



The Modern Zoo:

Foundations for Management and development

1.0	1.0	0.10	1.1	1.12	0.0	0.0
1.0	multiple	1.1	1.12	0.0	0.0	0.0
1.12	0.05	0.08	0.02	0.02	0.02	0.02
1.7	0.04	0.02	0.02	1.20	0.20	0.20
0.04	0.010	0.1	0.1	1.10	2.20	1.10
0.04	0.04	0.1	0.1	1.10	1.10	0.30
1.2	0.2	1.1	1.1	1.10	1.10	1.10
0.2	0.2	1.1	1.1	1.10	1.10	1.10
1.2	1.1	1.1	1.1	1.10	1.10	1.10
1.1	1.1	1.1	1.1	1.10	1.10	1.10
1.1	1.1	1.1	1.1	1.10	1.10	1.10
0.3	2.2	1.1	1.1	1.10	1.10	1.10
2.2	1.1	1.1	1.1	1.10	1.10	1.10



The Modern Zoo:

Foundations for Management and development

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EAZA's Committees

- EEP Committee
- Membership & Ethics Committee
- Aquarium Committee
- Legislation Committee
- Education & Exhibit Design Committee
- Research Committee
- Conservation Committee
- Technical Assistance Committee
- Veterinary Committee

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KEEPERS CLEANING THE ORYX EXHIBIT IN LISBON ZOO, PORTUGAL
Training keepers in the zoo is vital for the welfare of the animals.
Keepers need to know how to do their job and should be aware of
all safety and hygiene regulations.



ABOUT THE MANUAL

Why this manual

Your institution (zoo or aquarium) is in the process of joining the European Association of Zoos and Aquaria (EAZA). This Manual has been developed by the Technical Assistance (TA) Committee to assist during the “Candidate for Membership” (CfM) period.

Institutions need to meet several criteria to comply with the standards for EAZA membership. Documents produced by EAZA are used as guidelines to explain how an EAZA member institution is expected to operate. The TA Committee and your TA Mentor are committed to guiding you through this period of development.

The aim of this manual is to give the zoo director and zoo management a reference on the basics of zoo operations and the role of zoos. The manual also provides you with additional guidance etc. for your zoos’ development, and combines the knowledge of several zoo experts that have been supporting zoos for over 15 years.

The TA Mentor

The main role of the TA Mentor is to guide you in the development of your institution and to report on that development to EAZA. He/she will provide you with knowledge and technical advice on any topic and will have frequent contact through email, telephone and visits.

The Mentor will visit your institution at least once a year to assess the situation, discuss possible problems and provide advice. The Mentor that has been appointed to your zoo is a senior member of staff of an EAZA member institution.

The Mentor will guide you in your development, meet with relevant (Municipal) officials and act as an advisor on national zoo legislation and general zoo related topics. The Mentor may perform training sessions with zoo staff and provide information upon request. The Mentor will also help you get in contact with experts or colleagues, for example at the EAZA conference.

How to use this manual

There are a lot of aspects to keep in mind when running a zoo. These could never be published in one single document as each of these aspects is extremely varied and complex. In this manual, a selection of the most important basics of zoo practice is described. The manual gives Candidates for Membership an idea of what running a zoo or aquaria to EAZA standards involves.

It is important to remember that what is covered in this manual cannot be achieved all at once. Most EAZA Full Members have taken many years to accomplish the standards laid out in this document. Consequently it is hoped that CfMs are inspired to work towards achieving these standards with the understanding that it may take a number of years. The TA Mentor will work with you to explain which aspects have first priority and which are to be dealt with later.

Do not be discouraged if progress seems slow or setbacks occur. The main thing your TA mentor wants to see is that you understand the concepts in this manual and are working towards achieving the EAZA minimum standards.

The manual does not include full information on all aspects of running a zoo: it will only give you an idea of how a modern zoo is run. Please note that this manual is not intended as a full guidance towards EAZA membership.

Each chapter in this manual will begin with a general introduction to the topic. In some of the chapters, a section “where to start” will help you get started more easily. Textboxes are used to give practical examples and ideas (box 1), and illustrations and pictures provide examples or clarify the text.

BOX 1

In this manual, boxes are used to give small examples or practical ideas on the subject.

A glossary is included to explain several words used in this manual. The index provides you with a means to quickly lookup certain keywords.



ABOUT EAZA

The “European Association of Zoos and Aquaria” (EAZA) has over 340 member institutions in over 40 countries. EAZA members cooperate in animal breeding programmes and conservation, and all members should aim for the highest standards in zoo operations and fulfilling the roles of modern zoos in the 21st century:

- Conservation
- Education
- Research

EAZA forms a large zoo community and consists of several committees and working groups (see box 2). These committees and working groups deal with all issues within the community.

More information about EAZA’s committees can be found on the EAZA website: www.eaza.net (EAZA Home > About EAZA > Organisational structure).

More information about EAZA’s working groups can be found on the EAZA website (EAZA Home > EAZA Activities).

If you want to know more about the committees or who to contact, please speak to your TA mentor.

EAZA has two different types of breeding programmes, the EEP’s & ESB’s (see Chapter 6.2). Through these breeding programmes the EAZA community aims to maintain a viable population for each species kept in EAZA institutions.

For each animal group within EAZA, there is a “Taxon Advisory Group” (TAG). A TAG consists of a group of professionals, mostly employed by EAZA member institutions, with specialist knowledge and interest in the specific animal group for which the TAG is responsible.

TAGs are consulted whenever there is an issue on a particular animal species or group. TAGs are also responsible for the development of regional collection plans (see chapter 6.2) and husbandry guidelines (see chapter 4.1.2).

BOX 2

EAZA’S COMMITTEES:

- EEP Committee
- Membership & Ethics Committee
- Aquarium Committee
- Legislation Committee
- Education & Exhibit Design Committee
- Research Committee
- Conservation Committee
- TA Committee
- Veterinary Committee

EAZA’S WORKING GROUPS:

- Campaign Working Groups
- Nutrition Working Group
- Population Management Advisory Group (EPMAG)
- Transport Working Group
- Zoo Horticulture Group
- Reintroduction and Translocation Group
- Animal Training Group
- EAZA Group on Zoo Animal Contraceptives

BOX 3

EAZA Standards & Policies:

- EAZA Minimum Standards for the Accommodation and Care of Animals in Zoos and Aquaria.
- EAZA Code of Practice.
- EAZA Code of Ethics.
- EAZA Education Standards.
- EAZA Research Standards.

All documents can be printed on the EAZA website: www.eaza.net

EAZA standards

To enhance the professionalism of its members, EAZA has produced several guidelines and recommendations. These documents provide the standards by which the EAZA community works (box 3).

EAZA Executive Office

The EAZA Executive Office (EEO) supports the work of the EAZA committees through two dedicated departments: Communications and Membership, which administrates the website, produces EAZA documents (including the Zooquaria magazine that can be downloaded from the EAZA website), leads community wide communications, organizes conferences, oversees accreditation and runs campaigns; and the Conservation and Collection Planning department which assists with breeding programmes, collection planning and management and conference schedules.



BONOBO ENCLOSURE,
VALLÉE DES SINGES, FRANCE
Zoos in the 21st century display
animals in enclosures that resemble
their natural habitats



DUTCH ZOO FEDERATION (NVD)
Children are an important target for
education in zoos. They are to be the
future caretakers of our planet.



CHAPTER 1

Zoos in the 21st Century

This chapter provides an overview of some of the most important aspects of zoo management. Next to some of the general aspects of management, this chapter will explain the importance of developing a mission statement and a budget. It will explain the importance of developing a masterplan and collection plan. The chapter on maintenance, zoo keeping and policies will help you further along the development process.

HISTORY OF ZOOS & THE ROLE OF MODERN ZOOS

From the 19th century to the end of the 20th century, zoos have evolved from menagerie type collections into conservation centres.

The word “menagerie” is used to describe old-fashioned zoos that were designed mainly to display a large number of animal species. The aim of the zoos in those days was to display as many species as possible. Most animals were not bred in captivity but taken directly from the wild. The animals were displayed in small cages, without considering the welfare of the animals.

Zoos and aquaria in the 21st century aim to educate their visitors about the living world. Their aim is to ensure that every visitor is aware of the importance of nature conservation. The animals in zoos and aquaria serve as ambassadors for animals in the wild and inspire visitors to care for and understand natural ecosystems and the threats that these systems face.

Children in particular that visit the zoo must be brought into contact with nature because they are the future caretakers of this planet. In the zoo, children can develop a larger sense of respect and understanding towards the living world.

An effective way of educating visitors is ensuring that they have a great day out with lots of enjoyment! This ensures the visitors remember what they have seen or learnt.

Zoos educate their visitors by displaying animals in good exhibits that cater for their physical and psychological needs. Signs, exhibitions and educators serve to teach the visitors about the animals and the habitat they live in. Animals are stimulated to show their most natural behaviour by providing them with environmental enrichment (see chapter 4.3) and through good enclosure design.

Zoos in the 21st century acknowledge the need to conserve biodiversity. Mankind cannot foresee the after effects of collapsing ecosystems, therefore zoos aim to cooperate with colleagues all over the world to support a large range of conservation efforts.

A lot of plant and animal species have become threatened with extinction due to human activities. Zoos highlight flagship species - charismatic animals that represent an ecosystem, the conservation of which would protect the future of less charismatic species that share the habitat.



One way in which zoos and aquaria contribute to the continued survival of species is by managing their populations in *ex situ* breeding programmes. They aim to provide the highest standards of animal care and husbandry. In addition to this, research conducted in zoos is vital for conservation and the understanding of biodiversity.

EAZA endorses the “World Zoo and Aquarium Conservation Strategy” (WZACS) of the “World Association of Zoos and Aquaria” (WAZA). This strategy states the role that modern zoos need to take in order to contribute to nature conservation (<http://www.waza.org/en/site/conservation/conservation-strategies>).

In 1999 the Council of the European Union (EU) adopted the “Zoos Directive” (Council directive 1999/22/EC). The “Zoo Directive” provides measures for Member States to implement the licensing and

inspection of zoos. This document is translated in most European languages and should be implemented by (new) Member States (<http://eur-lex.europa.eu>).

The directive states that zoos in the European Union will:

- Participate in conservation research (see chapter 6.4)
- Promote public awareness on conservation (see chapter 6.3)
- Have proper accommodation and care for animals (see chapter 4)
- Assure safety for animals (see chapter 3)
- Maintain adequate animal records (see chapter 2.4)
- Participate in captive breeding where appropriate
- Participate in conservation training

PLANNING IS ESSENTIAL WHEN
CONSIDERING NEW DEVELOPMENTS
AND IDEAS FOR THE FUTURE



ANIMAL TRANSPORT AT OUWEHANDS
DIERENPARK, RHENEN, THE NETHERLANDS
An "institutional collection plan" is used to decide
on which species are kept at the zoo. Cooperation
with other zoos is vital in successful managing of
zoo-populations. EAZA "regional collection plans"
provide recommendations on the species that could
be included in the "institutional collection plan".

CHAPTER 2

Zoo Management

This chapter provides an overview of some of the most important aspects of zoo management. Next to some of the general aspects of management, this chapter will explain the importance of developing a mission statement and a budget. It will explain the importance of developing a masterplan and collection plan. The chapter on maintenance, zoo keeping and policies will help you further along the development process.

2.1 ZOO MANAGEMENT

The first priority of managing a zoo is to keep the business running; the management needs to assure that the zoo has regular income. Some zoos rely mainly on ticket income whereas other zoos run mainly on funding or governmental subsidies. In both cases the purpose of a zoo is conservation and to do that it must always be able to attract and entertain visitors. It will have no ticket income and a zoo without any visitors will not be a main priority for the governing authority providing the funds.

This means that zoo management has to ensure that the business is run properly and that visitors are attracted to the zoo. They also have to ensure that visitors have a pleasant time so they will think of coming back again (see chapter 5).

Most important in any zoo or aquarium is the animals in their care. Imagine a zoo without any animals: people will not come just to look at the empty buildings: visitors want to see animals. This means you have to provide good care for your animals to ensure their health and well-being (chapter 4). Healthy animals have a longer lifespan and a higher reproductive rate. If the animals are well cared for, the

zoo can house the individual animal for a longer period of time and will breed animals to replace animals that have died.

A zoo should not exist only to entertain visitors by “showing” wild animals. There must be a reason for the zoo to exist (see chapter 2.2). Chapter 1 explained the role of modern zoos: each EAZA member should be aware that their institution keeps animals in enclosures and that the animals would normally be living in the wild. This fact should be justified by the role of the institution in the conserving of nature.

Important when running a zoo

It is important to set aims and targets for your institution to achieve. Several policies and plans, which are described later in this chapter, should guide the management of the zoo in the choices they make and the daily running of the zoo. It is important for the zoo management to show leadership, motivate staff, delegate tasks and check whether work is done properly. This means that management should not stay hidden in the office, but take an active role out in the public areas and animal enclosures of the zoo.

Keeping up to date

Keeping good records and regular meetings are a means to keep everyone (including management) up to date (box 4). Meetings will also give members of (senior) staff the feeling that they are involved in running the zoo, which can be a great motivation.

It is important to keep records of all important things that are going on in the zoo. This ensures that the management as well as other staff are aware of things that are going on. Records can also be used to refer to things that happened in the past (see chapter 2.5).

BOX 4

EXAMPLE OF FREQUENCY OF MEETINGS AT THE ZOO:

Daily meetings:

WHO: Head of Animal department/ Curators, Head keeper(s)

TOPICS: Discuss previous day, discuss day ahead to set priorities and targets

Weekly meetings:

WHO: Management & senior staff

TOPICS: Assess week achievements and failures, make plans for the following week.

Monthly meetings:

WHO: All members of staff

TOPICS: Achievements, failures and setting the targets for next month

Regional cooperation

Zoos should cooperate on a local level as well as a European level. Developing ties with zoos in the same region or country can provide a network of support and local knowledge that is essential for successful business practice. These national and regional associations are an excellent way to share good practice and cooperate in developing educational programmes for schools or staff training sessions. In some countries zoos also cooperate in a national zoo federation or make agreements about breeding and animal transfers within the region. It must be taken into account that these agreements do not go against EEP or ESB recommendations. Another example of this cooperation could be to establish a national collection plan.

Structure & Hierarchy

Zoo management cannot be at all places at the same time nor keep track of everything. Therefore communication and a clear organisational structure is very important. It is important for all staff members in the zoo to know who is responsible for the different departments and tasks. Creating a clear organisational structure makes sure that this is the case. It should be clear who deals with daily decisions and who is in charge of whom.

A clear organisational structure ensures that work is divided and that each member of staff knows his/her responsibilities. Furthermore, it prevents the management from being too much involved in the daily running of the zoo, thereby creating time for the management to focus on the future.

Senior staff (head keepers, curators, head of education etc.) should have their own responsibilities and targets and these should be discussed during senior staff meetings.

An “organogram” can be used to give an overview of the structure of an organisation. Image 1 is an example of such an organogram.

In this example the director is head of the institution. The administration department falls directly under his supervision and the four other departments each have a person responsible for that department (the head of education, head of maintenance, the veterinarian and the curator). Each head of department has one or more staff members under his/her supervision (these are not included in the organogram): For example the head keepers of the three animal departments.

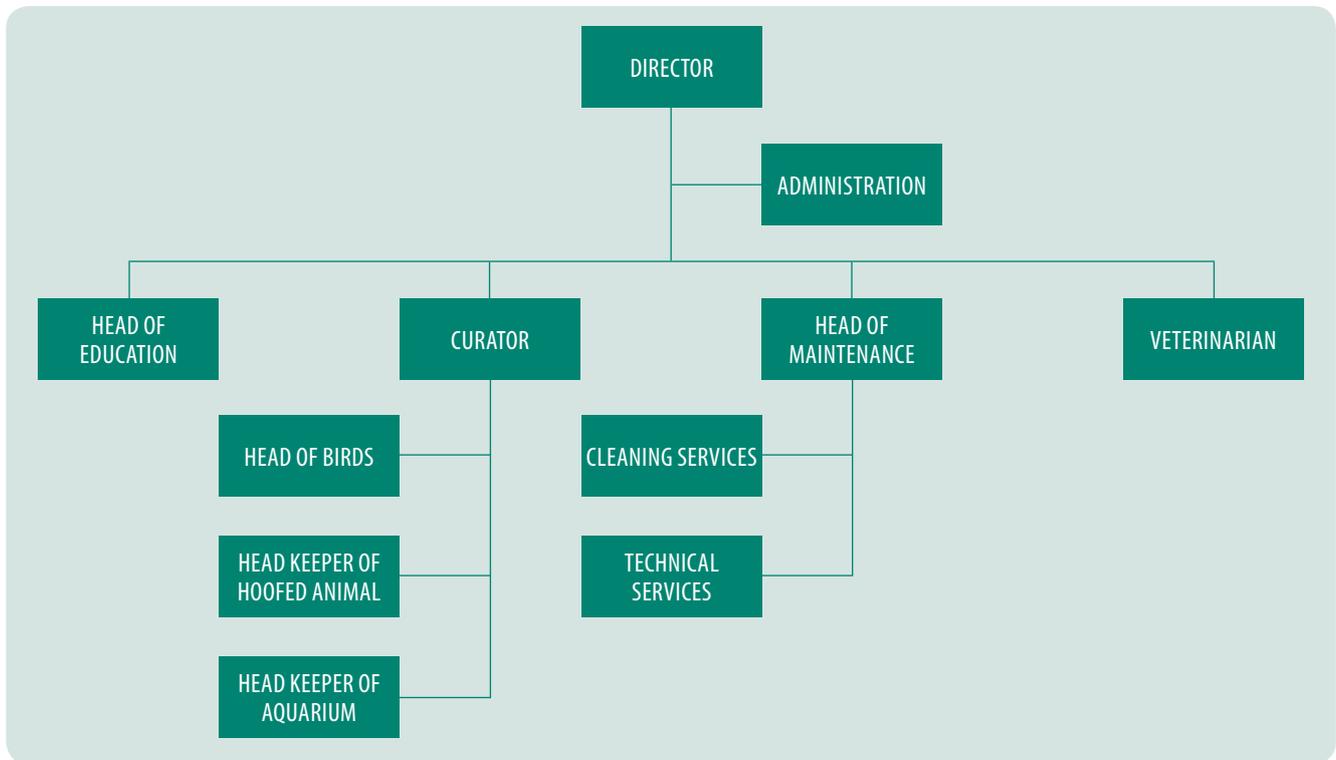


IMAGE 1: An example of how an organisational structure in a zoo could look like. In reality the structure of an organisation could be more or less detailed and include several other positions.

2.2 MISSION STATEMENTS

It is important for a zoo or aquarium to have a mission statement, describing its ideals. A mission statement clearly shows what the institution would like to achieve and what its goals are (examples in box 5). Mission statements are often presented to the public in brochures or a website, to show the institution's intentions. The most important function of a mission statement is to provide direction for the running of a zoo.

If for example the statement would be that the institution is aiming to be “an inspiring place for visitors to learn about animals and nature”, it clearly shows what the institution stands for and what it wants to achieve. Furthermore, it helps to build the image of your institution towards a variety of people from outside the zoo world and also fellow zoos and staff.

BOX 5

EXAMPLES OF MISSION STATEMENTS:

Newquay Zoo

As well as being a great family day out, Newquay Zoo is an education, research and conservation charity which is dedicated to protecting global wildlife heritage. We hope to inspire a life long respect for animals and the environment amongst our many visitors.

Talinn Zoo:

Besides providing biological education to people, Tallinn Zoo is dedicated to reproductive biology and conservation research in situ and ex situ, maintaining populations of animals that are endangered or extinct in the wild and seeking to minimise the negative impact of human activities on wildlife. With its diverse animal collection and natural setting the Zoo is a perfect place for studying animals and enjoying nature.

Edinburgh Zoo:

'To inspire and excite our visitors with the wonder of living animals, and so to promote the conservation of threatened species and habitats.'

2.3 BUDGETING

Many zoos in Europe run (partly) on governmental funding. When this is the case, it is important that the local authorities acknowledge the importance of the zoo. Next to clear lines of communication and a good working relationship this will ensure better cooperation and perhaps additional funding for projects.

Some zoos need approval from the governing authority for every expense they make. This is a very inefficient way of financial management and thereby inefficient in running the zoo. The use of a budget (that is approved by the governing authority in advance) might be a good way to deal with this problem.

A budget is a list of all planned expenses and income for the coming year. It is generally made for one year and it could be classified into categories to allow you to keep track of where/how money is spent or earned.

The amount of money that is needed for the running of the zoo should be estimated according to the income and expenses in previous years. A proposal for a budget should be discussed and approved by the governing authority (for example the municipality or other funding authority).

Daily running costs and income are not the only factors that need to be counted in your budget: because the aim is to improve the zoo, agreements on funds for construction or renovation need to be made according to the masterplan (chapter 2.4) and should be included in the budget as well.

It is also important to set some money aside to cover for any unexpected expenses. It is important to discuss with your governing authority how to deal with unexpected situations that require spending

more money than included in the budget (for example unexpected damages).

Image 2 gives an example of a budget. It shows a classification into departments or categories and the amount of money that each of the departments are allowed to spend the coming year. The total income and expenses are updated every month and the list gives an overview on what amount of the budget has been spent (in %).

Improve your financial situation

When working with a budget, your zoo will have a set amount of money that it is allowed to spend in that year. This means that you will become more financially independent and will not have to get approval for every individual expense. The zoo should be held responsible for its expenses and the keeping of the budget. Before the budget is closed, all parties should come together and discuss the results. It is important to officially close the budget and document that all the involved parties approved on the closing of the budget in the final accounts.

The budget for the following year needs to be finished and officially approved before the present year comes to an end. A meeting of all parties should be convened before the end of the current year to discuss the most recent results, and use them as a guide for expenses and income still outstanding, as well as in planning the budget for the following year. The budget is closed and the next one will be put in place shortly after all finances have been finished at the end of the year.



INCOME				
DEPARTMENT	CATEGORIES	BUDGET 200X	TOTAL INCOME 200X	% OF BUDGET
ADMINISTRATION	GOVERNMENT FUNDING	€80.000,00	€80.000,00	100,00%
CUSTOMER SERVICES	ENTRANCE FEES	€15.000,00	€25.000,00	166,67%
TOTAL INCOME		€95.000,00	€105.000,00	110,53%

EXPENSES				
DEPARTMENT	CATEGORIES	BUDGET 200X	TOTAL INCOME 200X	% OF BUDGET
TECHNICAL DEPARTMENT	MAINTENANCE	€24.000,00	€21.500,00	89,58%
	CONSTRUCTION	€30.000,00	€29.289,00	97,63%
ANIMAL DEPARTMENT	REPTILE HOUSE	€9.870,00	€7.800,00	79,03%
	LARGE STABLE	€15.000,00	€15.000,00	100,00%
	BIRD HOUSE	€8.000,00	€9.000,00	112,50%
CUSTOMER SERVICES	DESK EXPENSES	€3.000,00	€1.289,00	42,97%
TOTAL EXPENSES		€89.870,00	€83.878,00	93,33%

IMAGE 2: a simplified example of one of the many ways of keeping a budget. The example gives the result of the budget at the end of a year. Amounts, categories and departments are random examples; in reality a budget is probably higher and more detailed.

2.4 MASTERPLANNING

It is very important to plan for the (near) future: a masterplan describes the planned development of a zoo over a period of 5 to 10 years. When the masterplan is finished, it is used as a guideline for all developments and construction work. With a masterplan, an institution has a clear view of what needs to be done thereby assuring its development over the long term.

In most cases a masterplan is divided into several projects. For each of the individual projects the masterplan explains what is going to happen, when it is due to be finished and the estimated costs of the project (image 3).

Developments that could be included in the masterplan are: development of a collection plan (chapter 2.6), (re-) construction of buildings / animal enclosures or the production of brochures, maps, events, volunteering programmes etc.

The plan could include several maps and floor plans showing the current situation as well as the future situation, showing the total area of the zoo and all of its buildings, enclosures etc. A masterplan has to incorporate the planning of the (future) collection according to the animal collection plan (chapter 2.6).

Development of the masterplan should take place in cooperation with all senior staff, including the director, curators, architects but also veterinarians and staff from keeper and education departments etc. By doing so, a varied group of people is formed, all having different points of view. The challenge is to incorporate the needs and suggestions of all disciplines into the plan to optimize the efficiency of the enclosure / building. It will also reduce the amount of time spent on adjustments after construction is finished.

Where to start?

To start with the development of a basic masterplan there are a few steps to be taken.

Draw current situation

The first step to take when developing a basic masterplan is to document the current situation. All maps and floor plans of the current situation need to be gathered, a list of all animals should be made (see chapter 2.5) and a list of all enclosures, buildings, infrastructure services available (water, electricity, gas) and so on.

Collection plan & what needs to be changed

The next step is to develop a collection plan (see chapter 2.6) and discuss where the animals will be housed in the future. Make an overview of all enclosures that need to be constructed or redesigned (chapter 4.2) and plan all additional construction work or developments. Especially in this phase it is important to involve several specialists from inside and possibly also from outside the zoo. All ideas on development are to be realistic and should be included in the budget.

Draw future / planned situation

Once all necessary actions/ improvements have been identified, there should be a clear view of the situation after all works have been completed. Maps, floor plans and artist impressions of this future situation can be made to visualize the ideas.

Planning the process

After completing and visualizing the planned situation, the process should be planned in detail. This means dividing the whole plan into several projects or phases and defining what exactly needs to be done, how long it will take, when it is due to be finished and what the costs will be.

Some of the construction work needs detailed drawings and plans and these will also have to be included. You could also make an overview of all investments and when the projects are to be started / finished (image 3).

If you are to develop new brochures or maybe new signs at animal enclosures, you can also include the designing of these into your masterplan.



MASTER PLAN "EXAMPLE ZOO"		INVESTMENT PLAN		DURATION							
NR.	PROJECT NAME	START	INVESTMENT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8
1	REPAIRING OF ALL PATHWAYS	SEPT. (YEAR 1)	€50.000,00	■							
2	REDECORATION OF BEARS EXHIBIT & PRIMATES	APRIL (YEAR 1)	€15.000,00	■							
3	RENOVATION OF AFRICAN STABLES	APRIL (YEAR 1)	€25.000,00	■	■						
4	RENOVATION OF PRIMATE HOUSE	MARCH (YEAR 2)	€60.000,00		■	■	■				
5	CONSTRUCTION OF NEW OUTSIDE ENCLOSURE FOR IBEX	APRIL (YEAR 4)	€30.000,00				■	■	■		
6	DEVELOPMENT OF NEW SIGNS	JAN (YEAR 5)	€2.000,00					■	■	■	
7	CONSTRUCTION OF QUARANTINE FACILITIES	JUNE (YEAR 6)	€30.000,00						■	■	
8	REBUILDING OF STAFF FACILITY/CANTEEN	MARCH (YEAR 7)	€20.000,00							■	
9	RENOVATING OF PARKING FACILITIES	JUNE (YEAR 7)	€100.000,00							■	■
10	ETC.								
INVESTMENT TOTAL:			€332.000,00								

IMAGE 3: An example of how to make an overview of your investments and masterplan. Amounts and projects are random examples, in reality the plan will probably be more detailed and complex.

2.5 ANIMAL RECORD KEEPING

Keeping animal records is extremely important (box 6). Good animal records will help keeping track of everything that happens in the animal department and everything that has happened in the past. It will also allow easy sharing of information with other institutions, which is the basis for population management. (chapter 6.2)

Designing report forms and procedures that are easy to use ensures that everything is registered in an appropriate way. Such reports and procedures should be presented to staff that will be involved in their use to ensure that the staff are well trained to write/complete these records. Working with daily reports for keepers also allows you to keep record of what happened with a certain animal group or at a certain department. (chapter 2.8)

Where to start?

The first task is to review the current animal collection. Start with making a list of all the different animal species in your zoo. After that fill in how many animals live in the zoo and what sex they are. Image 4 shows how the number of animals and sex can be indicated. The example shows a total of 11 impala at the zoo, 1 male, 6 females and 4 animals of unknown sex (in this case young).

Ideally animals should be individually recognizable. For example you have to know that a certain drug was administered to one animal and not to the other, or that one animal is the child of the other (for breeding). This means that you have to have a way to recognize one animal from the other. Some animals cannot be confused with others, but a large part of your animal collection cannot be recognized by simply looking at the animal.

In some cases animals can be identified by making photographs or drawings of specific marking patterns of the animal. Coloured leg bands can be used to identify birds (Image 5). EAZA members can order leg bands for a variety of species at the EEO.

There are a number of ways to identify or mark animals. The most commonly used method within the EAZA community is identification through a microchip, which is implanted under the skin of the animal. This microchip contains a unique code and so enables the owners to identify an animal. A disadvantage is that this

BOX 6

WHY ARE ANIMAL RECORDS IMPORTANT?

- They provide an insight into the collection. How many animals, breeding, deaths etc.
- It helps to investigate and evaluate the impact of changes in husbandry (diet, enclosure, group structure).
- The veterinarian can keep record of all medicine that has been administered in the past.

WHY ARE ANIMAL RECORDS IMPORTANT TO THE ZOO COMMUNITY?

- The records are the basis for breeding programmes. Information on breeding results, age, sex and other demographics are important in managing captive populations.

COMMON NAME	LATIN NAME	NUMBER OF ANIMALS
IMPALA	AEPYCEROS MELAMPHUS	1.6.4
	♀ ♂ ?	
	NUMBER OF MALES	NUMBER OF FEMALES
		NUMBER OF UNKNOWN SEX

IMAGE 4: How to indicate an animal's sex within the number that a zoo has.



IMAGE 5: Leg bands can be used to identify birds. These can be ordered at the EAZA Executive Office.

method cannot be used at a distance, an animal needs to be examined at close hand with a scanning device to read the code.

ISIS & animal records

EAZA member institutions should keep records of all individually recognisable animals in an established and globally recognised and accepted record database software system. The records should be maintained in relation to all individually recognised animals and groups of animals. To fulfill this requirement, EAZA members need to use the animal record keeping software provided by the non-profit organisation “International Species Information System” (ISIS). Therefore membership of ISIS is compulsory for full and Temporary EAZA Members. ISIS provides the generally used software for keeping animal records, in particular the Zoological Information Management System (ZIMS) online software.

The ZIMS software is recognized as the best method to keep standardized animal records, allowing for easy online access and examination of real-time data. Animal record information is shared amongst colleague zoos and aquaria, which is important for successful captive animal and population management.

Image 6 shows an overview of the information that EAZA members should include in their animal records.

Normally records of individual zoos would have to be kept safe and copies would have to be stored in another place to ensure that at least one copy is saved in case of, for example, a fire. ISIS stores the information of all of its members remotely on servers with adequate backups built into the ZIMS server structure. This ensures safekeeping of all the important animal data collected by an institution.

ZIMS provides one complete global database, which can be accessed through the internet at any time to get an accurate real-time overview of the animal data in a zoo or aquarium. EAZA has the ability to run a stocklist/collection overview report over all their member institutions in the ZIMS software, making sure

the member institutions have minimal time investment in keeping EAZA informed. Such a list gives a number of details for each animal group that is kept in the zoo or aquarium. The details provided by such a report are the number of births, deaths, departures and arrivals that took place during the particular year. Image 7 gives an example of this collection inventory report.

The example shows that this institution started with 3 (2.1.0) Red-breasted goose (*Branta ruficollis*) at the beginning of the year 2012. Five young geese were hatched. One of the newborns died and the four others were transferred before their sexes were determined. Leaving the original number of 3 geese (2.1.0) in the institution at the end of the year 2012.

For more information on ISIS and the ZIMS software, please visit <http://www.isis.org>.

THE RECORDS SHOULD PROVIDE THE FOLLOWING INFORMATION

- A** THE CORRECT IDENTIFICATION AND SCIENTIFIC NAME
- B** THE ORIGIN (I.E. WHETHER WILD OR CAPTIVE BORN, INCLUDING IDENTIFICATION OF PARENTS, WHERE KNOWN, AND PREVIOUS LOCATION/S, IF ANY)
- C** THE DATES OF ENTRY INTO, AND DISPOSAL FROM, THE COLLECTION AND TO WHOM
- D** THE DATE, OR ESTIMATED DATE, OF BIRTH
- E** THE SEX OF THE ANIMALS (WHERE KNOWN)
- F** ANY DISTINCTIVE MARKINGS, INCLUDING TATTOO OR FREEZE BRANDS ETC.
- G** CLINICAL DATA, INCLUDING DETAILS OF AND DATES WHEN DRUGS, INJECTIONS, AND ANY OTHER FORMS OF TREATMENT WERE GIVEN, AND DETAILS OF THE HEALTH OF THE ANIMAL
- H** THE DATE OF DEATH AND THE RESULT OF ANY POST-MORTEM EXAMINATION
- I** THE REASON, WHERE AN ESCAPE HAS TAKEN PLACE, OR DAMAGE OR INJURY HAS BEEN CAUSED TO, OR BY, AN ANIMAL TO PERSONS OR PROPERTY, FOR SUCH ESCAPE DAMAGE OR INJURY AND A SUMMARY OF REMEDIAL MEASURES TAKEN TO PREVENT RECURRENCE OF SUCH INCIDENTS.

IMAGE 6: Collection overview report from the ISIS software program called ZIMS.

Mnemonic	Beginning	Births	Acquisitions	Deaths	Dispositions	Ending
Summary Inventory Report For						
Report Start Date 1/1/2012	Aves/Birds				Report End Date 12/31/2012	
Report Type:		Physical				
<i>Branta ruficollis</i> / Red-breasted goose, IUCN: II, CITES: Endangered (EN)						
institution	2.1.0	0.0.5	0.0.0	0.0.1	0.0.4	2.1.0
Totals	2.1.0	0.0.5	0.0.0	0.0.1	0.0.4	2.1.0
<i>Branta sandvicensis</i> / Ne-ne, IUCN: I, CITES: Vulnerable (VU)						
institution	3.3.0	0.2.1	0.0.0	1.0.1	0.0.0	2.5.0
Totals	3.3.0	0.2.1	0.0.0	1.0.1	0.0.0	2.5.0
<i>Cereopsis novaehollandiae</i> / Cereopsis goose, IUCN: -, CITES: Least Concern (LC)						
institution	1.1.0	0.0.0	0.0.0	0.0.0	0.0.0	1.1.0
Totals	1.1.0	0.0.0	0.0.0	0.0.0	0.0.0	1.1.0

IMAGE 7: Summary inventory report from the ISIS software program called ZIMS.

2.6 COLLECTION PLANNING

The animal collection in a zoo is of great importance: without animals there would not be a zoo. Therefore a zoo has to think carefully which animals it would like to care for now and in the future. A collection plan defines which species a zoo would like to care for, how the animals are displayed / housed and should be used as a guideline for future acquisitions and dispositions.

A collection plan should also consider the educational or conservation purpose of keeping a certain species. (see chapter 6)

At its simplest a collection plan provides an overview of which species the zoo has and which it would like to have in the future (5 to 10 years) (image 8). A collection plan explains which animals will stay in the collection and which animals should be sent out of the collection or obtained from other institutions.

The collection plan should be realistic and feasible. This means that there is no need to focus on having the most important breeding species or very rare animal species. Consider which species would contribute most to the goals of your institution as described in the mission statement (chapter 2.2) and which animals you are best able to care for.

Developing a collection plan

A collection plan needs serious consideration by the director and (senior) staff. The first thing to do is to have a look at the list of all species in the zoo (see chapter 2.5). With this the zoo management can discuss which animals they would like to have during the next few years.

The list with all current species should be a starting point and discussion should eventually result in a collection plan for your institution. Box 7 lists several considerations that all have to be taken into account when choosing a species for an institutional collection plan. These considerations are the basis of your plan.

The collection plan should point out: which animals that currently live in the zoo will stay in the collection, a clear view on which new species are to be obtained and a plan on how animals that you do not want to keep, but are still in the collection, will be moved out of the collection. Chapter 2.6.1 gives an overview of the

IMAGE 8: Example of a collection plan. In reality the collection plan will include all species kept at the zoo and species that the zoo might want to keep in the future.

COLLECTION PLAN								
COMMON NAME	SCIENTIFIC NAME	STATUS IN THE WILD	STUDBOOK STATUS	CURRENT NUMBER	BREEDING	FUTURE IN THE COLLECTION	FUTURE NUMBER	ANY OTHER COMMENT
MAMMALS								
RACCOON	<i>Procyon lotor</i>	LOWER RISK	NONE	2.8.2	YES	YES	4.8.0	Drainage needs to be improved.
SIBERIAN TIGER	<i>Panthera tigris altaica</i>	CRITICALLY ENDANGERED	ECP	0.1.0	NO	NO	0.0.0	Important breeding animal, to be moved to Zoo X (August 200X) according to EEP
BROWN BEAR	<i>Ursus arctos</i>	LEAST CONCERN	ESB	1.1.0	NO (related)	YES	1.1.0	Search for non related male/female for breeding. Upgrade enclosure so it is suited for future breeding.
WILD BOAR	<i>Sus scrofa</i>	LEAST CONCERN	NONE	1.2.0	YES	YES	1.2.0	Fence needs repairing at north side park.
RHESUS MACAQUE	<i>Macaca mulatta</i>	LEAST CONCERN	NONE	1.1.0	NO (castrated male)	NO	0.0.0	To remain in collection until natural death. Redecorate enclosure with branches & ropes.
LLAMA	<i>Lama glama</i>	X	NONE	5.7.0	YES	YES	2.5.0	Enclosure is overpopulated, try to relocate 2.2 adult animals to other zoo.
BIRDS								
DALMATIAN PELICAN	<i>Pelecanus crispus</i>	VULNERABLE	ECP	2.7.0	YES	YES	2.7.0	-
SCARLET MACAW	<i>Ara macao</i>	LEAST CONCERN	NONE	0.0.1	NO	YES	0.1.0	Exhibit to be redeveloped.

considerations that are to be taken when decisions are made on these subjects.

It should also be made clear which animals are allowed to breed and more importantly which animals are not. For animals that you want to breed, you must consider where offspring will be placed in the future:

Do you have another enclosure for them or is the parents' enclosure big enough to hold the offspring as well without any problems like hierarchy or inbreeding?

If animals have to leave the zoo, an Acquisition & Disposition policy (chapter 2.10) should clearly state where animals can and cannot go.

A Regional Collection Plan (RCP) is made by EAZA for each animal group/ taxon (chapter 6.2). The RCP should be the basis of your considerations to keep certain species or not. All EAZA members try to contribute to the conservation and breeding of species; RCPs include recommendations to keep a certain species or not.

All EAZA members should consider the RCP recommendations for their institutional collection plan to ensure successful cooperative breeding programmes. RCPs can be found at the member area on the EAZA website or obtained through the EAZA Executive Office.

2.6.1 CONSIDERATIONS

If you decide to keep a certain animal species or perhaps decide that you would not like to continue to keep a species, there are some specific considerations that you should take into account.

New species to the collection

For the species that you would like to add to the collection, consider:

- How many would be ideal to hold?
- How / where will you get this species from?
- When do you aim to bring the species into the collection?
- How will you accommodate this species when added to the collection?
- Do you want to breed this species?

Species to keep in the collection

For the species that you would like to continue to keep, several factors should be considered and planned:

GROUP SIZE AND STRUCTURE

- How many animals do you currently have?
- How many would be ideal to keep?

BOX 7

CONSIDERATIONS FOR CHOOSING A SPECIES FOR THE COLLECTION PLAN:

- The reason to hold the species (conservation, research, education and/or recreation)
- Is it a recommended species according to the Regional collection plan? (see chapter 6.2)
- Does legislation allow you to keep or import the species?
- Can you breed this species in captivity? (avoiding inbreeding and overcrowding!)
- Do you have, or will you have the space to house this species?
- How many animals would you like to hold and what is the maximum number you will be able to house, taking into consideration future breeding? (need for replacement of offspring)
- Can you provide the animal with all its welfare needs? (chapter 4.1)
- Are staff experienced with keeping the species or do they need additional training?

BREEDING

- Are you breeding this species?
- Do you want to breed this species in the future?
- How will you encourage / prevent breeding?

ACCOMMODATION OF THE SPECIES

- Do you have an appropriate enclosure for the species?
- If not, how / where will you provide an appropriate enclosure? (masterplan chapter 2.4)

NUTRITIONAL NEEDS OF THE SPECIES

- Do you have the ability to provide full nutritional needs, e.g. sufficient fresh browse?

Species not to keep in the collection

For the species that you do not want to continue to keep, consider:

- How / where will you move this species out of the collection? (Acquisition & Disposition policy, see chapter 2.10)
- When do you aim to move the species out of the collection?
- How will you accommodate this species until you are able to move them out of the collection?

2.7 MAINTENANCE

It is important that buildings, pathways, fences etc. in your zoo are properly maintained. This will provide a safe environment for staff, visitors and animals. It also ensures that the zoo looks nice and tidy.

When everything in the zoo looks clean and well maintained, it will have a positive effect on your visitors. Visitors will appreciate buildings that are clean and well painted. A clean environment also ensures that visitors behave properly. It is therefore important to have staff responsible for cleaning the visitor areas, seeing to it that everything is looking good and reporting larger problems (e.g. a broken fence, or blocked pathway). Provide rubbish bins on various locations in the area so that visitors can throw their rubbish away.

All staff should know the procedure for reporting a situation in need of repair or maintenance. Box 8 shows how this could work in practice.

BOX 8

MAINTENANCE REPORTS:

The keepers complete daily reports on the animals and enclosures under their responsibility. If for example the walls of an enclosure need repainting, this should be reported in the weekly maintenance report form. The form is forwarded to the maintenance department where the priority of the problem can be assessed and painting of the walls scheduled.

Safety

Zoo management should always keep safety in mind. Buildings, structures and other areas are to be maintained in safe conditions. It is important to inspect the conditions of the construction of the buildings and animal enclosures. Any other potentially dangerous situations also have to be checked and noted regularly (see chapter 3.5).

Pathways need to be checked and maintained regularly. Uneven paths or holes may hurt visitors or staff if they were to trip and fall or twist an ankle.

Inspection of the trees in your park on a regular basis will ensure safety and prevent damage to buildings etc. by falling trees. Regular inspections should also prevent branches from falling down (in a storm) to avoid damage to fences or harm to visitors.

2.8 STAFF MANAGEMENT

Your members of staff are key to the successful management of the zoo. Management has to see to it that staff is well trained and aware of all safety regulations and protocols in the zoo (chapter 3). You should for example see to it that the veterinarian gets the opportunity to go to courses or that keepers are trained in the care for a particular animal species. Exchange programmes where zookeepers go to another institution to learn about specific animals can be very useful and should always be considered. Staff members need to be committed to the zoo and need to know what they should do and how. When staff members are appointed for longer periods with contracts that run for a set amount of years, they will become more committed and motivated to do their work.

Keeping your staff motivated is very important. Staff will receive a salary for the work they do, this however will not be the only thing that motivates them. Staff will have to do their work properly and should be told when something has gone wrong. But telling staff they have done a good job is just as important as correcting possible mistakes.

Another way of motivating staff is by involving them in the running of the zoo. Regular meetings involving staff have already been discussed earlier in this chapter. Staff could also be involved in the development of the zoo. This is not only important to motivate your staff but could be vital to making your enclosures and buildings as efficient and suitable for purpose as possible. Your keepers or other members of staff will actually work in the facilities daily and can indicate a lot of practical adjustments that would not normally be considered.

Staff can also be involved in the conservation efforts that your zoo will eventually undertake. This could be projects for conservation in the wild (*in situ*, chapter 6.3) but could also mean they become involved in EAZA's breeding programmes (EEP/ESB coordinator etc., chapter 6.2). Staff will also appreciate if they are allowed to attend zoo related conferences, or training in other EAZA institutions. In turn this will ensure

that your staff is well-trained and informed of recent developments in the zoo world.

EAZA Academy

EAZA is committed to enhancing the professionalism of its member institutions through training opportunities and has been running courses in breeding programme management since the mid 1990's. Thanks to a generous donation from Fondation Segré (www.fondationsegre.org) in 2010 a Training Officer was appointed to help expand the range of courses on offer.

The EAZA Academy offers a wide range of courses covering areas as diverse as animal husbandry and nutrition, zoo and aquarium management, and educational related courses. Scholarships aimed at CfMs are available for these courses. In addition, the TA Committee works with the EAZA Academy to develop targeted courses for CfMs based in their country and offered at a discounted rate.

The range of courses for the current year can be found on the EAZA Academy pages of the EAZA website.

Volunteers

Volunteers can be employed to take on work that would normally not be addressed due to lack of finance or manpower to do the work that would normally not be done due to a lack of finance. These are tasks that are adding extra quality to your zoo. Volunteers could work as guides or assist the educator. Volunteers can be granted special benefits for their efforts (e.g. free entrance).

Volunteering will improve the bond of your institution with the local community; you will create a group of enthusiastic people that are willing to give some of their time to benefit the zoo without getting paid for it. Some zoos have a very large number of volunteers that are often joined in groups like "friends of the zoo". In most cases these groups eventually also include non-volunteers. These groups can have an enormous impact in the running of the zoo and can be very active in raising their own funds or donations to the zoo.

2.9 ZOO KEEPING

Zookeepers have the direct responsibility of caring for the animals. They clean and maintain the enclosures and feed the animals. For text on feeding of animals see chapter 4.1.1. Box 9 gives an example of the responsibilities of a keeper. As keepers work closest to the animals, it is important that staff are well trained and familiar with safety & hygiene regulations (chapter 3.6). In most zoos some of the keepers also contribute to education, giving so called ‘keeper talks’ where they provide information about the animals they care for. These talks can be given at a certain time (e.g. at feeding time) and place (most likely near the animal enclosure) and should be indicated on a sign to inform the visitors (for example at the entrance).

Routine

Having a routine for each animal department is very important. If staff work according to a routine, there is less chance of work being forgotten or postponed. A protocol or job description could be written for each animal department and each staff member. For every department these documents could explain what needs to be done, when and how. This will allow staff (also from other departments if necessary) to keep in mind what to do.

Observations

The keepers should check ‘their’ animals daily. By observing the animals on a regular basis, keepers will notice any unexpected changes in the behaviour of the animals. Such behavioural changes could be a sign of health (or other) problems and if spotted quickly, the veterinarian can act immediately if necessary.

BOX 9

EXAMPLE OF A ZOOKEEPER’S RESPONSIBILITIES:

- The keepers often start before the zoo opens. They check the enclosures and the animals, to see if everything is as it is supposed to be.
- The keepers feed the animals and look at every animal to see whether it is in good condition.
- If an animal seems to be sick or injured, the keeper should report this to the person responsible for the animal’s department or directly to the veterinarian.
- The keepers clean the inside and outside enclosures, moving the animals out of the enclosure before they go in to clean (in the case of dangerous animals).
- The keepers try to observe the animals daily and apply enrichment appropriately
- The keepers will make every preparation that is needed for the animals to get through the coming night (lock animals inside, provide additional food and water) and provide bedding where needed.
- The keepers will fill in a daily keepers report at the end of every day (see image 9).
- A final checkup when the last person leaves the animals department should make sure that everything is ok for the following night.

Cleaning

Animal enclosures should be cleaned on a daily basis. Cleaning prevents the spread of disease and therefore ensures a healthy environment for animals and staff (box 10 & 11).

A simple guideline for the daily cleaning of each animal enclosure could be:

- Remove leftover food items, as these can attract pests (ants, flies, rats etc.).
- Remove animal waste, these also attract pests and contain all sort of bacteria, viruses and parasites (worms) and create risk of (re)infection.
- Remove all rubbish (plastic, wires, glass, etc.) that might cause problems.
- Clean all surfaces if necessary and disinfect regularly (depending on the situation and species). If sand is used as a substrate, spade the substrate (loosening the soil) to prevent rotting.

Records & daily reports

Keeping animal records is a key aspect of zoo management (chapter 2.5). To ensure that their department is up to date and has all the information needed by curators and zoo management, keepers should provide daily reports to the head of the animal department.

By providing every department with a report form, you can make sure that information is available to zoo staff (including management) at all times. An example of a daily report is given in image 9.

Education & customer service

Zookeepers are some of the many members of staff that come into contact with visitors. As stated earlier in this chapter, keepers can have an important role in the education in the zoo. They can give keeper talks, but should also be open to any questions asked by visitors. As for all staff, the keepers have to be friendly to visitors and always be helpful and polite to improve customer service.

BOX 10

BIG CAT CLEANING:

(Big)cats spray urine to mark their territory. If you clean places on which the animals spray urine every day, this will only result in more spraying by the animals on those spots. Cleaning of these spots should be less intensive as other parts but enough to keep the enclosure clean and fresh.

BOX 11

TOOLS:

It is important that the tools used for the cleaning of animal enclosures are cleaned after they are used.

To prevent the spread of diseases and parasites, use separate tools for each animal department / house.



KEEPER DAILY REPORT							
DAY:				DATE:			
DEPARTMENT:				NAME KEEPER:			
ANIMAL OBSERVATIONS (HEALTH, FEEDING, GROUP BEHAVIOUR)							
SPECIES:	ID:	DETAILS:					
MEDICAL TREATMENT: (ANIMALS UNDER TREATMENT)							
SPECIES:	ID:	MEDICATION APPLIED (INCL. AMOUNTS & UNITS):			ANIMAL OBSERVATIONS:		
VETERINARIAN VISITS:				NAME OF VETERINARIAN:			
SPECIES:	ID:	DETAILS OF SICKNESS:			ACTION TAKEN:		
CHANGES IN DIET:							
SPECIES:	ID:	DETAILS:					
ANIMAL MOVES:							
SPECIES:	ID:	BIRTH:	DEATH:	ARRIVALS:	DEPARTURES:	MOVES:	DETAILS:
ANY OTHER COMMENT: (ENRICHMENT, PROBLEMS, FEEDBACK)							

IMAGE 9: Example of a report form for the daily reporting of keepers.

2.10 POLICIES

Policies are documents that are meant to guide decisions and to achieve certain goals. The policies should also provide the zoo with a clear picture of where it wants to be in the future. For example, a safety policy should describe in detail what to do in case of animal escapes, fire, or other emergencies. Another important policy is a policy for deciding where to send animals to or where to get them from (acquisition & disposition policy). A policy lists everything that has to be done and includes timetables and goals to lead the zoo in the desired direction.

Policies should be developed by the director and/or zoo management. Involvement of appropriate staff members or experts in the development process will benefit the effectiveness of the policies.

When working with a policy it will be easier for management and staff to keep working towards the goals of the zoo. Running a zoo requires a lot of rules and routines. It is essential to have such rules and routines written down in policies. This ensures that everything can be looked up in case of a problem or when a difficult decision has to be made. Policies also ensure continuity in case the director or zoo management are (temporarily) unavailable.

Each EAZA member has a number of policies to guide it. The following important policies are in use (in some form) in almost every institution:

Animal acquisition & disposition policy

The acquisition & disposition policy clearly explains all terms and conditions for any institution that you could send animals to (disposition) or receive animals from (acquisition). It is one of the most important policies for a zoo. The policy should state what is expected of an institution from which you receive animals or to which you send animals.

For any animal disposition (sending animals from your zoo to another) the policy should contain all terms and conditions for an institution to be able to receive animals from you. It should include every question that you would want to ask the institution: how the animals will be kept, are there keepers there that are able to care for the animals, what will they feed the animals, are they going to be housed in a group etc. The acquisition & disposition policy should ensure that your animals are only to be sent

BOX 12

ANIMAL ACQUISITION:

Buying (wild) animals from an animal dealer is not the way to obtain animals. Always try to obtain animals that have been bred in captivity. Animals that are bought from dealers will be replaced with new animals that might be caught in the wild. Buying animals from a dealer will only encourage these unsustainable and damaging practices. It is important to keep in mind that EAZA members do not value their animals in terms of money. In other words: EAZA members should not sell or buy animals but always donate animals or send them out on loan.

to respected institutions (preferably EAZA members), which are able to provide good care for the animals.

For animal acquisition (receiving animals from somewhere else) the policy should describe from which (type of) institution animals can be acquired. The policy should set specific terms to avoid animals being obtained from unwanted sources, such as animal dealers (box 12).

Health and safety policy

A health and safety policy ensures the safety in your zoo: Safety for staff, visitors and animals. The policy lists all measures that are taken to ensure safety.

A health & safety policy should explain: 1. Why risk assessment is needed (chapter 3.4), 2. why, when and which staff members are trained in first aid, 3. where First Aid posts for staff and visitors are located and 4. how protocols are written (first aid, hygiene).

It must also explain how to encourage and train your staff to identify, resolve or report any risk issues (possibility of animal escape, need for maintenance etc). A health and safety policy must contain protocols for: dangerous animal escapes, fire, terrorism, infectious diseases etc.

Veterinary policy

A veterinary policy includes an overview of all the work that needs to be done by the veterinarian.

Possible topics are: 1. when and where preventative measures are taken (screening faecal samples (dung), routine vaccination), 2. the involvement of the



veterinarian in designing animal diets, 3. how the quarantine facility is run and what should be in the working protocols for quarantine, 4. what animal health records are to be kept, 5. routine animal observations, 6. how to deal with injuries, 7. communication with management or staff and 8. how veterinary drugs and equipment are purchased and recorded.

Staff management policy

A staff management policy lists all measures that need to be taken to assure the quality of your staff. It explains the communication structure between management and staff, the need and frequency of meetings and it should also include the development of annual staff performance reviews, written protocols, guidelines, job descriptions and training.

Visitor services policy

In a visitor services policy all visitor facilities that are needed are listed including an overview how to ensure the quality of these facilities (chapter 4). It could for example include how staff should treat the visitors or how complaints are dealt with. In short, a visitor services policy should explain what is needed to provide your visitors with the best possible service.

Ethics policy

The Ethics policy is important when difficult decisions have to be taken about your animals in the future, but it is also important to ensure the animals' welfare. In this policy the minimum standards for animal care are described, how unwanted breeding is prevented and how and when animals can be put down (euthanized) by the veterinarian. This policy should contain all aspects that may change, or have an effect on, the life of the animals.

PR & Marketing Policy

A PR & Marketing policy lists all measures that can or should be taken to promote the zoo.

It includes how you want people to think about the zoo (and how you will achieve this), how to use media opportunities through press releases, special events, births, new arrivals and even informing media of the death of a popular animal (chapter 5.4).

Education policy

The education policy explains why your zoo needs to focus on education and how visitors are educated. Both written and spoken education should be included. Education in zoos is further explained in chapter 6.3.

Conservation policy

The conservation policy states what a zoo is doing and would like to do in the future to contribute to conservation. A first step could be to participate in the EAZA campaign each year (chapter 6.3) or support a national or international conservation organisation. This policy also states how the zoo can contribute to *ex situ* conservation of species (chapter 6.2). This should create a direct link to your institution's collection plan.

Research policy

A research policy states how the zoo can contribute to increasing knowledge. It could for example include details on cooperation with local universities or support to researchers in the field. The policy should state that all research is to be non invasive.

Research in zoos is further explained in chapter 6.5.

KEEP IN MIND:

THESE ASPECTS OF ZOO MANAGEMENT

- **REGIONAL COOPERATION:** cooperation within country and region
- **STRUCTURE AND HIERARCHY:** organisational structure and responsibilities of staff members
- **MISSION STATEMENT:** direction of zoo and how to present it to the public
- **BUDGETING**
- **MASTER PLAN:** develop current and future (collection) planning with entire senior staff
- **ANIMAL RECORD KEEPING:** inventory and mark all animals and record in ZIMS
- **COLLECTION PLANNING:** which species in collection and why?
- **MAINTENANCE**
- **STAFF MANAGEMENT:** staff training, volunteers
- **ZOO KEEPING:** observing animals, cleaning enclosures, education of visitors
- **POLICIES:** animal acquisition & disposition, health & safety, veterinary, education, conservation, research, visitor, ethics, staff management, PR & marketing.

A zoo should make every effort to ensure the safety of its visitors. Visitors often have limited understanding of the risks inherent in keeping wild animals, so the park needs to foresee every possible eventuality.



ZOO OSNABRÜCK, GERMANY (LEFT) & AMSTERDAM ZOO, THE NETHERLANDS (RIGHT)
Stand-off barriers keep visitors at a safe distance from the animals.

CHAPTER 3

Health & Safety

This chapter will explain the importance of considering the health and safety of animals, visitors and staff. It will help you to improve the situation in your institution by explaining the importance of hygiene, the recognition of possible risk and planning for an emergency.

3.1 HEALTH & SAFETY

Health and safety are extremely important aspects of zoo management. It is essential that steps are taken to ensure the health of staff and animals. Good hygiene and preventative measures should be in place to prevent disease and zoonoses (disease transmitted from animal to human). Both the safety of your staff (and animals) and the safety of your visitors needs to be guaranteed. Both visitors and staff are vulnerable to small accidents including animal bites, or falls. One qualified staff member should always be on site to provide first aid in case of such an emergency.

Clear lines of communication are very important, two-way radios or mobile phones are to be available to the staff, enabling them to take quick action in case of any danger or emergency.

There are several health and safety aspects which must be considered. Listed in this manual are:

- Suitable barriers
- Emergencies; including animal escapes
- Warning signs
- Risk assessments
- Protection from diseases and injury

3.2 BARRIERS

Barriers must be designed, constructed and maintained to contain animals within the enclosure. Animals that can fly (birds, bats), climb (e.g. primates, cats, bears, small mammals) or jump high (e.g. antelope, deer or leopards) must be kept in enclosures secure enough to prevent escape. (box 13)

Also keep in mind that in some enclosures you want to keep wild animals (fox, Mustelids: ferrets, weasel, etc.) out! If not, they might take the animals in the enclosure as prey.

Checkups:

Regular (daily) checks of the fences or other barriers by the keepers will prevent an unnoticed broken fence where animals could get out! It is always important to keep records of all checkups on fences, even when all fences are in good condition. The easiest way of doing this is by including it in the daily reports of keepers. When every check-up is registered, one can easily keep track of the safety and condition of the fences and barriers.

Gates and doors

Gates and doors to areas where visitors are not allowed must be securely locked to prevent unauthorized access.

Visitor safety

Zoos must ensure that visitors are kept well away from enclosures that house potentially dangerous animals.

Stand-off barriers are barriers that keep visitors at a safe distance to prevent bites or other injuries from animals (see photos page 38). These barriers will also protect visitors against barbed wire or electrified fences, which are used to keep the animals inside the enclosure.

Stand-off barriers should be designed to prevent children getting through, under or over them and adults from reaching the animal or enclosure.

A space of approximately 1.25 meters (image 10) between the stand-off and normal barrier will ensure a safe distance from the enclosure or fence. However, some animals may reach further than this and the distance should be larger in these cases (for example big cats like Jaguar (*Panthera onca*)).

A stand-off should be approximately 110 cm in height and should not allow children to crawl through. The space in between the barrier and stand-off can be covered with plants/shrubs not only to make it more effective, but also to make it look more natural.

BOX 13

TO PREVENT ANIMAL ESCAPES:

- Digging animals must be kept in enclosures which are designed to avoid escape by digging underneath the barriers (e.g. by including an underground barrier).
- With climbing species: Check for overhanging trees regularly so that animals cannot climb or jump from their own tree to one outside the enclosure.
- To test an animal enclosure, simply go into the enclosure and try to escape. Many animals have far better capabilities than humans have (jumping, climbing, strength) so keep in mind which animal you are going to house.

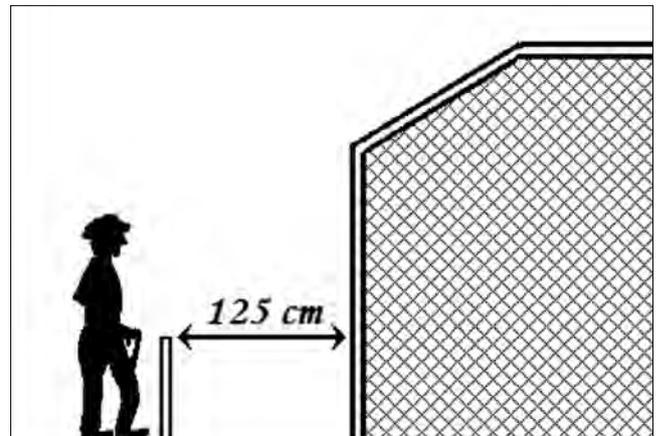


IMAGE 10: In most cases 125 cm is enough to keep visitors at a safe distance. However, some animals may be able to reach further than that (primates). The distance should then be larger.

3.3 EMERGENCIES

This paragraph outlines measures that zoos should take to ensure safe working conditions for their employees and others who enter the zoo, e.g. visitors, volunteers etc.

An emergency procedure plan should be drafted for different types of emergency situations that might occur in zoos. This plan should be a written document readily available to all employees. Everyone in the zoo should receive regular training so they know their role in the plan.

Fire and explosion

Managing Health and Safety in Zoos (HSE, 2006) outlines the following measures that should be included in a fire emergency plan:

- Action employees should take, how to raise the alarm;
- Procedure for contacting the fire service;
- Means of warning people in case of fire;
- Where people should assemble in case of fire plus procedures for checking whether the site is evacuated;
- Identification and maintenance of escape routes;
- Arrangements for a safe evacuation of people, with specific procedures for people at risk (people with disabilities, elderly);
- Equipment to secure and isolate the affected area
- Arrangements for areas identified as representing a high fire risk;
- Provision, identification and location of firefighting equipment, e.g. hydrant points;
- Which roles do which employees have in the event of a fire;
- Procedures for liaising with fire and rescue service on arrival and notifying them of any special risks;
- Employees' training needs and arrangements for their training;
- How to alleviate stress in the animals and prevent an escape;
- Stand-down procedure prior to re-occupation of the zoo or particular buildings.

BOX 14

ELEMENTS OF AN ANIMAL ESCAPE PLAN:

- How to communicate an escape to the person in charge? The responsible person(s) should always be on call via reliable communications methods to ensure the fastest possible response.
- Who is coordinating all events?
- What should staff do when the person in charge is not yet there?
- What needs to be done by whom (capturing, protecting visitors, alerting police)?
- Who reassures or evacuates the visitors?
- Who is responsible for the darting, shooting or capturing of the animal?

Animal escape

The first priority of a zoo is to prevent an animal escape. In particular the escape of an animal that is potentially dangerous is the last thing that a zoo wants; it would mean an enormous risk to the animal, visitors and staff and could bring bad publicity. The perimeter boundaries (high fence surrounding the total area of the zoo) should be designed, constructed and maintained to discourage unauthorized entry but also to keep escaped animals inside the zoo and prevent them from wandering off into the surroundings.

Zoos must assess whether any danger may arise from an animal escaping from its enclosure and consider the likely route that the animal could take in the zoo when it is escaped (where would it go to?).

To prepare for an animal escape, there must be a clear emergency plan. It is vital that the animal escape plan is available to and fully understood by all staff members (box 14). Regular emergency training should also be carried out including a minimum of one full escape drill a year and additional smaller practice sessions. This ensures that all staff members know exactly what to do in case of an animal escape or other emergency. This will also highlight any faults or risks within the procedure so this can be adjusted in time for a real escape.



Any other major incidents

Major incidents, accidents resulting in multiple casualties, multiple escape or release of dangerous animals, require a well-planned response. In addition to involving emergency services the following should be addressed:

- Appointing a senior manager and a deputy to take control of the situation;
- Nominating a dedicated communications officer as a contact;
- Ensuring that the communications officer keeps a record of contact, as directed, with other essential personnel and emergency services;
- Identifying an area, with essential facilities and services, which can serve as a central control point;
- Identifying and communicating information on routes which would be unsuitable for emergency access and areas which are difficult to reach;
- Making arrangements for dealing with casualties;
- Providing a temporary mortuary and catering facilities as necessary. (HSE, 2006)

BOX 15

FIRE ARMS & AMMUNITION AND DARTING EQUIPMENT MUST BE:

- Available for immediate use.
- Used by licensed people only.
- Cleaned and maintained.
- Kept securely under lock when not in use.
- Used only by staff who regularly practice capturing of the animal?

Protection of the public

It is vital to have the appropriate equipment in your zoo. When keeping hazardous animals, you must keep in mind that if animals escape, these may have to be darted or shot in order to protect the public from possible attack. Therefore, firearms and darting equipment must be available in the case of an animal escape (box 15).

3.4 WARNING SIGNS

Where visitors may come into contact with animals, warning signs should be in place to warn them of possible risk. Animals could bite or peck a visitor and animals with horns could also cause injury. There should also be warning signs to warn people of the risk of an electric fence or an edge which poses a risk of falling.

It is advisable to use signs that show symbols instead of words (image 11 & 12). These symbols should be easy to understand and ensure that foreign visitors, children, but also people that are not able to read, are warned of risks in your zoo.



IMAGE 11: Use warning signs to warn your visitors for possible risks.



IMAGE 12: Signs that use symbols can be used to warn children or foreigners. Sofia Zoo, Bulgaria (left), Amsterdam Zoo, The Netherlands (right).

3.5 RISK ASSESSMENT

The safety of the zoo must be one of the management's highest priorities. To be aware of every possible risk, a risk assessment should be made on a regular basis. A risk assessment is an examination of what could cause harm to people. In the examination it is highlighted where the dangers are and which actions need to be taken (box 16).

At its simplest this means that senior members of staff walk through every part of the zoo and note each potentially dangerous or risky situation that exists. After pointing out the potential problems, make sure that all these risks are eliminated as soon as possible. An example of a risk assessment is given in Image 13.

A risk assessment should also include the risks of working with animals, e.g. when restraining an animal for health checks / veterinary purposes or transport.

It is important to know how dangerous every single animal in your zoo is. A grading system could be used to grade the different animals (image 14).

It requires skill and experience to work with animals of higher risk, and assigning an experienced member of staff to work with high risk animals is an essential part of reducing hazards to staff and visitors.

BOX 16

RISK ASSESSMENT:

When performing a risk assessment one should take the following steps:

Step 1: Look for hazards.

Step 2: Detail who might be harmed and how.

Step 3: Find a solution and take action.

ENCLOSURE/LOCATION	PROBLEM	RISK	TO WHO?	SOLUTION
BEAR ENCLOSURE	PAWS AND HANDS CAN FIT THROUGH BARRIER	INJURY TO HAND OR OTHER BODY PART INFLICTED BY THE BEAR	STAFF & VISITORS	KEEP SAFE DISTANCE AWAY FROM THE FENCE. WARNING SIGN IN AREA. STAND-OFF BARRIER FOR PUBLIC SIDE.
PATHWAYS	POTHoles AND CRACKS	RISK OF TRIPPING OR FALLING	STAFF & VISITORS	RESTORE HOLES IN PATHWAYS
IGUANA ENCLOSURE	SLIPPERY ROCKS AROUND WATER POOL	RISK OF STAFF TO SLIDE AND FALL	STAFF	FOOTWEAR SHOULD HAVE GOOD GRIP, TRY TO AVOID WET ROCKS. MOVE CAREFULLY IN THE EXHIBIT.

IMAGE 13: Example of a risk assessment layout

CATEGORY	LEVEL OF RISK	TYPE OF ANIMALS
5	VERY HIGH	BIG CATS, CHEETAHS, RHINO, BEARS, GREAT APES, ELEPHANTS, VENOMOUS SPECIES.
4	HIGH	SOUTH AMERICAN SEA LIONS, (PYGMY) HIPPOS, ZEBRAS, LARGE MONKEYS, WOLVES
3	MODERATE	SMALL CATS, CAMELS, GIRAFFES, SMALL MONKEYS, OTTERS, VULTURES, OSTRICHES, LARGE PYTHONS (UNTRAINED), LARGE MONITOR LIZARDS.
2	SLIGHT	LLAMAS, LARGE LEMURS, TAMARIN/MARMOSET MONKEYS, PIG SPECIES, DEER SPECIES, MONGOOSES, PARROTS, FALCONS AND OWLS, SMALLER SNAKES, IGUANAS.
1	LOW	AMPHIBIANS, TORTOISES, FISH SPECIES, FLAMINGOS

IMAGE 14: Animal risk categories used to categorize the risk that a certain animal brings. (Colchester Zoo, United Kingdom)

3.6 RISK PREVENTION

It is important to train animal keepers in personal hygiene and safety. Hygiene prevents the spread of disease. It includes cleaning, disinfection, pest control and personal hygiene.

Zookeepers are in close contact with the animals. They could easily bring disease into the zoo through farm animals, pets or other humans, and can also transmit diseases from the zoo to the outside. Keepers regularly walk from one animal enclosure to the other and can thereby also transmit disease around the zoo. Therefore personal hygiene is very important. Box 17 lists the basics of personal hygiene for zookeepers.

Zookeepers also need to be aware that many animals are potentially dangerous. When staff enter an animal enclosure for cleaning or feeding, potentially dangerous animals should not be inside the enclosure. They are to be moved to the outside enclosure or to a separate part of the enclosure. This should also be kept in mind when designing an enclosure (see chapter 4.1.2 & chapter 4.2).

The keepers should also check the fences for damage and holes when they clean the enclosures, this way the fences are checked daily next to the official inspection.

Wild animals are very unpredictable; so even when working in an enclosure with non-dangerous animals, never turn your back on the animals and always keep an eye on them. Obviously, keepers should never enter an enclosure with dangerous animals still present. Such animals should always be locked away when keepers have to enter for cleaning and other work inside the enclosure. Also, when walking past the fence or bars of an enclosure, it is important to keep a distance, to prevent animals grabbing through it.

BOX 17

PREVENTING SPREAD OF DISEASE:

Several aspects of personal hygiene to prevent spread of disease:

- Stepping in a footbath with disinfectant when entering and leaving an animal area with high risk of disease.
- Always wash your hands before eating or smoking, after handling an animal, when going to another animal section and before leaving the zoo.
- Avoid unnecessary contact with animals.
- Wear rubber gloves when handling animal waste or dead animals.
- Wear overalls, boots and protective clothing if necessary.
- After work, take a shower and change your clothing.

When a keeper has finished working inside an enclosure and leaves it, he/she should ensure that all doors are locked. Protocols should include a double-check (or even three times!) to ensure proper locking of doors / hatches, especially in the case of dangerous animals. Ideally keepers should work in pairs to make sure that two pairs of eyes can guarantee safety and prevent mistakes. When working in pairs both individuals should always know where the other is in the animal enclosure. This must be done to prevent a keeper accidentally releasing a dangerous animal into an area where the other keeper is working.

KEEP IN MIND: HEALTH AND SAFETY OF ANIMALS, VISITORS AND STAFF

- **BARRIERS:** adequate barriers checked daily
- **EMERGENCIES:** protocols and training available to staff. Animal escape and capturing equipment, perimeter fence
- **WARNING SIGNS**
- **RISK ASSESSMENT:** identify potential animal risk and solution to that risk
- **RISK PREVENTION:** transmission of disease, enclosure maintenance, keeper/handler experience

ROTTERDAM ZOO, THE NETHERLANDS
When transporting animals the crate
needs to be handled with care.
(photo: Rob Dolaard)



Feed your animals with a variety of fresh food
to keep them healthy. Elephants love to feed
on carrots, apples and other fresh food items



CHAPTER 4

The Animal Department

The keeping of animals is one of the most complicated aspects of zoo management. With so many species that all have their individual needs, it is impossible to cover even a small fraction in this manual. Therefore this chapter will focus on the basics of animal keeping and discuss topics such as animal welfare, exhibit design, enrichment and animal transport.

4.1 ANIMAL WELFARE

Every zoo has to ensure the welfare of its animals (box 18). Animals in the zoo that are provided with the best of care will stay healthier, produce more offspring and have a longer lifespan.

There are five important principles to keep in mind when considering animal welfare (box 19). This chapter will give a short overview of these needs. The basic way of ensuring good animal welfare is to look how the animals live in the wild. Zoos should make an effort to keep their animals in a way that resembles the life of the species in the wild.

4.1.1 FOOD AND WATER

The basic needs for any animal to stay alive are food and water. Consequently, animals are to be provided with enough food and water to stay healthy. This means that the animal is fed with the right amount of food, resembling its natural diet and that clean drinking water is available at all times.

BOX 18

ETHICS AND ANIMAL WELFARE VISION, WORLD ZOO AND AQUARIUM CONSERVATION STRATEGY (WZACS):

“All zoos and aquariums will follow ethical principles and maintain the highest standards of animal welfare in order to establish and sustain viable populations of healthy animals for conservation purposes and to convey credible conservation messages to the public.”

BOX 19

THE KEY PRINCIPLES OF ANIMAL WELFARE:

1. Access to food and water.
2. A suitable environment to live in.
3. Provision of health care if animals are sick or injured.
4. Every animal should be able to express its most natural behaviour.
5. Protection from fear and distress.

Water

Water has to be present at all times. To keep the water fresh keepers should empty, clean and refill the water buckets on a daily basis. When the enclosure has a moat to contain the animals in their enclosure, this could be used by the animals to drink. In this case, it is important to keep the water in the moat as fresh as possible. Preventing the water from standing still for long periods (make a stream flowing through the water), combined with emptying and cleaning the moat regularly will keep the water safe for the animals to drink and simply makes it look better.

Feeding

Most animals feed throughout the day. In the wild herbivores and omnivores spend most of their time feeding or looking for food / water. Most carnivores on the other hand need to hunt for prey and may not always succeed. The feeding regime in the zoo should be designed to resemble the way the animals would feed in the wild.

Image 15 shows an example of a diet for lions (*Panthera leo*). Most big cats and other carnivores are not fed every day, this resembles the wild situation where the species also may not succeed every day in catching prey.

How food items are presented is also of importance. Again the natural behaviour of the animals and the social aspects of animals living in groups should be considered. For example, giraffe (*Giraffa camelopardalis*) naturally feed high up in the treetops.

In captivity the animals will have to be fed at a similar height, resembling their treetop feeding behaviour in the wild. As another example, species with strong hierarchical structures cannot be fed by simply providing a single plate of food: Dominant animals might claim the food and keep the lower ranking animals away from it. Spreading food items around the enclosure will improve the chance for every animal to get to the food. This is also a form of enrichment (see chapter 4.3), the animals will spend more time looking for the food and are therefore kept busy for a longer period of time.

BOX 20

FOR EVERY ANIMAL DIET THE FOLLOWING INFORMATION NEEDS TO BE DETAILED:

- The animal species.
- What to feed.
- How much food (amount per animal).
- Food schedule (time, frequency).
- How to prepare the food (whole food items? chopped fruit?).
- How to feed.
- Enrichment feeding.

Diets

The diet that is fed to the animals should be as similar to the animals' diet in the wild as possible. Each diet must find the balance between a starving animal and an over-fed animal. Every animal should be fed with more than one type of food: This way the animals have a more varied diet and are accustomed to several food items, this might come in handy when one type of food becomes unavailable for a while.

Animals that are fed a balanced diet will stay healthier, have a higher reproductive rate and offspring will have a better chance of survival.

Staff should research the nutritional requirements of each species. In the wild, the diet of animals will often change throughout the year. Image 16 shows how a seasonal diet for brown bears (*Ursus arctos*) in captivity might be implemented. To simulate hibernation, the bears have a richer and more varied diet during spring and summer and receive lower amounts of food during winter (November – March).

Veterinarians or other specialists can be consulted for the development of general animal diets as well as diets for animals under special care such as animals

IMAGE 15: Example of a diet for lions. They are fed 5 days a week and are provided with fish once a week. (Ouwehands Dierenpark, Rhenen, The Netherlands)

LIONS (PANTHERA LEO)	EACH DAY PER LION:	MON	TUE	WED	THU	FRI	SAT	SUN
MEAT AND CARMIX*	3-5 KG		●	●		●	●	●
FISH	10 PIECES					●		

* CARMIX IS A MINERAL AND VITAMIN POWDER SPREAD OVER MEAT. (0,2 KG CARMIX / 1 KG MEAT)

under veterinary treatment or pregnant animals. Within the zoological community there is a lot of knowledge about the diets of a variety of different animal species. The “EAZA Nutrition Working Group” provides a wide range of information on diets and nutrition for zoo animals that can be used as a guideline when developing an animal’s diet (box 20).

Changing a diet

If the diet of an animal is to be changed, it is important to do this slowly. The animal, as well as its digestive system,

needs time to adjust to the new food items. Many animals suffer from diarrhea when diets are changed too quickly. Start with introducing small quantities of the new food next to the regular food, gradually increasing the new food items and reducing the old.

Diets could be changed because the animal might have a changed food requirement (age, season, health, pregnancy). The diet could also be changed for improvement, but also some food items could be replaced by others because the animals do not eat these very well. It is therefore efficient to keep a record of

DIET SUMMER (DAILY)				
TIME	FOOD	NAME ANIMAL	GRAMS PER ANIMAL	GRAMS PER GROUP
MORNING	APPLE		900	3600
	PEAR		525	2100
	+ VARIABLE DIET			0
AFTERNOON	FISH		900	3600
				0
				0
				0
EVENING	BREAD		1 (PIECE)	4(PIECES)
	DOG FOOD	PEPPIE	1250	4000
		KOKKIE	1250	
		BOLKE	750	
		MOEKIE	750	
	MEAT	PEPPIE	500	2000
		KOKKIE	500	
BOLKE		500		
	MOEKIE	500		
VARIATION				
TIME	FOOD	NAME ANIMAL	GRAMS PER ANIMAL	GRAMS PER GROUP
MONDAY	ENDIVE		1 (piece)	4 (pieces)
TUESDAY	CARROT		750	3000
WEDNESDAY	ORANGE		1 (piece)	4 (pieces)
THURSDAY	ENDIVE		1 (piece)	4 (pieces)
FRIDAY	CARROT			3000
SATURDAY	ORANGE		1 (piece)	4 (pieces)
SUNDAY	CUCUMBER		1 (piece)	4(pieces)
GENERAL				
A DEVIATION OF 100 GRAMS WHEN WEIGHING IS TOLERATED.				

IMAGE 16: Example of a diet for brown bears. They are fed differently throughout the year. The diet aims to resemble their natural diet. (DierenPark Amersfoort, the Netherlands)

DIET WINTER (DAILY)				
TIME	FOOD	NAME ANIMAL	GRAMS PER ANIMAL	GRAMS PER GROUP
MORNING	APPLE		450	1800
	PEAR		275	1100
	+ VARIABLE DIET			0
AFTERNOON	FISH		900	3600
				0
				0
				0
EVENING	BREAD		1 (PIECE)	4(PIECES)
	DOG FOOD	PEPPIE	1100	1600
		KOKKIE	500	
		BOLKE	0	
		MOEKIE	0	
	MEAT	PEPPIE	500	1000
		KOKKIE	250	
BOLKE		125		
	MOEKIE	125		
VARIATION				
TIME	FOOD	NAME ANIMAL	GRAMS PER ANIMAL	GRAMS PER GROUP
MONDAY	ENDIVE		550	2200
TUESDAY	CARROT		1000	4000
WEDNESDAY	ORANGE		150	600
THURSDAY	ENDIVE		550	2200
FRIDAY	CARROT		1000	4000
SATURDAY	ORANGE		150	600
SUNDAY	CUCUMBER		400	1600
GENERAL				
A DEVIATION OF 100 GRAMS WHEN WEIGHING IS TOLERATED.				
DETAILS				
* FOOD IS NOT CHOPPED UP OR CHOPPED UP IN LARGE PIECES				
* PEANUTS: NO MORE THAN 200 GRAMS PER BEAR PER DAY				
* SPRINKLE MEAT WITH 5 GRAMS CAC03				

what was fed to the animals and what they actually ate. These logs can help evaluate the diet over the medium term and help suggest improvements for the future. (image 17).

Feeding by visitors

Uncontrolled feeding by visitors should not be permitted in the zoo. If visitors feed the animals without control, you will never know exactly what and how much food the animals received. As a result the animals might get fat through overfeeding or could be fed with unhealthy food items. Where feeding by visitors is still wanted, it should be with suitable food that is provided and approved by the management of the zoo. In any case the amount of food should be limited to prevent over-feeding.

Preparing & storing of food

It is important that the food for the animals is prepared the right way. Fruits and vegetables are often sprayed with insecticides and fertilizers. To prevent the animals getting sick from these toxins, all fruit and vegetables should be washed with fresh water.

Always check the food before it is fed to the animals, ensuring that it is not spoiled or contaminated. For example, hay and grass could contain dead animals, pieces of string, dried toxic plants or other dangerous objects.

Supplies of food and water should be stored under basic hygienic conditions (box 21). When working with frozen fish and meat, try not to refreeze the items as this will reduce the quality of the food and will induce the growth of bacteria. (box 22)

Many zoos use live food for enrichment. Zoos keep and breed their own live food for example: mice, rats, mealworms (*Tenebrio molitor*), crickets or grasshoppers. Please keep in mind that some countries have special regulations for presenting live food items.

BOX 21

CHECKLIST TO KEEP YOUR ANIMAL FOOD SUPPLIES FRESH:

- ✓ Is food and drink protected against dampness, rotting, mould and contamination by pests (mice, rats, sparrow, insects)? E.g. by storing the food items off the ground and in sealed containers.
- ✓ Are supplies of fresh food kept under refrigeration, when necessary?
- ✓ Is the preparation of food carried out in a separate area suitably designed and constructed for food preparation and not used for other purposes?



IMAGE 17: there are many ways to keep record of what was fed to the animals in a zoo. In Jersey Zoo (United Kingdom) the keepers write down on a board what exactly they have fed the animals every day.

BOX 22

FREEZING MEAT & FISH:

- Before fish is fed to an animal, it should be frozen and thawed (de-freezing) to kill parasites that fish often carry. Keep in mind that the fish might lose some of its vitamins and minerals during the process. These vital elements could be replaced with supplements.
- If meat is stored in the freezer it is advised to freeze the meat per portion for one day, for example meat for one week in seven separate lumps of meat used for the total zoo every day. This will prevent you from having to thaw the meat and refreeze the remainder again.
- Thawing meat or fish in water will wash out a lot of nutrients. It is better to get it out of the freezer in time to thaw slowly. Keep it out of reach of flies & pests by using a box with a cover.

4.1.2 SUITABLE ENVIRONMENT

Housing animals in a well designed enclosure is essential for their welfare.

When designing or modifying an animal enclosure, the species it will hold and the way this species lives in the wild should be considered. One species may have totally different needs than the other. As mentioned in chapter 2.5 one must determine the maximum number of animals that can be kept in an enclosure. When breeding, consider the maximum capacity of the enclosure so it will not become overcrowded.

Husbandry guidelines

The EAZA community exchanges information on how zoos and aquaria should best take care of their animals. EAZA's "Husbandry and management guidelines" are produced to exchange information on all kinds of topics like housing, nutrition or behavioural enrichment. These guidelines are developed by TAGs (see Glossary page 110) for a particular animal species or animal group, like for

example the "Husbandry guidelines for Pelicans (Pelecanidae)" or the "Husbandry guidelines for bears (Ursidae)". The husbandry guidelines can be obtained through the EAZA Executive Office.

Space and decoration

An enclosure must provide enough space and furniture for the animal to express natural behaviour. Animals need space to move around and places to feed, sleep/rest and to hide from group members or the view of visitors. Animals also need something to do in their enclosure. Most herbivores will spend a great part of the day feeding, but other species are less easily satisfied. Simply feeding these once a day means that the animals will be "bored" the rest of the day. Therefore it is important to try to keep these animals busy in another way (see chapter 4.3).

Materials

For most species it is advisable to make the enclosure look as natural as possible.

Use natural substrates (sand, woodchips, etc.) and furniture (logs, branches, plants, etc.) to make an enclosure look like a piece of the natural environment. This also makes the enclosure more appealing to visitors and shows them how the species lives in the wild. Also note that an enclosure decorated with natural materials will enrich the lives of the animals and can make their lives more comfortable.

Comfort and well-being

To ensure comfort and well-being of the animals, several conditions must be maintained at a certain level. The temperature, humidity, ventilation and lighting of the enclosure should be considered for all species.

Animals that arrive from other locations are to be fully acclimatized. This is a slow and gradual process that will allow the animal to get used to the conditions in its new surroundings.

Some of the animals might need shelter in their outside enclosure. The shelter provides protection from rain and storms, but also from excessive sunlight.

All species have different needs when it comes to furnishing an exhibit. Climbing animals need many objects to climb on, birds need branches or other places to sit on (perching) and other animals might

need burrows or nesting boxes to sleep/nest in. The furnishing of an enclosure should consider all aspects of an animals' natural behaviour. One animal might be eager to dig while another animal likes to take a bath or mud pool. A zoo should provide for these needs, so that the animal can live in the zoo in more or less the same way it would in the wild.

Drainage is important in outside enclosures. Animals with hooves (ungulates) can seriously damage the soil they walk on, preventing any vegetation from growing. There are several techniques to prevent the enclosure from becoming a mud pool (e.g. drainage by using layers of different soils in substrates).

Separation

Some animals need to be separated from the group every now and again, for example to separately feed individual animals to be sure all animals get their share of food. Some animals might have to be separated during the night. In some cases pregnant animals or animals with young may need to be separated in case of unnecessary stress or suffering.

Also injured or sick animals may need to be kept separately from a group for a certain period of time. When designing an animal enclosure, keep in mind the possible need for separation and include this in the design of an enclosure (see chapter 3.4).

BOX 23

MIXED SPECIES EXHIBITS:

There is a lot of experience in mixed species exhibits (several species in one enclosure) in zoos around the world.

When considering a mixed species exhibit, zoos should check to see if other institutions have experience of keeping these or similar species together.

Ask these institutions for advice on how to keep the mixed species and for insight into potential problems.

Ask your mentor or the EAZA Executive Office to help you locate a zoo with the right experience.

Keeping groups / mixed species

Some species live in herds or groups in the wild, and every effort should be made to provide the same group dynamic within a zoo exhibit.

Another possibility is to keep several different species in the same enclosure. This could be a great way to enrich the animals' lives, but it also needs careful planning and monitoring (box 23).

In both cases it is important to closely monitor the situation within the group or between species to prevent animals being dominated by other individuals. Mixing species and keeping groups also means a higher risk of persistent and unresolved conflict between group members or the different species in the exhibit; another reason for monitoring.

Also consider whether the enclosure is suitable for all the species it houses and whether it is large enough for the animals to get out of each others way. Some situations require specially designed barriers that divide the enclosure for one species but still allow another species to move from section to section. This allows the latter species to get out of reach of the first species. For obvious reasons, do not combine predator and prey or other combinations in which one animal may hurt the other.

4.1.3 VETERINARY CARE

Every zoo should employ at least one veterinarian or contract a private veterinarian in the area. Box 24 lists the responsibilities of the veterinarian in a zoo.

The veterinarian in your zoo could become a member of the “European Association of Zoo and Wildlife Veterinarians” (EAZWV) and share knowledge on wild animal health care.

The animals in the zoo should be provided with all necessary health care. There are several provisions which must be made to ensure both the physical and mental health of a zoo animal:

- Veterinary care
- Sanitation and control of disease
- Routine observation
- Quarantine

Veterinary Care

Every zoo should employ or contract a veterinarian. This veterinarian should develop and maintain a programme of veterinary care (box 24). The level of veterinary service should be appropriate to the state and type of the animal collection: A large zoo could employ one or more full-time veterinarians, smaller institutions can contract a private veterinarian. If no full-time veterinarian is employed, the contracted veterinarian should not only be available for emergency calls, but should also carry out frequent regular advisory visits to assess general health and preventative veterinary practices.

Veterinary facilities

If there is no fully equipped veterinary facility on the premises (surgery etc.), at least a separate room for routine or emergency examination should be available at the zoo. Basically it means that it is a room that is only used by the veterinarian for veterinary purposes. Your veterinarian should indicate what is needed for the veterinarian facility.

Keeping veterinary records

Veterinary records must be kept up to date and should cover the following:

- Preventative medical treatment (box 25).
- All the medical treatment and surgery that has been carried out.
- Test results (e.g. post mortem examination on animals that have died). (box 26 & 27)

BOX 24

WHAT IS THE VETERINARIAN RESPONSIBLE FOR?

- Routine inspections of the zoo
- Directing or carrying out treatment of all sick animals.
- Supervision of all contraception.
- Administration of vaccines, worming and other aspects of preventative medicine.
- Health monitoring of animals including submission of blood and other samples for laboratory examination.
- Safe and proper collection, preparation and dispatch of diagnostic and other samples.
- Ensuring that post mortems are carried out.
- Supervision of quarantine facilities.
- The design of nutritionally balanced diets.
- Cooperating in the zoo’s planning and exhibit design.

BOX 25

BASIC PREVENTATIVE MEASURES INCLUDE:

- Vaccination of animals.
- Deworming of animals.
- Contraception.
- Hygienic animal enclosures.
- Personal hygiene of staff.
- Monitoring the animals’ health. (observation, analyzing samples)
- Putting newly arrived animals to the zoo in quarantine.

BOX 26

SUBSTRATE SAMPLES:

If sand or another natural substrate is used in an animal enclosure, samples could be examined for worms a few times a year.

Sanitation & control of disease

It is important to prevent the spread of disease. Chapter 3.6 explained the role of zookeepers; the veterinarian should be responsible for developing a programme of preventative measures and carry out regular tests on substrate, dung or live animals. The veterinarian should also see to it that clinical waste (dead animals, medicine) is regularly disposed of in a way approved by the local authority.

Quarantine

New animals (i.e. coming from another institution) or animals that have a contagious disease should be placed in quarantine for a set period of time. The dung and blood of the animals in quarantine should be examined for parasites and viruses.

Placing an animal in quarantine before moving it into the collection will prevent outbreak of disease. Only move animals from the quarantine to their enclosure in the zoo once you are sure they are cured and free of disease.

The quarantine facility should not be used for other purposes than animal quarantine. Access to the quarantine facility should be restricted to authorized staff only. Hygiene is very important to prevent animals in quarantine infecting each other, but also to prevent spread of disease to staff or into the zoo. Washing hands before and after feeding and cleaning will lower the chance that bacteria or viruses are transmitted and a footbath with disinfectant at the entrance of the facility will disinfect the shoes of keepers and veterinarians going in and out.

Routine Observations

The condition, health and behaviour of all animals should be checked at least twice a day by the person or persons in direct charge of their care (zookeepers) (box 28).

Animals that give cause for concern must be thoroughly examined to find out whether they are stressed, sick or injured.

Daily reports should be kept by the persons in direct charge of the animals (chapter 2.5). The records should document changes to the prescribed diet, health checks carried out and any unusual behaviour or activity (chapter 2.8, image 9).

BOX 27

POST MORTEM EXAMINATION:

It is important to examine every animal that has died. The examination should make clear why the animal died. Some animals might die because of old age but if an animal died from disease, parasites or any other cause, it is important to know this. This information can then be used to improve the welfare of the other animals in your zoo.

BOX 28

OBSERVATION, WHY?

Most animals that are sick or injured behave differently than they do normally.

If the keepers observe every animal in their care on a daily basis, any abnormal behaviour could be noted quickly.

The behaviour of an animal (for example inactive or does not eat) might indicate that something is wrong. The earlier these signs are recognized, the earlier a veterinarian can be called to investigate the case.

BOX 29

BREEDING: AN OPPORTUNITY TO EXPRESS NORMAL BEHAVIOUR?

- Breeding allows an animal to express its natural behaviour.
- However only breed if you have the space to accommodate the offspring or when breeding is requested by other institutions.
- Animals must have privacy to breed and successfully rear their young.
- The offspring must not be sold to disreputable clients such as circuses, animal dealers, private clients or non approved zoos. They must only go to other approved zoos / institutions.

4.1.4 EXPRESSING NATURAL BEHAVIOUR

It is important for the animals to be able to express natural behaviour. This means, for example, that animals that climb should be able to climb, animals that search for food should be able to search for their food and animals that normally live in social groups should be kept in a suitably sized group.

For most animals in the wild the continuous search for food and safety, and sometimes the continued social interactions, make out the largest part of the day. By providing the appropriate surrounding, group size and enrichment, the animal will be able to express the behaviours that it would in the wild. It is important that animals are not over-activated or become stressed by being forced to express natural behaviour. A well balanced daily regime should assure that an animal has enough time during the day to feed quietly or rest when it feels the need to do so.

Breeding and caring for offspring (see box 29) is one of the most natural behaviours of almost all species in the zoo. Allowing animals to breed will stimulate natural behaviours and enrich the life of the animals. Breeding should only be allowed according to the collection plan (chapter 2.6), in short this means that it should be considered whether there is enough space to house the offspring or whether there is another institution that could house the offspring once they are old enough to be separated from their parent(s). If sending young animals to another institution, always keep in mind the acquisition & disposition policy (chapter 2.10).

4.1.5 PROTECTION FROM FEAR AND DISTRESS

Stress is dangerous for animals, as it will weaken them both physically and psychologically. It will also make the animals more susceptible to disease.

A zoo must therefore see to it that the fear and stress of animals is minimized.

Most animals have a natural fear for humans. It could therefore be very stressful for an animal if a visitor or keeper comes too close to the animal. Capturing animals is very stressful. If animals are to be handled, this must be done with care to prevent stress or physical harm. Animals that are to give birth are more easily stressed. Special accommodation for pregnant animals or animals with young should be available to minimize unnecessary stress.

Animals may become stressed by visitors, keepers or other animals. Animals might therefore have the need to hide if they feel crowded by visitors watching them or group members harassing them.

If there is a possibility that domesticated animals can come into contact with visitors, it is important to see to it that animals are not in contact with visitors for long periods and that the animals can move away from the visitors' reach in the enclosure.

Animals with a higher intelligence are susceptible to stress by not having anything to do. In the wild, animals use energy for moving around, hunting, swimming, playing and climbing. The animals are looking for food or have social interactions, a zoo should make sure that the animals are kept busy for a larger period of the day. This is called "environmental enrichment", this is further explained in chapter 4.3.

4.2 ENCLOSURE (RE)DESIGN

Sometimes it is necessary to renew or rebuild animal enclosures or other facilities at the zoo. In the first place this could be necessary to improve the welfare of the animals, but it could also be undertaken to make the enclosure more attractive to visitors or safer for staff.

Such projects do not necessarily require great amounts of money. Often rebuilding an enclosure is not directly necessary or possible: Renovation or redesign might be an option in that case.

4.2.1 ENCLOSURE REDESIGN

Many enclosures would simply look much better after small repairs, repainting and/or redecorating (image 18).

Many zoos still have a number of old facilities that were designed for the menagerie typed zoos of the past (chapter 1). To make such buildings suitable for a 21st century zoo, it does not always mean that the buildings have to be taken down entirely. Sometimes the building itself is worth preserving or there are simply no funds to remove the old building and construct a totally new one.

For example, smaller enclosures can be combined to create one large enclosure, providing additional space for the animals. This means that fewer species are housed in large enclosures instead of displaying many species, each in a small enclosure.

Bare, old style enclosures can also be enriched with natural substrate (box 30) and suited furniture. Tree trunks, ropes, etc. will make an enclosure more exciting for primates or other tree dwellers. Natural substrate provides the opportunity for animals to dig or look for food items underground.

4.2.2 ENCLOSURE DESIGN

The design of animal enclosures is one of the most complex aspects of zoo development. Each different species has its specific needs when it comes to housing and caring for it. When designing an enclosure it is important to design it in a way that guarantees safety and comfort for animals, staff and visitors. An enclosure should be suited for animals to live in, suited for staff to work in and suited for visitors to look at.

When designing an animal enclosure, there are four important things to keep in mind:

- Safety requirements
- Needs of animals
- Needs of staff
- Needs of visitors

BOX 30

THE USE OF NATURAL SUBSTRATES:

For many small mammals and primates, tree bark or sand is often used as a substrate in the enclosure.

Tree bark is used to create a sort of small ecosystem within the substrate.

It can stay in the enclosure for a longer period and reduces the time needed for cleaning.

Uneaten food items and animal waste should be removed, but micro organisms that naturally occur in the substrate help to clean up waste as well. The entire substrate has to be removed and refreshed after a certain period of time.

Sand or woodchips can also be used. In inside enclosures it should not be too deep, a thin layer usually being sufficient. Waste and left over food need to be removed and the substrate also needs to be refreshed every now and again. Spading the substrate (loosening the soil) should prevent rotting.

Safety requirements

Each enclosure should in the first place be safe. It should be designed to prevent any escape by the animals in it. An animal escape could be dangerous for staff and visitors, but could also be dangerous for the animal itself. Chapter 3.4 describes the basics of preventing escape and developing emergency plans.

Even when unable to escape, animals can still be dangerous when inside the enclosure. Keepers should be able to move the animal into another part of the enclosure when entering it, in particular when dealing with dangerous animals.

Therefore there should be several separate enclosures that can all be locked individually.

When operating any hatches or gates, the keepers should be able to see all animals in the enclosure. This is most important when keepers need to go inside the enclosure for cleaning. The keepers need to see if all the animals have moved through the hatch/gate to prevent any animal from still being inside the enclosure. It is also important that the particular hatch can be seen from the point where it is operated. This



IMAGE 18: Example of a redecorated enclosure for Mandrill (*Mandrillus sphinx*). The enclosure (inside and outside) has been filled with tree bark and furnished with trunks, logs and spiny vegetation. (Amsterdam zoo, The Netherlands)

will allow the keeper to close or open the hatch as he/she sees the animal has passed through.

If there is a walkway for keepers next to or between animal enclosures, it is important that there is enough space for the keepers to stay out of reach of the animals. Especially with primates, cats and bears this is important as these animals can seriously harm a person through the bars of the enclosure.

Doors that give access to outside areas should open to the inside of the enclosure. By doing so, the animal cannot simply open the door by jumping at it if it is not properly locked.

Needs of animals

There are no compulsory rules describing how an enclosure should be designed. However, the wellbeing of the animals should be a priority. The best way to do this is by using the natural environment of the species in the wild as a reference. A well-designed exhibit provides enough space and possibilities for the animals to express their natural behaviour (see chapter 4.1.4). For every species that is kept in zoos, you will find several colleagues that have specific expertise on the keeping of that species. Within EAZA, TAGs have developed several husbandry guidelines for the keeping of certain species (Chapter 4.1.2). But again, these do not include strict rules, but rather recommendations to get started.

First of all an enclosure should be safe for the animal to live in, there should be no risk of injury or stress. The animals should be able to hide if they feel stressed or should have the ability to flee or get out of sight from group members if there is a conflict in the group. Next to this the enclosure must allow animals to shelter from weather conditions like sun, rain, snow, cold etc.

The materials that are used should be strong enough to resist damage inflicted by the animals. The design should keep in mind the specific needs of the species that will be housed in an enclosure.

For example places for nesting, perching, a den for animals living in holes, vegetation or special feeding places may have to be provided. Husbandry guidelines have been produced for a number of species and can be obtained through the EAZA Executive Office.

Needs of staff

When designing an enclosure it is important to keep in mind that animal keepers will have to go into the enclosure every day to clean it. The enclosure should therefore be easy to clean. For most outside and some inside enclosures it is advisable to make it accessible to vehicles in case heavier work needs to be done.

It would be efficient to connect the facility to the electricity- and the water system. This way, keepers can directly connect water hoses or electrical equipment in the facility making cleaning more efficient. A place for the keepers to wash their hands should be installed to improve hygiene. To prevent accidents, see to it that animals cannot reach any of the water or electrical points. Floors in the inside enclosures that are cleaned with water need drainage, construct all floors to be elevated towards the drain to assure water will naturally flow towards it.

Animals have to be moved into the enclosure and after a while it might also be necessary to take them out again. In the design, places to safely connect and secure transport boxes/crates should be included.

Also think of ways to easily separate or catch an animal to make the work of the keepers and veterinarian more efficient (image 19).

Involve your staff!

Both keepers and the veterinarian(s) should be involved in the designing process because they are the people that will actually work in the facility and have a better insight into the practical aspects. If keepers and other relevant staff can influence the design, the end result will be much better for them to work in.

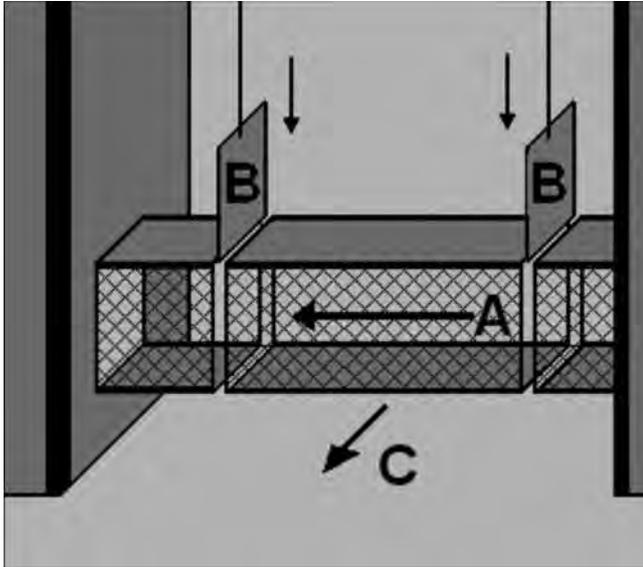


IMAGE 19: For many animals, a crush can be used to safely capture the animal. The animal should be used to walk through the tunnel daily (A), when the animal is to be captured or treated the slides can be pulled down (B) and the animal is trapped in between the slides. Some (small) crushes can also be pulled out for short distance transportation (C).

Needs of visitors

It is also important to consider the visitors that will be viewing the animals. Make sure that all visitors are able to see the animals: For example, children and people in wheelchairs have a much lower point of view and may not be able to look over a wall or bush.

An enclosure should look exciting and welcoming to attract visitors. Enclosures can be made rather naturalistic and the challenge is to let people think there is little or no boundary between them and the animal.

Remember to consider the number of visitors that could come and look at the enclosure at the same time and try to include this in the design to avoid overcrowding (broader pathways, one way walkthrough, multiple viewing points). However, visitors should never be allowed to view the enclosure from all sides to prevent the animals from feeling crowded. At some points the view of visitors should be blocked by shrubs or other materials to allow some privacy for the animals (especially for nervous species).

An enclosure should also be safe for the visitors. All doors to non-public areas should be locked at all times, to prevent unauthorized access and stand-off barriers should be added to make sure that visitors cannot come into contact with the animals (chapter 3.2).

Think of education!

Ideally, the person or department responsible for education is also involved in the design process. By doing so, the education can be integrated into the exhibit and thus be more effective.

4.3 ENVIRONMENTAL ENRICHMENT

Zoo animals, especially those with a higher intelligence, should be encouraged to express natural behaviour. One can imagine that a human locked in an enclosure is easily bored when not having anything to do. The same goes for some animals that could develop stereotypical behaviour as a result (box 31). To improve the living conditions of the animals in captivity, environmental enrichment should be provided. Environmental enrichment makes the lives of the animals in the zoo more active and interesting. Enrichment is not necessarily expensive and can be implemented quite easily with a little imagination (image 20). To be effective, environmental enrichment should be new, challenging and varied. Image 21 shows an example of a programme for the enrichment of lions in a zoo. A calendar like this can be used to plan the enrichment on a daily basis.

Always be cautious when implementing enrichment; some animals might undergo serious stress when exposed to new items or scents. You should also take care to prevent transfer of parasites or diseases.

The life of an animal in the zoo could be enriched in many different ways. Four main types of enrichment are listed in this chapter:

- Novel items
- Food presentation
- Sensory enrichment
- Enclosure design

Enrichment should be based on the natural behaviour of the animal. It should stimulate or assist the animal to do things that it would normally (have) to do in the wild:

- Sleeping or resting
- Grooming or other body care
- Exploration
- Foraging
- Sexual behaviour
- Playing
- Social interaction

BOX 31

STEREOTYPICAL BEHAVIOUR:

Animals like most carnivores, parrots, elephants, bears and primates are often seen making abnormal and obsessive expressions, regurgitation and re-ingestion behaviours or self-mutilation. This phenomenon, known as “stereotypical behaviour”, is caused by boredom and stress and causes the excretion of several endo-morphines in the brain. Examples of stereotypical behaviour are:

- Elephants shaking or nodding their heads for long periods.
- Carnivores walking obsessively along the fences.
- Parrots plucking their own feathers.

The animals find comfort in expressing these obsessive movements and do not quickly lose them. Environmental enrichment can reduce or stop this unwanted behaviour.



IMAGE 20: Stichting Harpij (see contacts page 93) published this very useful book about environmental enrichment for zoo animals in Dutch, English, Russian and Hungarian.

JANUARY 200X						
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
	1	2	3	4	5	6
	PREPARATION: HANG ROPES IN THE EXHIBIT OF THE MONKEYS	MAKE SMELL TRACKS WITH DEODORANT SPRAY ON ROCKS & GROUND IN LION EXHIBIT	HIDE RABBIT SKIN IN THE EXHIBIT	FEED A WHOLE CARCASS OF COW (OR OTHER)	MAKE HOLES IN SUBSTRATE AND HIDE FOOD IN IT	COLLECT THE ROPES FROM MONKEY EXHIBIT AND SPREAD THEM THROUGH LION EXHIBIT
7	8	9	10	11	12	13
PREPARATION: MAKE ICE BALLS WITH WATER, BLOOD & MEAT	FEED ICE BALLS TO THE LIONS	PREPARATION: MAKE 2 BAGS WITH STRAW AND PUT THEM IN THE ZEBRA ENCLOSURE. FEED LIONS WITH MEAT THAT IS ATTACHED TO BONE	FEED LIONS WITH MEAT THAT IS ATTACHED TO BONE	COLLECT DUNG FROM ZEBRAS/GIRAFFES AND SPREAD THIS THROUGH LION EXHIBIT	COLLECT BAGS FROM ZEBRA ENCLOSURE AND PUT THEM IN THE LION EXHIBIT	FEED LIONS WITH MEAT THAT IS ATTACHED TO BONE

IMAGE 21: Example of an enrichment calendar for lions (*Panthera leo*).
(Ouwehands Dierenpark, Rhenen, The Netherlands)

Novel items

Animals can become very excited when introduced to a new item. Monkeys could for example be given a cardboard box.

The group will investigate the box and afterwards it might be used to play with. It can also activate the groups' social structure because novel items might be wanted and thus interesting to all animals in the group (low rank as well as high rank). Always make sure that items are safe for the animals and not toxic.

New items could be items to play with (ball, boxes, ropes, etc.) but also new furniture (new branches, trunks, etc.)

Food presentation

Feeding time is an excellent time for enrichment activities: Let the animals work to get to their food. For example scatter small items on the ground, hide or bury food so the animals need to search for it, put the food somewhere difficult to reach etc. (image 22). It will take the animals more time to search for and eat the food, keeping them busy for that time. Some examples of feeding enrichment are included in box 32 & 33.

Sensory (triggering their senses)

Use the animals' senses to trigger its interest. Smell is an important sense in the animal world. Predators are for example very sensitive to the scent of prey, and most animals are triggered by the scent or sound of food or other animals.

Use dung of prey animals to scatter around the enclosure of predators or let goats graze in the outside enclosure during the night. The next morning the animals will be very excited when they enter the enclosure and will sniff every rock and branch.

Enclosure design

The enclosure and everything in it can also function as enrichment in itself. Some animals might enjoy mud baths or dust baths. All sorts of enrichment can be included in the design of an enclosure and objects, such as branches or trunks can be very interesting to an animal to climb into, play with, search for food, move around the enclosure or to scratch the body (image 23 & 24).

BOX 32

EXAMPLES OF ENRICHMENT:

Keepers can hide food for bears throughout their enclosure. This can include small licks of honey in difficult to reach places. This will inspire the natural foraging behaviour of the animals. If meat is being fed to the bears, dragging the meat over the ground in the enclosure will create a scent trail. By creating false trails as well as genuine ones, the keeper can ensure that the bear is kept busy and fulfilled.

In the wild, large cats need to use their strength to bring down prey animals. By hanging meat high, the keeper can encourage climbing of trees, feats of balance and persistence, all of which are important to the animals' quality of life.

BOX 33

TREE TRUNKS:

For the enrichment of many species, a tree trunk can be used. The most effective way is to place a new tree trunk including its roots in the enclosure. The animal will explore every hole, crack and scent on the tree trunk, digging off the dirt on the roots or stripping off the bark.

Animals that like to eat insects can be kept busy for several days, removing all the bark off the trunk in search of insects.



IMAGE 22: Examples of animal enrichment: Put whole food items at places difficult to reach, like this apple (top picture), A cardboard box (right) filled with food items and straw will trigger most small mammals and primates to go and investigate it.



IMAGE 23: Large tree trunks installed in an enclosure for rhinos in Osnabrück Zoo, Germany. The animals rub their heads against it and lift it with their horns.



IMAGE 24: Primates need a lot of objects to climb ropes, poles, branches and other objects to climb enrich the enclosure of the animals. (Bonobo enclosure in Zoo Wuppertal, Germany)

4.4 TRANSPORT

When an animal is to be transported, all regional/ (inter)national regulations and legislation on animal transport should be followed. See to it that the animal is healthy and that it is not carrying any disease before transporting it. If more than one animal is transported, each animal should be placed in a separate crate or box.

Animals can be out of their 'normal enclosure' for about 24 to 48 hours. After this time the animal has to be placed into some sort of 'normal enclosure' to prevent stress and over-exhaustion. Most animals do not require food during the first 24 hours of transport. For longer periods, and with for example ruminants (antelope / cattle) food and water must always be provided during transportation.

IATA

The "International Air Transport Association" developed the "Live Animals Regulations". This book contains rules, regulations and officially accepted designs for transport boxes and crates for every species. These regulations have been adopted by many organisations as minimum standards for animal transports. The book on "Live Animals Regulations" can be ordered at the IATA office (see contact details on page 107).

Transport boxes / crates

A crate or box that is to contain an animal during transport should be large enough for the animal to stand, turn and lie down.

The box or crate should be strong enough to prevent damage or escape and should be well ventilated. Note that, for safety reasons, holes for ventilation are small enough to prevent the animal from reaching out. In general animals that are in the dark are calmer because they have the feeling of being hidden inside the crate.

Loading / off loading an animal

When a large animal is moved into or out of a crate in which it is to be transported, the crate should be placed in front of the entrance to the inside enclosure / stable. When placing the crate, it is important to secure it to the enclosure or gate with a rope or chain. This is because the animal might run very hard entering or leaving the crate causing it to slide away from the entrance by the force of its body. The animal could then escape from the gap between the crate and the entrance of the enclosure.

The easiest way to load an animal into a transport box or crate is to connect it/ place it into the enclosure several days before the actual transport. By putting food in it the animal will get used to the crate and will move into it more easily at the time of the actual transport. A crate should also be dark in this stage as an animal might go into the crate for shelter and get used to it.

If animals are immobilized before they are moved into a crate, do not drag the animals on the ground. Use a stretcher or a piece of canvas to move an immobilized large animal (like tiger).

KEEP IN MIND:

THE BASICS OF ANIMAL KEEPING

- **FOOD AND WATER:** clean water at all times, diet composition and presentation according to biological needs of species. Hygienic food storage.
- **SUITABLE ENVIRONMENT:** EAZA husbandry and management guidelines. Natural environment, biotic and abiotic factors, drainage, shelter and moving away from visitors, separation needs.
- **VETERINARY CARE:** employ or contract veterinarian, keep veterinary records. Quarantine and veterinary facilities.
- **EXPRESSING NATURAL BEHAVIOUR:** appropriate environment and enrichment, group size and composition.
- **DESIGN ENCLOSURES** in consultation with keepers, veterinarians, educators.
- **(RE)DESIGN ENCLOSURES** so it suits the animals natural behaviour and needs.
- **ENRICHMENT:** base on natural behaviour of animals. Main types of enrichment are novel items, food presentation, sensory enrichment and enclosure design.
- **TRANSPORT:** according to (inter)national regulations and legislation (IATA guidelines)

MEDIA PUBLICITY DURING A ROYAL VISIT TO
AMSTERDAM ZOO, THE NETHERLANDS
Visitors are the heart of zoo operations, without
visitors, a zoo could not continue to exist



KEEPER TALK AT THE SEA LION ENCLOSURE,
EMMEN ZOO, THE NETHERLANDS
Keeper talks or animal shows will attract many
visitors and allows you to educate them in a
more personal way



CHAPTER 5

Visitors & Customer Services

This chapter will focus on visitors and the service a zoo provides them with. It includes an overview of the types of facilities that should be provided to visitors and will explain the importance of marketing and image.

5.1 VISITORS

As we have discussed, a large part of the funding for your zoo, and indeed its very reason for existence comes from the desire of visitors to see and learn about the animals. Visitors may spend several hours or a full day at the zoo, requiring the installation of facilities that meet their needs (box 34).

Next to basic facilities like benches, shelters or toilets, visitors should also be provided with a place to buy food and drinks or a gift from a shop at the zoo. Good facilities can not only meet the expectations of visitors, but also provide a valuable source of revenue.

With the right facilities and services, plus a well run animal collection, your visitors will return time and again. A good experience will be shared with family and friends, encouraging them in turn to pay a visit to your institution.

Zoo management always needs to be aware of the visitors' needs and how they think of the service that is provided. Keeping track of visitor satisfaction levels, a

BOX 34

ZOO VISITORS HAVE SEVERAL NEEDS:

- Food and drink
- Shelter (from sun, rain, storm)
- Basic facilities (toilets)
- Safety and hygiene
- Enjoyment / relaxation

zoo can constantly improve its visitor service. Part of such good service is that all staff members are friendly and polite towards visitors.

Next to the regular visitors, the zoo could also aim to attract groups from business or schools. Schools should be offered the opportunity to take part in a well structured educational programme as an addition to their regular school programme. Businesses can plan their meetings, staff outings or perhaps a congress at the zoo.

5.2 FACILITIES

The most basic facilities that should be provided are toilets. The number of toilets should be sufficient to meet the needs of the expected number of visitors on a busy day.

Toilets should be well spaced throughout the zoo.

Toilet facilities must be properly maintained and regularly cleaned. On a busy day, the frequency of cleaning should be increased because more people will make use of the facilities. Provide separate toilets for your visitors and staff, this way staff will not overcrowd or dirty (mud on footwear etc.) the visitor facilities.

Several additional visitor facilities could be provided as well. Some ideas are: A play area for children or benches and shelters for the visitors to rest (image 25). Some visitors like to bring their own food and drinks: Creating picnic areas is therefore a good opportunity to provide for the needs of visitors.

The last basic facility that should be considered is parking space. A zoo should have a sufficient amount of parking places. Try to reserve a special place for zoo visitors to park their car, ideally this parking area should be big enough to provide parking space even on a busy day. Some zoos have agreements with neighbouring landowners to use their grassland or other land when a large number of visitors is expected.

Visitor guidance

Most visitors will not know their way around the zoo. Providing a (free) zoo map with every entrance ticket (image 26 & 27) might be an option for helping visitors plan their visit. Many zoos also install one or several large maps at strategic locations. The key to the use of such maps is to indicate the location of the visitor on the map (arrow, point) (image 28 & 29). It should be clear to visitors where they are in the zoo and where they can go to from that point: Placing simple direction signs at several locations is a great help (image 30 & 31).

Going to the zoo by car:

Visitors travel to the zoo in several different ways. It is important to see to it that road signs indicate how to get to the zoo. These signs should guide visitors to the parking area. Similar signs as used within the zoo, should also lead the visitors from the parking area to the entrance.

Going to the zoo by bus:

Many visitors will travel by public transport. Arrange with the municipality or other responsible authority, that a special bus stop is created near the entrance of the zoo. This helps people get to the zoo without a long walk.



IMAGES 25: Benches provide visitors with means to rest. A play area for children is always a success.

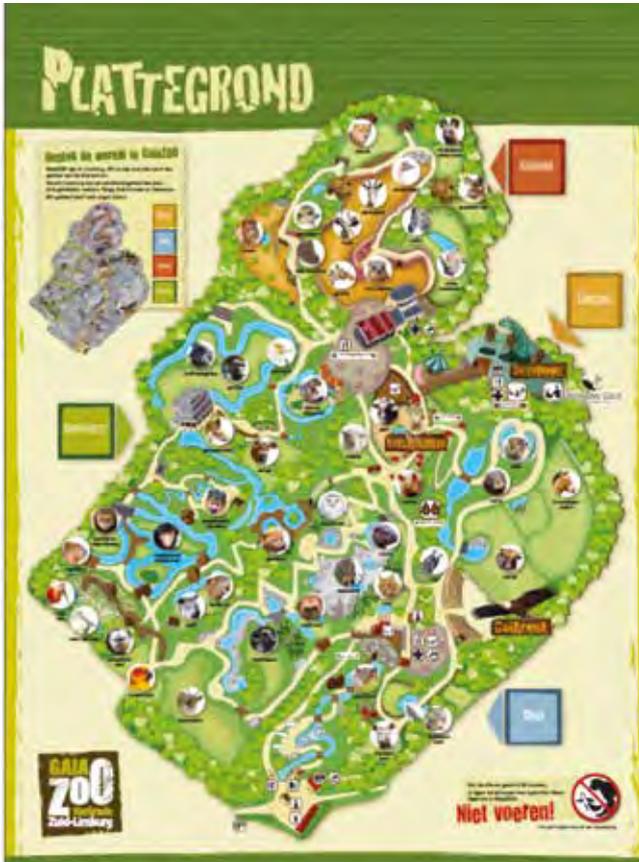


IMAGE 26: An example of a zoo map that can be handed out with every entrance ticket (example GaiaZOO, The Netherlands).



IMAGE 28: An example of a zoo map that is installed in the zoo (example Attica Zoological Park, Greece).



IMAGE 27: An example of a zoo map (example Zoo Augsburg, Germany).



IMAGE 29: Signs with a map of the zoo can be installed to let visitors know where they are so they will not feel lost (example Sofia Zoo, Bulgaria).



IMAGE 30: This panel in GaiaZOO, the Netherlands, tells people which animals they can see in this part of the zoo.



IMAGE 31: Signs at Attica Zoological Park, Greece.

Zoo guides

To provide visitors that are very interested in the zoo with additional information, a zoo guide can be developed (box 35). This guide can be sold at the entrance separately from the entrance fee, which can also help you generate additional income.

Providing a zoo guide for your visitors will make them feel more comfortable because they can read more detailed information on the animals or buildings and can read about, for example, the history of the zoo. This will help the visitors enjoy their day at the zoo even more (image 32).

BOX 35

ZOO GUIDES:

A good zoo guide should:

- Be pocket sized (smaller than A4).
- Be somewhat water resistant (laminated cover).
- Include a good sized map of the zoo.
- Guide the visitor through the zoo. It should help them plan their route and provide information on the things they see (animals, buildings).
- Promote the conservation efforts of zoos (breeding, reintroduction).
- Be changed every now and again to keep it fresh and updated (even if it is only the cover).
- Also be distributed to booksellers or tourist information centers.



IMAGE 32: An example of a zoo guide. A zoo guide can be bought at the zoo by people that want to read more about the zoo (DierenPark Amersfoort, the Netherlands).



5.3 ZOO SHOP & CATERING

For many zoos that do not have charitable status or government funding, visitors are the main source of income. These much needed funds can be used for new investments in the zoo. Even if there is additional (municipal) funding next to entrance fees, it is useful to try to earn more money and to support conservation projects. In order to generate this extra income, it is important to be commercially aware and find ways to create additional sources of income. Creating catering facilities (restaurant or café) and/or a gift shop are good opportunities to generate extra income and will also be welcomed by the visitors as an extra service. Through this service, your visitors have a great day and will be more likely to visit again or encourage others to visit the zoo.

Catering and gift shops can also be contracted to other companies. If other companies are allowed to

work in the zoo, always see to it that the quality is guaranteed and try only to sell products that have been produced in a sustainable (environmental friendly) and ethical way (chapter 6.6).

Catering facilities and gift shops provide your visitors with a place to buy something from the gift shop or something to eat or drink, this will improve your visitor service. Catering is not always a large restaurant with all sorts of food and drinks: Smaller catering facilities like an ice-cream stand or a small stand to buy coffee/tea or cold drinks can also be used. In these stands you could also serve food such as pieces of pie or candy and even warm food.

On warmer days visitors might want to enjoy their drink outside in the sun, but if it tends to be cold for longer periods of the year, it is important to provide a location (or shelter) where visitors can sit indoors.

5.4 MARKETING

To secure the zoos' continued existence, visitors will have to be attracted to it. The zoo has to be promoted to the public in order to keep a flow of people coming to the zoo. Earlier in this chapter it was discussed why and how to make sure visitors have everything they need. If visitors are provided with everything they need and the best of service, they are likely to visit the zoo again.

Every zoo has a number of regular visitors; other visitors might only visit once every one or two years. But there are also a lot of people that do not visit the zoo at all. Therefore it is important to attract these people as well, e.g. by letting them know that the zoo is fun to visit, that the animals are well cared for, and that everyone is welcome. In other words: A zoo will have to find ways to promote itself, because more visitors mean more income. In addition, more visitors will also mean that your (conservation) message will reach more people.

There are always more people that could be attracted to the zoo: Some people might not even know there is a zoo and others just do not consider visiting one. Others may also believe that they would not like to visit a zoo. But with some effort, a number of these people might still be attracted to the zoo. These potential visitors can be reached in various ways, a small number of these ways are discussed in this manual.

How to promote a zoo

There are several basic ways to promote a zoo to the public (box 36).

An active way of promoting the zoo is the production and distribution of posters and/or leaflets. The items you produce need to look attractive and the message should be clear in order to be effective.

BOX 36

BASIC WAYS TO PROMOTE YOUR ZOO:

- Distribute posters
- Send press releases
- Distribute leaflets
- Broadcasting on Radio / TV
- Advertise in stores or newspapers
- Promote your zoo online

Posters

A poster has to be eye-catching. A good poster should only contain one or two lines of text. People look at a poster when they drive or walk past it. This means they will only have a short moment to look at it. People looking at the poster should be able to understand it immediately. An example of a zoo poster is given in image 33.



IMAGE 33: Posters in the local city or town will promote your zoo to people passing by, Zoo Wuppertal, Germany.



IMAGE 34: An example of how a press release could look like. The title is clear and short and it does not contain much text (Colchester zoo, United Kingdom).

BOX 37

LEAFLETS:

A leaflet should contain basic information about the zoo:

- How / where to find the zoo, Provide the zoo's address and possibly a small city map or map with the route to the zoo.
- What has the zoo got to offer? Provide clear pictures that represent the quality of services/facilities and a short text about the zoo and its animals/exhibits.
- Overview of entrance fees.
- Special events or offers.

Press release

By sending clear press releases to (local) media, the zoo might feature in the newspaper or on radio/TV etc.

A press release informs press agencies and other media of relevant news in a clear and concise format. (Image 34)

The media can be extremely important when it comes to influencing public opinion and promotion within the community. It is therefore important to form strong links with journalists and other media to send out a positive image about the zoo.

News spreads around and many people will get the message: Every person that has read or heard something positive about the zoo will remember it and might be triggered to visit it. Even if people do not decide to visit, press coverage will expand the number of people that know and think positively of the zoo.

All media receive many press releases and will select only the most exiting news stories. They do not have the time to read several pages and therefore, for a successful press release, there are several aspects to think of. A press release needs:

- To be 1 page long (max)
- A clear headline
- Short and easy to read facts:
Who, What, When, Why, How

Leaflets

Leaflets should not contain too much text and should be illustrated with nice pictures of your zoo or perhaps a map of the zoo. (image 35 & 36) The purpose of a leaflet is to give the reader an idea of what the zoo looks like and what it has to offer (Box 37).

Promote your zoo online

The Internet provides a variety of low-cost advertising and promotional tools that you can use.

Your website is an essential tool in your marketing strategy. It helps visitors to find your zoo and advertises what you can offer. You can use it to keep visitors up to date with special offers and news about your zoo. Make sure you have a clear idea of who you are trying to reach and what you want to achieve before developing your website. For the design of your website it is important that visitors are able to find what they need quickly through clearly laid-out information and straightforward navigation. Use the following links to visit some examples of clearly laid-out websites from other EAZA member zoos:

- <http://www.zoo-wuppertal.de/>
- <http://www.papiliorama.ch/>
- <http://www.oceanario.pt/>

For it to stay a successful marketing tool you need to make sure that it works properly and is regularly updated. Choosing the right internet service provider to host your website will make sure that it works. To help visitors find you, you'll need to promote your website on search engines like Google. Search Engine Optimization (SEO) can help to get your website to the top of searches through search engines.

Social media can be used to promote your website and to keep visitors interested in your zoo. Below a few tips are given for using some of the most popular social networking sites: Facebook, YouTube and Twitter.

Facebook offers the possibility to create a special business page for your zoo. EAZA members often have success creating an individual animal personality page, alongside their main business one. Things that can be posted on Facebook pages to help drive interest to your zoo are: special offers, polls that ask visitors fun questions related to your zoo, pictures, events and updates of births.

Use Twitter to tweet interesting news or send out short tips on how to use the services provided by your zoo.

Create a YouTube channel and regularly add fun and interesting videos, launch a video contest or ask visitors to submit video testimonials. It is worth noting that to be effective these social media activities often take a lot of staff time.

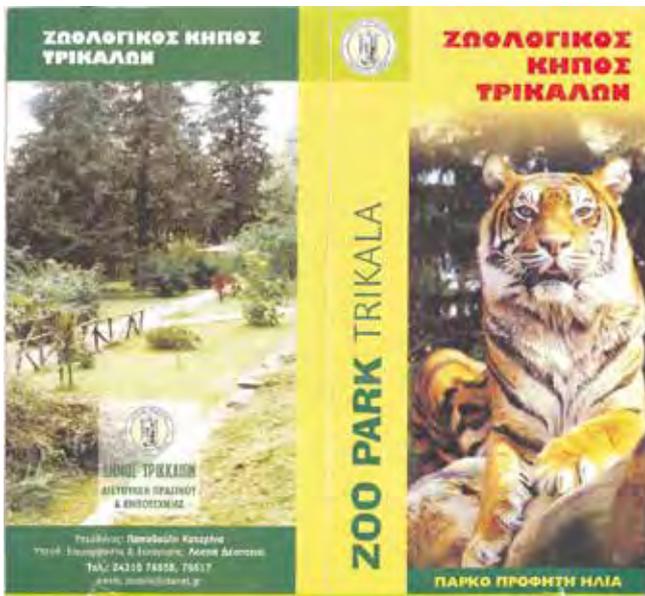


IMAGE 35: An example of the front and back page of a leaflet used in Trikala Zoo in Greece.



IMAGE 36: An example of the front and back page of a leaflet used in Attica Zoo, Greece.



IMAGE 37: Examples of coupons for reduced or free entrance (Colchester Zoo, United Kingdom)

How to attract attention

Promotion is an important tool to attract visitors to the zoo.

For example a special event or activity could be organized at the zoo. This could be a themed day with guided tours or for example a special day on which children can take their grandparents to the zoo for free. There are numerous types of events and activities that could be organized. Always promote the upcoming activity or event to the general public through press releases, posters etc.

Another option is to hand out coupons for reduced entrance fees or free entrance. This will stimulate the people that received these coupons to come to the zoo (again) (image 37).

Cooperation with shops or supermarkets might also be a way to attract additional visitors. These businesses could sponsor the zoo or cooperate with you in joint promotion.

Shops could for example give a means for customers to collect points or stamps for a certain number of products they purchase. After they have a certain amount of points/ stamps, they will get a reduction on the entrance fee to your zoo.

Always make clear what the terms are before a promotion project is started and agree on things like: Who provides the material, when does the project start, when does it end etc.

Image

It is important to know how people think of the zoo; the so-called image of the zoo. Do most people think positively of the zoo (good image) or do most of the people have negative feelings about it (bad image)?

To measure the way people experience or think of the zoo, one could produce short questionnaires and ask several visitors if they would like to complete it after their visit.

The general public, local or state government, the police, local businesses and other stakeholders can be important for maintaining wider support for the zoo. Some because they will visit the zoo, others because they might be involved in (future) cooperation. Keeping a good image is therefore vital to a zoo. This can be achieved not only by running the zoo well (as described in this manual) but also by good promotion. A good image can also defend you from untrue or misinformed criticism, which can place the existence of an exhibit or the zoo itself in jeopardy.

How to create a brand

People should be able to easily remember and recognize the zoo. One of the ways to do this is by developing a clear “brand”.

A “brand” consists of the name and the logo that are used in all communication. Every zoo has a name; this name should be easy to recognize and remember. The name could be accompanied by some sort of logo that people associate with the zoo. Image 38 shows some examples of logos of zoos in Europe. Note that these are easily recognizable and clearly linked with wild animals. The name of the zoo is often used in the logo or placed next to it. The “brand” should be visible on letters, posters, signs and all other zoo-related communication.

To clearly indicate to the public what the zoo stands for, the mission statement (see chapter 2.2) should be available on the website and/or in the zoo guide or leaflet.



IMAGE 38: Logos will allow people to instantly recognize the zoo.

KEEP IN MIND:

VISITORS AND ZOO SERVICE

- **FACILITIES:** catering, parking space, toilets, zoo shop, play area.
- **VISITORS GUIDANCE:** zoo map, road signs.
- **MARKETING:** website, distribution of posters, online social media, press releases, advertisement.
- **ZOO LOGO**

COLOGNE ZOO, GERMANY
Presentations by an educator can be very effective. Use animal objects for people to touch



RECYCLING TRASH AT ZOO DE PONT SCORFF, FRANCE
A zoo should make an effort to take a leading role in environmentally-friendly practice



World Association
of Zoos and Aquariums
WAZA

Building a Future for Wildlife

The World Zoo and Aquarium
Conservation Strategy



The World Association of Zoos and Aquaria (WAZA) produced the World Zoo and Aquarium Conservation Strategy (WZACS) that explains how zoos and aquaria can best contribute to conservation

CHAPTER 6

Conservation, Education & Research

Zoos play an important role in the worldwide effort to conserve nature by cooperating with colleagues in different fields. Cooperation in conservation includes breeding programmes, research, raising funds for *in situ* conservation and raising awareness for nature conservation with the general public. This chapter will explain the basics of zoo participation in conservation.

6.1 CONSERVATION

The earth provides mankind with an enormous variety of natural resources and a suitable environment to live in.

Over centuries mankind extracted these resources for use and production of food, medicine, construction, warfare, industry etc. However, natural resources are not always harvested in a sustainable way and many are finite. To ensure that the same large variety of important resources is still available to mankind in the future, we have to make an effort in conserving nature.

Conserving nature can only be achieved if a lot of people share this responsibility. Governments and nongovernmental organisations (NGOs) can only make a conservation effort if they are supported by a great number of people. Zoos can help with this through education by showing their visitors the problems that organisations (NGOs) (EAZA Campaigns, image 39).

Funds raised in a zoo could benefit a particular conservation project and research that is done in the zoo can further expand our knowledge of nature and therefore contribute to conservation.

Zoos also cooperate in maintaining sustainable populations of animal species by coordinated breeding and population management.



IMAGE 39: EAZA's Southeast Asia Campaign in 2010–2012 was dedicated to the conservation of highly threatened biodiversity hotspots

6.2 EX SITU CONSERVATION

Ex situ conservation literally means off-site conservation and refers to the keeping and breeding of (small) animal populations outside their normal environment (e.g. in zoos) for extended periods.

In the beginning animals were caught from the wild when new animals were needed. Nowadays, zoos breed their animals and maintain viable populations of species through cooperative breeding. The breeding of animals that are susceptible to inbreeding or are threatened in the wild are intensively managed in breeding programmes.

Zoos contribute to *ex situ* conservation by creating a living archive of a large variety of species living on this planet to ensure that none of the wild animals come to extinction in the case of habitat loss or a future catastrophe in their wild habitat.

In a few cases animals are even reintroduced into the wild from captive populations (Bearded vulture – *Gypaetus barbatus*, Przewalski horse – *Equus ferus przewalskii*, European bison – *Bison bonasus*).

When keeping (small) populations isolated from wild populations (like in zoos), it is important that the population is managed to maintain the genetic diversity and to prevent inbreeding. This means that for some species the total or regional zoo population has to be managed and that zoos have to cooperate in managing the population to achieve this.

Breeding programmes

Zoos try to maintain self-sustaining captive populations of the species kept in captivity. EAZA member institutions participate in breeding programmes for the management of a number of species. Breeding programmes are aimed at maintaining genetic diversity in the zoo population by preventing inbreeding and hybridisation (box 38).

BOX 38

HYBRIDISATION:

Hybridisation should be avoided at all times. Hybridisation occurs when animals of a different (sub-) species reproduce and rear offspring. Only animals of the same (sub-) species should be allowed to produce offspring. To prevent hybridisation, do not keep closely related species or different sub-species in the same enclosure.

If a hybrid is accidentally produced in the collection, it should be sterilized and when transferring it to another collection, the recipient zoo must be informed that the animal is a hybrid.

Management of numbers

The goal of good zoos should always be captive management of sustainable populations. This is achieved through managed captive breeding or from preventing breeding. There are limited spaces available within zoos to hold animals, therefore it may be required that captive management programmes do not increase populations, but maintain them at stable levels or reduce them over time.

There are various ways in which this can be achieved. A few of these methods are given below:

- Separate the sexes and maintain groups of single sexed animals. However, this may lead to complications, because single-sex groups are not necessarily part of the natural social systems of the species.
- Contraception: This can be achieved through physical separation when females are in season, surgical techniques, and drugs. For more information on common contraceptive methods, ask your TA mentor for the EAZA Group on Zoo Animal Contraceptives contact information.
- Breed and cull: Animals are allowed to breed, but because the offspring are surplus to the population, they are culled at an appropriate time. This allows adults to live in their natural social grouping, without the need for contraception, with the benefit of enabling them to express parental care behaviours. For some this is a controversial method and may not be possible in certain countries where euthanasia is restricted by law. (Hosey et al., 2009)

Euthanasia

According to EAZA's Euthanasia statement, euthanasia should be considered

- Where an animal poses a serious threat to human safety (e.g. escaped animals);
- Where an animal is suffering (e.g. disease, detrimental psychological state or severe pain) which cannot be adequately alleviated;
- Where the only alternative is transfer to substandard accommodation or;
- Where the decision is part of a balanced population management strategy, recommended by the EEP Coordinator/ESB keeper.

When all options have been thoroughly investigated and the decision is made to euthanize an animal, care must always be taken to ensure that it will be carried out humanely. Euthanasia techniques should result in rapid loss of consciousness followed by cardiac or respiratory arrest and the ultimate loss of brain function. The technique should also minimise distress and anxiety experienced by the animal prior to loss of consciousness. More specific guidelines on animal euthanasia can be found in the AVMA (American Veterinary Medical Association) Guidelines on Euthanasia. These guidelines are revised every 10 years and in the interim years requests for inclusion of new or altered euthanasia procedures can be made. (American Veterinary Medical Association, 2007)

Regional Collection Planning

Collection planning is an important aspect of achieving conservation and education goals (see chapter 2.6). Next to such 'institutional' collection plans, Regional Collection Plans (RCPs) are produced to optimize the effect of breeding programmes (image 40).

RCPs plan the keeping and breeding of all species (groups) within a certain region. In Europe (the region), EAZA is producing RCPs to guide the collection planning. EAZA's Regional Collection Plans are developed by the different TAGs and consider (amongst others): Available space to house the species, status of the species in the wild, husbandry expertise and the educational value of a species.



IMAGE 40: Regional Collection Plans (RCPs) contain recommendations for zoos within the region (Europe) on whether or not to keep or breed certain species.

EEP

The “European Endangered Species Programme” (EEP) is the most intensive type of population management for a species kept in EAZA institutions. Image 41 shows the logo that is used to indicate European breeding programmes. Each EEP has a coordinator: Someone with a special interest in and knowledge of the species and working in an EAZA member institution. The EEP coordinator is assisted by a Species Committee that consists of several experts on the particular species.

The coordinator has many tasks, such as collecting information on the status of all the animals of the species within EAZA, producing a studbook, carrying out demographic and genetic analyses and producing a plan for the future management of the species.

Together with the Species Committee, recommendations are made each year indicating which animals should breed or not breed, which individual animals should be transferred from one zoo to another, and so on. All recommendations are aimed at maintaining the highest possible level of genetic diversity to create a viable captive population. This is a lot of work, and EAZA is fortunate that so many people within the community have taken the responsibility for such a complicated task.

ESB

A “European StudBook” (ESB) population is less intensively managed than an EEP programme. The studbook keeper is responsible for an ESB and collects all the data on births, deaths, transfers etc. in EAZA member institutions that keep the species. These data are entered in ISIS software programmes that allow the studbook keeper to carry out analyses of the population of that species. EAZA members may ask the studbook keeper for recommendations on breeding or transfers.

By collecting and analyzing the relevant information on the species, the studbook keeper can judge if the species is doing well in the EAZA region, or if maybe a more rigid management is needed to maintain a healthy population over the long term. In that case, the studbook keeper may propose that the species be managed as an EEP programme.

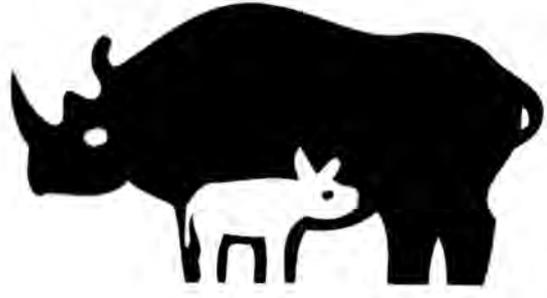


IMAGE 41: The logo that is used to indicate European Endangered Species Programmes

6.3 IN SITU CONSERVATION

In situ conservation refers to all conservation activities that take place in the natural environment of the animal (as opposed to *ex situ* conservation, which takes place outside the natural environment, e.g. in a zoo). EAZA supports many organisations that have projects to prevent habitat loss in a certain area or any other conservation project. EAZA strongly believes that zoos should take a leading role in the conservation of species and their natural habitat. Zoos could financially support *in situ* conservation projects or offer technical assistance or equipment to such projects. Fundraising for international conservation efforts has proven to be quite effective through the EAZA annual conservation campaign.

EAZA Campaigns

Each year, the EAZA community raises funds and/or awareness for conservation through its two year campaigns. EAZA members are provided with campaign information via a dedicated website. packages. This information contains background information and guidelines for the campaign, as well as photos that may be used to prepare exhibitions and activities during the campaign year (image 42).

The campaigns may focus on specific animal species, problems, habitats, areas or a combination of these. Examples are the EAZA European Carnivore Campaign (2008/09) and the EAZA Southeast Asia Campaign (2011-13).

Participating EAZA members (and some non-EAZA members) raise funds for *in situ* conservation projects and the visitors are informed about the problems and solutions for a specific problem and about the species and conservation projects that are supported by the campaign. This helps to familiarize the general public with such problems and the need for conservation of species and habitats. Most of the campaign funds come from zoo visitors that donate a small amount to the campaign after being informed of the problems.

Often, large panels are designed which can be placed at the zoo to make a themed exhibition about the campaign (image 43). Products for retail are developed (t-shirts, toys). These are sold at the zoo and the profit is added to the fundraising result.



IMAGE 42, EXAMPLES OF EAZA CAMPAIGNS.

A special place for the campaign is installed to educate the visitors for the specific problems, visitors are asked to donate a little amount of money. Examples of Givskud Zoo, Denmark, with the Carnivore Campaign in 2008 (top picture), Borås Djurpark, Sweden, with the Rhino Campaign in 2006 (middle picture) and the Madagascar Campaign in Punta Verde 2007, Lignano, Italy (bottom picture).

IMAGE 43: An example of an exhibition for the Madagascar Campaign in 2006/07. The signs are provided by EAZA and are placed in the zoo.

How can you help Madagascar?

European zoos (members of EAZA) are working together to help the wildlife Madagascar. There are many ways you can help too. For example you can donate money in the special boxes in this zoo. With your money we will be able to fund many wildlife conservation projects in Madagascar.

You can also help at home by buying fairly traded products. This will help to decrease poverty in the developing world, which of course is the main reason for the pressure on the wildlife. And if you're thinking about taking an exotic holiday, why not consider Madagascar? Eco-tourism will show the inhabitants of Madagascar that their wildlife is unique, and that it is possible to make a living from it in a sustainable way.

Trouble in Madagascar

As much as 10% of the primary forest in Madagascar has already been lost. Large areas with a high density and old trees have been cut down, and are being replaced by fast growing trees. The loss of old trees is a major threat to the survival of many species of plants and animals.

Many trees are chopped down for firewood.

Poverty is the biggest threat for nature in Madagascar.

Poverty forces the soil to erode.

European zoos (members of EAZA) are working together to help the wildlife Madagascar. There are many ways you can help too. For example you can donate money in the special boxes in this zoo. With your money we will be able to fund many wildlife conservation projects in Madagascar.

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EAZA MADAGASCAR CAMPAIGN

Learn more at www.eaza.org

6.4 EDUCATION

Education is one of the main roles of zoos and aquaria today. Many people visit zoos and aquaria worldwide each year (c.a. 600.000.000 annually). This means that the zoo community can reach a very large group of people and explain the importance of conservation. Zoos enable visitors to learn about our natural world and thereby respect nature in all its forms.

Education in zoos

Visitors want to see (wild) animals and have fun. Most visitors will be generally interested by what they see in the zoo and would probably like to know more: “What kind of animal is this?”, “What does it eat?”, “Where does it come from?” etc.

A zoo can fill this need for information by providing signs that tell about the animals and the way they live in the wild.

The more people learn about our living world, the more respect and understanding they gain. And even if people will not read anything during their visit, the visit will help them to take a step further to understanding nature and the importance of nature conservation.

How to educate

Education does not have to be expensive: Much can be achieved with one enthusiastic educator that has a lot of knowledge and ideas. It is not essential to have a special building or classroom for educational programmes, these programmes can easily be conducted in a corner inside a tropical house or outside in another area in the zoo.



IMAGE 44: An example of a basic animal sign in Osijek Zoo, Croatia.



IMAGE 45: Examples of basic signs that should be displayed on every animal enclosure. A sign could be illustrated with pictures or drawings of the animals, maps or certain behaviours and should not contain too much text to be most effective. Examples of signs used in Givskud Zoo, Denmark.

BOX 39

A SIGN AT AN ANIMAL ENCLOSURE SHOULD CONTAIN:

- Name of the animal
- Scientific name
- Diet in the wild
- Habitat in the wild
- Behavioural topics
- EEP/ESB logo if necessary
- Threats in the wild
- Conservation status (e.g. Red List).

There are many ways to educate visitors. The most traditional way is by providing signs at each animal enclosure (image 44 & 45). These signs could include a variety of basic information about the species (box 39). If space is available, exhibitions with more detailed information on the species, its habitat or other subjects could be installed (image 46).

“Interactive education” will not only make people read texts or look at pictures, but also let them do or touch something. Visitors could for example learn more by playing an animal game or by touching an animal skin, rather than by only looking at the animal and occasionally reading a sign. Such “interactive education” is often a more effective way of educating visitors.

Educators & keepers

An even better way of reaching the visitors is by personal communication. Keepers and educators can all have a role in this. Keepers giving a presentation or a talk during feeding will attract a lot of visitors. Presentations by an educator at set times can also be very effective in attracting and educating your visitors. This educator should have some training in education, a university degree and/or a teacher training qualification. The educator or education department should be in charge of all education in the zoo and could for instance develop information signs and give lectures about a certain subject. Your educator could also join the “International Zoo Educators Association” (contact see page 107) and attend the EAZA Zoo Educators Conference, which is held every two years. This allows your education staff to meet with colleagues and learn new ideas.

The educator can also bring animal items for the visitors to touch (such as horns or skins) or live animals (spiders, insects, domesticated animals) for display to assist him with education (image 47). However, always make sure that hygiene and safety is ensured (washing hands afterwards) and that the animals that are used for this purpose are not animals that are potentially dangerous or stressed by this displaying. Use domestic animals or insects etc. for this purpose, always keeping in mind the safety of the visitors and animals.



IMAGE 46: An example of a sign at the African wild dog (*Lycaon pictus*) enclosure in Osnabrück Zoo, Germany

Schools and groups

Some visitors may come to your institution in groups. These groups (for example school classes) often come with the purpose to learn about animals or nature (next to having fun). Simple education programmes can be made to facilitate a special programme in which the groups can learn from an educator (box 40). Programmes in the zoo could even be developed to be an addition to existing school programmes, this could encourage teachers to take their groups to the zoo.

If people and time are available, guided tours around the zoo could be provided. A guide takes the group through the zoo and explains about the zoo, how it is run and tells about the animals. The guided tour could be combined with keeper's talks at certain enclosures or an exclusive view behind the scenes. Always make sure that the safety of your visitors is assured when guiding them through places that are not normally visited by the public.



IMAGE 47: Educators or volunteers can teach visitors at stands about animals and nature. They can show them all sorts of objects to touch and look at for example: skins, skulls etc. (Safari park Beekse Bergen, the Netherlands)

BOX 40

EXAMPLES OF EDUCATIONAL ACTIVITIES:

- Touch tables (eggs, skins, feathers, etc.).
- Animal presentations (learning about and touching the animals like snake, frog, tortoise, etc.).
- Keeper talks / short lectures on site.
- Public feeding.
- Short thematic tours around the zoo (African savannah, predators, small carnivores)
- Art workshops for children (creating animals from cheap materials such as paper or organic materials or creating simple objects for animal enrichment).
- Special school programmes with workshops or lectures that link to the national school programme.

What to tell your visitors

Visitors do not want to (and do not have to) read every sign in the zoo.

Most visitors only want to know a few basic things about the animals they see.

The main thing to tell the visitors is how the animals they see live in the wild. Visitors see these animals and learn the name of the species and learn where it originally comes from. They might want to know what the animal eats or what its enemies are. They could also be informed of the threats that the animals face in the wild. This will help the visitors understand the need to preserve the species and their habitat.

It is also possible to tell something about the individual animals (e.g. their name, weight, specific behaviour). This will help visitors get a better understanding of what the zoo and its animals are all about. Making it more personal might create a better understanding about the animals in the zoo and make visitors more susceptible to the message that you are trying to bring.

Even if a person would only learn a few things about the animals during the zoo visit, it will contribute to the growing of a general sense of understanding of conservation.

6.5 RESEARCH

Research is one of the last roles of zoos that are discussed in this manual. Knowledge obtained by research can be vital for the understanding of the life of animals and nature in general which is essential in our struggle to conserve nature. Research might also contribute to our efforts to improve the life of animals at the zoo.

A zoo should make an effort to contribute to research. This does not necessarily mean that you need a researcher or a research department. There are a few different ways in which a zoo can contribute to research efforts. In the first place, a zoo could do research itself (box 41). Another opportunity would be to link with local universities, whereby the zoo provides the facilities for students and university researchers to perform their work. The zoo as well as the university could come up with subjects for research.

A zoo could also participate in the research of others. If for example another zoo investigates the diets of spider monkeys in captivity, sending data about spider monkeys in your institution is also a way to participate in research.

You could also promote research that is done in your zoo, in other institutions or in the wild. Send a summary of the research to colleagues and other related institutions. The results of the research could benefit another institution or could be input for other related research.

Linking with (national or international) conservation organisations that also carry out research projects is another option. Zoos can often contribute to conservation and research in many ways, e.g. by providing facilities, data, volunteers or funds.

BOX 41

BASICS OF RESEARCH IN ZOOS:

- Identify a problem.
- Find a way that could possibly solve the problem.
- Make observations and record them before you change anything.
- Implement the changes.
- Make observations and record them after the change.
- Analyse your results (difference between before and after).
- Present / publicise your results.

If a research project is carried out at the zoo, several people can help collect data. Students and volunteers are a great opportunity and can for example observe animals for a longer period. But zookeepers could do some observation next to or during their regular work as well: Data collection could be included in the routine of the keepers (see chapter 2.8). As an example take dung collection for research on nutrition. The keepers could collect dung samples every morning before they clean the enclosure. Keepers can also note relevant information in their daily reports.

Research means finding answers. These answers will help organisations that make efforts to protect nature *in situ* (habitat survey, ecology studies, etc.), but answers could also benefit your institution or the zoo community (nutrition, behaviour, husbandry, enrichment, reproduction, etc.).

6.6 GREEN PRACTICE

Conservation activities do not only include *in situ* conservation and raising awareness through education. A zoo should work towards sustainability to provide a positive example and encourage others to behave in an environmentally-friendly way (box 42). Sustainability could also benefit your institution financially. For example minimizing your energy use benefits the environment, but also lets you pay less on your energy bill.

Every country or state has its own environmental legislation. At a minimum, a zoo should comply with environmental legislation and regulations. Next to this you should try to minimize the environmental impact as much as possible and try to raise public awareness for sustainability.

Develop a “green policy”

For your zoo to become more environmentally friendly, you should use a “green policy”. This policy should contain plans on how to achieve the goals you set. To develop this policy, the management needs to decide what the zoo can do to become more environmentally-friendly and set realistic targets (e.g. 6 months or 2 years). Consider all aspects and all activities of the zoo and include staff from different areas in the zoo in the development (zoo keeping, retail, maintenance).

There are several basic ways for your institution to become more environmentally friendly. A zoo could reduce its use of energy and water and should recycle waste if possible. Always remember that simple changes can make a big impact!

Energy & water saving

You could reduce the energy and clean water that is used in the zoo. This could be done by (gradually) introducing energy efficiency measures (energy saving lamps, heating or other equipment). When constructing new buildings or redeveloping old buildings you could try to incorporate these energy efficient systems. Implementing special rules for energy saving (turning off lights when people leave etc.) might also be effective.

Furthermore you could use energy from renewable / sustainable sources when this is available and make efforts to use materials from sustainable and environmentally-sensitive sources (e.g. FSC wood).

BOX 42

WHAT IS SUSTAINABILITY?

‘Development that meets the needs of the present without compromising the ability of future generations to meet their own needs’

Waste management

The zoo should minimise the use of materials that are harmful to the environment (chemicals, pesticides etc.). You could also make an effort to reduce the production of waste and packaging by using recyclable materials. When you recycle the waste of the zoo and the visitors (picture page 88), the items can be reused in other production processes.

Other green practices:

Ideally, if the zoo aims to be environmentally-friendly, your institution should also prefer to cooperate with other environmentally-friendly companies to use their services or buy environmentally-friendly products from him. Visitors and members of staff could be encouraged to reduce environmental impacts by changing their travel habits. An example would be to find ways for visitors and staff to reach the zoo by public transport.

Finally the zoo could be home to a range of local wildlife species. A zoo could try to find ways to benefit the use of the zoo area by local wildlife (like: birds, hedgehogs, insects etc.)

KEEP IN MIND:

CONSERVATION, EDUCATION & RESEARCH

- **CONSERVATION *EX SITU*:** breeding programmes, Regional Collection Planning, EEP's (European Endangered Species Programmes), ESB (European Studbook)
- **CONSERVATION *IN SITU*:** Conservation projects, EAZA Campaigns
- **EDUCATION:** one of the main roles of zoos and aquaria today. Different ways of educating visitors are formal learning, interactive education, personal communication.
- **RESEARCH:** in the zoo, in cooperation with local universities, by participating in other research projects, promote research that has been conducted in the zoo
- **GREEN PRACTICE:** sustainability in the zoo by energy & water saving, waste management, green policy.

Further reading



Further reading

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HSE, 2006, *Managing Health and Safety in Zoos*. Available at: <http://www.hse.gov.uk/>, go to: Guidance – Resources- Publication – HSE Books - Full catalogue

<http://animalbehaviorsociety.org>

<http://www.enrichment.org>

<http://www.foodcomp.dk>

www.frozenark.org

www.iucn.org

<http://www.stlzoo.org/animals/scienceresearch/contraceptioncenter>

<http://www.vet.ed.ac.uk/animalpain>

<http://www.zoolex.org>

Suggested Specialist Contact



There are a number of organisations that can be contacted. Some of these are mentioned here. Many of the zoo related organisations have specialized in one or several aspects of zoo management.

EAZA Executive Office

C/o Amsterdam Zoo
PO Box 20164
1000 HD Amsterdam
The Netherlands

Phone: 0031 20 520 07 50
Fax: 0031 20 520 07 52
E-mail: info@eza.net
Website: www.eaza.net



EAZA's Committees:

EAZA has several specialized committees. Each can be contacted through the EAZA Executive office. The Executive Office also employs one special contact for all business concerning Candidates for Membership (information, requests, assistance).

- EEP Committee
- Membership & Ethics Committee
- Aquarium Committee
- Legislation Committee
- Education & Exhibit design committee
- Research Committee
- Conservation Committee
- Technical Assistance Committee (TA)
- Veterinary Committee

European Association of Zoo and Wildlife Veterinarians (EAZVV)

E-mail: secretariat@eazvv.org
Website: www.eazvv.org



World Association of Zoos and Aquariums (WAZA)

World Association of Zoos and Aquariums
C/o IUCN Conservation Centre
Rue Mauverney 28
CH-1196 Gland

Phone: 0041 22 999 07 90
Fax: 0041 22 999 07 91
E-mail: secretariat@waza.org
Website: www.waza.org



International Air Transport Association (IATA)

Tel. nr.: 001 22 770 27 51

Fax nr.: 001 514874 9659

Website: www.iata.org



International Zoo Educators Association (IZE)

IZE Executive Office

C/o IUCN Conservation Center

Rue Mauverney 28

CH-1196 Gland

Switzerland

Phone: 0041 22 999 07 90

Fax: 0041 22 999 07 91

E-mail: IZA.CentralOffice@IZEA.net

Website: www.izea.net



International Species Information System (ISIS)

International Species Information System (ISIS)

7900 International Drive Suite 1040

Bloomington, MN 55425

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Fax nr.: 001 651 209 9279

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Website: www.isis.org



ISIS branch office Europe:

C/o Amsterdam Zoo

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Phone: 0031 20 520 07 50

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Stichting Harpij

Dutch Zookeepers association

C/o Blijdorp / Rotterdam Zoo

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3000 AM Rotterdam

The Netherlands

E-mail: bestuur@deharpj.nl

Website: www.deharpj.nl





Glossary of terms & Index

GLOSSARY OF TERMS

Collection plan

A collection plan is a document that explains what animal collection a zoo currently has and what animal collection the zoo plans to have in the future. Taking into account several considerations.

EAZA

EAZA is the European Association of Zoos and Aquaria. All members cooperate in fulfilling the modern role of zoos and maintaining the highest standards within the profession.

EAZA Best Practice Guidelines

EAZA's husbandry guidelines are developed by TAG's and give a full guidance to the care, breeding and housing of a particular species (group).

EEP

The "European Endangered species Programme" is the most intensive type of population management for a species within the EAZA community. Specialists coordinate decisions on which animals should or should not breed and which animals should move to another collection.

Enclosure

Enclosure indicates any accommodation that houses and confines an animal or group of animals.

ESB

The European StudBook is another type of population management within EAZA, but not as intensive as an EEP. It registers and monitors the population of a particular species.

Exhibit

Exhibit is mostly used to indicate the area of the animals' enclosure that visitors view at.

Ex situ

Activity taking place outside of the natural habitat, either in the country of natural range or elsewhere, out of this range.

Furniture

In this manual, furniture is used for everything that is placed within the enclosure of an animal. This includes tree trunks, branches, ropes, vegetation, platforms, shelters etc..

In situ

Activity taking place in the natural habitat (including reintroduction).

International Species Information System (ISIS)

ISIS is an international non-profit membership network that is governed by an international board of trustees elected by members from more than 600 institutions on six continents. Members share standardized and detailed information on almost two million specimens of 10.000 species, using specially developed computer software (ARKS / ZIMS).

Regional collection plan (RCP)

Regional collection plans are documents which plan for the breeding of all species (groups) within EAZA membership institutions (the region). The plans are developed by the different TAGs and make considerations about space to house the species within the region, status of the species in the wild, husbandry expertise and the educational value of a species.

Stand-off barrier

A stand-off barrier is a barrier that prevents visitors from getting close to an animal or to the enclosure. It is a safety measure to prevent injury or damage to visitors or animals

TA

The Technical Assistance committee is the committee within EAZA that provides advice and technical support to non-EAZA zoos and aquaria that aim to raise to EAZA standards.

Taxon Advisory Group (TAG)

Each animal group within EAZA has a TAG, this TAG consists of professionals from zoo's and aquaria who have special expert knowledge of the particular animal species. TAGs are responsible for the regional collection planning and development of husbandry guidelines.

WAZA

The “World Association of Zoos and Aquaria” is the worldwide association of zoos and aquaria. EAZA is a regional member of WAZA.

WZACS

This document is produced by the WAZA and states what efforts a zoo or aquarium should make in order to contribute to conservation. (<http://www.waza.org/conservation/wzacs.php>)

Zoos and Aquaria

A zoo or an aquarium is an institution that is open to the public and uses an animal collection to attract visitors. It includes zoos, animal parks, safari parks, bird gardens, dolphinarium, aquaria and specialist collections (butterfly houses).



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