teams comprised for example, of state officials from several relevant areas, complementing teams of local officials with selected external personnel with relevant expertise, government or academic experts or any other combination.

Another useful tool some Member States have developed is advisory bodies, which can provide support for zoo licensing and inspections. Member States, depending on their specific needs, may assemble advisory bodies composed of any combination of government, academic, zoo professional, independent or other experts. Annex 6.6 provides more information on the potential roles of advisory bodies within the scope of the Zoos Directive.

### 3.2.2 Zoo inspector training

Zoo inspector teams require up-to-date, working knowledge of a variety of subjects related to each requirement of the Zoos Directive, such as (but not limited to):

- Zoology and ecology
- Conservation of biodiversity (techniques and current issues including IAS/Alien Species)
- Member State/EU nature and other relevant legislation and strategies
- Scientific research (current techniques and Member State relevant legislation)
- Education and communication
- Veterinary medicine (specifically in wild animal species)
- Animal care and husbandry
- Animal welfare assessment methodologies
- Zoo safety (including ecological and IAS/Alien Species safety) and security measures
- Zoo record keeping
- Zoo management
- Specific experience/knowledge, dependent on the zoo inspected (e.g. reptiles, aquaria, primates, etc.)

A well-trained zoo inspectorate is an important factor in the implementation and enforcement of the Zoos Directive. Well-trained inspectors will be able to make the necessary observations during the inspection process, apply achievable conditions to licensing and make suitable recommendations to help enforce these and further the objectives of the Zoos Directive.

Regardless of how Member States choose to structure their zoo inspection and licensing regimes, it would be highly beneficial if inspectors have training or experience directly related to zoos. In this regard, collaboration between experienced zoos and competent authorities to conduct specialised training for inspectors could be very productive. Collaboration may be achieved with the help of national associations, their members, and EAZA. (More information in Annex 6.2.1. Case study 16 for an example of multidisciplinary and multi-stakeholder zoo inspection courses)

The task of the zoo inspector requires constant adaptation and evolution, training and experience. It is desirable that zoo inspectors constantly improve their skills through periodic specialised training and by networking with other inspectors at the National and European levels.

## 3.3 Closure of zoos

5. If the zoo is not licensed in accordance with this Directive or the licensing conditions are not met, the zoo or part thereof:

(a) shall be closed to the public by the competent authority; and/or

(b) shall comply with appropriate requirements imposed by the competent authority to ensure that the licensing conditions are met.

Should these requirements not be complied with within an appropriate period to be determined by the competent authorities but not exceeding two years, the competent authority shall withdraw or modify the licence and close the zoo or part thereof.

*Article 6*

Closure of zoos

In the event of a zoo or part thereof being closed, the competent authority shall ensure that the animals concerned are treated or disposed of under conditions which the Member State deems appropriate and consistent with the purposes and provisions of this Directive.

### 3.3.1 Scope

The Zoos Directive allows for the closure of zoos in the event of non-compliance with the conservation measures included in Article 3.

When a zoo does not fulfil these requirements the competent authorities of the Member States will proceed to close it to the public and the animals belonging to the closed zoo should be adequately relocated and their accommodation and treatment aligned with the EU Zoos Directive's objectives. In cases where relocation cannot be achieved it may be necessary to dispose of the zoo animals by euthanasia, where legally possible.

According to Article 4.5 the competent authorities will proceed to close a zoo or part thereof to the public when:

- the zoo is not licensed in accordance with the Zoos Directive;
- the zoo does not comply with the licensing conditions.

When a zoo does not fulfil the conditions of the license, the competent authorities may impose the appropriate requirements, to which the zoo must comply within no more than two years. In the case of non-compliance the zoo or part thereof will be closed.

In the case of a zoo being closed to the public, Article 6 establishes the general provisions to ensure that the animals concerned are treated or disposed of appropriately. Three important aspects of this article are:

- The competent authority of the Member State shall ensure that the animals are treated or disposed of appropriately.
- Zoos may close temporarily or permanently and totally or partially. In any of these cases, it is necessary to activate a plan for the animals' care and accommodation. Such a plan may consider the following possibilities:
  - Maintaining some animals in the zoo when the appropriate conditions can be met;
  - Transfer to other institutions when the appropriate conditions cannot be met or when the zoo is to close permanently;
  - Euthanasia, when no appropriate institution for relocation can be found or if animals are sick or injured to such a degree that euthanasia is recommended and legally permitted by the State's internal regulations.[14]
- How animals should be treated or disposed of when zoos are closed. In all cases animals should be subjected to conditions that satisfy their specific biological and conservation requirements. Article 6 requires Member States to apply conditions that are appropriate and consistent with the purposes and provisions of the Zoos Directive. That is to say, they are well and healthy enough to be an active part of the conservation strategies of the zoos.

No zoo should be licensed or allowed to remain open if the conservation objective of the EU Zoos Directive and the requirements of Article 3 are not met within an appropriate period. According to Article 5, this applies even when the Member State implements the EU Zoos Directive through an equivalent system of zoo inspection and registration.

**Relevant Definition**

**Euthanasia** is the act of inducing death using a method that causes a rapid and irreversible loss of consciousness with minimum pain and distress to animal.[15]

### 3.3.2 Types of closure

#### *3.3.2.1 Temporary or permanent closure:*

Zoos might be closed provisionally or permanently depending on the likelihood of improving their conditions:

- Temporary closure: the competent authority considers it necessary to close the zoo for a certain time due to any incompliance which can be solved in the short term, as long as it does not jeopardise the objectives of the Zoos Directive.
- Permanent closure: the competent authority considers that it will be impossible for the zoo to comply with its requirements and when the animals concerned are not accommodated and treated as required, representing a serious risk to their welfare.

#### *3.3.2.2 Partial or total closure:*

Zoos may be closed partially or completely according to conditions imposed by the competent authority. The conditions may depend on the degree of their incompliance and/or the parts of the zoo that are not meeting the requirement:

[14] UK Standards of Zoo Practice (2012)

[15] OIE (2013). Terrestrial Animal Health Code (Glossary)

- Partial closure: incompliance is related to certain parts of the zoo (some enclosures or some specimens, etc.) but most of the conservation measures are being applied satisfactorily.
- Total closure: the degree of incompliance is so substantial that it justifies not giving a licence or the removal of the license, whether this be temporarily or permanently.

These different circumstances of closures will determine the most appropriate plan for the accommodation and care of the animals concerned. In the worst case scenario, the permanent and complete closure of a zoo, it will be necessary to relocate the entire zoo collection whilst maintaining the appropriate conditions consistent with the "purposes and provisions" of the Zoos Directive.

### 3.3.3 Closing zoos: preventing and dealing with relocation of animals

Relocating animals following a zoo closure has been a major difficulty for many EU competent authorities because it is difficult to ensure that the appropriate conditions are provided for often high numbers of animals and a range of different species.

In general, big animals with long life spans are the most difficult to relocate. In many cases, the zoo that closes does not possess the means to undertake relocation and this leaves the authorities as those ultimately responsibility for creating the appropriate solutions to cover the animals' needs.

The following are some aspects that can assist the competent authorities when dealing with this problem through preventive and reactive approaches.

#### *3.3.3.1 Preventing the need to relocate animals*

At the licensing stage it may be possible to find some indicators of a zoo's likely sustainability. For example:

- evidence that the zoo has a strategy in place for breeding control and, where necessary, an euthanasia policy to avoid surplus animals and minimizing the need for their disposal;
- evidence of sustainable financial resources - does the zoo retain an extra budget for emergencies?
- evidence that staff have the required skills and that they engage in training activities to ensure continuing high husbandry standards;
- evidence that the zoo has an extended network of professional contacts, which enables it to collaborate with other organizations like zoos, rescue centres or sanctuaries.

#### *3.3.3.2 Dealing with relocation*

The closure of a zoo can happen in different contexts ranging from the complete unavailability of the zoo operator to their full cooperation with the authorities.

Dealing with zoos' closure requires effective coordination between the entities involved (the zoo under closure, the competent authorities, relevant NGOs, other zoos and rescue centres/sanctuaries, etc.).

For this reason and because competent authorities are ultimately responsible for the animals following a closure, it is appropriate to develop a national action plan to deal with closure and relocation. This action plan may include, among other aspects, the following:

- An evaluation strategy to analyse possible solutions for the animals and parties. Close collaboration with relevant non-governmental organisations has been fruitful in many instances, where they acted as the intermediary between the competent authorities and the receiving bodies. Such intermediaries can reduce the time required to reach a solution.
- An organised network of national (and, if needed, international) contacts for animal placement; readily available in case of need;
- An appropriate coordination plan and the assignment of a coordinator between the different national authorities that will be involved in the process; ready to be activated at any time;

- A case-by-case definition of the concerned animals' ownership and who is likely to be responsible for their transport, maintenance and all other related expenses;
- A possible strategy for closing (a gradual or sudden process); priorities for outplacement; improvements that can be made for the remaining animals and care on site for those that stay temporarily on the zoos' premises.

#### *3.3.3.3 Possible solutions for the animals*

When a zoo no longer offers acceptable conditions for the animals and has to close permanently, a solution for the animals must be envisaged. The IUCN Guidelines for placement of confiscated animals provides three management options: relocation, return to the wild and euthanasia, through corresponding decision tree analysis.

The second option, 'return to the wild' is considered in a very small number of instances and under very specific circumstances since, in practice, it is unlikely that animals from a zoo's closure will meet the necessary conditions to make this transition viable, except in accordance with IUCN/SSC (2013) Guidelines for reintroductions and other conservation translocations. It is also important to highlight that if a zoo, or part of it, is only closing temporarily, animals must be offered the appropriate conditions to be maintained in the zoo premises.

CITES Resolution 10.7 states that the disposal of live species confiscated by authorities as a result of illicit trade should be dealt with in a manner that promotes conservation, is without risk to animal health, discourages illegal trade and leads to an appropriate solution, whether this is captivity, reintroduction into the wild, or euthanasia.

### 3.3.4 Relocating animals: the role of zoos, zoo associations, rescue centres and sanctuaries

Relocating animals to other zoos or to rescue centres and sanctuaries is a complex matter. It should be undertaken in collaboration with the competent authorities, who have a supervising or a proactive role, according to the circumstances.

It is important that any facility to which animals are sent is licensed and/or, in the case of sanctuaries and rescue centres, appropriately accredited to a recognised standard (whether national[16] or international[17]) and, as far as possible, experienced in keeping the species concerned.

Some rescue centres and sanctuaries fall within the scope of the Zoos Directive, and can be licensed under the relevant national law or under other appropriate welfare and sanitary laws. Rescue centres and sanctuaries that do not fall under the scope of the Zoos Directive, and for which there is no specific or applicable law, could be approved based on recognised animal welfare and management standards (see box below). It is important that animals are relocated to conditions that satisfy their specific biological and conservation requirements.

#### *3.3.4.1 The role of zoos and zoo associations*

Zoo associations, such as EAZA, and others at a national or regional level, can provide invaluable support in preventing a zoo's closure and helping relocate animals following closure. This may include: building capacity of zoo members; promoting breeding policies to avoid surplus animals; assisting the competent authorities and others to identify specimens that may be included in international breeding programmes.

In this sense, consultation with Taxon Advisory Groups (TAGs) to evaluate the genetic relevance of animals may be helpful. Where possible, relocation of specimens belonging to European Endangered Species Programmes (EEPs), Studbooks (STBs) and International Studbooks (ISBs) can then follow under the supervision and guidance of the appropriate entities.

[16] E.g. Quality Protocol for the reception of native wild live animals (Netherlands)

[17] E.g. Standards of the Global Federation of Animal Sanctuaries

The role of zoos can be extended to specimens with lower conservation value since some zoos may still be willing to receive them. In some cases there might be welfare reasons for receiving animals (e.g. an individual from a social species is relocated to join a solitary conspecific). It is important to establish connections between zoos, zoo associations and rescue centres in order to find the best solution on a case-by-case basis. Relocations should be to suitably licensed zoos where welfare can be assured. See also case-study 17 (Annex 6.2.2)

**Example**

The Hungarian zoo law includes the obligation of zoos to act as rescue centres for native species:

"The zoo must participate in scientific research and species conservation, specifically by participating in the protection of nationally or internationally-recognised protected species, **as well as to perform the function of a rescue centre for native species**. Zoos may not engage in commercial activities (Article 1(2) of JD3/2001)."[18]

### *3.3.4.2 The role of rescue centres and sanctuaries*

Professionally managed and good quality rescue centres and sanctuaries are, by their very nature, entities that can provide an appropriate solution for the placement of animals from closing zoos. However some may have intake policies and priorities that limit the acceptance of animals according to the available space and resources.

Rescue centres generally offer only short-term placement and aim to find permanent homes for rescue animals; very often these are zoos. One or the other should be appropriately licensed and/or accredited..

In summary, placement of a high number of animals from different species requires communication and analysis of possibilities, and may require the involvement of multiple solutions.

Many rescue centres and sanctuaries in the EU are specialised in specific taxon groups, and the establishment of national networks of rescue centres and sanctuaries could facilitate a coordinated response in cases of need.

National rescue centres or sanctuaries are often selected in preference to counterparts abroad as they are likely to involve less travel and disruption for relocating animals, but ultimately the most suitable place for the animal must be of paramount consideration. Nevertheless, a network of rescue centres and sanctuaries in the EU and neighbouring countries would be helpful. See also case-study 18 (Annex 6.2.3).

**Relevant Definition**

**Animal Sanctuary -** A facility that rescues and provides shelter and care for animals that have been abused, injured, abandoned or are otherwise in need, where the welfare of each individual animal is the primary consideration in all sanctuary actions. In addition, the facility should enforce a non-breeding policy and should replace animals only by way of rescue, confiscation or donation.[19]

**Example**

The European Alliance of Rescue Centres and Sanctuaries (EARS) is a network that supports and represents rescue centres and sanctuaries across Europe, enabling them to work together to achieve mutual animal welfare and conservation goals.

EARS works to promote and achieve continuous improvements in animal welfare, and tackle the reasons for the existence of rescue centres and sanctuaries. To become an EARS Partner, facilities must undergo an internal screening procedure to ensure they meet EARS criteria for animal welfare and management.

EARS works to establish and manage a system in Europe to facilitate the most appropriate animal placement according to individual welfare and species-specific requirements, and that provides professional standards of care and management.

[18] Born Free Foundation (2011) EU Zoo Inquiry - Hungary.

[19] Global Federation of Animal Sanctuaries

*For more information on EARS see http://www.ears.org/EARS*

The Global Federation of Animal Sanctuaries (GFAS) is a non-profit organization formed for the sole purpose of strengthening and supporting the work of animal sanctuaries worldwide.

GFAS fosters collaboration among sanctuaries and promotes excellence in sanctuary management.

GFAS helps sanctuaries to help animals by independently verifying that sanctuaries, rescue and rehabilitation centres meet peer-reviewed high standards in animal care and operational management, and by providing them with educational resources.

GFAS has certified facilities in North America, Central America, Europe and Africa and works with sanctuaries and related facilities throughout the world.

*For more information on GFAS, see http://www.sanctuaryfederation.org*

G

# Glossary of terms

**Accession number:** A string of characters - up to six for ISIS purposes - assigned by the recording institution, unique to one specimen (or group), and used to identify that specimen (or group) in the files of the recording institution. The accession number is tied to the physical characteristics (tag, tattoo, identifiable colour patterns) and transaction information about that specimen (or group). In essence, it is a key or code to a specimen and its history (Buffalo Zoo).

Alien species: any live specimen of a species, subspecies or lower taxon of animals, plants, fungi or micro-organisms introduced outside its natural range; it includes any part, gametes, seeds, eggs or propagules of such species, as well as any hybrids, varieties or breeds that might survive and subsequently reproduce (Source: Regulation 1143/2014 on invasive alien species)

**Animal record:** Data, regardless of physical form or medium, providing information about individual animals or samples or parts thereof or groups of animals. (AZA, Animal Records Task Force)

**Animal transaction**: The transfer of title to a specimen and/or the shipment of a specimen to or from another location, and the subsequent exchange of data and documents. Birth and death are specialized types of transactions. (Miller, J. & J. Block (2004).

**Animal sanctuary:** A facility that rescues and provides shelter and care for animals that have been abused, injured, abandoned or are otherwise in need, where the welfare of each individual animal is the primary consideration in all sanctuary actions. In addition, the facility should enforce a non-breeding policy and should replace animals only by way of rescue, confiscation or donation (GAFS)

**Attitude:** A relatively enduring organization of beliefs, feelings, and behavioural tendencies towards socially significant objects, groups, events or symbols. (Hogg & Vaughan, 2005)

**Awareness:** Knowledge or perception of a situation or fact. Concern about and well-informed interest in a particular situation or development. (Oxford dictionary)

**Barren environment:** Environment with few, if any, furnishing or environmental enrichment. (Hosey et al 2009)

**Behavioural need:** Behaviour that is largely motivated by internal factors in that its performance may not depend on external stimuli nor on the attainment of a specific goal, being rewarding in itself. Preventing animals to perform this kind of behaviour may cause them to suffer. Species-specific behavioural needs are not easy to understand and need to be interpreted with caution, but they are likely to be very important to animals' welfare. (Dawkins 1990, Jensen and Toates 1993)

**Behavioural diversity:** Measure of the number and variety of behavioural patterns performed by an animal or group of animals. (Broom and Johnson 1993)

**Behavioural profile:** Set of behaviours that are relatively consistent across time and context in response to environmental stimuli. Two extreme profiles are distinguished and characterised by typical behavioural and physiological patterns. The active response is characterised by territorial and aggressive behaviours and low levels of corticosteroids. The reactive response is characterised by increased immobility, low aggressiveness and high levels of corticosteroids. Other terms that are used in the literature to refer to these two profiles include 'copying styles', 'personality' and 'temperament'. (Koohaas et al 1999)

**Behavioural restriction:** Limitation to the expression of an animal's repertoire of natural behaviours. (Broom and Johnson 1993)

**Biological requirements:** Requirements that assure the individual's ability to survive and reproduce. In captivity, they are attained by the provision of appropriate resources, including an appropriate environment for the performance of necessary species-specific behaviours. Biological requirements are commonly divided into physiological and behavioural needs. Physiological needs demand the provision of resources aimed at satisfying the individuals' physiological balance (e.g. food, water, sex, shelter, etc.). Behavioural needs relate to the performance of behaviours highly motivated by internal factors, which if not performed may result in symptoms of frustration. (Broom and Johnson 1993)

**Biodiversity or biological diversity:** The variability among living organisms from all sources including terrestrial (above and below ground), marine and other aquatic ecosystems and the ecological complexes of which they are part. This concept covers the diversity of genes, species and ecosystems. (CBD and EU 2020 Strategy/Impact Assessment). / Biodiversity—short for biological diversity—means the diversity of life in all its forms—the diversity of species, of genetic variations within one species, and of ecosystems. The importance of biological diversity to human society is hard to overstate. An estimated 40 per cent of the global economy is based on biological products and processes. Poor people, especially those living in areas of low agricultural productivity, depend especially heavily on the genetic diversity of the environment (CBD, CEPA Toolkit Glossaries).

**Biofilia:** "Innate tendency to focus on life and lifelike processes"(Wilson 1984, p. 1), "innate emotional affiliation of human beings to other living organisms"(Wilson 1993, p. 31) or "inborn affinity human beings have for other forms of life, an affiliation evoked, according to circumstances, by pleasure, or a sense of security, or awe, or even fascination blended with revulsion" (Wilson 1994, p. 360).

**Circus:** A group of entertainers, sometimes with trained animals, who performs skilful or amusing acts in a show that travels around to different places (Oxford Dictionary).

**Cognition:** Cognition is the ability to perceive, process, store and act upon external information. It can range from a simple form of stimulus-response to much more complex mental processes. (Brydges and Braithwaite 2008)

**Control:** The ability to make an active behavioural response to approach a positive stimulus or to avoid a negative stimulus in the environment, or to choose between preferred alternatives. (Bassett and Buchanan-Smith 2007)

**Conservation:** Means a series of measures required to maintain or restore the natural habitats and the populations of species of wild fauna and flora at a favourable status. (Habitats Directive, 2007 version)

**Conservation of biodiversity:** The management of human interactions with genes, species and ecosystems so as to provide the maximum benefit to the present generation while maintaining their potential to meet the needs and aspirations of future generations; encompasses elements of saving, studying and using biodiversity. (CBD)

**Conservation translocation:** Deliberate movement of organisms from one site for release in another. It must be intended to yield a measurable conservation benefit at the levels of a population, species or ecosystem, and not only provide benefit to translocate individuals. (IUCN)

**Culling:** Reduce the population of a wild species by selective slaughter (Online Oxford dictionaries)

**Displacement activity:** Behaviour that is performed in response to non-related stimulus, i.e. in the wrong context. It is usual in situations where an animal is faced with a conflict situation and is not immediately able to solve it. (Dawkins and Manning 1992)

**Domesticated (or cultivated) species:** Means species in which the evolutionary process has been influenced by humans to meet their needs. (CBD)

**Ecological threat:** Any external factor, whether is human related or not, that has the potential to negatively impact species, processes, or ecosystems. (Adapted from the word Threat in the dictionary)

**Ecosystem**: A dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit. (CBD)

**Enclosure:** Any accommodation provided for animals in zoos and aquaria. (EAZA's guidelines)

**Endemic species**: A term for species inhabiting only a geographically confined area. (CBD)

**Environmental Enrichment:** The husbandry provision of species-specific opportunities within an animal's environment to enable it to express a diversity of desirable and natural behaviours. (Hosey et al. 2009)

**Environmental Sustainability:** Meeting the needs of the present without compromising the ability of future generations to meet their needs. Encompasses, e.g. keeping population densities below the carrying capacity of a region, facilitating the renewal of renewable resources, conserving and establishing priorities for the use of non-renewable resources, and keeping environmental impact below the level required to allow affected systems to recover and continue to evolve. (UN)

**Establishment**: Process of an alien species in a new habitat successfully producing viable offspring with the likelihood of continued survival. (Decision VI/23 of the Conference of the Parties, CBD)

***Ex-situ* conservation**: Means the conservation of components of biological diversity outside their natural habitats. (CBD)

**Furnishing:** All elements added to the basic design of an enclosure, including surfaces, climbing apparatus, shelters and internal visual barriers, etc. (Hosey et al 2009)

**Genetic adaptation:** A change in individuals' genetic composition due to natural selection. It makes an organism better suited to its environment and leads to greater fitness. Populations with different genetic adaptations to different environments also differ in phenotypes because genetic adaptation is shaped by natural selection. Such adaptation is inherited and is an epiphenomenon of changed evolutionary trajectories. Operationally, genetic adaptation and phenotypic plasticity in different environments are difficult to distinguish. (Fa et al., 2011)

**Hazard:** A biological, chemical or physical agent in, or a condition of, an animal or animal product with the potential to cause an adverse health effect. (Terrestrial Animal Health Code - OIE).

**Habitat**: The place or type of site where an organism or population naturally occurs. (CBD)

**Genetic diversity:** Describes the genetic variation between individuals. It can be described by several estimators, which are not equivalent to each other and which describe different aspects of diversity. Estimators include observed, ho, and expected, he, heterozygosity, polymorphism at loci. (Fa et al., 2011)

**Hazardous species:** Any species which, because of its individual disposition, sexual cycle, maternal instincts, or for any other reason, whether by biting, scratching, butting, compression, injecting venom or by any other method, is likely to injure seriously or transmit disease to humans. (EAZA's guidelines)

**Husbandry manuals:** Guidance on the day-to-day care of an animal or species covering a wide number of issues related to their accommodation and maintenance in order to satisfy their biological needs. (Hosey et al 2009)

***In-situ* conservation**: The conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties. (CBD)

**Indigenous species** (syn. native): A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy using its natural dispersal systems. (Modified after CBD, GISP)

**Integrated Pest Management:** The careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. IPM encourages natural pest control mechanisms (FAO)

**Intentional introduction:** Refers to the deliberate movement and/or release by humans of an alien species outside its natural range. (Decision VI/23 of the Conference of the Parties, CBD)

**Introduction**: Refers to the movement by human agency, indirect or direct, of an alien species outside of its natural range (past or present). This movement can be either within a country or between countries or areas beyond national jurisdiction. (Decision VI/23 of the Conference of the Parties, CBD)

**Invasive alien species:** an alien species whose introduction or spread has been found to threaten or adversely impact upon biodiversity and related ecosystem services (Source: Regulation 1143/2014 on invasive alien species)

**Isolation:** The physical separation of an animal for whatever reason. 'Isolation' and 'quarantine' are not always precisely defined in European Union legislation, and one word is usually described by reference to the other. (EAZA; DEFRA)

**Native species** (*Indigenous*): Means a species, subspecies, or lower taxon, occurring within its natural range (past or present) and dispersal potential (i.e. within the range it occupies naturally or could occupy without direct or indirect introduction or care by humans). (IUCN)

**Natural behaviour:** Species-specific behaviour that animals have a tendency to exhibit under natural conditions, because it promotes biological functioning and may be perceived as pleasurable. (Bracke and Hopster 2006)

**Normal behaviour:** Behaviour that promotes a good adaptation of the animal to the natural or artificial conditions and it is usually shown by the majority of the population. It can be the same as natural behaviour or not. (Fraser, 1992; Wechsler, 2007)

**Pet shop:** A shop-selling animals intended as pets. (Collins English Dictionary)

**Population**: Is defined as the total number of individuals of the taxon. For functional reasons, primarily owing to differences between life-forms, population numbers are expressed as numbers of mature individuals only. In the case of taxa obligatory dependent on other taxa for all or part of their life cycles, biologically appropriate values for the host taxon should be used. (IUCN)

**Post-mortem:** The examination of a dead animal or parts of its body, organs or tissues. (Hosey et al 2009)

**Propagule:** Structure (as a cutting, a seed, or a spore) that propagates a plant. (Merriam Webster Dictionary)

**Quality of Life:** The subjective and dynamic evaluation by the individual of its circumstances and the extent to which these meets its expectations, which results in affective responses that can be assessed through reporting. (Scott et al 2007)

**Quarantine:** A facility under the control of the veterinary authority where a group of animals is maintained in isolation, with no direct or indirect contact with other animals, in order to undergo observation for a specified length of time and, if appropriate, testing and treatment. (The Office International des Epizooties (OIE) Terrestrial Animal Health Code)

**Record**: Information created, received, and maintained as evidence and information by an organization or person, in pursuance of legal obligations or in the transaction of business ISO 15489-1 (International Standard 15489-1, International Organization for Standardization, 2001).

**Registrar:** the person that provides oversight for the animal record keeping function, records management, animal shipping, wildlife permit procurement and related reporting requirements and legal compliance (ZRA-Zoological Registrars Association).

**Reinforcement and reintroduction:** Deliberate movement of organisms from one site for release in another within a species' indigenous range, and conservation introductions, comprising assisted colonisation and ecological replacement, outside indigenous range. (IUCN)

**Risk:** The chance, high or low, that somebody could be harmed by any hazards, together with an indication of how serious the harm could be. (Health and Safety Executive, UK)

**Stereotypic behaviour:** An abnormal repetitive behaviour, which may be induced by frustration, repeated attempts to cope with environment or by a central nervous system malfunction. In certain cases, exhibition of these abnormal behaviours may have a relation with the past conditions and not so much with the present ones. In any case, provision of appropriate behavioural opportunities can successfully reduce the incidence of these patterns in various species. Stereotypies can be oral (e.g. linking in giraffes), locomotory (e.g. perche cyrcling in parrots) or involve other body movements like swaying in elephants. (Mason et al. 2007)

**Sustainable development**: Development which meets the needs of the present without compromising the ability of future generations to meet their own needs. (UN)

**Taxon (pl. taxa)**: A taxonomic unit, whether named or not: i.e. a population, or group of populations of organisms which are usually inferred to be phylogenetically related and which have characters in common which differentiate the unit (e.g. a geographic population, a genus, a family, an order) from other such units. A taxon encompasses all included taxa of lower rank and individual organisms. (ICZN Code)

**To educate:** Give intellectual, moral and social instruction. (Oxford dictionary)

**Unintentional introduction**: Refers to all other introductions that are not intentional. (Decision VI/23 of the Conference of the Parties, CBD)

**Vacuum activity:** Behaviour that is performed in the absence of the stimulus that would normally trigger that behaviour. (Dawkins and Manning 1992)

**Values**: Represent our guiding principles: our broadest motivations, influencing the attitudes we hold and how we act. (Schwartz, 2011)

**Wild species:** Organisms captive or living in the wild that have not been subject to breeding to alter them from their native state. (CBD, CEPA Toolkit Glossaries))

**Zoonosis:** Means any disease and/or infection which is naturally transmissible directly or indirectly between animals and humans (Directive 2003/99/EC on the monitoring of zoonoses and zoonotic agents, art.2)

*Other useful definitions related to biodiversity and invasive alien species:*

*https://www.cbd.int/cepa/toolkit/2008/doc/CBD-Toolkit-Glossaries.pdf*

*http://www.cbd.int/invasive/terms.shtml*

B

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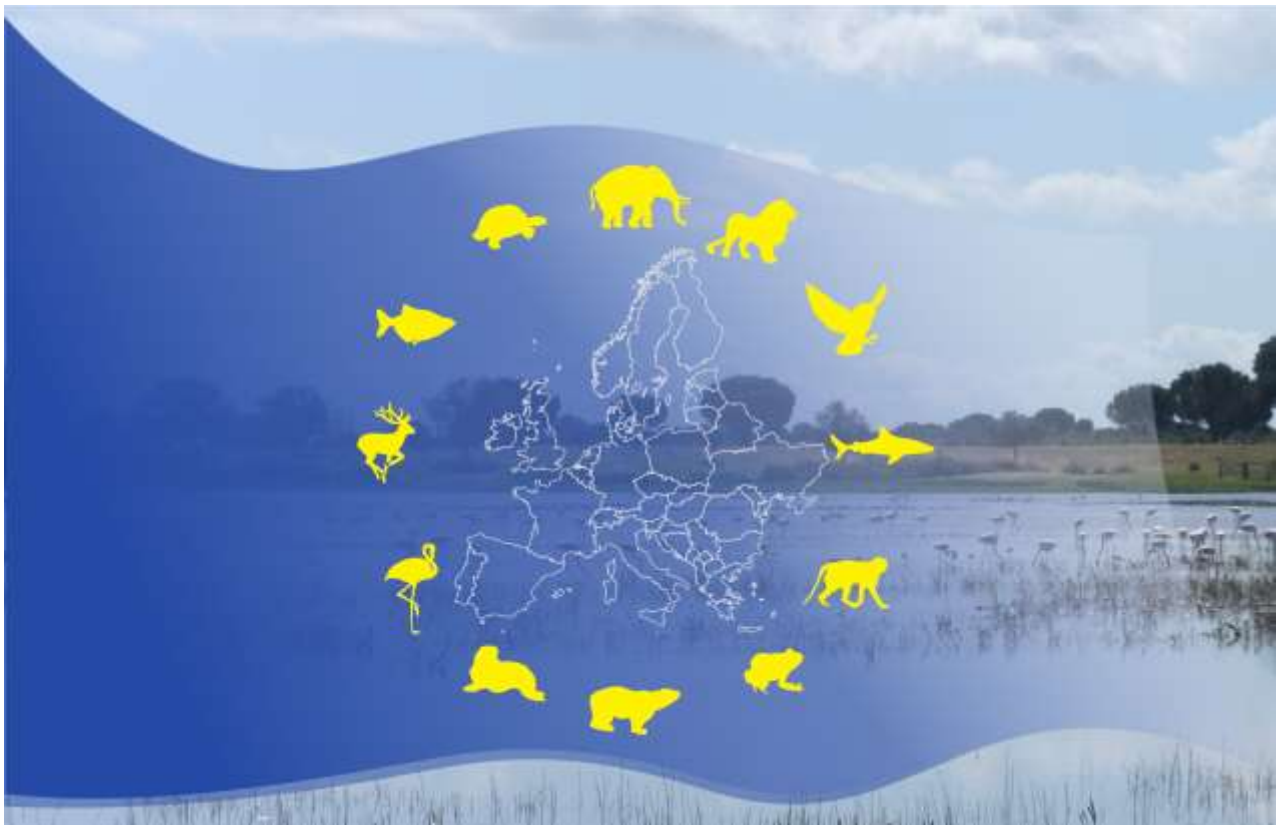

# EU Zoos Directive
# Good Practices Document
# - Annexes -

# EU Zoos Directive Good Practices Document

## Annexes


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IN ASSOCIATION WITH

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# 1 Article 3 - first indent - Conservation, research and training

## 1.1 Websites

### 1.1.1 Links to zoo research

Animal Conservation

Animal Welfare

Applied Animal Behaviour Science

CEPA Magazine (Association CEPA, France)

Conservation Biology

Der Zoologische Garten (Journal of WAZA and VDZ)

International Zoo News

International Zoo Yearbook

Japanese Journal of Zoo and Wildlife Medicine

Journal of Threatened Taxa

Journal of Zoo and Wildlife Medicine

Journal of Zoo and Aquarium Research

Oryx: The International Journal of Conservation

Wildpro electronic library. Wildlife Information Network

Zoo Biology

Zoos' Print Journal (Zoo Outreach Organization)

### 1.1.2 Other useful Websites

CBD

IUCN

IUCN Red List

IUCN Conservation Breeding Specialist Group

EU Nature and Biodiversity

EU Biodiversity Strategy to 2020

IBAs BirdLife International

WDPA World Database of Protected Areas

CBD Protected Areas

## 1.2 Case studies – Conservation, research and training

### 1.2.1 Case study 1: Small zoos and conservation. Jerez Zoo

**Case study 1. Small zoos and conservation. Jerez Zoo**

Jerez Zoo is a small publicly run institution situated in the south of Spain. Jerez Zoo carries out and collaborates in a variety of conservation activities, for example:

Jerez Zoo has collaborated in the Iberian lynx captive breeding programme since its start (an initiative largely funded by EU LIFE+), by maintaining off-show remotely monitored Iberian lynx breeding facilities, keeping and breeding surrogate species (bobcat) for research, promoting and raising awareness of the project and more recently opening a dedicated exhibit using animals no longer participating in the programme.

The zoo undertakes and collaborates in research on IAS and at least ten native species.

Other conservation projects undertaken at the zoo are:

- European StudBooks (ESBs) and European Endangered species Programmes (EEPs)
- Rescue (from being destroyed by spring tides) and ***ex situ* incubation** of Eurasian spoonbill eggs. Hand-rearing of chicks and release using hacking techniques. Article in EAZA News
- Rescue (from being destroyed by hasvesting machines) and ***ex situ* incubation** of Montagu's Harrier eggs. Hand-rearing of chicks and release using hacking techniques
- Rehabilitation of eagle owls
- Restoration of native flora
- Captive breeding of several vulture species for EU reintroduction programmes
- Captive breeding and reintroduction of Hermit Ibis

### 1.2.2 Case study 2: Zoo coalitions and protected area collaboration: The Madagascar Fauna Group

**Case study 2. Zoo coalitions and protected area collaboration: The Madagascar Fauna Group.**

The Madagascar Fauna Group was founded in 1987 after a petition of support from the Malagasi government. A coalition was formed which eventually united 39 zoos from Europe, USA, Australia and Africa in order to support conservation in Madagascar through:

- Technical support
- Help in the protection of natural parks and reserves
- Field research
- Breeding programmes
- Conservation planning
- Education
- Fundraising


As an example, Zurich zoo, one of the institutions collaborating since 1992, founded Masoala Hall, directly linked to activities undertaken at the Masoala National Park. This was created for education and fundraising purposes and it allows Zurich Zoo to cover 1/3rd of the yearly expenses of Masoala National Park, as well as promote sustainable ecotourism in the area and provide technical support and materials.

EAZA Madagascar Campaign (2006-2007) supported some of the Madagascar Fauna Group projects, as well as other initiatives, carrying conservation actions at this highly threatened biodiversity "hotspot".

### 1.2.3 Case study 3: Reintroduction of species into the wild: the Przewalski horse

**Case study 3. Reintroduction of species into the wild. The Przewalski horse**

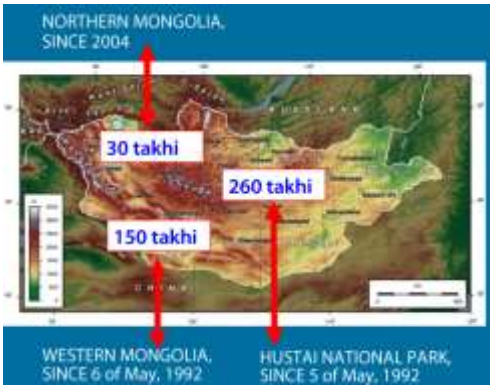
Source of data: Usukhjargal Dorj (Hustai National Park, Mongolia)

The Przewalski horse or "takhi" is the only species of wild horse left in the world. It became extinct in the wild in the 1960s, due to competition with domestic livestock and extreme climatic phenomena.

The reintroduction project was spearheaded by the Dutch Foundation for the Preservation and Protection of the Przewalski horse and largely co-funded by the Netherlands government at the Hustai National Park, the Mongolian government and the German "Christian Oswald" Foundation at Gobi B protected area.


In 2003 the project received support and "branding" from WAZA. Between 1992 and 2004, 90 horses bred in 24 institutions were reintroduced into the wild.

Since then the population at Hustai has grown as reintroduced animals adapted satisfactorily to the wild. Currently the major cause of horse mortality is predation by wolves, thus the human-induced threats which drove the species into extinction originally have been overcome and no difficulties have arisen from the captive breeding period.




### 1.2.4 Case Study 4: Activities of Latgales Zoo, Latvia on conservation

**Case Study 4: Activities of Latgales Zoo (Daugavpils, Latvia) on conservation of European pond turtle (Emys orbicularis), Smooth snake (Coronella austriaca) and Fire-bellied toad (Bombina bombina) on the northern boundary of its European area.**

**Authors**: Mihails Pupins, Aija Pupina

More information can be found in Case study 5. Activities of Latgales Zoo (Daugavpils, Latvia) on Invasive Alien Species (IAS).

Latgales Zoo is a small municipal institution that leads an active programme of nature conservation, educational and scientific activities directed at rare species of European herpetofauna found in Latvia. The projects include *ex situ* and *in situ* practical measures for conservation of the species, as well as development and implementation of educational measures.

The European pond turtle *Emys orbicularis*, Fire-bellied toad *Bombina bombina* and Smooth snake *Coronella austriaca* are protected species in Europe. The northern boundary of the European area of these species passes through Latvia. The pond turtle is so rare in Latvia that, despite the fact it is officially listed among protected animals of Latvia, in the Red Book of Latvia (2003) it is put in the "zero" category of already extinct species in the country. *Bombina bombina* and *Coronella austriaca* are placed in the first category: "critically endangered species". The LIFE-Nature project "Protection of habitats and species in Nature Park "Razna" (LIFE04 NAT/LV/000199) is a completed conservation project that was co-financed by the European Commission. Latgales Zoo was a partner in the project and its activities were rearing of *Bombina bombina* in zooculture and releasing of juveniles in new created ponds in the wild. The current LIFE-Nature project "Conservation of rare reptiles and amphibians in Latvia"(LIFE-HerpetoLatvia LIFE09 NAT/LV/000239) is also co-financed by European Commission. There was an urgent need to implement conservation plans for *Emys orbicularis*, *Bombina bombina,* and *Coronella austriaca* in Latvia. The most important problems for these three species are: 1) degraded water and terrestrial habitats; 2) small populations becoming extinct with few remaining individuals; 3) degraded corridors for contact between populations; 4) old facilities of the breeding centre for a long-term keeping of a breeding group; 5) low level of knowledge on *Emys orbicularis*, *Bombina bombina, Coronella austriaca* among landowners and the general population of Latvia.

LIFE-HerpetoLatvia activities and the main results for the three species are: 1) preliminary study of populations becoming near to extinction; 2) development of plans on management of the populations of Silene Nature Park, Kemeri Nature Park and Demene; 3) restoration of habitats; 4) renovation of the Rare reptiles and amphibians breeding centre; 5) rearing of juvenile *Emys orbicularis* and *Bombina bombina*; 6) improvement of near-extinct populations by releasinging of juveniles of *Emys orbicularis* and *Bombina bombina* into the wild; 6) education of the general population of Latvia.

**Total results statistics of Project LIFE-HerpetoLatvia conservation activities of Latgales Zoo in 2010-2013, co-financed by LIFE programme of European Commission:**

- Breeding group of 22 adults *E.orbicularis*, checked for autochthony, is reared since 1985.
- Rare reptiles and amphibians breeding centre is renovated in the LIFE-HerpetoLatvia project in 2013.
- The Species Conservation plan for *Coronella austriaca* in Latvia will be created.
- Every year *E.orbicularis* eggs are received from the breeding group (72 eggs in 2013); more than 1000 *Bombina bombina* are reared and released in wild in 2013, 2000 will be released in 2014 with continuation after-LIFE years.
- Every year young turtles are hatched in incubators (24 hatchlings in 2012).
- The young turtles are reared for some years before the young adult stage for better adaptation to future release in wild.
- *E.orbicularis* zooculture "from egg to egg" is created in Latvia in 2012: the first eggs were received from turtles, hatched in the Centre.
- For the first time in the history of Latvia 42 young turtles reared in the Centre will be released in wild in 2014.

- For the first time in the history of Latvia *E. orbicularis* ponds and eggs-laying places and *Coronella austriaca* habitats are restored in Latvia, two new Natura 2000 sites for *Bombina bombina* will be established and many ponds were created that create green corridors for contacts among populations in Latvia and with populations in Belarus.
- Since the onset of the project a total of 16 press releases were made. We had 17 publications in journals and newspapers in Latvia and in USA (Diena, Seichas, Nasha Gazeta, Dinaburg etc.) where the project was highlighted with the total edition of issues (calculated from official information about sizes from editions of specific newspapers and magazines) more than 300 000; the Project was presented at 25 public events for a total audience of more than 80 000 people, the Project was presented to President of Latvia Mr. V.Zatlers. It was presented during several TV interviews, including most popular TV show Latvia's Pride awarding ceremony, which was reflected by most popular mass-media nationwide.
- Two seminars with local land owners were conducted: 1) Demene, 21.12.2011., for land-owners of Demene District – future Nature 2000 territory, discussions mostly about Bombina conservation; 2) Silene, 30.08.2012., for land-owners of Nature Park Silene, discussions mostly about Emys conservation. These seminars were necessary for explaining the role of the LIFE and the Project in target species conservation in Latvia, and achieving agreements with them.
- 17 additional seminars and workshops with no additional expenses were organised for land owners, environment protection authorities since the onset of the Project (a total of 351 participants).
- Project LIFE-HerpetoLatvia organized International Workshop „Research and Conservation of European Herpetofauna and its Environment: *Bombina bombina, Emys orbicularis*, and *Coronella austriaca*", held in Daugavpils, 08-09.10.2012. The aim of the workshop was experience exchange over different aspects of research, management of populations, and conservation in-situ and ex-situ of three project species, meeting with other LIFE projects' representatives. Two-day free-of-charge workshops included presentations, discussions, field visits to the sites of future habitat improvement works, and visiting of renovated Center building. 24 presentations of 37 authors from 8 countries (Germany, Poland, Lithuania, Latvia, Netherlands, Latvia, Belarus, and Estonia) were presented in a form of oral presentation or poster, 21 participants - experts, other LIFE projects' representatives, scientists and students participated in workshop in person.
- Project LIFE-HerpetoLatvia was presented in total in 21 scientific meetings (4 visits financed from the Project) in Latvia, Russia, Poland, Belarus, Italy, Germany, Luxembourg etc. with 61 presentations and posters; 14 articles and 22 abstracts were published.
- The web-information about three species in Latvia was created in LIFE-HerpetoLatvia project http://www.life-herpetolatvia.biology.lv/ and in Latgales Zoo www.latgaleszoo.biology.lv .
- 10 notice boards on three species are placed in LIFE-HerpetoLatvia project sites.
- Every year more than 30 000 visitors of Latgales Zoo receive information on LIFE EU and on three species conservation in Europe and in Latvia.
- Three brochures on the species conservation in Latvia and LIFE EU are created and distributed to land-

owners and other people.
- *Coronella austriaca* was recognized as "The animal of the year 2013" in Latvia.
- *E.orbicularis* is recognized as "The animal of the year 2013" in Latvia.

### 1.2.5 Case study 5: Activities of Latgales Zoo. Latvia on Invasive Alien Species

**Case study 5. Activities of Latgales Zoo (Daugavpils, Latvia) on Invasive Alien Species (IAS).**

**Authors**: Mihails Pupins, Aija Pupina

More information can be found in 1.2.4 Case Study 4: Activities of Latgales Zoo, Latvia on conservation

Biologists Mihails Pupins and Aija Pupina began the study of *Emys orbicularis* in 1985 with an old female pond turtle, obtained from a local inhabitant. *Emys orbicularis* is a very rare animal in Latvia. Therefore, the initial method of study of *Emys orbicularis* distribution was a survey of local inhabitants about the turtles they saw in wild. Verifying communications of inhabitants about *Emys orbicularis* found in Latvia, the biologists found out that in some cases inhabitants had seen in Latvia alien exotic species of turtles. Studied since 2004, *Bombina bombina*is were very rare in Latvia and the biologists found their habitats had been invaded by the fish Rotan (*Perccottus glenii)*, which is very dangerous for the turtle.

Rotan threatened both *Bombina bombina* and *Emys orbicularis* in Latvia, therefore, Latgales Zoo has since 1995 been trying to tackle this invasive alien species (IAS). This activity is carried out by combining four strategic directions: preliminary study, basic and applied research, nature conservation actions *in-situ* and *ex-situ*, and education.

**First step: Preliminary study**

The biologists estimate and analyse information gathered from local inhabitants at interviews, during expeditions in the wild, scientific meetings and conferences. The received information is analysed to assess the target IAS problem for the local territory and formulate hypotheses.

Results

- For the first time allochthonous turtle species are found in Latvia.
- For the first time IAS *Perccottus glenii* are found in habitats of *Bombina bombina* in Latvia.

**Second step: Basic and applied research**

The biologists of Latgales Zoo studied the distribution of the target IAS using interviews of inhabitants and field expeditions; they analysed some aspects of ecology of the target IAS in nature and in experimental conditions, and the ecology of the target species *Bombina bombina* and *Emys orbicularis* for a better understanding of the threats posed by the IAS.

Results

- In 2006, the IAS red-eared slider (*Trachemys scripta elegans)* was found for the first time in Latvia; and a group of adult 5 *Trachemys scripta elegans* was registered in Latvia.
- For the first time 7 allochthonous species and subspecies of Turtles (*Trachemys scripta troostii*, *Mauremys caspica*, *Mauremys rivulata*, *Pelodiscus sinensis*, *Testudo horsfieldii*, *Testudo hermanni hercegovinensis*, *Trachemys scripta elegans*) are registered in Latvia, mostly single adult animals.
- For the first time in Latvia successful overwintering of a group of *Trachemys scripta elegans* was registered in an out-door basin of Latgales Zoo; and *Trachemys scripta elegans* egg-laying was registered in the out-door shelter of the Zoo. Also for the first time in Latvia, successful overwintering of a group of *Trachemys scripta elegans* was registered in the wild.
- *Trachemys scripta elegans* direct predation on *Emys orbicularis* was registered in Latgales zoo.
- The distribution of *Perccottus glenii* in habitats of *Bombina bombina* and in catchment areas of salmonid lakes in Latvia was researched and materials were published in scientific magazines.
-

Project LIFE-HerpetoLatvia organized an International Workshop (8 countries), held in Daugavpils in 2012. The aim of the workshop was experience exchange over different aspects of research, management of populations, and conservation, as well as about threats to the main species: IAS turtles, *Perccottus glenii*.

- Information on IAS turtles, *Perccottus glenii* in Latvia was presented in six presentations at six scientific conferences. In addition three scientific articles and six abstracts were published.

**Third step: Development of strategy and tactics of conservation of autochthonous target species**

According to research results, the biologists of Latgales Zoo developed principles to fight the target IAS in Latvia for the conservation of autochthonous target species.

Results

- The national strategy plan for conservation of *E.orbicularis* in Latvia is created by Latgales Zoo biologists in 2007 and officially approved by the Ministry of Environment. The main threat– invasive alien turtle species and their parasites - was described and measures for combating them were recommended.
- Similarly the national strategy plan for conservation of *Bombina bombina* is created and officially approved in 2006. The main threats– invasive alien water turtle species, *Perccottus glenii*, and IAS parasites of exotic amphibians, were described and measures for combating them were recommended.
- A management plan for the largest population of *Bombina bombina* with contra-measures against *Perccottus glenii* was created for two new NATURA 2000 areas through the Project LIFE-HerpetoLatvia.

**Fourth step: Conservation *ex-situ* and *in-situ***

The biologists of Latgales Zoo captured and received IAS turtles captured by inhabitants or from owners. The activity was carried out in a very strong and wide cooperation with inhabitants of Latvia. Latgales Zoo also created a shelter for exotic turtles, which were abandoned by their owners or captured in the wild.

Results

- In total 24 water and terrestrial turtles (and their parasites) were removed from the wild in Latvia.

- In total 54 water and terrestrial turtles were received from owners, other zoos and the nature conservation agency.
- Some other single animals of alien species (and their parasites) were also removed from the wild (*Pygocentrus naterreri* were removed by angle fishing, an exotic lizard, spider species).
- Shelter for water and terrestrial turtles is established in Latgales Zoo (out-door basin and in-door terrariums).
- New owners for exotic turtles were found.
- 32 water and terrestrial turtles were kept in the shelter in 2013.
- More than 2000 *Perccottus glenii* were removed in 2008 from *Bombina bombina* habitats in Nature 2000 areas Ilgas and Silene Nature Park.
- 30 new ponds for *Bombina bombina* without contact with water bodies invaded by *Perccottus glenii*, were created in Silene nature park (LIFE-HerpetoLatvia project is co-financed by LIFE program of European Union) and in other places.

**Fifth step: Education**

The biologists of Latgales Zoo tell the inhabitants about the danger that target and other alien species may cause for the nature of Latvia. We have in Latgales Zoo good specialists for the educational work.

Results

- Every year approximately 70 respondents are consulted by phone on IAS species and exotic turtles keeping.
- Every year more than 30 student biologists are educated on IAS target species in visits to Latgales Zoo.
- The field guide on exotic turtles found in wild in Latvia is created and published in 2012 as a learning tool, also in PDF in open access.
- Every year Latvian people, especially children, students, specialists and land-owners are educated on IAS turtles and other species in Latvia: in 2010-2013 25 public events with more than 22 000 participants were organized or participated.
- The web-information about dangers of IAS turtles, Perccottus glenii in Latvia was published in Latgales Zoo www.latgaleszoo.biology.lv
- In Latgales Zoo in the shelter there are 4 boards on exotic turtles with calls to owners not to release them in the wild but to bring them to Latgales Zoo.
- Since the onset of the LIFE-HerpetoLatvia the Project and info on IAS turtles, Perccottus glenii in Latvia was presented at 25 public events for total audience of more than 80 000 people, the Project and info on IAS was presented to President of Latvia Mr. V. Zatlers.
- Every year more than 30 000 visitors of Latgales Zoo receive information on IAS turtles, Perccottus glenii in Latvia.
- The following brochures were produced and distributed in 2007 in open access in PDF. Brochures were also updated in 2012:
  - on *E.orbicularis* conservation in Latvia, when IAS turtles in Latvia were described;
  - on *Bombina bombina* conservation in Latvia, where *Perccottus glenii* in Latvia was described.

### 1.2.6 Case study 6: Rescue and rehabilitation of animals for conservation purposes

**Case study 6: Rescue and rehabilitation of animals for conservation purposes**

**Author**: Simonyi Gábor (Hungarian Federation of Zoos; Budapest Zoo, Hungary)

Protected animals often suffer serious injuries in nature, or may be wounded by human activities, such as persecution or conflicts, poisoning, incidents on public roads, etc. Zoos are also often requested by authorities to receive confiscated animals falling into CITES categories. In the work to rescue the life of these animals, zoos are among the most competent institutions. Zoos have to be ready to help, and provide animals with appropriate veterinary treatment. The rescue work of zoos is important for nature conservation and often implemented in cooperation with nature conservation authorities and other conservation and animal welfare organisations.

Zoo staff, particularly veterinarians, zoologists and animal keepers have the necessary knowledge and experience in receiving, treating, rehabilitating and reintroducing animals of a large number of wild taxa. In Hungary, every year thousands of specimens of protected species are transported into the zoos by the public, most frequently common species, e.g. hedgehogs, blackbirds, white storks, great tits, bat species, and occasionally very rare and strictly protected species as well. Their re-introduction into the wild contributes to maintain healthy ecosystems. Also, saving injured or orphaned animals specimens is highly important in raising the conservation awareness of the public.

On the other hand, rescue of specimens of rare, flagship species may have high importance for the maintenance of healthy populations of the affected species. For example, the Eastern imperial eagle (**Aquila heliaca**) is a globally threatened species, the world population is only a few thousand breeding pairs. Hungary holds the largest population (about 117 nesting pairs) in the European Union, which is about 60% of the total EU population. In the last 10 years Budapest Zoo received 17 specimens of imperial eagle, 9 specimens of white-tailed eagle (*Haliaeetus albicilla*), which were either poisoned or wounded by hunting bullets. The released animals were monitored and detected many times after releasing, and they became the part of the breeding population again.

Budapest Zoo rescued cc. 1700 specimens in 2012 (mainly birds and small mammals). – in Europe (especially in the Central and Eastern part) it is common that zoos serve as sanctuaries for wild, protected species as well.

## 1.3 Zoo professional training

### 1.3.1 Formal zoo training and education opportunities

A zoo's participation in training in relevant conservation skills under the Zoos Directive Article 3 (1st indent) may involve the delivery of training, the receipt of training, or both. In any case, zoos should be ready to offer their employees a training plan sufficient for their needs. Ideally zoo staff will receive continuing and updated training.

The following information is presented as examples:

Diploma in the Management of Zoo and Aquarium Animals (DMZAA), http://www.sparsholt.ac.uk/animal-management

FdSc, Integrated Wildlife Conservation Course Bristol, http://www.sgscol.ac.uk/

BSc Hons Zoo Biology, School of Animal, Rural and Environmental Sciences, Nottingham Trent University, http://www.ntu.ac.uk/ares/

MSc International Animal Welfare Science Ethics and Law (on-line), university of Edinburgh, http://www.ed.ac.uk/schools-departments/vet/studying/postgraduate/taught-programmes/

MSc Applied Animal Behaviour and Welfare University of Edinburgh, http://www.ed.ac.uk/schools-departments/vet/studying/postgraduate/taught-programmes/

MVetSci Conservation medicine (on-line), University of Edinburgh, http://www.ed.ac.uk/schools-departments/vet/studying/postgraduate/taught-programmes/

MSc Zoo Conservation Biology University of Plymouth,http://www1.plymouth.ac.uk/courses/postgraduate/2678/Pages/CourseOverview.aspx

Zoo/Wildlife management http://www.vanhall-larenstein.nl/

Zoo keeper training, Groenhorst college Barneveld, http://www.groenhorstbarneveld.nl/

Post-graduate course “Comportamento e Bem-Estar Animal”, ISPA- University Institute; Lisbon http://www.ispa.pt/cursos/comportamento-e-bem-estar-animal

### 1.3.2 Professional training and conferences

EAZA Events, http://www.eaza.net/News/Documents/EAZA%20Events%20Calendar.aspx

EAZA Academy, http://www.eaza.net/activities/academy/Pages/EAZAAcademy.aspx

Durrell Conservation training, http://www.durrell.org/training/

BIAZA Events, http://www.biaza.org.uk/about-biaza/ou-activities/meetings/

Animal Training Seminar,Chessington World of Adventures Resort
International Zoo Educators Associationhttp://www.izea.net/education/interpretation.htm

Twycross zoo animal training, http://www.twycrosszoo.org/animaltrainingconference.aspx

Zoological Society of London, http://www.zsl.org/education/careers-and-courses/

DEFRA Zoos expert committee, handbook, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69611/pb13815-zoos-expert-committee-handbook1.pdf

The Shape of Enrichment, http://www.enrichment.org/

Animal Concepts, http://www.animalconcepts.eu/

Animal Welfare training, http://www.aware-welfare.eu/aware/45674/7/0/60

European Association of Zoo and Wildlife Veterinarians, http://www.eazwv.org/php/

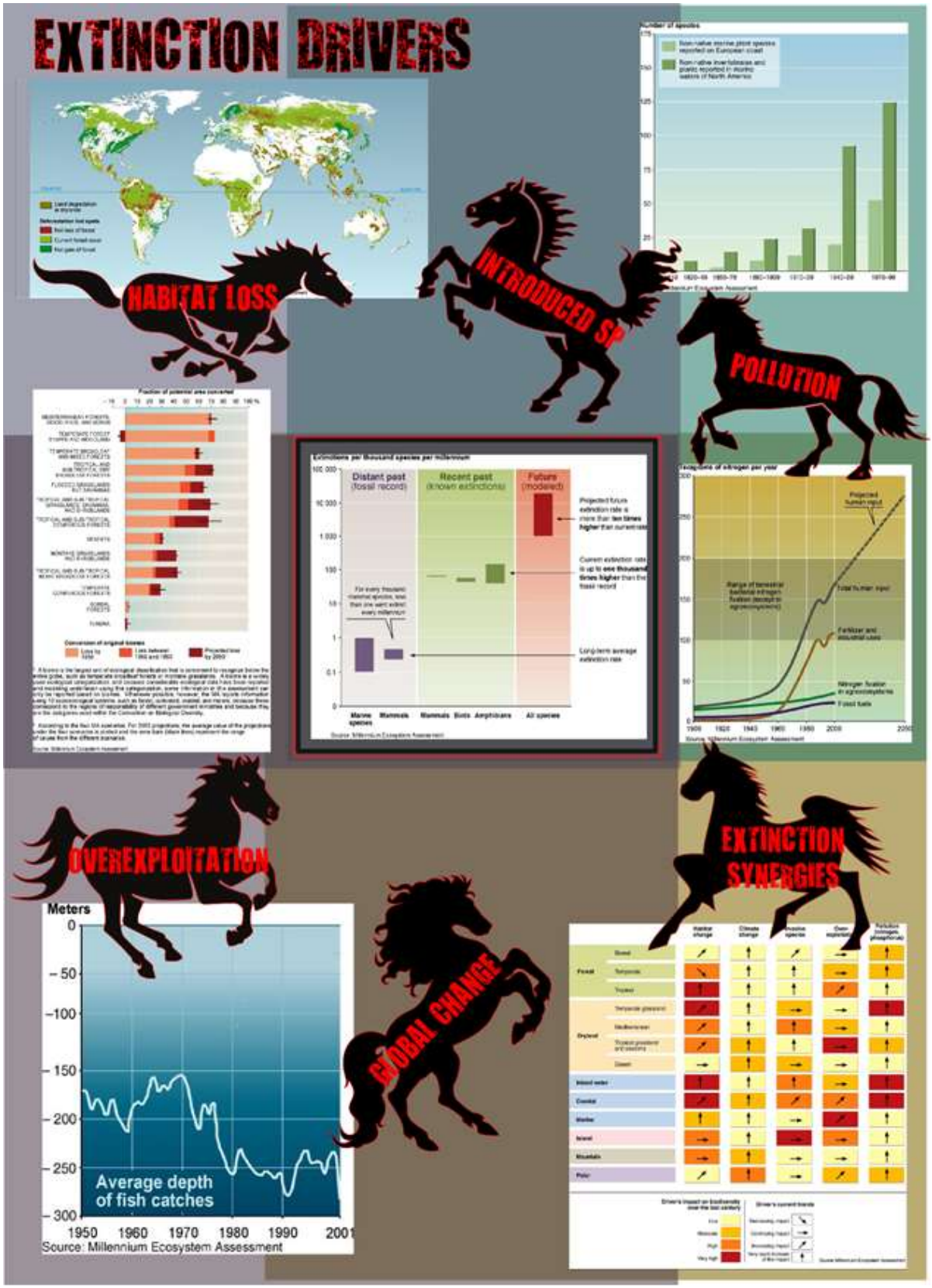
British Veterinary Zoological Society, http://www.bvzs.org/

European Wildlife Disease Association, http://www.ewda.org/

DEFRA Zoo Inspections, http://www.defra.gov.uk/ahvla-en/imports-exports/cites/zoos-inspectorate/

Summer course in Stichting AAP http://www.aap.nl/english/news/news/aap-summer-course-2013-husbandry-of-rescued-primates.html

## 1.4 Extinction drivers




Compiled by Vanessa Herranz Muñoz. Inner graphs from Millennium Ecosystem Assessment

## 1.5 Sustainability of zoo operations

Some examples of how to improve sustainability of operations would be:

- Improving efficiency of energy consumption and investing in renewable technologies such as solar panels or biomass-derived energy generators to decrease external consumption.
- Implement an environmentally aware policy for supplies to take into account the origins and impact of all materials and provisions used.
- Improve waste management and promote recycling both within operations and towards visitors.
- Implement water management and grey water re-use systems.
- Implement recognised environmentally responsible standards such as ISO 14001 and the EU Eco-Management and Audit Scheme (EMAS)

There are also specific standards for sustainability in animal parks, such as the certificate "Biosphere Parks Animal Embassy" developed by Loro Parque (Spain) and the Institute for Responsible Tourism (associated with UNESCO) to accredit sustainability and good practices in zoo management.

Other examples of sustainability in zoos can be found on the EAZA website.

Sustainable development is legislated through other EU and state regulations. WAZA environmental sustainability section, EAZA Sustainability pages, and the document "How to become a more sustainable zoo BIAZA Guidelines" provide extensive information and recommendations on this area. The Arcus Foundation has also published an open document titled Building Sustainable Sanctuaries, which may be useful for zoos considering sustainability when building new enclosures.

**Example:** Paignton Zoo (UK)

The greener zoo. Paignton Zoo Environmental Park tries to live up to its name. We try to set an example to our visitors and test out ideas that can help the planet. These range from solar panels and composting to ethical trading and avoiding wherever possible the use of palm oil (plantations are destroying orang utan habitat in South East Asia).

Some of the more unusual ideas include biological pest control in off-show greenhouses, a reed bed water filtration system and biomass heating in Crocodile Swamp. The front entrance building has a living roof.

We have an Environmental Management System and our ISO14001 international accreditation for environmental management. In 2008 Paignton Zoo was named Best Sustainable Tourism Business and overall award for the Best Sustainable Business in Devon by the Devon Environmental Business Initiative (DEBI). The Zoo has also won awards from the Green Tourism Business Scheme.

The most significant initiative of recent years has been VertiCrop. VertiCrop was the world's first public high-density vertical growing system. This working prototype has shown how this sort of technology could help solve the world's food production problems. VertiCrop combines low food miles, high density production and the reduced use of resources like land and water - and it means we can produce fresh, tasty herbs and leaf vegetables for our animals, right here in the Zoo!

## 1.6 Examples of Mission Statements

### 1.6.1 Zoological Society of London

**ZSL Vision:** A world where animals are valued, and their conservation assured.

**ZSL Mission:** To promote and achieve the worldwide conservation of animals and their habitats.

**ZSL strategic aims:**

- **Strategic aim 1:** To undertake and promote relevant high quality zoological and conservation research, to help us achieve our conservation objectives and to inform and influence conservation policy.
- **Strategic aim 2:** To encourage and motivate all our stakeholders to support and engage in conservation.
- **Strategic aim 3:** To implement and achieve effective and appropriate '*in situ*' and '*ex situ'* conservation programmes for priority species and habitats.
- **Strategic aim 4:** To lead and deliver exemplary Zoos in order to advance ZSL's mission.
- **Strategic aim 5:** To further ZSL's mission by maximising opportunities to generate funds.

### 1.6.2 Copenhagen Zoo

**Zoo's mission**

The Zoo must:

- Through modern display and characteristic animal species fit for the local conditions function as a cultural institution within the areas of:
  - Culture
  - Information/education
  - Science
- Increase the interest in and the understanding of nature and its multitude through experiences based on relevant, activating and entertaining education and display.
- Be actively involved in the international efforts to preserve animal species and habitats and thereby contribute to the conservation of the biodiversity.
- All of these activities must be based on science.

**Zoo's vision**

Over the next five years the Zoo is:

- Denmark's leading cultural institution regarding innovative communication, education and display, including the aspects of environment and sustainability.
- Known and respected for its high standards and quality regarding the keeping of animals and the standard of animal enclosures and as an attraction within which good architecture and design add to the value and quality of the experience.
- Known and respected as Denmark's leading information centre regarding exotic animals and the conservation of their natural habitats.
- Known and respected as an active nature conservation organisation with a global perspective and network.
- A company with high ethical standards.
- A company focusing on the visitors.
- Among the companies with the most motivated, highly qualified and highly educated employees within the world of European zoos and aquaria
- A company with an economic basis, that secures the fulfilling of the Zoos mission.

### 1.6.3 The mission of the Riga Zoo:

To introduce and educate society about the diversity of the natural world;

To participate in research and conservation of different species of animals in Latvia and all over the world;

To promote conservation of wildlife and habitats;

To motivate people to understand the nature around us and to realize our role in it.

### 1.6.4 The Mission And Aims Of The Wroclaw ZOO:

The mission of the Wroclaw ZOO is to preserve the biological diversity out of concern for the proper and full development of the future generations.

Being in charge of animal ambassador in the human world, we get engaged in nature conservation, from an *ex situ* breeding of endangered species, through scientific research, promoting pro-ecological solutions, up to *in situ* protection and reintroduction of bred specimens to their natural environment.

We put an emphasis on education because only full awareness in society may result in conscious actions for the preservation of endangered species. We make sure to provide our animals with conditions similar to their natural habitat. These aspirations are reflected by the constant changes in the infrastructure of the ZOO as well as modernization of animal enclosures.

The institutional objectives define how the zoo plans to achieve its mission through specific aims or strategies, which can be guided by answering questions such as:

- **What is the zoo's main conservation focus?** e.g.: native species or habitats, taxonomic groups, specific regions or ecosystems, conservation research, education or training, *in situ* conservation, captive breeding, reintroduction, etc.

- **What are the long term or most important programmes that the zoo is committed to?** e.g. captive breeding programmes, EU initiatives, state projects, collaborations with academic or conservation institutions, etc.
- **What is the zoo's approach to promoting public education and awareness?** e.g. through inspirational or interactive exhibits, making emotional connections, becoming hubs of biological knowledge within their area of influence, actively involving the public in conservation initiatives, leading local community conservation projects, etc. - more in Art. 3 (2nd) -.
- **Other aims** reflecting, for example, the approach to providing high standards of animal accommodation, commitment to sustainable development, participation in other conservation arenas such as influencing policy, reserve creation, etc.

**Note from Author**: These Mission Statements are transcribed directly from their source, without any correction or modification.

## 1.7 Choosing conservation priorities and planning conservation

Choosing the conservation priorities in which to invest funds and efforts is a central issue in the field of conservation. In field conservation, priorities are often categorised as area-based or species-based. Area-based approaches typically propose specific areas for different conservation actions on the basis of characteristics such as:

- Avoiding species extinctions. For example, Alliance for Zero Extinction (AZE), comprises dozens of non-governmental organisations that are working to save sites that hold virtually the entire population of a Critically Endangered or Endangered species. In effect, losing these sites would mean a species going extinct.
- Overall species richness. The concept of 'biodiversity hotspots' was first introduced in 1988 and has since been used to demarcate parts of the world that are exceptionally rich in biodiversity, which is typically described in terms of numbers and diversity of species. Thirty four hotspots have now been defined.
- Numbers of endemic species. One of the first priority-setting programmes that sought to identify areas of the planet for targeted conservation action was the identification of Endemic Bird Areas in the early 1990s. Important Bird Areas were subsequently defined at a smaller scale so that specific sites could be identified for conservation support.

Representativeness. A final example of setting priorities geographically rather than taxonomically is a selection based on ecoregions. This seeks to conserve the most outstanding examples of all major habitat-types, not just those containing species with particular characteristics (such as those highly threatened and/or localised). Each of these geographical approaches reflects a particular vision about what should be the target of conservation action. Some are ambitious and seek to ensure that the biodiversity that we see today remains, whilst others seek to promote action in the most urgent cases, by avoiding extinctions.

The same approach holds true when species priorities are being determined. First, it is important to determine what kind of species should be the target of the conservation programme. For some, the choice is a particular taxonomic group and there are many organisations devoted to particular groups of, for example, mammals, plants and invertebrates. Although the Alliance for Zero Extinction approach mentioned above targets particular sites for action, these sites are identified on the basis that they are the most important places on earth for some of the most threatened species: safeguarding them will go a long way towards preventing extinctions of species that are particularly close to extinction. A third example of a species-based conservation approach is targeting action and attention towards the widest spectrum of evolutionary diversity that is also threatened. These species are known as Evolutionarily Distinct and Globally Endangered.

The selected approach reflects the particular interests of those creating the conservation programme. There is however, a practical component as well: to determine by careful analysis what is feasible in terms of both actions needed to address threats and the resources (money and people) available. For zoos, there are many options depending on the extent to which a zoo wishes: to work in partnership or alone; to run its own programmes or support projects of other organisations, and; to adopt a species-based approach or contribute more widely to habitat or other conservation objectives.

Organisations wish to spend their money as wisely as possible. To meet this aim, the cost-effectiveness of projects has been analysed recently at the Possingham Lab (University of Queensland, Australia). The Lab

devised a Project Prioritisation Protocol (PPP) which is being applied successfully to New Zealand conservation planning. It is not clear yet how widely applicable this protocol is.

**Conservation planning.** Some of the aspects to take into account when planning a conservation programme and what it takes to make it successful have been considered by the Cambridge Conservation Forum (CCF) and the Conservation Measures Partnership (CMP). These bodies have taken different approaches, but they encourage thinking into the role of research, management and other factors in conservation effectiveness (CCF: see Figure 1) and exactly what should be considered when planning a project so that it has the best chance of success (CMP: see Figure 2).


**Figure 1. Measuring conservation success (Adapted from CCF, 2008)**

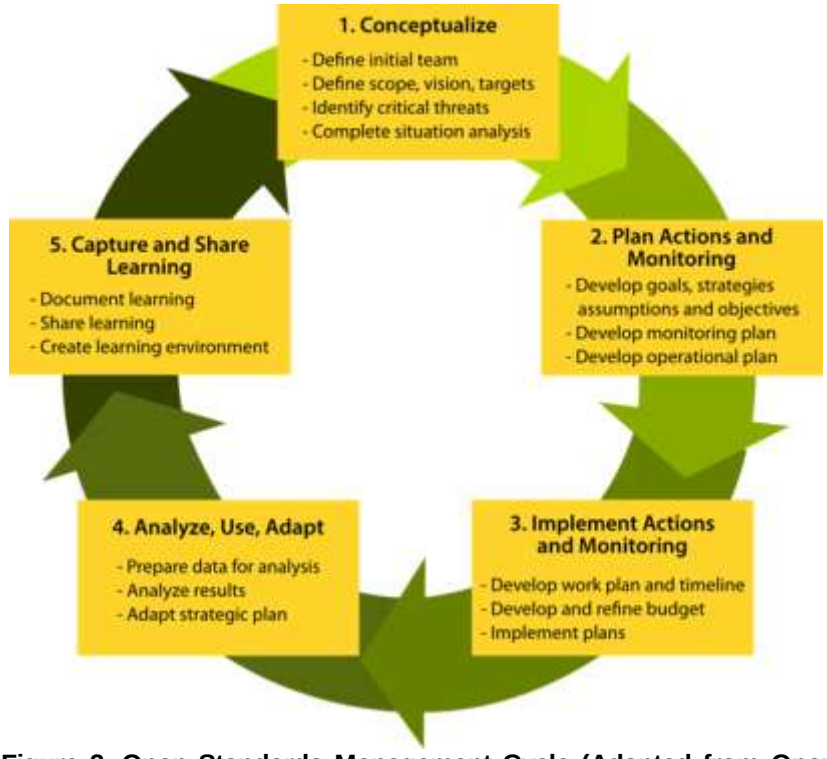



**Figure 2. Open Standards Management Cycle (Adapted from Open Standards for the Practice of Conservation, Conservation Measures Partnership, 2013)**

The IUCN Species Conservation Planning Subcommittee promotes careful planning for species in accordance with SSC guidance (IUCN SSC 2008). It seeks to produce strategies that have been developed in partnership with all those who have a concern or interest in a species or a group of species. This may include government officials, hunters, local communities, researchers and wildlife groups. The first step is to produce a status review which is discussed, revised as necessary and agreed. Then participants (or stakeholders) develop a long-term vision for the species (or species-group) from which Goals, Objectives and Actions can be derived. Overall, the planning process allows detailed consideration of the practical steps that need to be taken in order to achieve the long-term goals and vision.

Zoos often have a particular interest in developing programmes that involve their captive collections in some way. This can be either directly, through the use of individuals in breeding programmes or indirectly as ambassadors and educationally. IUCN'S Species Survival Commission is in the process of providing new guidance on the *ex situ* management of populations These draft guidelines[1] propose a five step process for determining whether a captive population is helpful and, if so, what form its participation should take. These steps are:

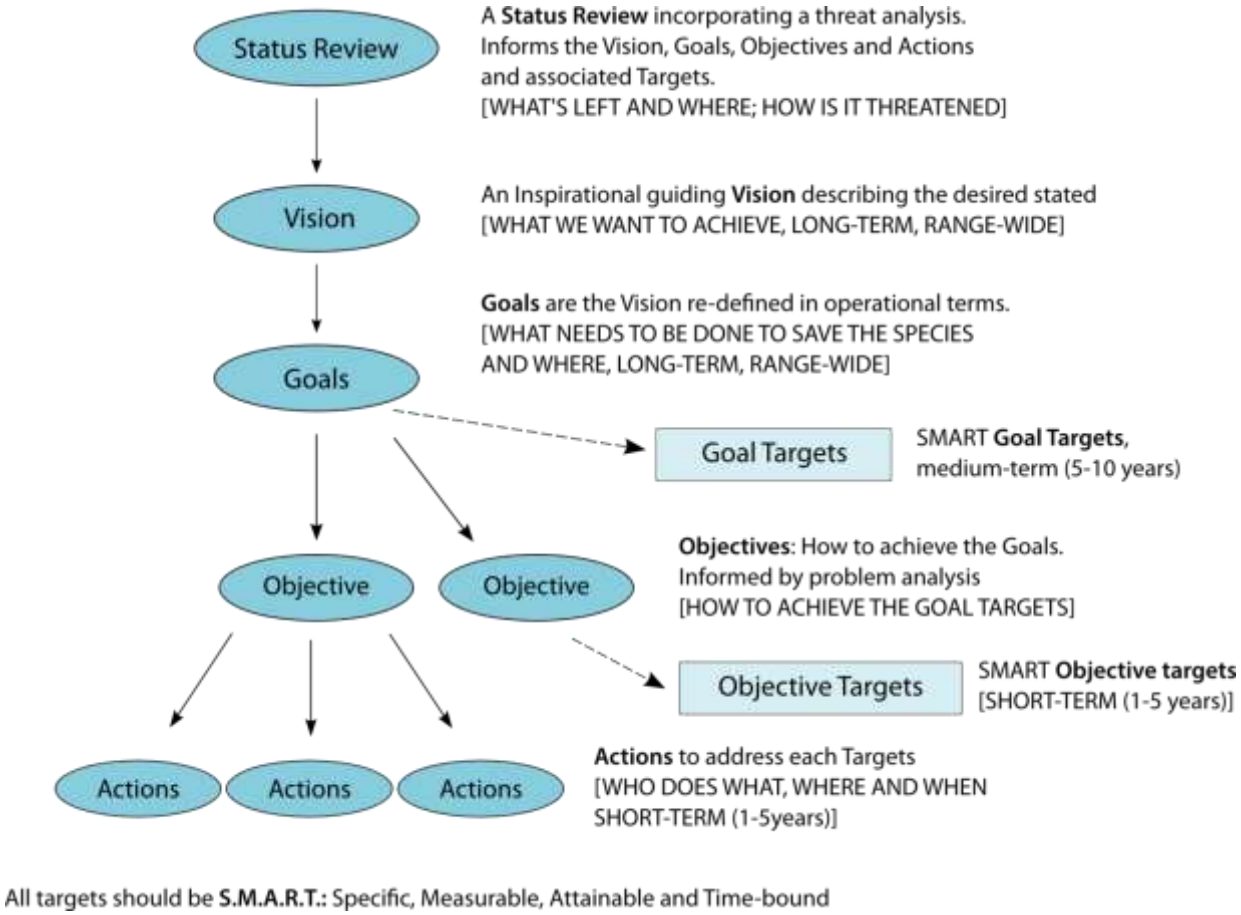



**Figure 3: Components of the IUCN/SSC Species Conservation Strategy (Adapted from IUCN SSC 2008)**

Five-step decision-making process to decide when *ex situ* management is an appropriate conservation tool:

- STEP 1. Compile a status review of the species, including a threat analysis.
- STEP 2. Define the role(s) that *ex situ* management can play in the overall conservation of the species.
- STEP 3. Determine the characteristics and dimensions of the *ex situ* population needed to fulfill the identified conservation roles(s).

[1] These guidelines should be available during 2014. In the meantime, further information can be found in Traylor-Holzer *et al.* (2013)

- STEP 4. Define the resources and expertise needed for the *ex situ* management programme to meet its role(s) and appraise the feasibility and risks.
- STEP 5. Make a decision that is informed (i.e. uses the information gathered above) and transparent (i.e. demonstrates how and why the decision was taken).

It is also essential for zoos to decide carefully the *ex situ* conservation programmes in which they wish to participate. The IUCN Conservation Breeding Specialist Group (CBSG) *"fosters contributions of the conservation breeding community to species conservation"* by, amongst other activities, undertaking population analyses (i.e. Population Viability Analyses [PVAs] and Population and Habitat Viability Analyses [PHVAs]) through specialised software such as Vortex. This is followed by the development of plans and recommendations for species conservation connecting captive and wild populations. CBSG also undertakes Conservation Assessment and Management Plan (CAMP) Processes aimed at prioritising research and management actions as required by different species.

**Reference.** Traylor-Holzer, K, Leus, K and McGowan, PJK (2013) Integrating Assessment of *Ex Situ* Management Options into Species Conservation Planning. WAZA Magazine 14: 6-9.

**Compiled by the author in collaboration with:** Philip McGowan (IUCN Species Survival Commission Task Force on strategic planning for species conservation)

## 1.8 Zoo strategic planning

Depending on the institution, a zoo's strategic planning documentation may contain the following information, which may be relevant to the implementation of the EU Zoos Directive:

- Institutional objectives
- Institutional Collection Plan (ICP)
- Breeding Plan
- Conservation Plan
- Research Plan
- Staff Training Plan
- Education Plan
- Veterinary Care Plan
- Nutrition Plan
- Environmental Enrichment / Welfare Plan
- Environmental Safety Plan (IAS Provisions)
- Health and Security / Emergency Plans
- Record keeping system
- Liquidation Plan
- Environmental sustainability plan/certifications
- Economic sustainability plan

An example of a zoo's planning documentation is Bristol Zoo Strategic Plan

The Institutional Collection Plan or ICP is a tool to keep control of all the species in the collection and their conservation role, links to programmes, plans to acquire or remove specimens and other relevant information. One of the most important functions of the ICP is that of assigning each species a conservation role within the collection.

For EAZA member institutions, the Regional Collection Plan (RCP) advises on the roles and actions to undertake for priority species at the regional level and is also taken into account when designing the ICP. EAZA has defined several RCP categories or roles a species may be assigned to. Figure 4 below shows an example of what an ICP may look like and details of the information it may include. The British and Irish Association of Zoos and Aquariums (BIAZA) provides these Institutional Collection Planning Guidelines

The method of designating and defining the conservation role of species has been the subject of much work within EAZA and some of its members. As a result, for example, Chester Zoo and ZSL use a categorisation system adapted from Riga Zoo, which considers roles within three functions: conservation, education and

research. Chester Zoo collection-planning section provides further information on the species conservation roles that are used.

Acquiring new species for the collection needs to be properly justified and fit with the ICP and the zoo's conservation objectives. EAZA Taxon Advisory Groups or TAGs and the Amphibian Ark developed a decision-tree questionnaire, further modified by Chester Zoo, which is used for this purpose (see Collection Planning and Justification document).

Acquisition and removal of species from a zoo's collection can be a delicate subject. BIAZA Animal Transaction Policy gives a series of recommendations which might be useful to include in a zoo's acquisition and removal policies.

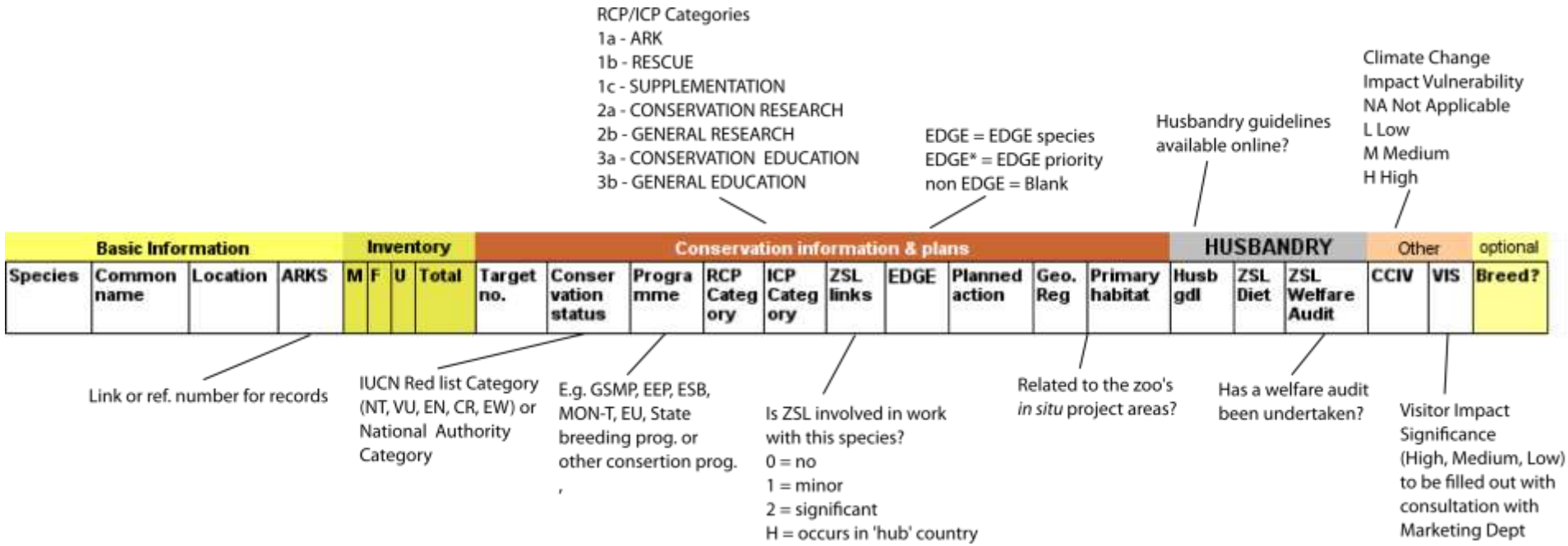



**Figure 4**: Spreadsheet categories of an ICP. Adapted from the Zoological Society of London (ZSL)

## 1.9 List of National and EU Zoo Associations and Organisations[2]

**Annex 1.9: National and EU Zoo Associations and Organisations**

| | | |
|---|---|---|
| Austria | Austrian Zoo Association. Österreichische Zoo Organisation (OZO) | http://www.ozo.at/ |
| Czech Republic | Union of Czech and Slovak Zoological Gardens -UCSZOO | http://www.zoo.cz |
| Denmark | Danish Association of Zoos and Aquaria - DAZA | http://www.daza.dk |
| France | Association Française des Parcs Zoologiques - AFdPZ | http://www.afdpz.org |
| | Société Nationale Des Parcs Zoologiques - SNDPZ | http://www.sndpz.fr |
| | Union des Conservateurs d'Aquarium - UCA | http://www.uca.asso.fr |
| | L'Association Francophone des Soigneurs Animaliers -AFSA | http://www.afsanimalier.org/ |
| Germany | Zoological Society for the Conservation of Species and Populations -ZGAP | www.zgap.de |
| | Stiftung Artenschutz | http://www.stiftung-artenschutz.de |
| | Berufsverband der Zootierpfleger - BdZ | http://www.zootierpflege.de |
| | Leibniz Institute for Zoo and Wildlife Research – IZW | http://www.izw-berlin.de |
| | Verband Deutschsprachiger Zoopadagogen e.V. - VZP | http://www.vzp.de |
| | German Association of Zookeepers. Berufsverband der Zootierpfleger e.V. -BdZ | http://www.zootierpflege.de/ |
| | German Wildlife Park Association. Deutscher-Wildgehege-Verband e. V. DWV | http://www.wildgehege-verband.de |
| | German-speaking Zoo Directors Association. Verband Deutscher Zoodirektoren -VDZ | http://www.zoodirektoren.de/ |
| | Deutsche Tierparkgesellschaft - DTG | http://www.deutsche-tierparkgesellschaft.de/ |
| | Frankfurt Zoological Society-ZGF | http://www.zgf.de/?id=14&language=en |
| Hungary | Hungarian Zoo Federation | http://www.zoo.hu/index.php |
| Italy | Unione Italiana Zoo ed Acquari - UIZA | http://www.uiza.org |
| Netherlands | Dutch Zoo Federation - NVD | http://www.nvdzoos.nl |
| | Alertis | http://www.alertis.nl |
| | Stichting 'De Harpij' | http://www.deharpij.nl |
| Romania | Romanian Zoo and Aquaria | http://www.federatiazoo.ro/ |

[2] Note. This list is not exhaustive.

| | | |
|---|---|---|
| | Federation (RZAF) | |
| Spain | Iberian Association of Zoos and Aquaria - AIZA | http://www.aiza.org.es |
| | Iberian Association of Wild Animal Keepers - AICAS | http://www.aicas.org/ |
| Sweden | Swedish Association of Zoological Parks and Aquaria - SAZA | http://svenska-djurparksforeningen.nu/ |
| United Kingdom | British and Irish Association of Zoos and Aquariums - BIAZA | http://www.biaza.org.uk |
| | Association of British and Irish Wild Animal Keepers -ABWAK | http://www.abwak.org/ |
| | British Veterinary Zoological Society -BVZS | http://www.bvzs.org/ |
| | Royal Zoological Society of Scotland -RZSS | http://www.rzss.org.uk/ |
| EU | European Association of Zoos and Aquaria -EAZA | http://www.eaza.net/ |
| | European Association for Aquatic Mammals -EAAM | http://www.eaam.org/ |
| | European Association of State Veterinary Officers -EASVO | http://www.fve.org/about_fve/sections/EASVO.php |
| | European Association of Zoo and Wildlife Veterinarians-EAZWV | http://www.eazwv.org/php/ |

Chapter

2

# 2 Article 3 - second indent - Public education and awareness

## 2.1 Websites

AZA Education

BIAZA Education

Bibliography on visitor studies

CEC, the IUCN Commission on Education and Communication

Conservation Education Training Manual (AZA, 2010)

EAZA Education

Evaluating the Effectiveness of the Educational Delivery Models at Zoos Victoria

IZEA International Zoo Educators Association

WAZA Education

Zoo Aquarium Association (Australia and New Zealand) Education

Zoo Education Masterplan (Central Zoo Authority, India)

ZooLex Zoo Design Organization

## 2.2 Case studies

### 2.2.1 Case study 7: Initiative for an Environmental Education Qualification of the German Wildlife Park Association (Deutschen Wildgehege-Verband e.V. - DWV e.V.-)

**Case study 7. Initiative for an Environmental Education Qualification of the German Wildlife Park Association (Deutschen Wildgehege-Verband e.V. -DWV e.V.-)**

**Authors**: Eckhard Wiesenthal and Pascale Wiesenthal

The environmental education qualification initiative of the German Wildlife Park Association (DWV) calls on a holistic approach to the operational organisation of its members. The "Environmental Education Quality Seal" is designed in line with the objectives of the EU Zoos Directive and the World Zoo and Aquarium Conservation Strategy. Environmental education objectives are based on the sustainable development agenda (BnE in Germany), the principles of UNESCO Decade of Education for Sustainable Development (2005-2014) and Agenda 21, the Rio Declaration on Environment and Development. Measures for assignments in conservation, science and education are dependent on the size of each institution (number of employees, animals and visitors per year). The education certification acknowledges this complexity and variety on its overall training offer (see table 1). An ultimate goal is also achieving the highest possible standards of animal keeping.

**Table 1: Training offered by DWV**

| Level / Duration | Content | Objectives | Follow-up tasks | Accreditation |
|---|---|---|---|---|
| Level 1 (4 days) | • Informal environmental education / formal environmental education<br>• Guided tours<br>• Design of educational materials | • To provide a practical insight into informal education planning<br>• To incorporate best practice of formal environmental education and BnE in zoos | None (this level serves as an entry seminar package that focuses on main issues of experience-based environmental education in order to establish a common quality level) | Certificate / Document Badges/ Base Certificate |
| Level 2 (4 days) | • Basics of the quality management I<br>• Marketing<br>• Animal enclosure - & park designing<br>• Evaluation/ visitor research | • QM: Mission statement, possibilities, limitations and implementation<br>• Marketing strategy, planning and measures.<br>• Animal husbandry: a comprehensive model "around the animal"<br>• Visitor research: Methods and practice. | The parks should be able to prove that they have concrete ameliorations in their formal environmental education measures and have laid groundwork for the quality management | Certificate / Document Badges / Premium-Certificate |
| Level 3 (3 days) | • Basics of the quality management II<br>• Volunteer management<br>• Education / training schemes | • QM II: Tasks. Assessing their own development for sustainable implementation.<br>• Securing successful and effective volunteering<br>• WZACS, Agenda 21, participation in species conservation | The parks shall represent further ameliorations and more comprehensive quality management, which comply with the requirements of larger parks | Certificate / Document Badges / Premium plus certificate |

**Importance of quality management within the scope of the certification**

Quality management (QM) is a structured element on two levels integrating specialised activities:

a) Defined requirements are monitored externally. Periodically repeated follow-ups of the inspection ensure that improvements in expertise and knowledge in the area of informal environmental education are continuously further developed and education activities are designed sustainably. E.g. determination of development objectives for the period between certification and re-certification.

b) The requirements include framework conditions, which are essential for the success of informal environmental education and quality development in general. E.g.: work organisation.

The levels I and II place particular emphasis on the needs of smaller parks with a few employees. Level III considers additional needs of larger parks resulting of a higher of employees and more complex operational procedures.

A central aspect of QM is that the parks determine their own goals and needs for training. Therefore level III is also open to small parks, if they want to establish a more extensive QM.

**Integration of scientific, nature and conservation topics**

The DWV supports scientific projects in nature conservation and animal conservation. The relevant information is distributed to each institution via the Internet, the DWV magazine, newsletters and meetings. The institutions then integrate the communicated knowledge in their education. The DWV management group establishes cooperation with nature conservation organisations. BUND (Friends of the Earth Germany) and NABU (Nature and Biodiversity Conservation Union) currently use the DWV member parks as a platform to promote *in-situ* projects. This kind of cooperation is highly effective and bundles expertise more successfully in nature and animal conservation.

**Further information:** http://www.wildgehege-verband.de/ Initiative for an Environmental Education Qualification. WAZA News, 4/10, pg. 2-4.

## 2.2.2 Case Study 8: ZSL Informal education devices at London Zoo

**Case Study 8. ZSL Informal education devices at London Zoo**

"Founded in 1826, the Zoological Society of London (ZSL) is an international scientific, conservation and educational charity whose mission is to promote and achieve the worldwide conservation of animals and their habitats.

Our mission is realised through our groundbreaking science, our active conservation projects in more than 50 countries and our two Zoos, ZSL London Zoo and ZSL Whipsnade Zoo (ZSL)"

Informal education devices methods used in London Zoo are shown in the pictures below. These devices convey the importance of biodiversity conservation in creative and interactive forms.

**Imaginative educational techniques do not need the use of expensive materials to inspire, communicate and engage.**


Clockwise from left: An interactive panel telling visitors about the roles different people play in a field conservation project and proposing to support with 1£ whoever they choose. A poster giving useful tips on welcoming native wildlife. Climate change messages inside the turtle's enclosure.

Below: A recycled materials penguin parade talking about consequences of climate change.

The examples below show how to engage people through people (i. e. the keepers and the keeper's knowledge). Clockwise from left: A poster telling visitors to look out for places where enrichment is hidden to attract the monkeys. Keeper for a day activities allow for an even closer experience of animals and the zoo. Keeper information panels and tips teach about the animals and help watching them.





## 2.3 Zoo informal education and exhibit design

Zoos count on a resource that no other conservation organisation has in their pledge to defend biodiversity: live animals. The innate attraction humans feel for animals draws millions of visitors to zoos. This resource can be employed to inspire, educate and raise awareness, but it can just as easily convey damaging messages inadvertently. A few considerations in this respect are:

- The conservation, education and marketing departments of zoos may find it useful to maintain constant communication and learn from each other in order to make sure the right messages are conveyed at every instance.
- "Recreation" is outside the scope of the EU Zoos Directive, however research has shown that although some visitors may believe that the main function of a zoo is conservation and education, for many their

reason to visit is “recreation”, “a good day out with the kids”, “fun” or “being outdoors”. The argument that “recreation” is what gets people through the zoo's doors (and brings revenue for other activities) has been used to justify making decisions and undertaking developments or activities with marketing perceptions as the priority, rather than conservation and education values which are often secondary or the last consideration and may even be non-existent. Some recreation activities may be contrary to conservation objectives and therefore would need to be evaluated within the framework of the EU Zoos Directive.

- Focusing on attracting visitors (particularly children) may send messages of wild animals as just cute, not dangerous or suitable as pets. The exotic pet trade (both legal and illegal) and exotic pet ownership has been shown in the last few years to have negative impacts on conservation of some species in the long term; it can be a source of IAS, biodiversity resources need to be diverted to rescue abandoned animals and owners often lack the necessary knowledge to provide appropriate welfare conditions, which is a concern for wildlife protection authorities. Conversely, zoos are especially well equipped to provide education on responsible exotic pet ownership and on appropriate husbandry of exotic species, or volunteering opportunities for people to get close to animals safely and discourage irresponsible exotic pet ownership.
- Educational messages conveyed in shows, presentations or direct contact activities may require assessment within the scope of the Zoo Directive.

**Exhibit design**

Zoos exhibit design is constantly evolving. Besides providing an appropriate accommodation to animals, the objective of zoo exhibits is to engage and communicate with visitors. Current trends are moving even further away from immersion exhibits and into more interactive exhibits, where a subtler presentation of information and the direct participation of zoo staff help spark an emotional connection with visitors. Some current exhibit design principles are:

**Monika Fiby** (founder of ZooLex Zoo Design Organization**)** follows four principles in zoo design:

- **Attractiveness:** Aesthetical experiences create positive minds. Designing attractive zoo environments sets the ground for rewarding zoo visitor experiences.
- **Effectiveness:** Designing with natural processes in mind is sustainable. Sustainability is cost effective in a long run.
- **Flexibility:** Requirements for ex-situ conservation are rapidly evolving. Designing for flexibility is an answer to changing animal management needs.
- **Timelessness:** Nature is always attractive. Natural landscapes are the benchmarks for zoo design.

**Oregon Coast Aquarium carried out a survey on exhibit interpretive trends in AZA institutions. The findings revealed the following trends:**

- **Content** – a move from animals and habitat concepts to ecosystem conservation and the inclusion of culture and local peoples’ stories. Focus on hope and success as effective approaches to changing behaviour.
- **Audiences** – exhibit interpretation based on research into how people learn. Multilingual interpretation to engage a broader audience. Targeting different levels of age and conservation literacy. Emphasis on storytelling as a technique. Interpretive panels that appeal to the emotions as much as the intellect.
- **Conservation** – providing information on the institution’s involvement in local conservation and options for visitors to get involved in projects at the zoo.
- **Interaction with staff and volunteers** – live interpretation is the best way to reach guests; more staff and volunteers are now involved in exhibit interpretation.
- **Animal encounters** – enabling visitors to observe animal training and keepers interacting with animals.
- **Colour and text** – fewer, more colourful signs with shorter blocks of text and stronger content. Links may be provided to the Internet for more in-depth information.
- **Interactives** – three-dimensional objects are used throughout exhibits to engage visitors of all ages, including hands-on objects, props, and whole body experiences.
- **Technology** – technology needs to be incorporated into exhibits, as this is how people are interacting with their world and accessing information. Use of mobile phone apps and text messaging is increasing. Aim to make technology family and group friendly.

Using the Internet and social media to stay connected with people after they leave the institution.

(Trends in Zoo and Aquarium Exhibit Interpretation. Oregon Coast Aquarium. Terry O'Connor Consulting, 2010)

| Informal education devices and activities. Guidance, trends and examples. | |
|---|---|
| **Device/activity: Signage and graphics** | |
| **Guidance** | **Pointers/trends** |
| Provide accurate species information (see above) | Trend in zoo graphics are going from animals and habitats to ecosystems, landscapes and relationships with human activities and cultures.<br>More visual: photos, larger colourful fonts, and several layers of information. |
| **Interactive displays** | |
| Promote cause-effect awareness and participation | Increased use of all senses and technology.<br>Enable to make choices and observe consequences.<br>Participation in zoo conservation initiatives.<br>Post-visit interaction. |
| E.g. Puzzles, audio devices, biomaterials for touch, games, videos, quizzes, touch screens, mobile apps.<br>Interactive visitor centres (Adelaide Zoo, Zurich Zoo) | |
| **Printed information** | |
| Use wisely. When possible substitute for more environmentally friendly alternatives. | Used in conjunction with other activities.<br>More specific and useful information about involvement in *in situ* conservation, campaigns, lifestyle choices, conservation messages, further engagement and participation. |
| E.g. Maps, leaflets, guidebooks. | |
| **Talks/Keeper talks/animal encounters** | |
| Convey accurate biological and conservation information.<br>Relate to appropriate behaviours towards wildlife (See EU Zoos Directive Good Practices document: Article 3 -first indent)<br>Minimize animal manipulation and use enrichment/training instead to show species natural behaviour.<br>Follow guidance on animal contact and preventing zoonoses (See EU Zoos Directive Good Practices document: Article 3 -3rd indent)<br>Provide public speaking training to staff involved. | Staff-led talks while feeding or training animals are becoming more popular. They often use storytelling, give interesting facts and figures and encourage questions for further interactivity.<br>Almost any species can be the focus of these activities, providing more opportunities for direct communication with visitors.<br>Some zoos create windows to watch keepers, scientists and volunteers at work. |
| **Animal presentations and shows** | |
| All of the guidance in the box above also applies to presentations.<br>Using animals for photo opportunities and rides may need to be assessed carefully in terms of whether it | Both shows and encounters are used as means to inspire empathy and focus attention on conservation messages.<br>The public is increasingly aware of what one type of |

| | |
|---|---|
| has educational value and making sure it does not have adverse effects on animal welfare.<br><br>Unnatural "circus-like" behaviours and tricks are not educational.<br><br>Welfare of the animals involved should be monitored respective to the amount of training and performing they undertake, and to ensure compliance with the measures in Article 3 (third indent) of the Zoos Directive.<br><br>Choice of species should have educational and husbandry justifications. | presentation or another may entail and therefore some raise concerns.<br><br>Some species and individual animals may enjoy human contact and benefit from mental stimulation and therefore be more suitable than others for this sort of activities. |
| **"Keeper for a day" programmes** | |
| Follow animal contact and safety guidelines – Zoos Directive, Article 3 (third and fourth indents) and EU Zoos Directive Good Practices document<br><br>Provide staff training on the species in the wild and public relations.<br><br>Keep groups small and book a few days a week. | These programmes encompass "behind-the-scenes" tours or spending a day helping an experienced keeper.<br><br>Keepers can relay their intimate knowledge of the animals, creating stronger connections.<br><br>These activities can provide closer yet less intrusive encounters and contact with animals. |
| **Websites** | |
| Reflect mission statements, conservation, research and education programmes.<br><br>Promote a realistic and respectful image of animals. | Websites and on-line resources can provide pre- and post-visit information for both formal and informal education, in-depth species information, details of conservation and research programmes, long-term participation options, information on sustainable lifestyle choices, etc. |
| E.g. Seafood Watch Monterey Bay Aquarium | |
| **Special events** | |
| Days or weeks dedicated to a conservation campaign or topic. They may include a wide range of activities such as putting up stands with information, donation boxes, games, competitions, talks, etc. | |
| E. g.South East Asia Campaign (EAZA-IUCN/SSC) | |
| **Media relations** | |
| Show awareness of how animals are portrayed and handled in front of the media. | Press releases and TV appearances are increasingly used, not just for publicity and to raise the profile of the zoo, but also to communicate related conservation information and to comment on environmental matters such as ecological disasters or new species discoveries. |
| **"Walk the walk"** | |
| Zoos are encouraged to take steps to become more sustainable.<br><br>Replacements and new elements can be chosen/designed with sustainability in mind. | Showing visitors practical examples of how the zoos themselves take action towards sustainability can encourage them to take action as well. |

<table>
<tr><td colspan="2">E. g. All catering facilities at Helsinki Zoo offer only Fair Trade and local, organic produce.<br><br>Adelaide and Monarto Zoos act, campaign and inform to “Go Palm Oil Free” as most sources are unsustainable and plantations are threatening orang-utan survival.</td></tr>
<tr><td colspan="2">“What you can do”</td></tr>
<tr><td>Zoos are encouraged to use all the means at their disposal to suggest appropriate conservation actions to visitors.</td><td>Suggestions of conservation actions are increasingly embedded in each education programme/activity.<br><br>Zoo association campaigns provide educational materials, indicate appropriate conservation actions and design awareness and fundraising activities for members.<br><br>Some zoos give visitors opportunities to choose environmentally friendly actions on-site, for transport and at their catering facilities or shops.</td></tr>
<tr><td colspan="2">Bristol Zoo offers discounts to visitors arriving in public transport.<br><br>Dublin Zoo “What you can do” section.</td></tr>
</table>

# 3 Article 3 - third indent - Accommodation for animals

## 3.1 Websites

### 3.1.1 Useful websites

American Veterinarian Medical Association (e.g. euthanasia, disinfectants, etc.)

Australasian Husbandry Manuals

Australian Zoo Biosecurity Manual and Self-Audit Checklist (biosecurity)

AZA Husbandry Manuals and Husbandry Guidelines (e.g. nutrition, quarantines, animal care manuals, etc.)

Brien, M.L., Cherkiss, M.S., Parry, M.W., Mazzotti, F.J. (2010) Housing Crocodilians in Captivity: Consideration for Central America and Caribbean

British Association of Zoos and Aquaria (e.g. nutrition, enclosure's design, biosecurity, poisonous or venomenous reptiles, amphibians, fish and invertebrates, zoonoses, environmental enrichment, effects of visitors, animal welfare assessment, etc.)

CITES non-air Transport Guidelines of live wild animals and plants

Comparative Nutrition Society

Council Regulation (EC) Nº1/2005, 22 December 2004 (e.g. protection of animals during Transport)

DEFRA, UK (2012) Zoos Expert Committee Handbook (e.g. animal welfare assessment, etc.)

Disney's Animal Training Programme (e.g. training, environmental enrichment, human-animal relationships)

EC Animal Welfare During Transport

EFSA statement on the use of animal-based measures to assess animal welfare

Environmental enrichment guidelines. Association of British and Irish Wild Animal Keepers (ABWAK)

European Association of Zoos and Aquaria (e.g. nutrition, list of hazardous and dangerous species, euthanasia statement, zoonoses, biosecurity, etc.)

EAZA Group on Zoo Animal Contraception

European Zoo Nutrition Group

Fish and Amphibian Euthanasia, Cornell University, 2012

Florida Fish and Wildlife Conservation Commission Species Profiles

IATA Live Animals Regulations

International Congress of Zookeepers (e.g. human-animal relationships, environmental enrichment)

Merck Veterinary Manual on Exotic and Laboratory Animals (Zoo animal health)

Minimum Requirements for the Keeping of Wild Animals-Switzerland Standards

Minimum Requirements for the Keeping of Wild Animals-Switzerland Standards (2001)

Proceedings of the Eighth International Conference on Environmental Enrichment

Saeugetiergutachten (Animal welfare requirements for the keeping of wild mammals and other wildlife in the German speaking countries)

The shape of enrichment (environmental enrichment)

Zoo Enclosure Designing Software

Zoolex Zoo Design Organization

Zootrition - Dietary Management Software

### 3.1.2 Examples of specific husbandry manuals available online

Australian Codes of Practice: Captiva Amphibian and Reptile Husbandry

AZA Amphibian Husbandry Resource Guide

AZA and EAZA Joint Flamingo Husbandry Guidelines

AZA Elephant TAG resource

AZA Orangutan SSP Husbandry Manual

AZA Penguin Husbandry Book 2005

Codes of Practice for the Welfare of Animals - Private Keeping of Reptiles (Victoria)

EAZA Marmoset Husbandry Guidelines

EAAM Standards and Guidelines on *Tursiops truncatus*

Elasmobranch Husbandry Manual

Elephant Management Guidelines (BIAZA) (2006)

Guidelines for the Use of Amphibians and Reptiles in Field and Laboratory Research

Horse Care Guide. British Veterinary Association.

Husbandry and Management of Parrot Species

IWRC Guidelines for Wildlife Rehabilitation

MYFWC Sea turtles Conservation Guidelines

Nashville Zoo's Toucan Husbandry Manual

Policy on Exhibiting Primates in New South Wales

Reptiles and Amphibians, Western Sydney Institute

Rhino Keeper Association

Western Sydney Institute Frilled Lizard Husbandry Manual

## 3.2 List of General Standards, Codes of Practice or Guidelines:

American Association of Zoos and Aquariums (2011). Accreditation Standards and Related Policies

Animal Protection Ordinance of Switzerland (Tierscutzverordnung). The Swiss Federal Council (2008)

Australasian Regional Association of Zoological and Aquaria (2000) Codes of practice and associated guidelines

Australian Government (2009) Animal welfare standards and guidelines: exhibited animals (draft)

Canada's Accredited Zoos and Aquaria (2008) Animal Care and Housing Manual

DEFRA, UK (2012) Secretary of State's Standards of Modern Practice

European Association of Zoos and Aquaria (EAZA) Minimum Standards for the Accommodation abd Care of Animals in Zoos and Aquaria

New Zealand Animal Welfare Advisory Committee (2005). Animal welfare (zoos) Code of Welfare

The Zoological Park, a new ally for biodiversity (Guidelines for the implementation of the Zoo legislation in Spain, Spanish Ministry of Agriculture, Food and Environment)

## 3.3 Case studies

### 3.3.1 Housing and environment

**Case study 9. Successful housing for tamanduas (Tamandua tetradactyla)**

**Author and photos**: Jennie Westander (General Curator & Head of education and research, Parken Zoo)

The tamanduas in Parken Zoo in Eskilstuna, Sweden, are kept in a family group consisting of a male and a female with two offspring born in the zoo. Tamanduas are generally difficult to breed in zoos, as reported by ESB.

The tamanduas are kept in an enclosure with access both to outdoor and indoor parts. This is unusual as most tamanduas are kept indoors in relatively dark enclosures. The enclosure consists of several parts so as to allow the animals to choose whether to be close to the other family members or farther away. Environmental enrichment consists of plenty of climbing structures, old logs, rocks, and in the outdoor also natural vegetation. Although the animals are not trained their calm nature allows the keepers to enter the enclosure to feed them and clean the exhibit.

In this exhibit, the tamanduas are breeding very well, they offer a very good display to the visitors, and they spontaneously perform natural behaviour as the enclosure resembles a natural habitat. The behaviour and breeding results obtained in this kind of enclosure suggest that it is beneficial for this species to have access to outdoor facilities.

## Case study 10. Stimulation of portjackson sharks' (Heterodontus portusjacksoni) captive breeding through changes in environment

**Author and photo**: Núria Baylina (Curator, Lisbon Oceanarium)

Two couples of portjackson sharks have been kept since 2000 in the Oceanarium of Lisbon. The two females became sexually mature in 2005, when they started laying eggs. However, there were no signs of mating nor of production of viable eggs. The males had been sexually mature since 2009.

Knowing that in the wild there is a breeding season during which the males find the females in inshore waters, while in the Oceanarium's water temperature is stable all year round, it was thought that the lack of breeding could be related to the lack of temperature variation during the year. Thus, the temperature in the tank was set to simulate the annual temperature cycle (13-26 ºC), staring in May 2011. The first signs of mating were observed and the first viable egg was laid in November 2011, followed by a second and third viable egg in January 2012. The eggs were monitored by ultrasound to control if they were fertile and to monitor embryonic development. The first two juvenile sharks were born in 2013.

This intervention resulted in the successful captive breeding of portjackson sharks in Lisbon's Oceanarium There are registers of births in captivity from wild eggs in Australia, but this is probably the first time worldwide that captive breeding is achieved for this species.

### 3.3.2 Environmental enrichment

#### Case study 11. The re-housing of a single, large Protopterus (lung fish)

**Author and photos:** Valerie O'Hare, Shape of Enrichment

The aquarium area staff at Sofia Zoo were concerned that this large, charismatic fish was currently living in suboptimal welfare. The tank was small and there was no complexity or variety to its contents. The fish had been in this tank for some time, outgrowing it as it aged.

Staff conducted a brainstorming session to identify methods to enhance its quality of life through Physical Habitat development and Sensory enrichment. Changes made were:

1. Enclosure size: the fish was moved to a nearly double sized tank.
2. Refuge 1: Clear plastic tube, only slightly larger in diameter than the fish, cut in half lengthwise and placed against the front glass. The tube provided an area where the fish could feel hidden in full view of the public.
3. Refuge 2: Using various sized rocks, slate, and a clear plastic sheet, a cave was created with one side consisting of the glass front of the aquarium, providing full viewing for the public.
4. Cover: artificial plant groupings on top of the cave and elsewhere in the substrate created two large hiding areas, allowing for the fish to be clearly visible through the vegetation. For additional cover, a piece of driftwood, was placed from the bottom center to the top end of the aquarium.
5. Elevation: Two substrate elevations were created from the existing gravel and added stones. A 3rd elevation was created on the roof of the cave.
6. Texture: various-sized stones were added as a different substrate; new driftwood, artificial plants, cave, and tube provided new tactile opportunities.
7. Light: the addition of the cave, vegetation, hills, and driftwood provided a range of lighter and darker areas within the tank.

Informal observations showed the Protopterus using all of the additions to the tank. The clear tube refuge, large rocks, and artificial vegetation groups seemed to be especially preferred. Staff felt that the fish benefited from its new environment. It has become more active and interesting for the visitors.

## Case study 12. Enrichment workshops to promote animal welfare and public education

**Author and photo:** M. Kingston-Jones, (Education, enrichment and research supervisor at Howletts and Port Lympne Wild Animal Parks)

Howletts and Port Lympne Wild Animal Parks in Kent, UK, house approximately 100 primarily mammalian species. Staff from the Education Department with a background in animal welfare work alongside keepers to promote animal welfare through enrichment, while adding a new dimension to education opportunities in the parks. Keepers of captive collections do as much as they can to promote good welfare, but they do not always get as much time and funding to create enrichment items as they would wish.

To overcome these constraints, an 'Enrichment Workshops' initiative was created in 2008 whereby members of the public pay to create enrichment items, which they then see going into the enclosures.

- School groups can opt to take part in short workshops at a low cost for up to 15-20 children at a time, where they create large quantities of simple enrichment (e.g. sewing hessian food parcels*[1] or cleaning and stuffing plastic drinks bottles with small food items).
- Corporate or team building groups pre-book to create large-scale enrichment items for 1-2hrs or for half-day sessions of higher prices. Groups are split into teams and either work against each other to create the same items in a set time (e.g. primate feeding devices to go on a new pulley system*[2]), or each team works to create a component of a much larger item (e.g. a dynamic branching system for baboons*[3]).

Indicators of success are the positive feedback from groups (including the evidence of increased connection with the animals), the number of items created and the funding generated. Feedback has been very positive. Teachers mention that seeing the animals receive their items was the best part of their visit, and an example of a corporate feedback is as follows:

*'The idea of the enrichment project is a fantastic one and worked really well from a team building point of view. To have all the gorillas interact with the items we made was fantastic! I still get a buzz when I think about that day.'*

These workshops have proved to be incredibly worthwhile. Keepers have the opportunity to test the newly designed and built items, to focus on more complex enrichments and to provide animals with more varied approaches. In addition, they generate a profit, which can be reinvested into developing new ideas.

*1 http://www.youtube.com/watch?v=N5cp4FbYwcY

*2 http://www.youtube.com/watch?v=UZEZBQOWuMs

*3 https://www.facebook.com/photo.php?v=10150722797150207&set=vb.185861671462824&type=3&theater

### 3.3.3 Human-animal relationships

## Case study 13: Stimulating elephant mother-rearing

**Author:** Endre Sòs (Chief Veterinary, Budapest Zoo) **Photo:** Budapest Zoo

Angele, a 10 year old female elephant arrived at Budapest zoo on the recommendation of the European Endangered Species Programme (EEP). Angele arrived in autumn 2010 and came as an untrained individual. The recommendation of the EEP was to keep this animal under protected contact (PC) conditions. At this time the elephant keeper team was also changing from free to PC. There was a consensus that Angele's training should start immediately.

A professional animal trainer worked with the keepers and veterinarians in both the practical and theoretical basis of training. Important priorities were to gain the trust between the animal and the keepers, and medical training in order to treat the feet and collect samples. The ultimate aim was to breed this animal with a young bull. Results were continuously discussed, even after each training session. The progress was slow, as care should be taken not to push it too hard, to avoid losing Angele's trust or a step back from a too early or painful move. Progress was awesome as Angele proved to be a good "student" and work was done systematically. Some actions took more time and had to be repeated whenever needed. For the pregnancy detection, blood had to be collected on a weekly basis for 3 months.

The training programme proved to be absolutely vital when Angele gave birth for her first calf in February 2013. The calf came earlier than expected and she did not want to suckle for almost 50 hours, while everything was tried to avoid the hand rearing. With Angele's trained co-operation, she was manually milked to encourage the calf to associate milk with the nipple. In order to ensure adequate access to colostrum, Angele had to be sedated once to place the calf manually on the nipple. Bottle-feeding was also involved, but efforts to encourage the calf to the nipple continued. After 48 hours the calf finally started to search for the nipple at the right spot, but by that time Angele was very tired and did not let her suckle.

A further training session engaged Angele's attention and allowed the administration of a painkiller given by hand injection. With mother and calf both feeling better, the bond was established and normal mother rearing started. Without the previous training and the commitment to encourage mother-rearing, the only option would have been the hand rearing, which with elephants has a low success rate.

## Case study 14: Management of veterinary procedures by training cooperative behaviour in dolphins (Tursiops truncatus)

**Author and photo:** Claudia Gili (Director of Science and Veterinary Services, Acquario di Genova)

In 2001, at the Aquarium of Genève, a female dolphin displayed an unusual behaviour, which consisted of sinking to the bottom of the tank as if "fainting". This behaviour only lasted a few minutes, but was repeated several times over a period of days. Since the first event had taken place, the dolphin was kept under a permanent monitoring scheme, with staff next to the pool 24 hours a day, to make sure that she could be rescued in case of need. The differential diagnosis of the problem included hypothesis related to possible neurological problems, epilepsy and related syndromes, cardiac failures, etc. However, the fact that the animal never lost its attention and appetite (eating even soon after the events) made the veterinary staff suspicious that this might have been a behavioural event (rather than pathological) that was even being reinforced by calling the animal back to the surface with fish.

The veterinary team undertook a neurological examination, an echocardiogram, ultrasounds of the abdomen and ovarian cycles, and blood sampling. All these medical procedures were done using training cooperative behaviour. This especially included the animal's conditioning to keep attached to the body a monitor device (Holter) that would provide a remote electrocardiogram. This was matched with a video of behaviour, which allowed analysis of heart function during apnea and dive. The animal was asked to swim freely with this equipment attached with sucking cups for half hour to make the records, then was called back and reinforced.

The matching of these results together with the reading of the hormonal cycles indicated that the animal was healthy, and suggested that this was a behaviour related to the ovulation period, and performed to attract other animals. In this case, also trainers, since the behaviour was being inadvertently reinforced.

Research on other captive dolphins' behaviour and a closer monitoring of the behaviour at Genève Aquarium confirmed that this was a pre-copulation behaviour both in males and females. This behaviour pattern was not so uncommon and it was even observed and described for dolphins in the wild. This case study was presented in an international conference, which contributed to a better understanding and recognition of this behaviour pattern in captivity

### 3.3.4 Veterinary care and nutritional programme

**Case study 15. Nutritional and veterinary research**

**Author and photo:** Romain Pizzi, Royal Zoological Society of Scotland

Gentoo penguins, living in a large, long term and self-sustaining captive population at Edinburgh Zoo, are all housed together in an outdoor enclosure with a large pool. Staff felt that the gentoo penguin population was being kept less successfully in recent years. It was believed that a diet change at the end of 1997 from fresh whiting (*Merlangius merlangus*) to frozen Atlantic herring (*Clupea harengus*) and the addition of a vitamin supplement may have contributed to this, but other factors such as infectious diseases were also suspected. Analysis was performed of 743 post-mortem examinations of gentoo penguins (1964-2004), with a diet change from fresh whiting to vitamin supplemented frozen herring.

Adult gentoo penguins on the frozen supplemented herring diet demonstrated:

1. 19% decrease of 5-year cumulative survival probability for supplemented frozen herring in comparison to birds on fresh whiting.
2. Increase from 5.95% to 23.36% in mean annual adult mortality rate.

Nutritional analysis of available feeding fish species and comparison with Antarctic krill (*Euphasia superba)*

| | Fresh whiting | Supplemented frozen herring | Antarctic krill |
|---|---|---|---|
| Oil | 3.9% | 15.9% | 2.8% |
| Vit. E | 0.74mg/kg | 28.08mg/kg | 0.78mg/kg |

Changing the diet over the following 5 years to blue whiting (*Micromesistius poutassou)*, containing 3.5% oil and 0.73mg/kg Vitamin E, resulted in a reduced annual adult mortality of 5.75% and reproduction success (chick survival to fledging) improved from 50% (n=26) to 93% (n=46).

After 2010, a change was made to sustainably fished hake species, with very similar nutritional content to blue whiting, and mortality and chick survival to fledging monitored. Outcomes were similar to those on blue whiting. The recommendation was made to other collections also holding gentoo penguins that they should ideally be fed a low fat content frozen whiting (*Merlangius* and *Micromesistius* spp.) or hake fish species (*Merluccius* spp.), which are more similar in nutritional content to the species natural diet of Antarctic krill (*Euphasia superba*) and should be supplemented with 25-50mg Thiamine (Vitamin B1) twice weekly.

## 3.4 Zoo animal welfare assessment

Assessment of animal welfare is part of responsible zoo management. Routine management of zoo animals as well as changes in husbandry practices or in the enclosures may be accompanied by a scientific assessment of animal welfare. Such systematic assessment requires a good knowledge and understanding of the target species and their particular context. Animal welfare assessment can be based on measures of provisions (resource-based approach) or on animals' responses to their environment (animal-based approach).

### 3.4.1 Resource-based approach to animal welfare assessment

Legislation and certification schemes have focused on measures of provisions, which may be easier and more practical to check. The evaluation of accommodation requires provisions to allow natural behaviour expression by all ages and physiological status, and that provide opportunities for them to express natural behaviour. For this reason, inspectors need to obtain specific knowledge to adjust general assessment approaches to specific contexts. General provisions can be directly observed and/or asked to staff and may include:

**Housing and Environment:**

- Is the enclosure design (tri-dimensional space, materials used, different compartments, indoor and outdoor, etc.) appropriate to the animals?
- Is the substrate appropriate? Are there different kinds of substrate that allow animals to perform different behaviours?
- Does the furniture allow the exhibition of natural activity? Does it allow self-protection or hiding from the public in case of need?
- Are temperature, light, ventilation, aquatic quality and other environmental parameters well adjusted? Do they provide for the choice of different intensities of these parameters?

**Environmental enrichment:**

- Is environmental enrichment in use? If yes, is it appropriate (e.g. opportunities to climb, to explore, etc.)? Is there a plan/a routine associated to it? Is it periodically evaluated?
- Does the environmental enrichment provide complexity and some degree of environmental control to the animals?
- Is the social group appropriate for the species and individuals concerned?
- Are there training procedures in place? How are they carried out and for what purposes?

**Human-animal relationships**

- How are the interactions with keepers? Are there species-specific appropriate in terms of establishment of bonds and safety?
- Is there a routine monitoring of animals' behaviour? How is it done and what kind of information is registered?
- What is the effect of visitors in that particular group? What measures are taken to deal with disturbances due to visitors (e.g. visual barriers)?
- Is there any visitor-animal direct contact? In which context? Is it supervised?
- Is there in place a procedure for handling, restraint and transport of animals?

**Programme of veterinary care**

- Is there a programme of veterinary care (e.g. preventive approach)? Are there facilities that allow a good preventive and curative veterinary practice? Does the zoo have a system of veterinary records?
- Are there biosecurity measures in place? Are the procedures following animals' arrival appropriate in terms of biosecurity?
- Does the zoo have a policy for euthanasia? Are there protocols in place?
- Does the zoo use post-mortem material?
- Does the management of the collection (animals' acquisition and disposal, identification of animals, control of breeding population) take into consideration aspects related to welfare?

**Nutritional programme**

- Is the nutritional programme adjusted to the needs of the individuals? Is there an appropriate distribution of drinking water?
- Are there facilities and equipment to undertake the nutritional programme in appropriate conditions?

- Does the food distribution take into consideration the behavioural needs of animals and particular seasonal aspects such as hibernation?

### 3.4.2 Animal-based approach to animal welfare assessment

Despite the usual resource-based approach to measure animal welfare, emphasis has shifted to a more direct and accurate approach related to the way the animals actually respond to their environment.

Welfare is a neutral term that can range from very poor to very good. In the past, welfare assessment focused on the absence of suffering, so indicators were related to the physiological and behavioural stress response. Nowadays, attention is also drawn to how the animals feel. A combination of these indicators is also used to infer emotions on animals.

The extent to which an animal adjusts to its environment includes approaches that involve measuring behavioural responses, physiological responses and health. None of the already identified animal-based indicators can provide *per se* an appropriate welfare evaluation, while too many taken together may result in an inconsistent assessment. An integrated approach is likely to offer the best picture into the state of animals.

A brief visit to a zoo is generally not enough to undertake a comprehensive animal-based welfare assessment, but a very important body of information can be provided by the staff and complement observation. It is always important to know the context in which animals behave in a certain way, the frequency of certain behaviours, and to know their physiological and health status. Observing behaviour is more complex than a simple snapshot. The following are some of the usual questions that can help to complete the resource-based approach:

**General Behavioural Activity**

- Do the animals show natural activity (flow of natural patterns of behaviour)?
- Do the animals use the space and its elements during their activities?
- Do the animals undertake natural patterns of maintenance behaviour (grooming, feeding, resting)?
- Do the animals exhibit patterns of foraging or exploratory behaviour? Do they play?

**Social Behaviour**

- Do the animals exhibit normal social relationships (normal grooming, low levels of overt aggression)?
- Although some low levels of aggression are normal in social species, are the aggressive patterns prolonged or do they easily escalate to overt aggression?
- Do the animals successfully escape or protect themselves from other animals?

**Animal-Humans Interactions**

- Do the animals successfully avoid the visitors?
- Do the animals easily resume their patterns of activity after being disturbed by visitors? Or do they interrupt them permanently?
- Do the animals try to escape from interactions with humans, or are they docile and willing to engage in such interactions?
- When applicable, do the animals fear the keeper or interventions of the keeper in the enclosure? Or is there a positive relationship between keeper's procedures and the animals?

**Abnormal Behaviour**

- Do the animals appear to be bored and/or restricted to a specific area of the enclosure?
- Are there animals showing some kind of abnormal behaviours (self-mutilations, stereotypes, over-feeding or drinking, excessive inactivity, hyperactivity, etc.?)

**Body Condition and Health**

- Do the animals look well (eyes, nose, general appearance, weight)?
- How is the state of the animals' fur or feathers?
- Are the animals free of injuries?
- Does locomotion appear to be normal?
- Do the animals show any self-directed protective behaviour (pain symptom)?
- Do the animals show any other symptom of disease?

### 3.4.3 Animal welfare indicators

The UK Zoos Expert Committee Handbook provides a thorough description of behavioural responses and physiological and health measures as well as advantages and disadvantages of their use as welfare indicators.

**Using behavioural indicators**

Behavioural responses of animals are the most immediate indicators of the way they are coping with their environment. Measurement of behaviour is practical since frequently it does not disturb the animals' current activities. It is advisable to observe animals over time and assess their responses to visitors, keepers, housing and husbandry routines. Evaluating behaviour is easily undertaken by skilled and attentive keepers and thus it represents the earliest potential signal of disturbed health and wellbeing.

| **Behaviour that may indicate poor welfare:** | **Behaviour that may indicate good welfare:** |
|---|---|
| - Arousal response, with short-term suppression of current activity<br>- Freezing and other inhibitory behaviours<br>- Avoidance/escape behaviours (individual or in group - performed spontaneously or in the scope of preference and motivation tests)<br>- High level or out of context agonistic behaviours (abnormal approach, chase, bite, ritual displays, submissive postures, etc.)<br>- Isolation from the social group<br>- Changes in normal activity patterns (excessive inactivity or excessive locomotion)<br>- Changes in feeding behaviour (loss or excessive appetite)<br>- Changes in reproductive behaviour (including disturbances in maternal care, infanticide, etc.)<br>- Changes in postures and/or locomotion (e.g. excessive running, jumping, rocking)<br>- Changes in anti-predator behaviour<br>- Changes in cognitive function (loss of learning ability/memory)<br>- Excessive self or allogrooming (or allopreening), scratching or self-mutilation (e.g. fur pulling or feather pecking)<br>- Stereotypic behaviour (locomotor, oral, or other)<br>- Displacement or vacuum activities | - Approach behaviours (performed spontaneously or in the context of preference or motivation tests for positive resources.<br>- Natural active behaviours (e.g. climbing, foraging, swimming, etc.)<br>- Exploration<br>- Play<br>- Appropriate levels of self and allogrooming or allopreening<br>- Appropriate relaxing behaviours (resting)<br>- General diversity of functional behaviour<br>- Facial expression, body postures<br>- Vocalisations |

**Which baseline for behavioural indicators?**

A behavioural assessment could use as a baseline:

- the behaviour of captive individuals, groups or cross-institutional populations in situations where their behavioural opportunities were unrestricted, or;
- a behavioural repertoire described for wild counterparts.

Behavioural indicators are very important to provide the right context for interpretation of physiological measures. Nevertheless, they also have some limitations due to problems in observation and interpretation.

**Using physiological indicators**

A wide range of physiological indicators may provide useful information on how a species is coping with its environment. However, as they are often impractical outside of a research context, only a few are in practice used in the context of zoos.

Non-invasive approaches such as measurement of cortisol from faeces are often better approaches to avoid stress responses due to handling and sampling that will mask the results of the analysis.

An alternative and modern approach is to train animals for veterinary procedures, which results in animals voluntarily offering parts of the body for collection of biological material. When this is not possible, validated protocols for sampling can be used in order to keep stress induced by the procedure to a minimum.

**Some examples of physiological indicators include:**

- Glucocorticoids and metabolites
- Adrenaline, noradrenaline
- Heart rate
- Temperature
- Blood pressure
- Breathing rate
- Blood chemistry (e.g. packed cell volume)

**Why are corticosteroids difficult to interpret?**

- They are primarily involved in the regulation of metabolic energy, so peaks can be detected when the body requires energy but is not stressed (e.g. circadian rhythms, sex, reproductive status, diet, seasonality, social status).
- They indicate physiological arousal, but not whether animals feel well or bad about a stimulus. For example, sexual activity, voluntary physical exercise or fear, are all very different emotional contexts in which these hormones are produced. Complementary analysis of behaviour is the solution to interpret hormones in context.
- Comparison with validated individual or even species baseline levels is not always easy to achieve.

**Using health indicators**

Health is one of the most important elements of animal welfare, but there may be cases where poor health does not elicit poor subjective experiences like pain or discomfort.

Some easy indicators can be used to assess poor and good health. A prolonged stress response involves changes in the whole organism and a depression of the immune system, generally related with an increase in disease incidence. Indicators of these prolonged conditions include measures of growth, physical condition, reproductive status (stillbirths, inter-birth intervals, parental behaviour, etc.), incidence of disease and mortality.

| Indicators of ill-health | Indicators of good health |
|---|---|

| | |
|---|---|
| - Decrease in normal activity or isolation from social group<br>- Loss of body condition<br>- Dull coat or plumage<br>- Lameness and/or abnormal body postures<br>- Disturbances of appetite<br>- Digestive disturbances (vomiting, abnormal faeces, etc.)<br>- Eyes or nose discharges or abnormal respiratory rate<br>- Fever<br>- Injuries and wounds<br>- Hair or plumage loss and skin rashes<br>- Excessive scratching<br>- Abnormal behaviour<br>- Absence of or excessive vocalisation<br>- Signs of species-specific pain behaviour | - Normal activity and resting patterns<br>- Good body condition<br>- Clear coat or feathers<br>- Normal locomotion and body postures<br>- Normal eating and drinking pattern<br>- Apparent normal digestive functioning<br>- Clear eyes and nose and normal respiratory pattern |

In analysing the health of the animals, it is important to identify the species-specific signs of disease, the degree of severity and to what extend it is affecting animal welfare. Sometimes direct observation and routine screening needs to be complemented with other means of diagnosis.

**Signs of pain**

Signs of pain and suffering are not well defined for many zoo species. Evolutionarily there is no value in displaying such signs as they would increase chances of attack or predation from others and so most species have evolved to display very limited behavioural signs of pain. However it is essential to note that physiological, behavioural and anatomical evidence indicates that all vertebrate animals and many crustaceans have the capacity to feel and thus suffer pain. Therefore it must be considered that if a syndrome, disease or situation would be painful in one vertebrate animal e.g. a human, it would be similarly painful in another vertebrate animal, even if that animal may not display symptoms of pain as humans do.

**Geriatric animals**

Increasingly zoo animals are living longer and geriatric disease is becoming more common. Old age itself is not a disease. Animals do not generally become slower or less active because of old age. However they may become slower or less active because of osteoarthritis, cardiac, renal or hepatic dysfunction, or other old age disease syndromes. The clinical signs shown may be subtle and non-specific. Thus, it is important that veterinarians and keepers work together to record slight behavioural changes and investigate those that may be subtle signs of complex disease. When diagnosed, it is important to treat these diseases to a level where quality of life is assured. If resources or therapeutics are not available to maintain the animal in a good quality of life, euthanasia may be considered.

### 3.4.4 Assessment of emotions in zoo animals

Assessment of emotions can only be done indirectly, since animals cannot report through language how they feel. Behavioural and physiological indicators are frequently combined with arguments concerning analogy with humans (species-specific assessment of pain and fear). Particular attention is relevant to behaviour that may indicate positive mental states e.g. play, or natural behaviours such as climbing, grooming swimming or foraging, and to behaviour that may indicate negative mental states e.g. abnormal behaviours such as compulsive hair plucking or pacing, or excessive resting or hiding.

| **Assessment of emotions in zoo animals** |
|---|

| Test | Aim | Description | Example |
|---|---|---|---|
| Tests of preference | To identify particular needs and infer positive and negative mental states | Animals chose between resources | Bark is a preferred substrate to straw in Sulawesi crested macaques |
| Tests of motivation | | Animals are made to pay a cost (e.g. pushing weighted doors, pressing buttons, walking against wind, climbing ramps, etc.) to accessing a wanted resource | Minks express a high motivation to have access to water |
| Cognitive bias tests | To infer pessimism or optimism on animals | Animals are required to react towards an ambiguous stimulus (with positive and negative components) | European starlings are more optimistic in enriched and large cages |
| Anxiety-related tests | To measure anxiety and fear. | Diverse tests such as open field tests, elevated plus-maze tests, neophobia tests. | Isolated fish is more neophobic than fish in social contact. |

**Using Quality of Life and qualitative approaches**

The concept of 'quality of life' (QoL) led to the development of multi-dimensional evaluation indices related to different aspects of poor and good welfare. These are animal-based markers related to behaviour and physiology.

While in people QoL is based on self-report, in zoo animals it was adapted to questionnaires to be completed by the keeper. In line with this approach is the qualitative evaluation of animal behaviour, which developed scientifically validated methods for qualitatively describing personality traits and emotions of animals by correlating these with quantitative measures of behaviour and physiology.

These approaches applied to zoo animal management exploit the keepers' knowledge about individual animals and their subtleties. This is used to complement available quantitative information. There is evidence that this approach is both reliable (measures taken by the same observer at different times or by different observers are similar) and valid (assessment items measured were the most appropriate and correlate to other already known measures).

**Example**

At the Chicago Zoological Society, 12 species-specific Welfare Score Sheets (WSS) for welfare monitoring were developed based on a qualitative assessment by the keepers. This process involved the WSS design, the cross-validation of some WSS specific items and the testing WSS management application (for further details, see Whitham and Wielebnowski, 2009).

## 3.5 Design of enclosures

### 3.5.1 Exhibit enclosure design (including tanks and aquaria)

A good design of indoor and outdoor enclosures allows:

- the animals to perform most relevant natural behavioural patterns (including birds to fly, lift-off and land safely); and to hide, retreat or shelter from any source of disturbance (e.g. other animals, visitors, adverse atmospheric conditions) when necessary;

- the keepers to remove and isolate sick or healthy animals, to smoothly introduce new animals, to monitor health and behaviour. Enclosures that are flexible enough to allow full separation of subgroups of animals may be very useful for some species during breeding periods;
- easy cleaning and maintenance of the space;
- the visitors to have a safe, educational and pleasant experience looking at the animals and their surrounding environment.

A good design of indoor and outdoor enclosures avoids:

- the animals competing and developing conflicts within the group;
- disturbance by an overly invasive presence of visitors, predators or any other aversive stimuli (e.g. walkways or mechanical devices over the animals' enclosures; too open or conspicuous views of the enclosure);
- the spread of diseases and security problems that can affect both animals and humans.

### 3.5.2 Overnight quarters and off-exhibit holding facilities

The need to use overnight quarters depends on enclosure design, husbandry, climate and type of species (e.g. hazardous or dangerous).

In recent times there is a tendency to allow animals to spend most of the time in their main enclosure. Very often this will comprise indoor and outdoor areas and animals will be trained to go to off-exhibit facilities for specific purposes.

Overnight quarters are designed for the night resting period or to temporarily restrict animals but, in some cases, may also be used to keep sick or injured animals.

Off-exhibit holding facilities can be designed to accommodate animals for more prolonged periods of time. Good quarters allow the animals to have a comfortable night rest on a space with appropriate equipment, substrate, and environment, being able to move and retreat from any threat presented by other animal.

**What kind of equipment is good for resting?**

Roosting areas for roosters; raised sleeping platforms for many mammals (e.g. tigers); sleeping nets for some primates; nest boxes for many birds and mammal species; sand basins for elephants.

Performance of common patterns of natural behaviour is also important in off-exhibit holding areas. These facilities may provide for keepers to easily remove and isolate animals, to monitor health and behaviour, and to easily clean and maintain the space.

### 3.5.3 Further reading:

www.zoolex.org

John Coe Zoo Design

Secretary of State's Standards of Modern Zoo Practice (DEFRA, UK) (Specialist exhibits, App 8)

British and Irish Association of Zoos and Aquaria

European Association of Zoo and Wildlife Veterinarians

## 3.6 Environmental enrichment

In order to enrich animal environments, basic aspects of the animals' accommodation must already be in place and providing for the animal's biological and conservation needs. These include appropriate enclosure design, interactions with keeper and visitors and daily husbandry routines.

It is important that enrichment is not used to compensate for inadequate housing or husbandry in the long-term, although it may be acceptable as a short-term measure to improve an animal's physiological and psychological functioning until alternative, improved accommodation can be developed.

Impoverished enclosures may be improved by developing an interactive activity programme for the occupants, this would not be enrichment in the true sense of the word but an attempt to improve welfare to a baseline level through promoting natural activity levels. Ultimately, animals in impoverished environments may be relocated to suitable environments. All species may benefit from enrichment.

**The provision of non-enriching items is not enrichment**

**Author and photo**: Heather Bacon (University of Edinburgh)

A barren cement enclosure is inadequate to meet any of the behavioural requirements of the American black bear (climbing, swimming, digging, foraging).

Whilst food, water and shelter are provided, the conservation and biological requirements of the species exceed this basic life support and are not provided for. The provision of logs does not qualify as enrichment for two reasons:

1. Before the animal's life can be enriched, the enclosure design has to provide for the biological requirements of the species.
2. There is no incentive for the bear to do anything with the logs; they do not provide physical enrichment.

### 3.6.1 Enrichment planning:

It is important that enrichment programmes are planned and recorded. Initially this may seem counter-productive as it appears to decrease opportunities for spontaneity by keepers. But a comprehensive enrichment programme requires appropriate stock levels of enrichment items, training of keepers and an avoidance of repetition, and this is almost impossible unless an enrichment plan is developed.

Initially, the plan may begin with the development of a list of safe, species-appropriate enrichment items covering all categories of enrichment. Enrichment items are temporary features, which may be added to an animal's environment. They are not permanent features or furnishings within the enclosure. It is important that enrichment covers all categories as shown in the following chart:

| **Categories of enrichment** | | |
|---|---|---|
| **Photos** by: Heather Bacon (University of Edinburgh) | | |
| **Type of enrichment** | **Description** | **Examples** |
| Physical enrichment | Bedding material, branch work, burrows, nesting boxes, pools, substrate, appropriate vegetation, etc. |  |
| Occupational enrichment | Natural or man-made objects that can be manipulated, e.g. toys, traffic cones. |  |
| Feeding enrichment | Provision of food-related activities, novel food items and devices, scattered food, etc. |  |
| Sensory enrichment | Provision of novel or familiar scents, sounds, visual or tactile stimuli, etc. |  |

| Categories of enrichment | | |
|---|---|---|
| **Photos** by: Heather Bacon (University of Edinburgh) | | |
| **Type of enrichment** | **Description** | **Examples** |
| Cognitive enrichment | This may overlap with other approaches, but it particularly relates to provisions that present mental challenges, which take advantage of many animals' characteristic of wanting to work for a reward (contrafreeload). |  |
| Social enrichment | Provision of intra or interspecies social stimuli; training and animal-human relationships can also be regarded as suitable enrichment techniques for some species, depending on the final objective of such activities (in some cases retaining species natural behaviour requires reducing human-animal contacts to a minimum). |  |

### 3.6.2 Enrichment calendars and frequency charts

A variety of enrichment calendars exist. These range from the relatively simple to the more complex. The more research and planning of an enrichment programme, the more likely it is to be effective for the animals. Below are some examples of bear enrichment calendars:

| Simple bear enrichment calendar | | | |
|---|---|---|---|
| **Natural behaviour** | **Is the behaviour exhibited in the zoo?** | **Enrichment to encourage behaviour** | **Projects to achieve behaviour** |
| Self-maintenance: rubbing and swimming | Yes | Provide rubbing opportunities by attaching brushes to enclosure fixtures<br>Float toys in pool | Fit sprinkler system to pool |
| Sensory: Smell | Yes but only to incidental stimuli | Use a variety of olfactory enrichment | |
| Nesting behaviour | Yes straw in holding area | Provide straw, dry leaves and nesting opportunities in enclosure also for day nests | |

The above calendar has the following limitations:

- Limited use of different enrichment categories
- No specific instructions for giving olfactory enrichment
- No frequency instructions for enrichment
- Could easily become invariable and dull (thus not enriching)

A better example of an enrichment calendar covering more categories of enrichment (as previously described above) would be:

| **Comprehensive bear enrichment calendar** | |
|---|---|
| **Week 1** | |
| Day 1 | Dry leaf pile, carrots, presented as forage, traffic cones, banana palm leaves |
| Day 2 | Mulberry browse, log puzzle feeders, lavender spray, rock piles |
| Day 3 | Yoghurt drizzle, straw, bamboo feeders, tyre |
| Day 4 | Firehose toy, coconuts, fresh bamboo, hessian sacks |
| Day 5 | Kong, perfume spray, catfood smear, mulberry browse |
| Day 6 | Wood shavings, banana palm leaves, peanut butter smear, boomer ball |
| Day 7 | Dry leaf pile, firehose toy, yoghurt drizzle, apples presented as forage |
| **Week 2** | |
| Day 1 | Rock piles, water spray, fresh bamboo, peanut butter smear |
| Day 2 | Bamboo feeder, tomatoes presented as forage, lavender spray |
| Day 3 | Wood shaving, jam smears, yoghurt drizzle, banana palm leaves |
| Day 4 | Dry leaf pile, whole watermelons, mulberry browse |
| Day 5 | Straw, log puzzle feeders, traffic cones |
| Day 6 | Cardboard boxes with food inside, peanut butter smear, apples as forage |
| Day 7 | Coconuts, perfume spray, kongs stuffed with food |

In this more comprehensive calendar:

- the items presented span a range of different enrichment categories;
- the items presented encourage a range of different behaviours (nesting, smelling, foraging, manipulation of objects, cognition);
- the items are given on a regular basis;
- each day offers a different variety of items.

Frequency of delivery of effective enrichment is a crucial component. Delivery of enrichment only sporadically may create over-excitement and competition when enrichment is finally delivered, and frustration in the intervening periods. Too-frequent use of a particular enrichment item may become tedious and therefore not enriching. Thus a balance is important.

Ideally zoos may develop frequency charts as shown below to check their enrichment calendar and amend the calendars if it becomes apparent that there is over reliance on a particular item.

| Example frequency chart for some enrichment items | |
|---|---|
| **Item** | **Frequency (per fortnight)** |
| Dry leaves | III |
| Apples | II |
| Straw | II |
| Traffic cones | II |
| Peanut butter smears | III |
| Hessian sacks | I |
| Tyres | I |
| Bamboo feeders | II |
| Fresh bamboo | II |

The frequency chart shows that a variety of items are presented between one and three times during a fortnightly period. It is common for keepers to over-present items which are easy for them to access or provide and such items may easily become boring for an animal that encounters them frequently. The use of a calendar together with a frequency chart prevents this from happening.

### 3.6.3 Impacts of environmental enrichment

An appropriately planned enrichment programme encourages a diversity of behaviour similar to that typically observed in the same species in the wild. Inappropriate enrichment programmes may result in boredom, or even fear, frustration and distress. For these reasons keepers are advised to always monitor and evaluate the implementation of a new enrichment programme.

It is important to remove items that are unstimulating or items that become potentially hazardous. Plentiful enrichment prevents competition and even aggression in socially housed animals.

Enrichment programmes can be tailored to the needs of the individual and the species. All species across all taxa can benefit from an appropriately considered enrichment programme.

## 3.7 Animal training

Animal training can be a useful component of the 'toolbox' of measures for ensuring that the biological and conservation needs of animals in zoos are met. To be successful, it is important that a training programme is cognitively challenging but achievable for the animal, and that the animal is positively motivated to achieve the training challenges.

Training facilitates good animal husbandry and veterinary procedures. Some zoos use training demonstrations to educate the public about their animal management strategies. Training can also be undertaken in relation to animal performances. In this context, the training of unnatural behaviour is discouraged on the basis of the potential risks for welfare and educational value.

| Examples of educational training displays and performance of unnatural behaviour | |
|---|---|
| **Photos** by: Heather Bacon (University of Edinburgh) | |
| **Educational training displays** | **Performance of unnatural behaviour** |
|  |  |
|  |  |
|  |  |

**Different training methods are available:**

- **Positive reinforcement training** is the preferred and recommended method. It consists of pairing a new animal's response to a given stimulus with a positive reinforcer (e.g. food reward); a secondary reinforcer can also be involved (e.g. whistle).
- **Fear-based or avoidance-based training method**s are not recommended. Negative reinforcement consists of removing a negative stimulus when the desired response is exhibited. Punishment consists of pairing undesired responses with negative events. A good practice does not make use of fear-inducing training tools such as water hoses (for example to shift animals), ancus or bull-hooks, whips or sticks.

Positive reinforcement training may be used as a type of cognitive enrichment if the animal is actively learning and enjoying the experience. Training is not enriching if it is repetitive, cognitively unchallenging or frustrating. Effective training techniques can produce excellent results in animals that are able to respond calmly and cooperatively to a range of husbandry and veterinary procedures.

Poor training techniques can easily generate frustration, which may eventually lead to inappropriate or abnormal behaviour. Training is a skilled, technical endeavour, and all animal trainers must be properly trained themselves in animal behaviour and learning theories. Inconsistent, boring or fear-based animal training leads to behaviour and welfare problems.

There are more subtle forms of learning which may occur during daily routines and produce unexpected behavioural results. If well managed, these forms of learning can be used to promote desirable behaviour towards the environment, other animals and humans. These include:

- **Habituation** - the animal reduces its negative response to a permanent or repetitive stimulus;
- **Classical conditioning** – the animal learns to associate an existing response with a new stimulus;
- **Shaping** – the animal gains growing familiarity with a stimulus through successive and increasing exposure.

## 3.8 How to improve the quality of human-animal interactions

### 3.8.1 How can effectiveness in husbandry be promoted?

Effective husbandry can be promoted through:

- protocols clearly stating the duties expected from employees;
- adoption of existing species-specific husbandry manuals or, if non-existent, production of similar protocols for species in the collection based on the most updated information available;
- control and supervision by more senior professionals of actions undertaken in the day-to-day routines;
- opportunities for informal training in the zoo (e.g. new keepers trained by senior keepers for a given period; provision of relevant and updated reading material; assessment of training content and outcome);
- periodic internal discussion meetings to review procedures;
- periodic control of quality on the implementation of procedures;
- opportunities for formal training in the zoo or elsewhere (e.g. training courses for keepers are offered in some EU countries by zoo associations, universities or private companies;
- attendance at conferences and similar forums where knowledge can be updated and experience exchanged;
- enrolment in academic courses on related subject areas (longer term and somewhat more indirect measure).

### 3.8.2 How can quality of public-animal interactions be promoted?

Visitors are an integral part of the zoo environment and inherently, of the zoo animal's life. The effect of visitors on animals has been studied for many years.

Visitor proximity tends to change the behaviour of animals in different ways. For example, many species of primates seem to be adversely affected, as can be seen from physiological measurements. Other species, such as some species of felids, do not seem to show disturbance behaviour in the presence of visitors. Impacts on the animals depend significantly on enclosure design, and the location and behaviour of zoo visitors.

**Example - Where should visitor viewing areas be located?**

Jaguars show high salivary cortisol levels if visitors view the cats from above. By locating the visitor viewing area at the same level or slightly below the enclosure, cortisol levels do not become elevated.

As more is known about the effect of visitors on particular species, more solutions are devised to reduce their potential adverse influence on the exhibits. Some examples of these include:

- visitor viewing areas positioned in such a way that avoids visitors staring down onto animals, e.g. by lowering public walkways;

- visitor viewing spots are designed to avoid animals seeing the visitors, e.g. by creating specific corners, holes in opaque partitions, specific areas with one-way mirrors;
- visitor viewing spots are camouflaged in order to reduce impact for the animals, e.g. by placing plants in front of the exhibit;
- animals are given enough refuges in the enclosure to allow them to visually avoid visitors, e.g. plants, rocks, trunks, shelters;
- floors are designed to reduce noise created by visitors;
- signs are placed around the exhibit to request appropriate behaviour from visitors (e.g. not knocking on glass in aquaria; not making noises; not throwing objects or food into the enclosures);
- animals are trained to tolerate people.

**Example - How can negative visitor impacts be avoided?**

In a zoo holding a group of gorillas (*Gorilla gorilla*), it was noted that the viewing public and the noise level from the public area caused considerable distraction within the group and increased aggressive behaviour. For a relatively limited financial cost and without physical disturbance to the internal enclosure, improvements of the public area were made by:

- construction of a timber frame set back from the large viewing windows;
- covering the frame with insulating material and a bamboo matting;
- the provision of small viewing windows at differing heights and intervals set in the bamboo mesh, which did not allow public interference with the animals' privacy.

Within a matter of a few days of completion of the project the keepers reported significant changes in the social behaviour of the group: much more interaction between females, reduced male aggression and adoption of normal dominance structure.

**Author and photo**: Michael Fielding (Veterinary consultant)

When physical interactions between visitors and animals are promoted in zoos during presentations or specific interaction programmes, it is important that these are undertaken under staff supervision and within a planned approach to reduce risks both for humans and animals.

**What aspects could be taken into account during public-animal interactions?**

- No interaction should threaten animals' physical or psychological integrity;
- Selection of species and specimens to be used in interactions by an experienced trainer or other appropriate member of the staff;
- Animals with docile temperaments, suitable to be trained, and with no history of attacks against humans, are better suited to be involved in interactions;
- Use of a predictable environment familiar to the animals involved;
- As far as possible the animals have the choice to retreat from human contact; a scheme of animal rotation, with appropriate resting periods, may be planned;
- Interactions only allowed under supervision and control of a responsible person and according to the specific rules, including allowed contact duration;
- Facilities to allow all necessary hygiene procedures for safe interactions (e.g. hand-washing points; food-bath; baths if immersion in aquatic environments will occur);
- Monitoring and records of behaviour and health of animals involved in interactions kept and regularly evaluated;
- Food items used during interactions planned within the daily allowance for each specimen;

- Physical contact as much as possible limited and considering biosecurity and hygiene measures (see available public health guidelines on zoonoses);
- Interactions with visitors not forming a significant part of an animal's daily behavioural routine.
- Social or juvenile animals not used for interactions if the interaction requires disruption of the social grouping.

## 3.9 Collection planning and management

Veterinary input is very valuable in some specific aspects of zoo collection management. The zoo collection management may require difficult and sometimes controversial decision-making covering issues including reproductive management, collection planning, hand-rearing and euthanasia.

### 3.9.1 Reproductive management

Differences exist between zoos in Europe and North America regarding the ethical stance of culling and contraception in over-represented populations.

In North America, contraception to control populations is widespread. Conversely in many European countries, reproductive activity is encouraged and when over-represented individuals or species breed, their offspring are maintained until an age of natural dispersal at which point they are humanely culled.

Both approaches generate benefits and drawbacks. The North American approach inhibits natural breeding behaviours, which are part of the animal's natural repertoire and which may also form part of the biological and conservation needs of the species. The European approach allows the development and practise of natural reproductive behaviours but results in the euthanasia of young, healthy individuals, which can be difficult to rationalise to zoo visitors and the media.

A third approach to population control is to house single sex groups, which also brings management problems related to social behaviour, increased aggression and prevention of natural reproductive behaviour.

### 3.9.2 Collection planning

It is important that a zoo has the appropriate resources and expertise to provide the required conservation measures for the species in its collection.

Zoos need to consider the facilities required for the animals throughout the year including consideration for seasonality, breeding and geriatric management as part of the species' conservation and biological requirements. For species managed through the European Studbook programme, permission should be sought from the studbook keeper before animals are transferred or bred. It is also important that transfers of animals between collections conform to the requirements outlined in Council Directive 92/65/EEC.

**Example**

Lemurs are a popular exhibit in zoos around the world. However despite being a species that is relatively easy to manage, their unique biological and conservation needs cannot be forgotten. In zoos based in cold climates to which lemurs are not accustomed, additional resources must be provided to accommodate the biological and conservation requirements of lemurs.

Locking animals inside the indoor holding area through cold periods may limit the ability of the lemurs to exercise, climb, and access ultraviolet radiation unless the indoor enclosure is designed with these provisions in mind. Provision of a thermal gradient incorporating the entire enclosure, offering the opportunity to select the preferred habitat is a very good practice.

It is very relevant that zoos in cold climates ensure that they have adequate resources to adequately provide for the biological and conservation requirements of tropical species, and that zoos in Mediterranean climates can adequately provide for the biological and conservation requirements of cold-climate species.

**Author**: Heather Bacon (University of Edinburgh)

Additionally zoos have an ethical responsibility to ensure that species which are transferred are moved to institutions which are able to provide similar or improved facilities to meet the conservation and biological needs of the species. It is not recommended that species are transferred to collections where standards of animal housing or husbandry are lower than the collection currently holding the species.

### 3.9.3 Hand-rearing

Current scientific research on livestock and primate species is clear that stress in the pre-, peri-, and neo-natal periods can be a significant risk factor in abnormal brain development and later psychological disorders.

Types of stress may include handling/restraint of pregnant females, lack of maternal social contact and sub-optimal environments. These effects have been demonstrated in a wide range of taxa including rodents, livestock and primates, and there is no evidence that any zoo species would be exempt from these effects.

Based on this knowledge, the separation of young animals from their mothers for hand-raising by humans is strongly discouraged unless the species is of significant conservation value or unless well-documented hand-rearing programmes resulting in normal development are established. Lack of breeding and rearing success has been associated with sub-optimal environments and husbandry routines. Such sub-optimal environments are counter-productive to the conservation work of zoos. Zoos will benefit by focusing efforts on providing an optimal environment to encourage successful breeding and mother-rearing.

### 3.9.4 Euthanasia

If a zoo is no longer able to meet the biological and conservation needs of the species through a programme of proactive veterinary care that allows both physical comfort and behavioural diversity, then euthanasia may be considered as an alternative to chronic behavioural frustration or physical pain. It is recommended that zoos develop advisory bodies, including external scientists, to ensure a balanced approach to making these difficult decisions.

# 4 Article 3 - fourth indent - Preventing escape and the intrusion of pests and vermin

## 4.1 Websites

DAISIE: Delivering Alien Invasive Species Inventories for Europe.

CIESM's (the Mediterranean marine science research network) guides and research announcements: Guide of Mediterranean marine research institutes; Atlas of exotic species in the Mediterranean.

Gupta B. 2008. Barrier designs for zoos. Central Zoo Authority Ministry of Environment & Forests. India.

GISP (Global Invasive Species Database)

MIT Sea Grant Coastal Resources: Information on marine bioinvasions, including pathways, prevention, and control.

Centre d'Océonologie de Marseille: Information on the seaweed *Caulerpa taxifolia*. In French.

## 4.2 European Pest Management Service Standards

The European Committee for Standardization (CEN) has undertaken a project to establish European Pest Management Service Standards. National standards covering pest management services already exist in Malta, Spain, Germany and France. A European Standard would specify the requirements and competences to be met by professional providers of pest management services in order to protect public health, assets and the environment. The standard will apply to those who have the responsibility for delivering pest management services including the assessment, recommendation and subsequent execution of the defined control procedures. A technical committee of member delegations and observers has developed a draft standard that was circulated to national mirror groups for comments in autumn 2013. In 2014, the comments will be considered and a final European Pest Management Service Standard published for use by the industry.

Chapter

5

# 5 Article 3 - fifth indent - Record keeping

## 5.1 Websites

BIAZA Recommended Code of Practice for Microchipping Zoo Animals.

Animal Records Task Force, AZA: Guidelines for Creating and Sharing Animal Records

Miller, J .& J. Block, 2004. Animal records-keeping Buffalo Zoo.

Standardization of Records Keeping In Indian Zoos And Marking Animals For Identification. Padmaja Naidu Himalayan Zoological Park (India).

Standards for Data Entry and Maintenance of North American Zoo and Aquarium Animal Records Databases.

Wildlife information network. Mammal identification (Bourne, D. 2012).

CITES marking regulations.

European Union Wildlife Trade Regulations Reference Guide (February 2013)

## 5.2 Routine observations of animals and record keeping

A good animal monitoring programme involves, at least, a daily routine of observing behaviour, health signs, and environmental context, followed by an appropriate record.

After observing animals, it is a good practice that keepers produce a brief daily written record for each animal or group of animals including health status, activity, nutritional programme and food consumption, test results, treatments given and key environmental factors e.g. temperature and humidity for lower vertebrates, water monitoring parameters for aquatic animals. It is good practice that senior staff and veterinarians review this record. Veterinarians will have overall responsibility for medical reports for animals in quarantine or hospital, or undergoing treatment whilst in their enclosures.

Weekly reports may highlight any problems, interventions or treatments delivered, animal movements or changes to the animal housing or husbandry, and be reviewed by senior staff and veterinarians.

Monthly meetings of senior staff may review the current collection plan, strategy, and progress, discuss enclosure use, animal transfers, quarantine, and discuss staff training and development. Meeting records are important for future reference.

Every three to six months senior veterinary and curatorial staff may find it beneficial to generate morbidity, mortality and behaviour problem reports. It may be necessary to meet with an external expert panel to review strategies for addressing these problems, discuss treatments and how to resolve the underlying issues contributing to such problems. Recommendations for future therapies, husbandry or housing modifications can be fed back into the collection-planning strategy.

Annually it would be appropriate to undertake a records' audit to ensure that recording processes are transparent and useful. Records provide evidence for the annual zoo licensing inspection.

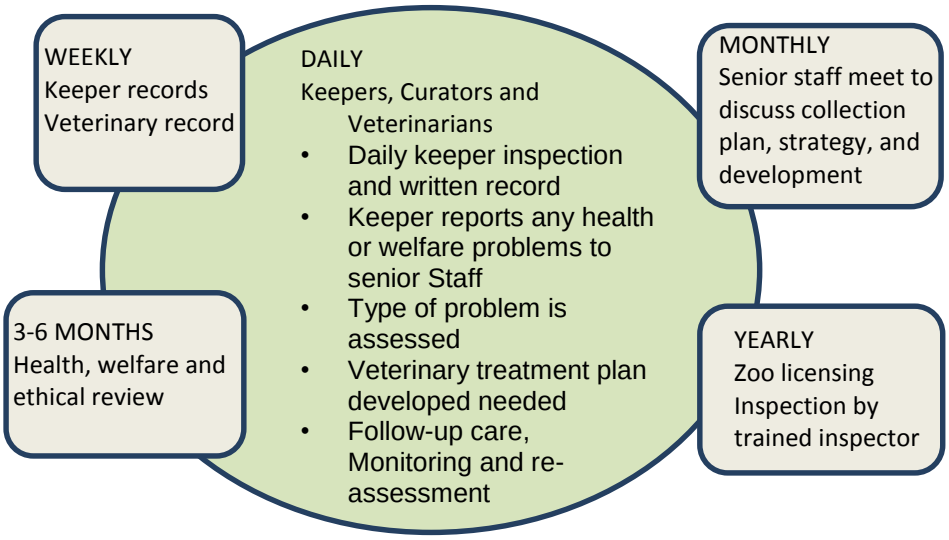



**Figure 5:** Summary of different kinds of record keeping for a thorough monitoring programme, made by María Fàbregas Hernández

## 5.3 How to create accession numbers

***Example 1***: First two digits are year of accession; last four are sequential:

#920006 = sixth specimen accessioned in 1992

***Example 2***: Strictly sequential:

First animal = 000001, second = 000002, etc.

***Example 3***: Systems in which each series of numbers designates a different class:

100000 - 199999 = mammals

200000 - 299999 = birds

300000 - 399999 = reptiles

400000 - 499999 = amphibians

500000 - 599999 = fish

600000 - 699999 = invertebrates

Therefore, in this system, #101234 = a mammal

***Example 4***: First two characters of number = last two digits of the year in which accessioned; third character = M, B, R, A (for Mammal, Bird, Reptile, Amphibian); last three characters = consecutive order of arrival:

#92M6 = sixth mammal accessioned in 1992

## 5.4 Marking and identification methods

Identification of individuals or groups of animals in the zoo collection is necessary for accurate record keeping. The identification systems employed should be appropriate for the species identified and to any relevant legislation.

No single method of identification is suitable for all species and individuals and for all circumstances. Sometimes a combination of two or more identification methods is useful for practical reasons, for example coloured ear tags (easily visible) in combination with implanted transponders (unique).

Whatever the particular method used, the following characteristics are relevant:

- safe for the animal, not affecting its behaviour, health or survival;
- stress and pain-free during and following application (as much as possible);
- secure and tamper-proof;
- persist for the appropriate length of time (in a zoological collection this means for the life of the animal);
- positively and uniquely identify the marked individual or group;
- easily read/observed at a distance;
- provide sufficient information for appropriate record-keeping;
- easy to use and quick to apply, to minimize stress on the animal during application;
- readily available at a reasonable price;
- inconspicuous to the public, not detracting from the animal's appearance.

**Methods for individual animal identification (from Hosey et al, 2009)**

| Method | Description/ location | Duration | Comments | Examples |
|---|---|---|---|---|
| Natural markings | Coat colour or pattern, physical deformity, size. | Permanent | Cheap and easy. Requires skilled staff and obvious differences between animals | Okapi: stripes.<br>Tiger: facial markings |
| Branding | Flanks, horns | Permanent | Painful | Snakes: freeze branded |
| Tattoo | Skin around eyes, rump, fingers | Permanent | Painful | Macaques: ischial callosities |
| ID cuts | Ears, horns, digits | Permanent | Potentially painful | Wildebeast: horn notches<br>Rhino: ear holes<br>Lizard: digit removal |
| Microchips, transponders | Injected under the skin | Temporary | Potentially painful and may require sedation. Potential migration under skin | Everything, from dormice to elephants |
| Adornments | Tags, beads threaded through skin, rings, collars | Temporary | Potentially painful Usually attached to young animals. Potential risk of entanglement | Blue iguana: beads Mara: ear tags<br>Ring-tailed lemur: necklaces<br>Bird: leg rings<br>Penguin: flipper rings |
| Clipping | Hair, feathers | Temporary | May be difficult to see from a distance | Rarely used in zoos |
| Dye/markers | Ram pads, spray, paint, stick-on markers | Temporary | May transfer into other animals.<br>Need to ensure non-toxic material used | Beetles: paper numbers Tortoises: painted dots |

For a comprehensive list of marking and identification methods for different taxa click here

# Annexes to Chapter 3 – Implementation and Enforcement

Chapter

6

# 6 Licensing and Inspection

## 6.1 Websites

Secretary of State's standards of modern zoo practice (DEFRA, UK)

Zoos expert committee handbook (DEFRA, UK)

The zoological park, a new ally for biodiversity (MAGRAMA, Spain) (Read online)

Accreditation Inspector's Handbook (Association of Zoos and Aquariums, AZA, US)

Accreditation Standards and Related Policies (Association of Zoos and Aquariums, AZA, US)

EU Reference Guide Wildlife Trade Regulations (2013)

DEFRA's Guide to the Zoo Licensing Act (1981): closing zoos, DEFRA, UK

Guidelines for the Placement of Confiscated Animals (2000), IUCN

Strategy for Confiscated Animals (2007), Eurogroup for Animals

Building Sustainable Sanctuaries (2012), Arcus Foundation

Standards for rescue centres, Global Federation of Animal Sanctuaries

## 6.2 Case studies

### 6.2.1 Case study 16 – Zoo inspector training courses in Spain

**Case study 16. Zoo inspector training courses in Spain**

**Source**: Active Life Company, S.L

The EU Zoos Directive 1999/22/EC was transposed into Spanish legislation as Law 31/2003 on the conservation of wild fauna in zoological parks. Previously, zoos only had to comply with health and safety regulations. The new requirements, which aim for all zoos to be welfare conscious centres for the conservation of biodiversity, were complex to implement for both the zoo sector and the authorities charged with enforcement. Also, responsibility for enforcement fell to the 17 Autonomous Communities and often three departments were involved in the authorization process: environment, animal health and public safety.

After the transposition of the Directive an in-depth study to assess the situation of zoos in Spain was undertaken. The study showed the need for further guidance to implement the requirements and assess compliance with Law 31/200. In order to address this need "*The zoological park, a new ally for biodiversity. Guide for the application of law 31/2003 on the conservation of wild fauna in zoological parks*" (2006) was published by the Ministry of Environment and the Biodiversity Foundation. A second updated edition was published in 2009 and a version in English in 2012.

To provide specialized training for zoo inspectors and other enforcement authorities, seven courses for public officials with progressively advancing contents (see Figure 1) were organised with the support of the Spanish Ministry of Environment (now Ministry of Agriculture, Food and Environment) and its Biodiversity Foundation. Throughout the training courses, multidisciplinary expertise was gathered from academics, zoo professionals (through collaboration with the Iberian Associations of Zoos and Aquaria [AIZA]), environmental law experts including CITES officials, experienced UK zoo inspectors and NGO wildlife rescue specialists. Course structure went from theory-based talks to debates and round table discussions, hypothetical case analysis and real-life case studies. Simulated inspection visits to zoos were undertaken as practical exercises, which benefited highly from the access and staff cooperation provided by the collaborating zoos.

Feedback from the participants revealed that the training was highly valued; the majority had a very different background and the multidisciplinary approach needed for zoo inspection was considerably new to them. The practical sessions, mock-up inspections and following debates were specially appreciated since they allowed putting theory into context and comparing their approaches, which they felt needed to become as standardised as possible. Periodic follow-up training was also requested.

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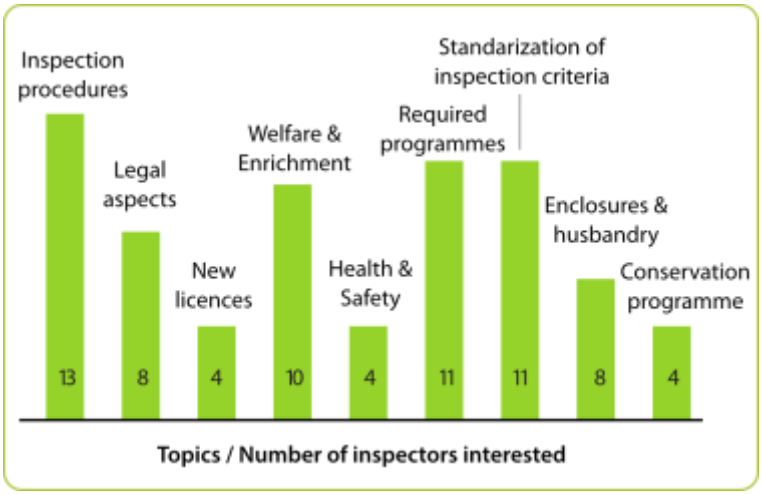


**Figure 1:** Main topics of interest of zoo inspectors surveyed prior to the advanced training course (2011) in order to adapt course contents in the most suitable way.

The practical sessions, mock-up inspections and following debates were specially appreciated since they allowed putting theory into context and comparing their approaches, which they felt needed to become as standardised as possible. Periodic follow-up training was also requested.

Participating inspectors also highlighted the positive impact of learning to organise and plan their approach to each inspection depending on the zoo's characteristics. Training also fostered cooperation and communication between all the departments involved on one hand, and the inspected zoos on the other.

Another initiative developed with the courses was an online learning and communication platform for zoo inspectors (zoo inspectors' group, forum and library at the Interactive platform of the Spanish Inventory of Natural Heritage and Biodiversity -biodiversia.es-).

The main lessons obtained from this experience pointed to the importance of (amongst other issues):

- Receiving multidisciplinary training for a comprehensive view of the full extent of the implementation and assessment of the EU Zoos Directive
- Zoo inspectorates to be clearly organised, communicate well internally and count on protocols, guidance and support adapted to national (and in this case also regional government) needs
- Training to be as continuous and extensive as possible
- Close collaboration with the zoo sector to take advantage of their experience and to allow training to be as practical as possible
- The increased use of IT in order to centralise resources, communication and animal data handling

**Acknowledgements**: The zoo inspector training courses benefited greatly from zoo and zoo staff collaboration at Zoo Aquarium Madrid, Faunia (Madrid), CosmoCaixa (Alcobendas), Safari Madrid and Cañada Real Nature Centre (El Escorial).

### 6.2.2 Case study 17: Closure of a zoo and relocation of animals (I)

**Case Study 17: Closure of a Zoo and relocation of animals I**

**Source**: Technical team of the Costa Blanca Safari Park (Spain)

In 2010, the cooperative management of the Costa Blanca Safari Park (Spain) decided to close the Park. Following this decision, the technical staff of the park designed a strategy to relocate all animals in the best possible conditions. In order to define the destination of these animals, three tasks were planned and executed, taking into consideration conservation status, breeding programs and all related administrative and legal requirements:

1. Identification of loans and grants of animals.
2. Identification of special situations, EEPs and ESBs programs and other institutional obligations.
3. Produce a collection of addresses of institutions, parks and intermediaries that could be involved in the relocation of animals.

A priority list of specimens for relocation was prepared based on:

- Urgent relocation of animals not owned by the safari park;
- Regularization of animals "lent out" by the safari park's transfers or loans;
- Relocation of other animals, safeguarding their welfare and ensuring the integrity of the recipient institutions.

The number of animals to be relocated was in 571 in total (411 mammals of 46 species, 148 birds of 17 species, 12 reptiles of 2 species).

A small team of keepers secured the care, training and transport of animals. In some cases external support

was also required. The technical team of the park was in charge of identifying and dealing with the formal arrangements with the institution receiving the animals, with the regional veterinary services and with all other necessary entities and authorities. The general relocation procedure involved a network of high-level communication in order to ensure all aspects related to:

1. Approval of final destination (by EEPs/ESBs, SAFARI's direction, veterinary services)
2. Sanitary requirements (sampling veterinary analysis, passports, transport, quarantines, etc.)
3. CITES requirements (for CITES listed species only)
4. Requirements under specific conservation-related regulations
5. Organisation of transport according to international regulations
6. Availability of all required equipment for loading and transport
7. Guarded transport, including transfer of all relevant documentation
8. Closing of records, compilation of information and storage of files

**Timeline and number of involved institutions:**

| | | |
|---|---|---|
| Closing date | 7 September 2010 | Contacts made for animals' relocation: |
| First contacts | 17 September 2010 | 31 zoological institutions participated (Of which 14 AIZA; 7 EAZA) |
| First relocation | 4 October 2010 | |
| Last relocation | October 2011 | 26 unsuccessful contacts |

## 6.2.3 Case study 18: Closure of a zoo and relocation of animals (II)

**Case study 18. Closure of a zoo and relocation of animals**

**Author**: Geert Jonkers (Outplacement coordinator, Stichting AAP)

In 2006, in France, a small zoo which was also a combination of an amusement park, went bankrupt and closed down. This zoo was privately held and the owner fled from the zoo, leaving all animals without any care.

The regional veterinary authorities intervened and secured at least the minimal daily feeding and watering of the animals. In the meantime, they urgently looked for possibilities to evacuate the place. A French animal protection organization indicated Stichting AAP, a rescue center for exotic animals in The Netherlands for, at least, the existing primate stock.

The high number of animals in need of being rescued and the different specificities required to keep them determined that three different entities became involved in the process. The French veterinary authority, together with the French animal protection organization, did all the coordination work. It was decided that animals were

going to be transferred to:

- Stichting AAP which took 23 red ruffed lemurs, 11 black and white ruffed lemur, 1 brown lemur, 22 ring-tailed lemur, 1 porcupine and 20 degus.
- A French sanctuary which took all hoof stock (e.g. ankole cattle, guanaco, lechwe, zebra).
- A French zoo which took all birds (e.g. parrots, etc.).

For the species that remained in France, no special arrangements were required in terms of documentation. But for the species transferred to the Netherlands (lemurs), which are listed CITES I, the respective certificates were needed and arranged without problems.

Special medical arrangements were not required. Crates and terrestrial transport was assured by the rescue centre. Quarantine measures upon arrival were also part of the routine procedures of the rescue centre. Due to the highly impaired welfare conditions, the process was carried out with maximum urgency and efficacy, with the final result of less than two weeks to have all formalities and practical details in place for relocation.

## 6.3 Two examples of zoo inspection systems: UK and Spain

| | UK (DEFRA) | SPAIN |
|---|---|---|
| Legislation | Zoo Licensing Act 1981 | Law 31/2003 of the conservation of wild fauna in zoological parks.<br>Regional governments (responsible for implementation) incorporated Law 31/2003 to their legislations with discretion to increase requirements. |
| The zoo inspectors | Government appointed zoo professionals and Local Authority representatives. | Regional government officials attached to the departments of:<br>- biodiversity / environment<br>- veterinary health<br>- public safety<br>(all three are involved) |
| Before the inspection | A Pre-inspection Audit Form is filled by the zoo operator including relevant documentation. | Each regional government has its own legislation and protocols adapted from a study on the sector. Some of them use pre-inspection questionnaires.<br>Relevant documentation is requested in advance. |
| New and substantial change licenses | Documentation on how the applicant is planning to meet the legal requirements is asked in advance. An inspection is carried out and a Zoo License Inspection Report is used to assess broad compliance and whether requirements are likely to be met. Licenses might be granted upon meeting the conditions specified. | Documentation on how the applicant is planning to meet the legal requirements is requested in application or in advance, including plans to comply with Law 31/2003 (Conservation, Education and Advanced Veterinary care plans) and any further Local Authority legislation requirements. |

| | | |
|---|---|---|
| The inspection | A Zoo Inspection Report is used to assess compliance with the measures of Article 3 and UK Zoo Licensing Act 1981 by means of Yes / No / not applicable questions and clarification/comments.<br><br>In case of deficits, licensing conditions or recommendations are included. | Questionnaires are also used to assess compliance with Art. 3, Law 31/2003 and regional legislation requirements.<br><br>In case of deficits, licensing conditions or recommendations are included. |
| Information and guidance | Secretary of State's standards of modern zoo practice. Specifies minimum Standards that zoos in England are expected to meet.<br><br>Zoos expert committee handbook. Provides further guidance. | The zoological park, a new ally for biodiversity[1]<br><br>Guide for the application of law 31/2003*on the conservation of wild fauna in zoological parks.<br><br>[1]Read online |
| Further information for inspectors | Zoos expert committee<br><br>Zoos expert committee internal communications (e.g. guidelines to improve consistency of inspections) | Online communication group for zoo inspectors (including forum, library and agenda) on a national platform dedicated to biodiversity (Biodiversia.es) |
| Inspector training | Biennial training seminars. | Ministry of Environment multidisciplinary zoo inspection courses. See Annex 6.2.1 |

## 6.4 Member States zoo legislation: examples of good practices

**Source**: Compiled by the author with the collaboration of Born Free Foundation (Nov, 2013)

| Member State | Relevant legislation |
|---|---|
| ***Article 2: Definition*** | The following good practices examples indicate how some Member States have differentiated zoos based on the species kept and specified different criteria that uphold the requirements of the Directive 1999/22/EC. |
| **Austria**<br><br>Federal Animal Protection Act 2004/2007 and Zoo-Regulation BGBL II No.30 (2006) | Zoos are separated into three categories dependent upon the species kept:<br><br>**Category A:** permitted to keep all taxa of an unlimited number; required to have a zoo manager with significant, relevant knowledge and experience; a sufficient number of trained animal carers; and required to undertake ALL the species conservation actions as specified in Art 2(1)5 (thus exceeding the requirements of Art 3(1) of the Directive).<br><br>**Category B:** permitted to keep up to 20 species of wild animal, in addition to those listed under Category C, however, the 'hazardous' / 'conservation dependent' wild species listed under Art 6(1) and 6(2), R491/2004, cannot be kept; management and carers to have sufficient knowledge and numbers compatible with numbers of animals kept; and required to undertake at least one of the species conservation actions specified in Art 2(1)5.<br><br>**Category C:** permitted to keep specified species of wild animals as listed under R491/2004 (these include small mammals, birds and fish that do not apparently require specialised care and are not thought to be hazardous in nature); there should be at least one animal carer on site at all times; these zoos are required to undertake at least one of the actions in Art 2(1)5. |
| **Slovenia**<br><br>Nature Conservation Act (Ur. I. RS, No56/1999) (last amended 22/04/2004), and the Decree on zoos and similar facilities (Ur. I. RS, No.37/2003) | Separated into two categories dependent upon the species, and numbers, kept:<br><br>**'*zoos*':** facilities with higher numbers of species, and individual wild animals, as specified below. Required to undertake one or more of the species conservation actions specified in Art 4(1)1, D37/2003 (this, and the other requirements are consistent with the Directive).<br><br>**'facilities similar to a zoo':** facilities with no more than 'six species of large mammals or 20 other mammal species; six species of owls or birds of prey or 20 other bird species; 10 species of amphibians or reptiles; 20 species of fish, cephalopods or higher crustaceans; 100 species of butterfly or 100 species of other invertebrates'. These facilities are exempt from partaking in the conservation requirements of Art 2(1) 5, R491/2004, but they are required to deliver an environmental education programme and comply with the requirements 'on living conditions and care of wild animal species in captivity', Order 11/2001. (Consistent with Art 3 of the Directive).<br><br>**Exemptions**: where animals are used *'during public gatherings; for in situ breeding; as room décor, including decorative aquariums and terrariums; or in pet shops'.* (Article 1(2), D37/2003)<br><br>The use of cetacean species for 'commercial purposes', such as in a dolphinarium, or their use for therapeutic activities, is not permitted. (Ur. I. RS, No.39/2008) |
| **Belgium** | The proposal includes a definition of zoo with specific parameters for |

| | |
|---|---|
| The Zoo Commission for Belgium has recently approved the amendments to include in their next zoo legislation update | exemptions (see below) and lists of "domestic species" and "commonly held species".<br>- **Definition of zoo**: Zoological Park: all establishments open to the public for seven days or more per year, including animal parks, safari parks, dolphinariums, aquariums and specialized collections which are kept for the exhibition of live animals of non-domestic species.<br>**Excluded** from this definition are:<br>- Circuses and traveling exhibitions;<br>- Commercial establishments for animals;<br>- Establishments that hold only cattle, sheep, goats, swine, cervides or ratites for production purposes and are approved by the competent health authority;<br>- Establishments that do not hold more than five species commonly held as fixed on the list in Annex B and which do not hold any other non-domestic animal than those included on this list;<br>- Establishments that do not expose more than 5 aquarium tanks with a total volume of less than 5000 l water.<br>Zoo legislation in Belgium also includes National Standards for different taxa (e.g. reptiles, birds, *T. truncatus*). |
| ***Article 3: Requirements applicable to zoos*** | |
| ***Article 3 (1st indent): Conservation, research and training*** | The following good practices examples indicate how some Member State legislation transposed the requirements of Article 3 (1st indent) of the Directive 1999/22/EC. |
| **Bulgaria**<br>Art. 60.2 Biological Diversity Act and Ordinance No.1 of 09/05/2006 on procedures for licensing of zoos. | Zoos are required to undertake ALL of the following requirements:<br>'*participate in specific research and conservation (…) including those related to the introduction of wild species into the wild,*<br>*participate in ex situ conservation programmes for threatened species to retain genetic diversity and probability for reintroduction into the wild and*<br>*exchange information with likeminded institutions.'* |
| **France**<br>Arrêté du 25 mars 2004 | Zoos that keep 'conservation-sensitive' species (as specified by Le Code de l'environnement & EC Reg 338/97) must deliver greater conservation measures:<br>'*participate in the exchange of animals that promote the conservation and management of captive animal populations. Contribute to national and international breeding programmes and to keep animals of species involved in these programmes.'*<br>*Contribute to the breeding of non-domestic species, or organisations involved in the conservation of biodiversity, the sharing of information concerning the breeding techniques of wild animals in captivity, knowledge of their biology or knowledge relevant to the conservation of biological diversity.'*<br>(Articles 54 & 55, A25/03/2005) |
| **Hungary**<br>Animal Protection Act (1998) and Joint Decree No.13/2003 (IX.9) | Zoos *'must participate in scientific research and species conservation, specifically by participating in the protection of nationally or internationally-recognised protected species, as well as to perform the function of a rescue centre for native species. Zoos may not engage in commercial activities*';<br>(Article 1(2), JD13/2003) |

| | |
|---|---|
| | On application for an operating licence, zoos are required to establish a '*Breeding Plan*', which should include details of the species involved, the treatment of offspring and their intended location. Appendices to the Decree list nationally and internationally protected species that should be involved in the programmes. |
| **Latvia**<br><br>Animal Protection Law, Chapter VI (12/09/1999) and Cabinet of Ministers' Order No.1033 (2010) | Zoos should<br><br>- '*provide research on the species conservation and exchange relevant information*; and<br><br>- *participate in wildlife conservation, especially endangered species, captive breeding and species re-introduction programmes.'*<br><br>(Articles 4.3.1 & 4.3.3 of O1033/2010) |
| **Portugal**<br>Decree-Law DL104/2012 | Zoos are required to undertake ALL the following requirements:<br><br>- 'participate in research that benefit the conservation of the species, without prejudice to the welfare of the animals involved'<br>Chapter II, Articles 4(3) and Chapter IV, Article 23(1), of the Annex to DL104/2012)<br>- 'captive breeding of species listed by IUCN as extinct or endangered in the wild should be, whenever possible, included within international, national or regional cooperative breeding programmes'<br>(Chapter III, Article 19(2), of the Annex to DL104/2012)<br>- 'zoos should also, where this is deemed appropriate, provide training in conservation techniques, exchange information related to the preservation of species, captive breeding, repopulation or reintroduction of species into the wild'<br>(Chapter IV, Article 23(2), of the Annex to DL104/2012) |
| **Poland**<br><br>Nature Protection Act 16/04/2004 | The '*species threatened with extinction in the natural environment should be subject to ex situ conservation in zoos'*, with the objective *'to restore individuals of species to their natural habitat'* (Article 47, NPA). The Minister of Environment also has the power to establish a list of species demanding additional protection in Poland (Article 49, NPA), as well as establish *ex situ* programmes for endangered species (Article 57, NPA). Further, zoos must:<br><br>*'Participate in scientific research, which benefits the species conservation.'*<br><br>(Chapter 3, Article 69(1), NPA)<br><br>*'Keep and breed endangered species for their ex situ conservation and their introduction to the natural environment.'*<br><br>(Chapter 3, Article 69(3), NPA) |
| **Romania**<br><br>Act No.191 (2002) and Ministerial Order No.1798 (2007) | *'Any activity that takes place must ensure a sustainable use of natural resources and the conservation of biodiversity.*<br><br>*A zoo that contains endangered species must actively participate in research programmes that contribute to species conservation in the wild.*<br><br>*A zoo must demonstrate measureable performance in respect to conservation, education and research.*<br><br>*Research activities must be compatible and in conjunction with national or international research programmes.'*<br><br>(Schedule 5, Chapter 2, Section 1(V), Articles 119, 121, 122 & 128, MO1798/2007) |

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| ***Article 3 (2nd indent): Public education and awareness*** | The following good practices examples indicate how some Member State legislation transposed the requirements of Article 3(2) of the Directive 1999/22/EC. |
| **Italy**<br><br>Legislative Decree 21 March 2005 n. 73 and Ministerial Decree n.469 (2001), specifically for the keeping the dolphin species *Tursiops truncatus* in captivity. | Zoos that keep *Tursiops truncatus* are required to provide information about the biology, eco-ethology and conservation of cetaceans, through tailor-made educational programmes for both the public and school groups, which are delivered by knowledgeable and experienced staff. This should include a variety of activities such as interactive audio/video exhibitions, pictorial exhibitions, educational material,; and guided tours. All dolphin demonstrations are required to '*mainly focus on the natural behaviour of the animals*' and include commentary referring to the biology of the species (Annex to MD469/2001). |
| **Romania**<br><br>Act No.191 (2002) and Ministerial Order No.1798 (2007) | *'Zoos must establish a public education strategy and action plan.*<br><br>*Zoos must allocate facilities for educational purposes.*<br><br>*Species information signage must include the conservation status.'*<br><br>(Schedule 5, Chapter 2, Section 1(V), Articles 125, 126 & 127, MO1798/2007) |
| ***Article 3 (3rd indent): Accommodation of Animals*** | The following good practices examples indicate how some Member State legislation transposed the requirements of Article 3(3) of the Directive 1999/22/EC. |
| **France**<br><br>Arrêté du 25 mars 2004 | Zoos must also ensure:<br><br>- 'The *composition of groups of animals is determined by the space available, and the behaviour and physiology of the animals.*<br>- *The welfare of animals and prevention of behavioural abnormalities are mainly addressed by relevant improvements to breeding conditions appropriate to the biological needs of each species.*<br>- *Animals should be protected from predators from outside the establishment.*<br>- *Caring for animals includes reducing sources of stress, discomfort and the risk of injury. Any interference or disruption needs to be banned. It is forbidden to provoke/*agitate the animals, in presence or absence of the public.'<br>(Chapter 3, Articles 11, 12, 13 & 15, Arrêté du 25 mars 2004)<br><br>- '*Enclosures and their enrichment should be adapted to the habits of each species, ensuring that the animals are safe and can express their natural behaviour.*<br>- *The facilities must allow them to escape the hostile or aggressive behaviour of cage companions, allowing them to express normal behaviour relating to defence or escape.*<br>- *Animals kept in outdoor enclosures should have access to shelters or other premises to allow them to avoid the negative effects of climate.'*<br>(Chapter 4, Articles 27 & 29, Arrêté du 25 mars 2004) |
| **Hungary**<br><br>Animal Protection Act (1998) and Joint Decree No.13/2003 (IX.9) | Persons responsible for the animal's care are obligated to ensure '*the living conditions for the animal are according to its species, gender and age, its biological, reproductive, ethological and health requirements, and including appropriate housing, nutrition, space, veterinary care, hygiene, rest, care, training, education and security*'.<br>(Article 4, Animal Protection Act)<br>Article 5 stipulates species-specific minimum requirements that are reportedly based on Swiss legislation and expert opinion. |

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| | Articles 6 & 7 list all prohibited activities involving animals. These include torture, fighting, force feeding, maintaining animals in substantial conditions (including during transportation) and forcing animals to perform unnatural or self-harming activities and behaviours. |
| **Italy**<br><br>Legislative Decree 21 March 2005 n. 73 and Ministerial Decree n.469 (2001), specifically for the keeping the dolphin species *Tursiops truncatus* in captivity. | Additional minimum standards concerning animal care, welfare, health and hygiene, include:<br>- '*The health conditions of animals should be checked daily by zoo staff.'*<br>- *'Shows, concerts, art exhibitions and amusements can only be sited in special areas, away from animal enclosures (…) so as not to disturb the animals.'*<br>- *'Animals should be housed in an enclosure (or tanks if aquatic animals) that provide appropriate space and environment, allowing the animals to exercise, according to the requirements of the species.'*<br>- *'Animals may not be induced to perform unnatural behaviours for the interest of the audience.'*<br>- *'The temperature, light and ventilation of the enclosures shall be suitable for the comfort and welfare of animals at all times.'*<br>- *'The outdoor enclosures must be prepared to protect animals from excessive rain or sun.'*<br>- *'The animal enclosures or tanks must be enriched depending on the needs of the host species, with bedding materials, branches, rope, dens, nest boxes, baths and in the case of aquatic species, materials such as plants, small stones or other suitable furnishings.'*<br>- *'Food and drink must meet, both in terms of nutritional value and quantity, the needs of each* single species and every individual of that species…'<br>(Annex 1, as referred to in Article 3(1)e, D73/2005)<br><br>In addition, the Annex of MD469/2001, specific to bottlenose dolphins, includes specifications on tank volume, diameter, depth, volume of water, the need for separate 'treatment pools', water quality, ion content and ensuring regular checks, as well as specifications relating to environmental factors outside the tank and animal care. |
| **Portugal**<br>Decree-Law<br>DL104/2012 | Zoos should ensure 'housing conditions, reproduction, breeding, maintenance, accommodation, travel and keeping of animals in zoos must safeguard the animals' welfare,' continuing with 'no animal shall be detained in a zoo if [these] conditions are not guaranteed...'<br>(Chapter II, Article 4, DL104/2012)<br>Further requirements include:<br>- 'Animals whose interrelationships are potential causes of excessive stress and disruption should not be kept in close proximity.'<br>(Chapter I, Article 1(6))<br>- 'Any direct contact with the public should be done under the strict supervision of staff responsible...and subject to a rotation scheme. Always safeguarding public health, safety and welfare of people and animals.'<br>(Chapter I, Article 2)<br>- 'The zoo can have structures for public recreation, providing these are not likely to disturb the well-being of the animals, and that they are located in areas well away from [animal] housing.'<br>(Chapter II, Section I, Article 10(5))<br>- 'The animals must have adequate space to display natural behaviours and satisfy their physiological needs.' |

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| | (Chapter II, Section II, Article 11 concerns 'Animal housing')<br>- 'The handling of animals must be done so as not to cause them any pain, suffering or unnecessary disturbance.'<br>(Chapter I, Article 1(4))<br>- 'The accommodation must be equipped according to the specific needs of the animals.'<br>(Chapter II, Section II, Article 11 concerns 'Animal housing') |
| **Poland**<br>Nature Protection Act, 16/04/2004 | Zoos must *'only keep those animal species which can be provided conditions that meet their biological needs.'*<br>(Article 72, NPA)<br>Article 70 of NPA refers to RZ12/2004, and specifically, the minimum standards for the keeping and breeding of animals in zoos. RZ12/2004 includes details on:<br>'the *necessary facilities and equipment required for the animal by species and species groups;'*<br>*'the minimum space conditions for breeding and keeping of animals of each species or species groups;'* and<br>*'the necessary conditions for the reproduction of animals of species or species groups*.'<br>(Article 1, RZ12/2004) |
| **Slovenia**<br>Nature Conservation Act (Ur. l. RS, No56/1999) (last amended 22/04/2004), and the Decree on zoos and similar facilities (Ur. l. RS, No.37/2003) | *'In accordance with the regulations governing minimum requirements for the keeping of animals in captivity, all animals must be kept in appropriate conditions which reflect the natural habitat of the species and provides a suitable (safe and agreeable) environment for the species.'*<br>(Article 4(1)3, D37/2003)<br>Chapter II, Article 4, O11/2001, recognizes adequate living conditions when the animal(s) has been given:<br>'*Enough space, in relation to physiological, ethological and other biological needs, taking into account the animal(s) age, stage in development and social structure, in accordance to professional experience and scientific knowledge;'* and<br>*'Adequate light, day / night rhythm, temperature, humidity, ventilation, gas concentration* (…) and minimising the intensity of noise and other distractions.'<br>(Article 4, O11/2001) |
| ***Additional requirements*** | |
| **Hungary**<br>Animal Protection Act (1998) and Joint Decree No.13/2003 (IX.9) | In addition to details about the location and structure of the proposed zoo, on application, the applicant must also provide the zoo's '*Breeding Plan*': providing details of any breeding of protected species; an '*Animal Plan*': detailing animal care and husbandry, conservation programmes and disease prevention; an '*Action Plan*': including risk assessment and procedures in the event of an escaped animal; a '*Liquidation Plan*': should the zoo need to, or be required to close; and proof of the experience and qualifications of the zoo's operator and staff.<br>(Article 3, JD3/2001; Chapter VI, Article 39(2-3), Animal Protection Act) |

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| **Spain**<br><br>Law 31/2003 of 27 October, on the conservation of wild fauna in zoological parks (BOE No. 258 of 28 October 2003) | *In order to comply with the conservation measures of Article 3 of the Zoos Directive, zoological parks are obligated to design, develop and implement, at least, the three following programs:*<br><br>*a) "Ex situ" conservation programs of wild fauna species. These take place outside the natural habitat, due to which the focus should be on contributions to the conservation of biodiversity, and include one or more of the following activities:*<br><br>*1. Participation in a scientific research program from which conservation benefits accrue to the species.*<br>*2. Training in species conservation techniques.*<br>*3. Exchange of information relating to species conservation with zoological parks and public or private bodies involved in species conservation.*<br>*4. Participation, where appropriate, in captive breeding programs for the repopulation or reintroduction of species into the wild, or for species conservation.*<br><br>*b) Educational programs to raise public awareness relating to biodiversity conservation, that include the following activities:*<br><br>*1.Information on the species exhibited and their natural habitats, particularly denoting the degree of threat.*<br>*2. Education of the public on the conservation of wild fauna and of biodiversity in general.*<br>*3.Collaboration, where appropriate, with other public and private entities in specific education and awareness actions on wild fauna conservation.*<br><br>*c) An advanced veterinary care program that includes:*<br><br>*1.Implementation of measures to prevent or reduce exposure by zoo animals to pathogens and parasites, reinforce their immune systems, and prevent injury or intoxication.*<br>*2.Medical attention for sick animals, using appropriate veterinary and surgical treatments, and the routine veterinary examination of healthy animals.*<br>*3. An appropriate animal nutrition plan.*<br><br>(Article 4. Programs) |

## 6.5 Human resources

The EU Zoos Directive does not specify that zoos dedicate certain resources, human or material, to meet the requirements of Article 3. However, in order to implement the measures contained in the Article, zoos need appropriate staff and equipment. Human and material resources are needed to meet the requirements of the type and size of a particular collection. It is not only important to have qualified and trained personnel to carry out the measures described in Article 3, but also to be able to plan, develop and assess the different activities and actions in a coordinated manner.

Some material resources and personnel are indispensable to carry out the assigned tasks adequately, whilst others are optional, depending on the type, size or goals of the zoo in particular. Competent technical staff are needed to take care of the zoological collection as well as to perform the planned conservation, education, security and record keeping activities.

Independently of whether each of the Directive's conservation measures is implemented by one or more professionals of the zoo's staff, it is highly desirable that there is one person responsible for managing and ensuring

that each of the requirements are met. This recommendation is based on two reasons, associated to two objectives: internally for zoos to plan and monitor efficiently the different activities carried out and recorded; externally to facilitate communication with the competent authorities by providing the inspectors with one "spokesperson" for each requirement.

However, it is for each zoo to decide the most suitable management structure, level of staffing and allocation of responsibilities proportionate to its size and complexity. In some instances it may be decided to use external specialists for particular functions (e.g. nutritional or veterinary services), or to seek guidance from zoo organisations, advisory bodies or other sources.

In order to facilitate inspections, the following boxes propose the desirable responsibilities and functions to be fulfilled in relation to each of the five conservation measures in Article 3 of the Zoos Directive. There are no references to qualifications or skills of the personnel involved, which is a decision that falls under the competent authorities of Member States.

**Box Human Resources 1 - Article 3 (first indent) Conservation, research and training**

The type and complexity of Article 3 (first indent) conservation measures a zoo can carry out will largely depend on the human and material resources it has at its disposal. The person or persons responsible for these conservation activities should be able to undertake the following tasks:

- Research, plan and monitor conservation activities using the latest available knowledge.
- Write reports and publications of the conservation activities.
- Enable the dissemination of information by the education department of the zoo and its suitable use by the marketing department.
- Liaise with collaborating institutions and foster new collaborations.
- Design, maintain and adapt the ICP.
- Advise management on any decisions to do with the animal collection.
- Supervise and provide conservation training both for zoo staff and external recipients.

Ideally, these tasks require training and/or knowledge in:

- Zoology
- Conservation of biodiversity techniques
- Project design, monitoring and adaptation
- Research design and analysis
- At least basic genetics
- Conservation communication & public relations

**Box Human Resources 2 – Article 3 (second indent) Education and Awareness**

The person or people responsible for Article 3 (second indent) conservation measures should be able to undertake the following tasks:

- Design, maintain and adapt the education strategy.
- Research, plan and monitor education activities using the latest available knowledge.
- Write reports and publications of the education activities.
- Lead dissemination of information by the education department of the zoo and assure appropriate use by the marketing department.
- Liaise with collaborating institutions and foster new collaborations.
- Advise management on any decisions to do with communication with the public.
- Supervise and provide education training both for zoo staff and external recipients.

These tasks require training or knowledge of:

- Zoology and conservation of biodiversity (including current issues and state endorsed biodiversity strategies)
- General environmental sciences
- Education and learning theory and particularly environmental education techniques
- Education evaluation
- Education reporting
- Communication and public relations
- Animal husbandry and training techniques (whenever any animals are directly involved in education activities)

**Box Human Resources 3 - Article 3 (third indent) Accommodation for animals**

The human resources required for high standards of animal accommodation and husbandry is a function of the zoo's size and its collection's needs. Skills required by relevant zoo staff to ensure this and respective responsibilities might include:

Zookeepers:

- Preparing food and feeding of animals under care
- Handling, confining and managing animals in their facilities
- Developing and implementing species specific environmental enrichment programmes
- Ensuring adequate safety in all procedures
- Keeping animals' facilities clean
- Undertaking animals' training procedures (when applicable)
- Monitoring and recording behaviour, amount of food consumed, signs of health and any other relevant aspects for husbandry and maintenance of animals
- Providing educational information to visitors
- Liaising with other zoo staff to ensure proper care of animals and appropriate compliance of zoos' objectives for the collection.

Curators:

- Coordinating and managing all aspects of animal care, which includes various aspects of the collections' management (e.g. acquisition of animals, breeding activities, record keeping).
- Participating in the educational activities.
- Developing or renovating a habitat in collaboration with architects and/or construction workers.

- In an emergency (where no vet is present) administering remote anaesthesia and supervise or manage the use of firearms.
- Ensuring staff competence.

Zoo Veterinarian:

- Monitoring health of all animals directly through examinations, when required, and through the zookeepers' reports.
- Running a preventive health programme.
- Coordinating a nutritional programme adjusted to all specific needs (in big zoos a nutritionist can be employed to undertake this responsibility).
- Delivering a programme of reactive veterinary care to deal with health and welfare problems as they arise.
- Coordinating and undertaking a curative approach to all situations involving diseases or injuries
- Participating in actions involving animals' breeding
- Coordinating and monitoring transfer, transport and, where required, the isolation or quarantine of animals.
- Securing emergency care.
- Performing humane euthanasia where necessary to deal with problems of health, welfare or genetic over-representation.
- Administering remote anaesthesia or, if public safety is a risk, participating in the potential use of firearms to secure an escaped animal.
- Undertaking post mortem examinations.
- Maintaining the veterinarian record keeping up-to-date
- Specific knowledge of zoo animals and the species at the particular zoo

**Box Human Resources 4 – Article 3 (fourth indent) Preventing escape and the intrusion of pests and vermin**

Regardless of the size of the institution or the type of animal collection the zoo may have, there must be a staff able to carry out and/or oversee the following duties:

- Ensure that the design of every enclosure in the park is safe against animal escape, regardless of the species housed.
- Regular monitoring and inspection of the facilities for potential damage of the structures.
- Ensure that water from enclosures and aquaria (or any other water body included in the zoo) is being adequately screened and/or treated (e.g. sterilized) as necessary.
- Have good knowledge of the local and national legislation in place regarding water treatment and/or disposal.
- Develop an emergency plan in case of animal escape and ensure all staff members are familiar with it.
- Determine who's in charge of what in case of an animal escape, as well as the chain of responsibilities.
- Ensure that all staff members are familiar with the IAS problem.
- Ensure that the environmental threat of IAS is reflected in their animal records.
- Be aware of scheduling, approvals, documentation and reports related to pest control activities, as well as information regarding what pesticides are being used, where pesticides are being used, the location of rodent control equipment, certificate of licenses and certifications, and copies of all relevant MSDS (Material Safety Data Sheets) documents and labels.

**Box Human Resources 5 – Article 3 (fifth indent): Record keeping**

The size and complexity of an institution will determine the duties the person in charge of keeping records performs. This section therefore may be customized for any zoo.

All records-keepers are responsible for (or overseeing):

- the recording of all animal transactions and related data
- assigning specimen ID numbers and creating record files for new accessions
- the guaranteed security of records by safe-keeping, necessary duplication and computer back-ups
- restricted access for data entry (limited to authorized personnel)
- obtaining as accurate information as possible about specimens and making additions or corrections to records as necessary
- distributing information to relevant staff of the facility (e.g., veterinary staff, curators, keepers, etc.) and to other institutions as required.
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Most records-keepers also:

- provide information for surveys and questionnaires, local, national, regional permits or licenses, studbooks- and loan updates
- prepare shipping papers and/or animal transaction forms
- prepare reports (e.g., inventory, statistics)
- act as institution representative/liaison for ISIS (if the zoo belongs to this organization)
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Other duties of a records-keeper might include:

- maintaining medical or other animal related records
- preparing Breeding Loan Agreements
- assisting in the updating and publication of studbooks
- maintaining a file of animal-related publications

Some records-keepers are REGISTRARS who may:

- assure that all animal transactions are in compliance with legal and policy requirements
- have a management-level position
- function as part of the Animal Management Committee
- direct shipping/quarantine arrangements
- monitor animal legislation and are responsible for the procurement of permits

It is for zoos and Member States to decide which job categories, academic qualifications and/or the minimum experience are required for zoo and conservation staff. It is, however, highly desirable, that the zoo personnel comprise a sufficient number of well qualified professionals.

## 6.6 Advisory bodies

The setting up of advisory bodies is an important tool to assist zoos and/or Member State competent authorities to fulfil their respective requirements under the Zoos Directive.

### 6.6.1 What is an advisory body?

An advisory body is an independent group composed of a variable number of experts with different but relevant backgrounds. Its purpose is to analyse, discuss and provide technical and ethical advice concerning zoo matters.

### 6.6.2 Role of advisory bodies

Advisory bodies can provide support and assistance to both the competent authorities and zoos in their respective activities. Advisory bodies related to competent authorities may fulfill the following roles:

- Providing independent technical advice to national authorities in relation to zoo legislation, implementation and other zoo matters.
- Providing advice on how to communicate zoo-related matters to the public.
- In some countries, where the same department is responsible for all animal welfare matters, it may also assist authorities with regard to the ethical approval of zoo research projects.

Zoos may have an ethical procedure in place proportionate to their size and the nature of their collection. Large zoos, or groups of large zoos, may establish formal committees, while smaller zoos may develop their ethical approach in a less formal way. Advisory bodies related to zoos may have the following potential roles:

- Developing ethical codes (e.g. EAZA's Code of Ethics 2009) and internal policies to ensure good animal welfare practices.
- Providing technical advice on strategies with a consistent approach in terms of conservation, welfare principles and public education.
- Providing technical advice on the ethical approach of zoo research projects.
- Discussing current ethical issues of importance for the concerned zoo (destiny of surplus animals, pinioning, etc.)

**Example - Zoos Expert Committee, UK**

In 2011, the Zoos Expert Committee replaced the Zoos Forum as the advisory body of the UK Department of the Environment, Food and Rural Affairs (DEFRA).

- **Function:** Provide competent authorities with independent, technical advice on zoo legislation, implementation and other related matters.
- **Members:** Chosen according to their expertise in areas such as veterinary, animal welfare, conservation biology and others. Representatives of small as well as big zoos. Members are appointed for a minimum of two-three years, and are reviewed after that time.
- **Meetings:** three times per year, sometimes in smaller groups.
- **An annual working plan** and report is available online (e.g. strategic work plan 2013-2014; 2011-2012 annual report) Secretariat: DEFRA
- **Publications:** Zoos Expert Committee Handbook

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