AALBORG UNIVERSITY

Environmental Management and Education at Aalborg Zoo

A Study of Potentials and Limitations

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Abstract:

This report examines the decade-old Environmental Management system in place at Aalborg Zoo. Through interviews and research, this system will be analyzed regarding its structure, performance, potential for improvement, and the potential to add education to it.

This report will also analyze the education department at Aalborg Zoo. This will be done through interviews, research, and an abbreviated AISHE audit. The education department will then be evaluated to see if its impact on its students can be measured and added to the environmental management system in place at Aalborg Zoo.

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Preface

This report "Environmental Management and Education at Aalborg Zoo- a Study of Potentials and Limitations" is made as a 10th semester project (thesis) in the Environmental Management program at Aalborg University in 2008-2009.

The author would like to thank the following people for their help in the making of this project.

-All the people at Aalborg Zoo for their kind help. Erik Nielsen from the technical department for conducting many interviews and inviting the author along for recertification. Morten Smetana from the education department for conducting interviews and showing the author around the educational department.

- Søren Løkke and Mikkel Thrane for supervising the making of this project and providing valuable insight.

- Anders Møller for taking the time to be the external examiner of this project.

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1 Introduction

Climate change is one of the most pressing issues facing our global society today. It is an issue that has only begun to be discussed amongst the scientific and political community in the past few decades. The first world climate summit occurred in 1979 where it was agreed that human activity has raised the amount of CO_2 in the atmosphere and elevated levels of CO_2 could lead to climate change. According to recent assessments, there is overwhelming evidence that human activities have an impact on the natural systems that create the climate of our planet, resulting in conditions that are inconsistent or different than the ones that have existed since the end of the last ice age (Pielou 1991). This activities range from the way we transport ourselves around the planet, the industry we create to sustain our lifestyles, to the meat and produce we cultivate to feed our population. These are examples of the different human activities that are changing the composition of greenhouse gases in the atmosphere, which influence climate change.

Much of this human activity can be credited to the western lifestyle of consumption and a 'high standard' of living that people in developed countries have become accustomed to. The average person living the western lifestyle consumes and leaves a larger carbon footprint larger than a person living in a developing country. This is rapidly changing as countries such as China and India change due to their pursuit of western life styles and a higher standard of living. China is rapidly changing as more industry is imported, attracted by the cheap labor costs and relaxed environmental regulations upon industry. This is leading to a better economy and a larger middle class, resulting in a more developed country. In a country of almost 1.3 billion people (UN Population Division 2000) this can lead to large scale environmental problems if everyone is

looking to live at standards achieved in the middle class of European nations and North America. Residents of developed countries, particularly the United States have become accustomed to a lifestyle that is far from sustainable, and are now making global initiatives to reduce this consumption driven lifestyle. As they are reducing, people living in poverty in developing countries, maybe one of the one billion people in the world living on less than $1 a day (Woodward and Labonte, 2008) are trying to move out of poverty and live a lifestyle that is more like the western lifestyle. But if this is to happen the people moving out of poverty may offset the more sustainable lifestyle of westerners. Should these people moving out of poverty have to pay for their new consumption in a world of carbon credits and fossil fuel powered energy?

In 'rich' countries like the ones in Europe and the United States, 15% of the world's population is responsible for an estimated 73% of the world's atmospheric concentrations of carbon dioxide and 53% of the current emissions (Woodward and Labonte, 2008). This is far from sustainable production since global production is far from environmentally sustainable levels, especially in carbon emission terms. This will get only worse as we bring developing countries up to western lifestyle because the less the developed countries reduce their impacts, the less room developing countries have to grow their economy to make a better lifestyle for their people. Solely economic restrictions to force the people in developed countries to change their lifestyle to a sustainable one are not enough. An extensive education campaign about sustainable development must be done in the educational institutions of developed countries, but also in the leisure sector such as sustainable tourism and environmentally conscious entertainment places such as zoos and aquariums.

Denmark is a Scandinavian nation in northern Europe that classifies as one of the nations mentioned earlier which enjoy a developed economy and a high standard of living. According to the United States' Department of State, "[Denmark's] standard of living is among the highest in the world" and "The Danish economy is fundamentally strong" (US Department of State, www.state.gov). The Danish gross domestic product per capita in 2006 was 302,000 Danish Kroners (Danmark Statistik, www.dst.dk), a strong figure when compared to other European nations and the United States. Danes generally have concern for the environment which can be seen with their large sustainable energy industry which has progressed greatly through the use of wind power. They also have their share of problems with the environment like any other industrialized nation. Within this country there is a zoo in the northern region of Jutland (the peninsula attached to the northern part of mainland region of Europe) called Aalborg Zoo that is a frontrunner in Environmental management utilizing an ISO 14001 certified environmental management system before any other zoo in the world. This is a great example of an entertainment/leisure business that can provide valuable education to the public regarding sustainability and environmental issues facing Denmark and the rest of the world.

1.1 Problem Formulation

Aalborg Zoo is a frontrunner in environmental management at zoos. This is because Aalborg Zoo was the first zoo in the world to establish a certified ISO 14001 environmental management system (Aalborg Zoo, 2008). Aalborg Zoo has been certified in ISO 14001 for nearly ten years, tracking and creating a report for the first time in 1998. Over the course of the years that Aalborg Zoo has been tracking their environmental impacts through the management system they, have

achieved substantial reductions in their environmental impact (this will be discussed more later on). Lately these reductions have been 'flattening out' which can happen in an institution which has had an environmental management system for some time. This leads to the following problem formulation.

How can Aalborg Zoo further reduce their environmental impacts through improvements in relation to education in addition to traditional areas of environmental impact tracked through their environmental management system?

When analyzing Aalborg Zoo from a product orientated perspective one can describe their main product as the experience of visiting the zoo and viewing the animals and displays. This 'product' includes elements of education, learning and last but not least entertainment.

This is not easy to measure since it is more of a service versus a manufacturing business such as a factory, etc. Effective education of visitors in a zoo should make a great difference since 125 million people visit zoos annually in Europe (EAZA, 2001) and nearly 2 million annually in Denmark (Smetana, 2008).

Along with this problem formulation come the following research questions:

1. How can education of visitors be integrated into the existing environmental management system?
2. How can the effectiveness of education at Aalborg Zoo in reducing environmental impacts be measured versus traditional environmental impacts?

3. What sort of issues should be presented to the visitors of the zoo that are relevant to the zoo and also relevant to global environmental issues?

4. Is the current environmental management system at Alborg Zoo working effectively?

In this project these issues will be discussed in relation to the practices in place at Aalborg Zoo and in relation to their obligations in keeping their environmental management system running. The latter can be analyzed from what is involved when the zoo is audited every year in order to be recertified in the ISO 14001 standard.

2. Theory and Methodology

In this chapter the theory and methodology used in this project will be discussed. This will include a definition and description of environmental management systems and a commonly used standard in environmental management. This chapter will also have descriptions of interviews conducted with the staff of Aalborg Zoo.

2.1 Environmental Management Systems

In this section EMSs will be explored in general, and then the ISO 14001 standard will be explored.

2.1.1 EMS

Environmental management systems or EMS can be described as a management system in a company that helps them self-regulate their activities or products that have an environmental impact. It also results in a demand for systems and tools to support cleaner production processes and products. (Jørgensen and Remmen, 2007) Environmental management systems started being developed in part as a response to the Rio Summit in 1992 which was about global environmental issues (quality.co.uk). Organizations and corporations started to have to take more responsibility on environmental issues related to their function. In an EMS environmental concerns are incorporated in business strategies from the development of products, production, and marketing in order to meet environmental demands from stakeholders. Having an EMS at an organization is also beneficial as a streamlined way of bookkeeping environmental impacts, which facilitates the process of making targets in improvements of performance and the ability to see if targets are met.

There are a few different standards in EMS which are accepted around the world. The first widely accepted standard came from Great Britain in 1992 and is called the British standard 7750 and is titled "Specification for Environmental Management Systems." (Jørgensen and Remmen, 2007) This standard originated in Great Britain but was used as a basis for early EMS abroad. In 1993 the EU developed EMAS which stands for "Eco-Management and Audit Scheme." This provided the means for organizations to develop a good bookkeeping system for their environmental impacts and provide the information to the public/stakeholders.

The third and most widely used standard in EMS is called ISO 14001. This was originally published in 1996 and later revised in 2004. (Jørgensen and Remmen, 2007) The regulations of ISO 14001 are not as strict as EMAS but are close. This standard will be described in greater detail in the next section.

2.1.2 **ISO 14001**

ISO 14001 is a standard for EMS which was developed by the International Standardization Organization in 1996 and later revised in 2004. This standard describes EMS as "part of an organization's management system used to develop and implement its environmental policy and manage its environmental aspects." (Jørgensen and Remmen 2007, taken from ISO 14001:2004) In order to be certified in ISO 14001 a company must implement and maintain an EMS that documents its impacts on the environment in accordance with the rules of ISO 14001 and continually improve its performance. The foundation behind this system is a methodology known as "plan-do-check-act." 'Plan' means to identify the significant environmental impacts related to the operation of the

organization. ‘Do’ means to implement a system by which the organization makes procedures to document the impacts associated with the operation of the organization. ‘Check’ is the monitoring and measuring the processes, comparing them to the environmental policy and laws, and reporting the results. ‘Act’ is the review of the EMS and the making of plans for continual improvement. Out of this an organization can gain quite a few benefits:

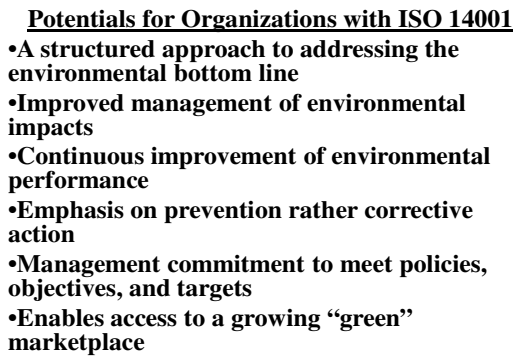


Figure 2-1: Potentials for organizations with ISO 14001. Inspired by Jørgensen and Remmen, 2007

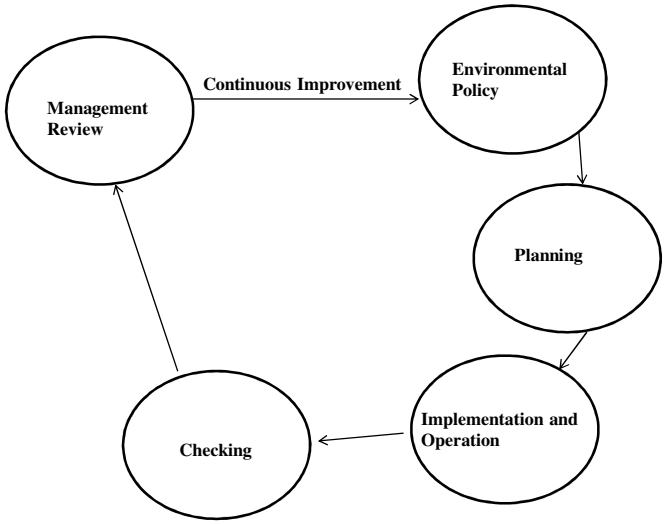


Figure 2-2: Shows the principles behind ISO 14001 EMS and the plan-do-check-act approach. Inspired by Jørgensen and Remmen 2007.

2.2 **Interviews**

In the context of this project, interviews were a necessary and important source of information in order to learn how the EMS at Aalborg Zoo works and to gain some familiarity with the organization. Interviews in a case study context are one of the most important sources of information. (Yin, 2002) They tend to be more of a conversational nature with certain guidelines established before the actual interview. Early interviews at Aalborg Zoo for this project were of this nature in order to find out how the organization ran, to get contacts at the zoo talking, and hopefully then these contacts will give insight on relevant topics that may have not been discovered otherwise. One has to be more informal and familiar in this type of interview, and not come on too strong in the

beginning because that might turn off the interviewee and make them hesitant to share information. This sort of interview is described well in the following quote:

…most commonly, case study interviews are of an ***open-ended nature,*** *in which you can ask key respondents about the facts of a matter as well as their opinions about events. In some situations, you may even ask the respondent to propose his or her own insights into certain occurrences and may use such propositions as the basis for further inquiry. The respondent also can suggest other persons for you to interview, as well as other sources of evidence.(Yin, 2002)*

More focused interviews were used later on in research for this project. This was later on when the initial formalities of becoming familiar with the zoo and its EMS had passed and there were focused questions on figures and initiatives to be answered. These interviews had aspects of being open-ended but followed a more prescribed direction due to certain questions needing to be answered (Yin, 2002).

2.3 **AISHE**

AISHE is an auditing technique used to evaluate the degree to which an institute of higher learning teaches and incorporates sustainability into the role of the educational institution. The name AISHE is actually an acronym for **'A**uditing **I**nstrument for **S**ustainability in **H**igher **E**ducation.' It is based on a quality management model developed by the European Foundation for Quality Management and later modified by the Institute for Dutch Quality Management (Roorda 2001). The original model for quality management was designed for the application for commercial industry. The

principles behind this original model were applicable but had to be modified and adapted in order to make it applicable to evaluating the sustainability of higher education institutions. AISHE does this by defining 20 criteria in five fields. These are set to the first three stages of 'plan-do-check-act.'

	Criteria
Plan	**1. Vision and Policy** 1.1 Vision 1.2 Policy 1.3 Communication 1.4 Internal Environmental Management **2. Expertise** 2.1 Network 2.2 Expert Group 2.3 Staff Development Plan 2.4 Research and External Services
Do	**3. Educational Goals and Methodology** 3.1 Profile of the Graduate 3.2 Educational Methodology 3.3 Role of the teacher 3.4 Student Examination **4. Education Contents** 4.1 Curriculum 4.2 Integrated Problem Handling 4.3 Traineeships, graduation 4.4 Speciality
Check	**5. Result Assessment** 5.1 Staff 5.2 Students 5.3 Professional Field 5.4 Society

Figure 2-3: Shows the 20 criteria by which AISHE evaluates the sustainability of the institution of higher education. Inspired by Rooda 2001.

Each category is judged on a scale of five stages. These stages in order of increasing integration are activity orientated, process orientated, system orientated, chain orientated, and society orientated. There are detailed descriptions of each category and the definition of all five degrees of integration of each category. After the results are compiled they are

displayed on a circular which shows graphically which areas the institution is excelling in and which areas need improvement.

For this project a full AISHE audit will not be done of the Aalborg Zoo's education department. AISHE will be used as a guide to evaluate the effectiveness of the current teaching practices at Aalborg Zoo with regard to sustainability and green practices. Aalborg Zoo is not an institution of higher learning; it is simply a supplement to students' current education. This does not mean that AISHE can be used as a guideline to a rough evaluation of the status of the zoo's current teaching practices.

3 History and Past Environmental Performance of Aalborg Zoo

This chapter will give some background to Aalborg Zoo along with some history. It will then go on to describe the past environmental performance of Aalborg Zoo along with some figures to show this.

3.1 History of Aalborg Zoo

Aalborg Zoo opened for business in April, 1935 and is today a relatively medium sized zoo, covering 8.5 acres and employing roughly 55 people annually. The zoo is located in Aalborg which is in the northern part of Jutland, Denmark. Aalborg is the fourth largest city in Denmark and the largest city in the Region. Over time the zoo has become one of the major tourist attractions in the region, recording over 390,000 visitors in 2007 (Nielsen 2008). The zoo draws large amounts of school groups and youth organizations from all over the region to visit its facilities. On any given day during the prime seasons (spring and summer) one can see large groups of school children touring the zoo and visiting the education department. This can be related to a diverse collection of animals across its 8.5 acre facility and a strong educational department that teaches visitors about the displays, animals from all over the world and conservation. The mission statement of Aalborg Zoo as given on their website is as follows

> *The overall purpose of Aalborg Zoo is nature preservation, directly through international animal breeding partnerships and indirectly through the dissemination of knowledge about threats to nature and animals (aalborgzoo.dk).*

Aalborg zoo's organizational structure is as follows:

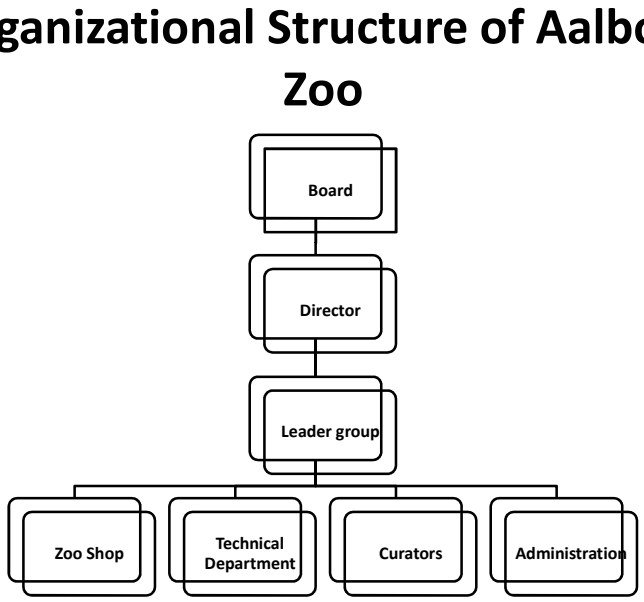


Figure 3-1:This figure shows the organizational structure of Aalborg Zoo. (Nielsen, 2008)

The board at Aalborg Zoo is made up of a few different organizations. These organizations consist of the city council, the tourist attraction organization of northern Jutland, and the business life organization. Below the board is the director of the zoo. At the time of the decision to implement EMS at Aalborg Zoo there was a different director. Below the director is what is called the leader group. This group has a representative of the different areas of the zoo. For example, there is a person from the shop, a person from the technical department, a person representing the curators, and a person from administration. These leaders represent their respective areas around the zoo and act as a medium between the organization and their respective areas.

Part of this desire for nature preservation played a role when they decided to develop an environmental management system. It initially began with the city council inviting different companies from around the city to participate in a group that wanted to prioritize the environment in their schemes. This group was running for about 6 months to a year. After the group ended the board and the director (a different one than the current director of Aalborg zoo) decided they wanted to go for ISO 14001 certification, so the planners at Aalborg Zoo began the process of developing an environmental management system with their first year certified in ISO 14001 being 1998. This made Aalborg Zoo the first zoo in the world to receive ISO 14001 certification. The zoo decided to act towards a better environment and experience the economic benefits of reduced consumption and waste. This also fit with their purposes as mentioned above. This task of initiating and developing an environmental management system was comparatively easier to develop than a big city zoo like Copenhagen's. Aalborg zoo's small size gives them the benefit of adapting and initiating new policy easier (Nielsen 2008). This also put them in a frontrunner position domestically as the only zoo in Denmark to have an ISO 14001 certified environmental management system, later being followed by Copenhagen Zoo in 2002 (Bydam 2008).

The process of achieving this environmental management system needed certain requirements.

Figure 3.2 Essential elements of EMS from Cheremisinoff and Bendavid-Val 2001

As was said before, due to Aalborg Zoo's medium size it was not a problem to get top management's involvement and commitment to the EMS. It should be noted that it is also necessary to get the employees that are not in top management's commitment as well. Since it is a zoo, many of the caretakers in the different animal displays are heavily involved in the monitoring part of the EMS which may not be the same for the typical locations of EMS, such as a factory. The environmental policy is quite consistent with the general purose or mission of the zoo, mainly being nature preservation and the dissemination of knowledge.

3.2 **Past Environmental Performance of Aalborg Zoo**

In this section there will be a presentation of the different main areas of Environmental Impact associated with Aalborg Zoo. There will also be a presentation of the levels of impact associated with these areas of impact.

3.2.1 **Garbage Production**

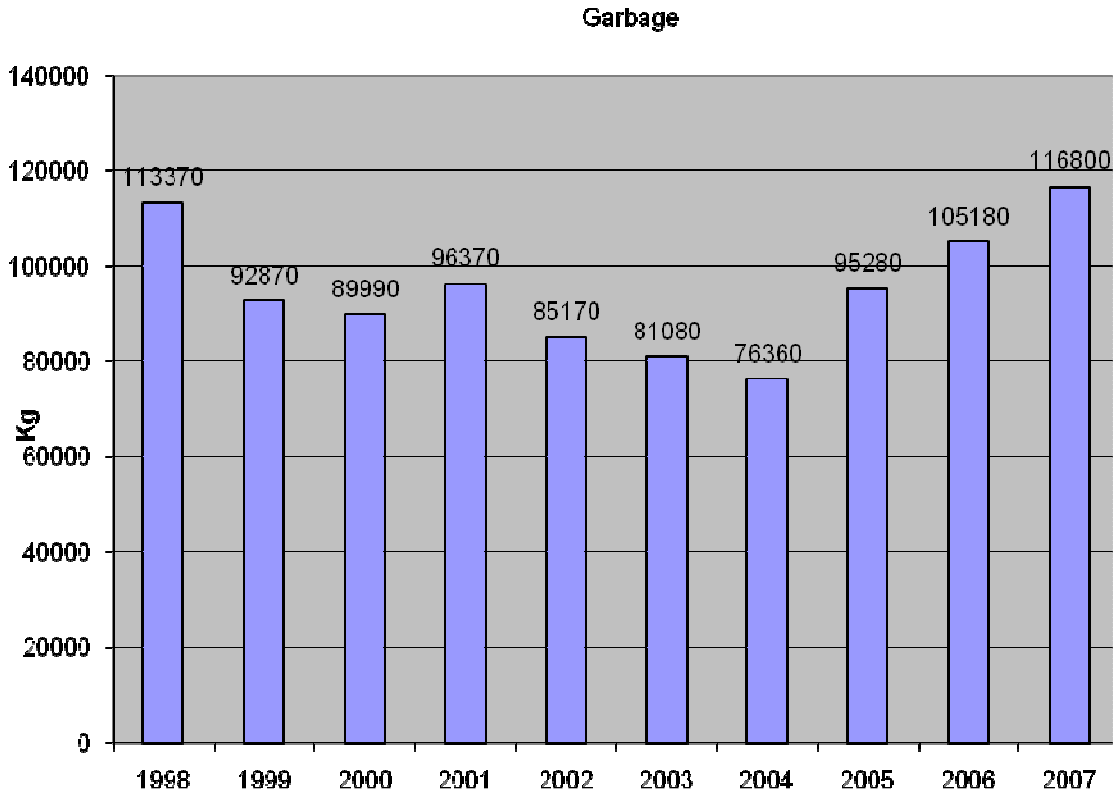


Figure 3-3: Shows the production of garbage for district heating from 1998 through 2007 in kilograms (Nielsen, 2008)

Solids wastes and trash are one of the main environmental impacts associated with the function of Aalborg Zoo. The different types of wastes are sorted extensively at the zoo amongst different catagories. There is a general trash which is sent to be burnt for district heating which is collected and tracked through the environmental management system. A chart displaying this can be seen in figure 3-3, which displays the amount of trash collected yearly from 1998 through 2007. This shows a general decreasing trend of trash production after the implementation of the EMS in 1998 until between 2004 and 2005 when there is a sharp increase in trash production. Aalborg Zoo is required by law to sort its hazardous wastes and keep track of how much is being produced.

Hazardous Waste Types at Aalborg Zoo

-Acids
-Bases
-Paint
-PVC/Hard Plastic
-Insulation Material
-Glass
-Lightbulbs
-Used containers
-Oil Spill Material

Figure 3-4: Lists the types of hazardous materials sorted at Aalborg Zoo

There are many sources of trash at Aalborg Zoo. When one visits Aalborg Zoo, or any zoo for that matter that houses large animals, one can see the large amount of waste these animals produce on a daily basis. For example, a Hippopotamus will typically consume one to one and a half percent of its body weight in food daily (Smithsonian, nationalzoo.si.edu). In the case of the Pygmy Hippopotamuses at Aalborg Zoo which weigh 180-260 kg (Aalborgzoo.dk) this can amount to anywhere from 1.8 to 3.9 kg of plant matter a day for each hippo. This is just one 1,200 different animals divided into 138 different species at Aalborg Zoo (Aalborgzoo.dk), therefore this can add up to immense amounts of food. Much of the food that is fed to the animals comes as free handouts of food that is unfit for human consumption (past expiration date, old food) from many local supermarkets or food distributors. Many times this food has lots of packaging in the form of plastic wrapping which is disposed of as normal trash, creating a

significant amount of trash. The employees at Aalborg Zoo greatly appreciate the food coming for free from these distributors, but since many times it is not used and creates excess trash, the zoo has made a deal that the distributors should call before delivering the old food.

Much garbage is also coming from the guests who visit the zoos. There are trash cans dispersed throughout the zoo for guests to deposit their trash in, but the guests are not seperating the trash so all of it is going into the general trash that is collected. When one compares the amount of visitors to the amount of trash being produced there is a slight correlation between the two factors. This does not apply over the whole course of the EMS (1998-2007) because the reductions of trash production experienced in the beginning of the years with the EMS were most likely experienced due to the new management techniques associated with the EMS. Looking at chart 3-3 one can see though that there is a sharp increase in garbage production between 2004 and 2007. If a correlation coefficient is calculated between the number of visitors during this time to the production of garbage there is a respectable correlation of .314[1]. Aalborg Zoo cannot explain the increase of trash from 2004 to 2005 but as a reaction to the recent increase in garbage has made a target to decrease trash production by 5%. Below is a chart which both displays trash production and visitor numbers for 1998 through 2007.

[1] Merriam Webster Dictionary defines the correlation coefficient as "a number or function that indicates the degree of correlation between two sets of data or between two random variables and that is equal to their covariance divided by the product of their standard deviations" (Merriam-webster.com)

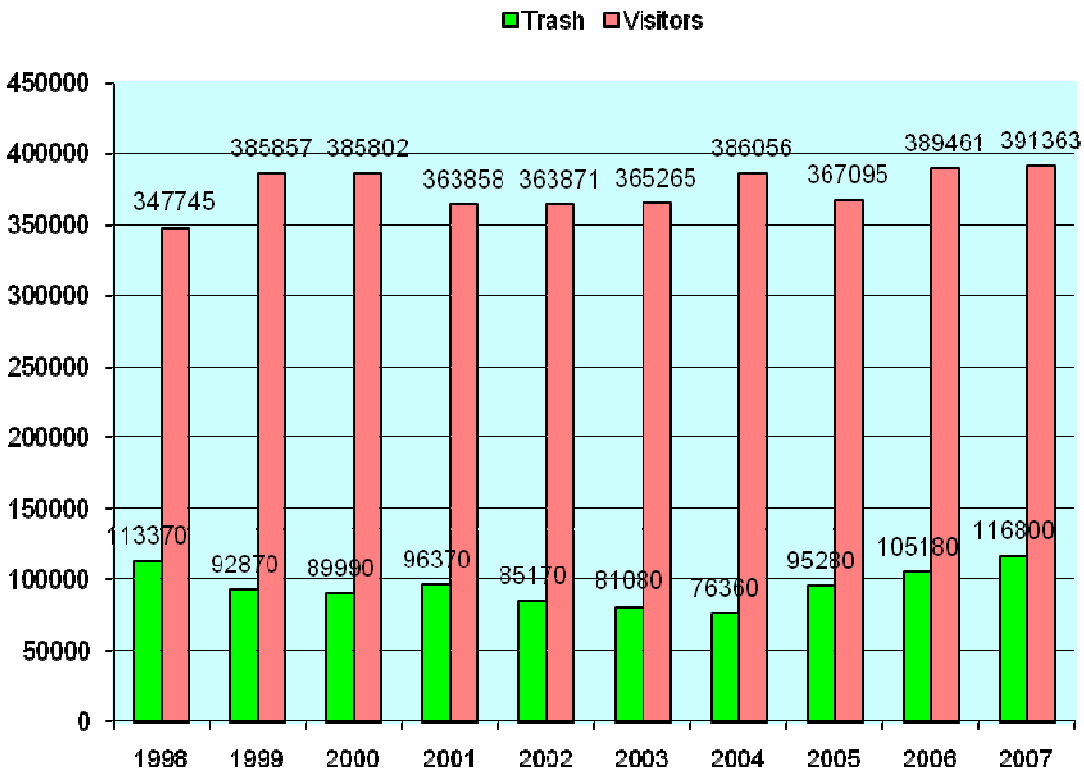


Figure 3-5: Shows the number of visitors and trash production in kilograms from 1998 through 2007 (Nielsen, 2008)

3.2.2 **Electrical Consumption**

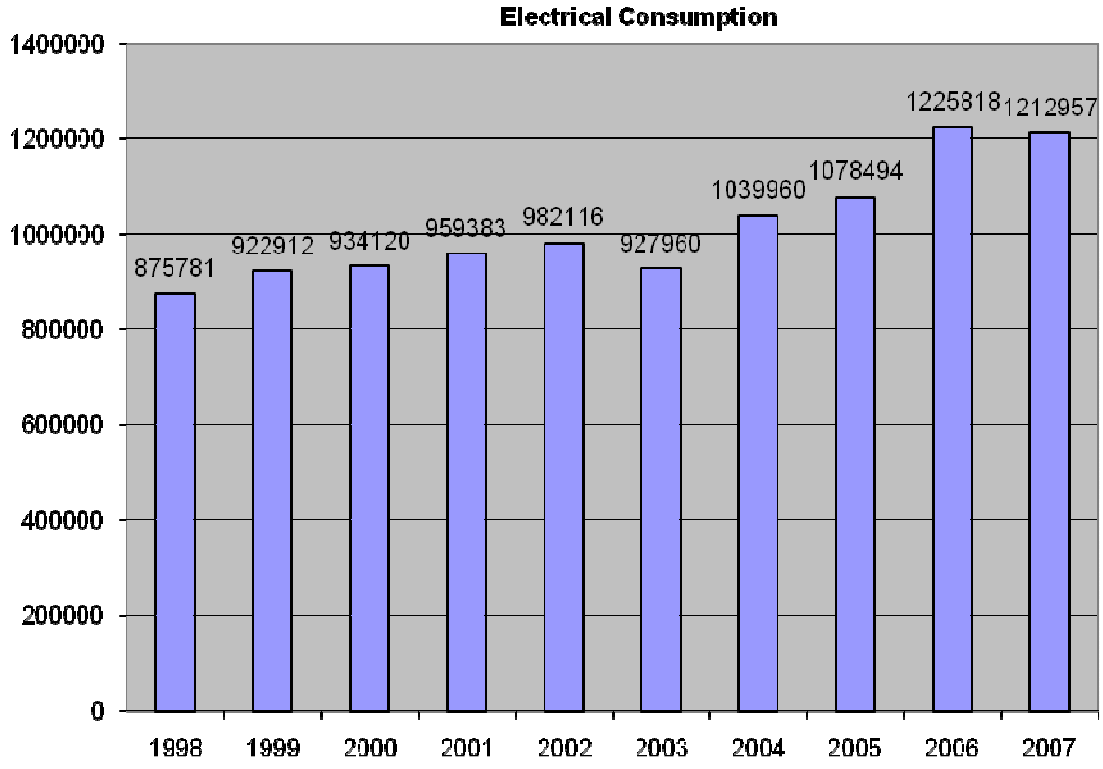


Figure 3-6: Shows electrical consumption in kilo watt hours from 1998 to 2007 (Nielsen, 2008)

Electrical consumption at Aalborg Zoo is tracked quite extensively through the environmental management system. Many different meters recording different areas of electrical consumption have been installed throughout the many buildings in the zoo. At the time of the implementation of the environmental management system around 1998 the electricity consumption could only be read for the entire zoo. Throughout the years more meters have been installed in the different areas and beginning last year meters have been installed in almost every house in order to find out where 'hot spots' of electrical consumption are located in the zoo (Nielsen, 2008). For example, the increase in electrical consumption from 2005-2006 was mainly due to the addition of the South American house and the African village. The South American

village was introduced mid-summer so its full impact was not seen until 2006. The African village uses lots of electricity due to it containing many buildings and pumps. Locating these 'hot spots' of electrical consumption are crucial in finding a remedy to lower their impact. At Aalborg Zoo, staff involved in the technical and operational aspects of the zoo are responsible for reading the electrical meters on a regular basis. The main electrical meters are read and logged every week and the meters for the specific houses are read and logged every month.

At the onset of the EMS in 1998 electrical heaters were still being used in certain areas of the zoo. Heaters that run on electricity are very inefficient and quite wasteful if district heating is available as an alternative. Therefore, electical heaters were phased out shortly after the introduction of the EMS.

3.2.3 **Water Consumption**

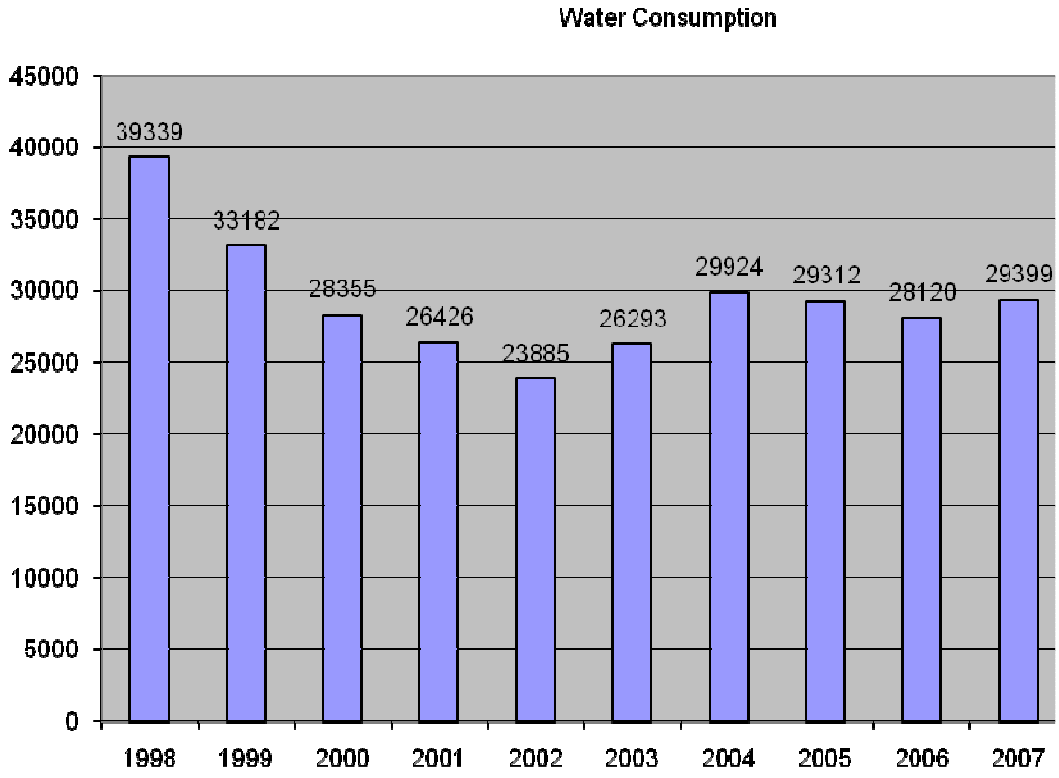


Figure 3-7: Shows consumption of water in m^3 for years 1998-2007 (Nielsen, 2008)

Obviously in a place like a zoo there will be significant water consumption in order to support such a diverse colllection of life. A significant reduction in water consumption was high priority for Aalborg zoo when the plan was made to develop an environmental management system. Water consumption was quite high in 1998 at the onset of the EMS, but also had a high potential for improvement. At the time of the development of the EMS, one of the main water saving initiatives was to install a water recycling system for the artificial stream in the display for the birds and cats. This greatly reduced water consumption because previously the stream used an immense amount of water that was simply pumped down the stream and out of the zoo. This

system brought the water back around to the head of the stream and reused. Simple, yet very effective as you can see from the drop of water consumption shortly after 1998 in figure 3-7.

Aalborg zoo also utilizes an advanced water filter system for the pygmy hippopotamuses in the African village. Hippos are known to require an immense amount of water in captivity due to the tremendous amount of waste they emit into the water (Nielsen 2008). The water filtration system Aalborg zoo uses in the hippo pen allows them to clean the water on site and recycle it through the pen, therefore requiring them to use less clean water from the district water supply. A similar water filtration unit is used in the polar bear enclosure. They had experienced problems with this system around 2006-2007. There was a leak in the filter system and underneath the pool of the polar bear. In 2006, the polar bear enclosure used 5,283 m^3 of water. After repairing the leaks during this time period the water consumption in the polar bear enclosure decreaed to 3,465 m^3 of water in 2007. The zoo experienced a decrease in water consumption at the polar bear enclosure of 34%, quite a good resonse to a problem that was identified and then tracked through the EMS. (Aalborgzoo.dk, 2008)

3.2.4 **District Heating Consumption**

Heating at Aalborg Zoo is created and provided through the district heating system in Aalborg city. As was mentioned earlier before the creation of the EMS some of the heat at the zoo was provided by electrical heaters (Nielsen, 2008). This was phased out quite quickly due to the inefficiency of these heaters and the availablity of district heat. But simply phasing out electirical heat and converting to district heat was not enough. The zoo wanted to improve the efficiency of the system.

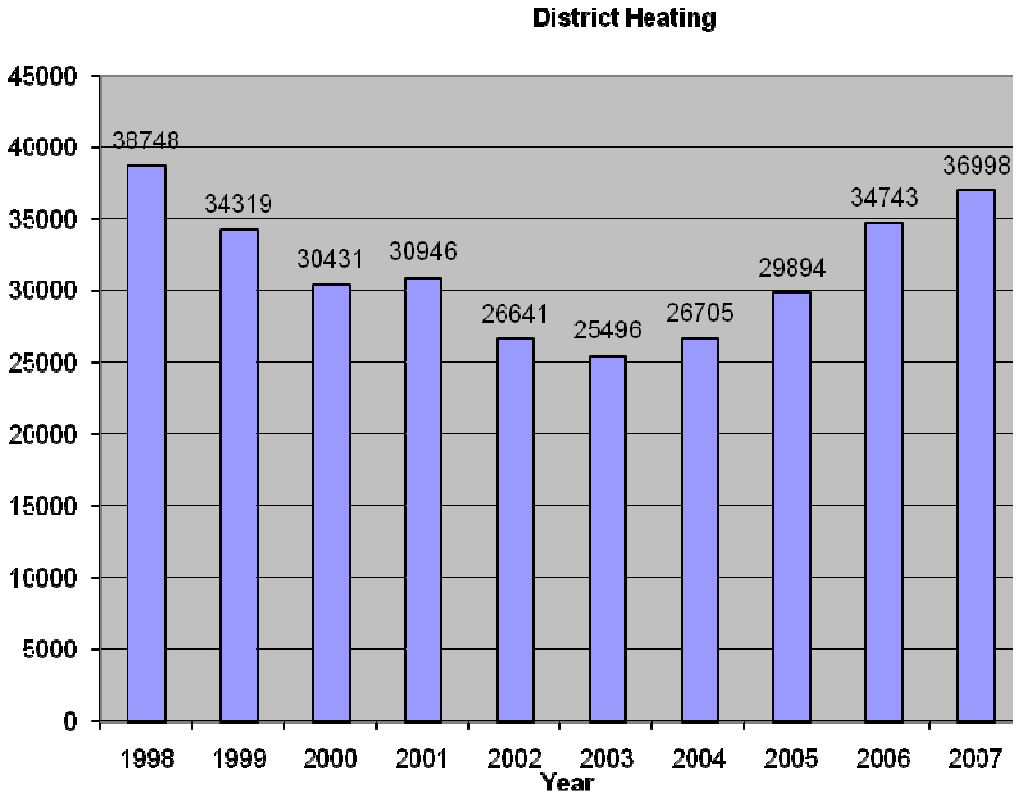


Figure 3-8: This figure shows the yearly district heating consumption measured in cubic meters. (Nielsen, 2008)

Before the EMS system was put in place all hot water for heating coming from the district heating facility was only run through the zoo's heating system once. This was because at this time the district heating facility wanted the water to come back as hot as possible so it was easier for them to heat up and send back out into the district heating system. Aroud the time of the onset of EMS at Aalborg zoo the district heating facility sttarted to allow the citizens and businesses in Aalborg to recirculate the hot water as it is leaving their heaters so it goes through the heating system again. This is because the water is still pretty hot after it has gone through the heating system somewhere and can be used again for free. This is almost "free heat" (Nielsen 2008) for the zoo and other Aalborg residents who take advantage of this privelage, therefore

Aalborg Zoo modified their heating system to recirculate the hot water and exerienced reductions in consumption. This accounts for some of the reductions in district heating consumption seen in figure 3-8. There were also some other small changes made around the zoo at the time, for example they replaced many valves on heaters and installed magnetic valves as well. They also upgraded the insulation in some of their buildings around the zoo. Basically they "did a lot everywhere at that time (Nielsen 2008)," because all employees were involved in giving suggestions for improvements at the onset of the EMS and activiely participated and suggested any small improvements that were possible.

3.2.5 Conclusion to Past environmental Performance

When Aalborg Zoo decieded they will persue a certified EMS there was a 2 week audit of the daily activities at the zoo. (Nielsen, 2008) All employees participated in planning to see what sort of impacts are associated with the function of the zoo and to what degree these impacts take place. Everything was measured and documented, and all employees could suggest initiatives for what they thought were hotspots. After this planning phase many initiatives and changes were made to pick off the 'low-hanging fruits,' menaing the obvious and fairly easy to manage problems. There is no timeline of when these things were done but there were many changes made around the zoo, and due to the informal/personal nature of Aalborg Zoo everyone was able to make suggestions and participate in the changes. This informal culture at Aalborg Zoo still stands and helps give everyone a voice no matter what your position to help continually improve the EMS.

4 Education at Aalborg Zoo

This chapter will discuss the education department at Aalborg Zoo. First some background will be given to the structure of the education department and how much they teach. Then some of the standards to teaching in zoos will be discussed.

4.1 Background

Aalborg Zoo has a department solely devoted to education. Many groups from schools and other institutions such as day care make arrangements to have an educational tour or lesson about the zoo and the animals they have. In order to fulfill these requests and keep the lessons new and fresh, there are three full-time employees to work the education department (aalborgzoo.dk). One of the employees named Morten Smetana also works with EAZA (European Association of Zoos and Aquariums), of which Aalborg Zoo is a member, to help define their educational standards and guidelines. At the zoo there is a school building with 2 different classrooms used for teaching these classes and to house the animals and tools they use for the lessons.

The aim of the educational department at Aalborg Zoo when translated to English is as follows:

To give knowledge and understanding of animals in a way that inspires people to take care of the wildlife. Only on this condition can you contribute to the conservation of endangered species

(Smetana, 2008)

Along with this environmental statement Aalborg Zoo adheres to EAZA's educational standards. EAZA has a list of criteria that must be adhered to. The following is a summary of these criteria.

EAZA Educational Standards

- **The educational role of the zoo is to be clearly written in its mission statement**
- **The zoo must have a written education policy**
- **The zoo must demonstrate it is carrying out its education policy**
- **At least one member of the staff should be responsible for professional implementation of the education policy**
- **Animals need to be clearly and correctly identified in their enclosures. Threatened species should be highlighted.**
- **Animal demonstrations that are part of the program must have an educational or conservation based message**
- **For education programs to be successful zoo animals must be displayed as closely to their natural environments as possible.**
- **Interpretation/education should be an integral part of zoo displays**
- **A reference library appropriate to the size of the zoo should be kept and be accessible to employees**
- **Resource material/educational information should be made available to the general public and zoo audience**

Figure 4-1 shows the EAZA educational standards. (EAZA 2001)

The educational department offers 25 different courses through their education department. Some of the courses take place solely in the school building and some involve walking around the zoo.

Classes at Aalborg Zoo

-Animals at home
-Life at the zoo
-Activities of animals at the zoo
-Records in the Animal Kingdom
-Reptiles
-Snakes
-Animal adaptation
-Animals of Greenland
-Denmark's Mammals
-Birds
-Evolution/Classification
-The seasons in the Animal World
-Endangered Animals
-Rainforest as a Habitat
-Cats
-Animal Behavior
-Attitudes towards Animals
-African Savannah
-South American Wildlife
-All manner of Animals
-Sensory Experiences
-Issues for Keepers
-Zoo as a company
-World's First Eco-Certified Zoo
-Your own proposal

Figure 4-2 Shows the classes offered at Aalborg Zoo's Educational Department

The education department at Aalborg Zoo educates around 10,000 people a year through these classes (Smetana, 2008). They are also responsible for special seasonal displays that can be viewed by all the guests visiting the zoo. For example, in spring 2008 there was a special display regarding amphibians in which there was interactive displays describing amphibians around the world and how they are becoming endangered through loss of habitat and pollution (Smetana, 2008).

4.2 **Education Related to Sustainability and EMS**

The education at Aalborg Zoo is understandably focused on the biology due to the fact that it is a Zoo which showcases animals, and it would like to educate its visitors on what they are seeing. This is consistent with their education policy which focuses on learning about the animals and their habitats in order to promote conservation of endangered species. But does the zoo

encourage sustainability in a manner that is not solely focused on animals but in a way that leaves a healthy planet for future generations? Around the time of the development of the EMS, the educational department at the zoo created some displays that teach the visitors how the zoo decreases their environmental impact through different initiatives. These displays were interactive boxes where the visitors could press a button and the boxes would display to them how things like the water recycle system in the stream, energy saving light bulbs, freezer in the carnivore area running on air instead of water, waste sorting, and the ISO 14001 in general could help save energy and decrease the environmental impact of the zoo (see appendix F for pictures of these boxes). These boxes eventually were removed and put in storage because the zoo changes its displays quite often in order to keep their entertainment fresh to encourage people to visit again. It is very important in a small to medium sized zoo to change your attractions in order to get people to return because they can see everything in one visit. Since then they have not had other displays about their environmental management system but the education department does offer a tour that focuses on the EMS, yet there is less than ten groups a year that request such a tour (Smetana, 2008).

The education department has adapted over the years to their market in order to keep them coming back. They develop fresh ideas and do it in a very hands-on manner. The lessons the education department offers are given as a supplement to the school curriculum (Aalborg Zoo education department, 2008) but are meant to be different than being in school. They use no books and preach a very hands-on manner, meaning they use many live animals in their lessons and when that is not possible they have an extensive collection of animals skins and furs from animals that have passed away. The education department will also bring their students around the zoo to view certain animals that are not possible to get for a hands-on experience, for

example the predators. All of this personal interaction with the animals is meant to give the students a better appreciation for the animals which will hopefully get them to contribute to the preservation of endangered species, the overall purpose of the education department at Aalborg Zoo.

Most visitors to the education department at Aalborg Zoo are children and the department has the impression that all children love animals. They are especially good for children with learning disabilities or different handicaps (Aalborg Zoo, 2008). If they can give these children a positive experience with the animals at an early age then they may have a more positive outlook upon conservation and sustainability, plus it is a good supplement to the topics children are taught at an early age in school.

5 Analysis

This chapter will include analysis of the Environmental Management System at Aalborg Zoo. This means there will be analysis of the different main areas of impact associated with the function of the zoo and how well the EMS tracks and alleviates these impacts. This chapter will go on to analyze the performance of the education department and discuss their education on the EMS and sustainability in general. The chapter will then conclude with a discussion on the potential to incorporate education at the zoo into the EMS in general.

5.1 EMS at Aalborg Zoo

Aalborg Zoo is a frontrunner among zoos regarding environmental management. They were the first zoo in the world to achieve ISO 14001 certification. Is this zoo still on the cutting edge of environmental management? Is the EMS still working as it should and achieving continual improvement, one of the basic goals of EMS? This will be analyzed in the coming sections through a look at the different areas of impact throughout the zoo and observations of the audit for recertification of their ISO 14001.

5.1.1 Before EMS at Aalborg Zoo

Before there was an environmental management system established there was a great consumption of resources taking place at Aalborg Zoo. In order to house many of the animals who call Aalborg Zoo their home you need to commit a great number of resources such as water,

heat, and electricity and the production of a lot of waste. These resources are quite expensive so when the managers at Aalborg Zoo realized they could implement changes to reduce consumption without affecting the well being of the animals it was quite an easy decision to make. This was further facilitated by the city council group which was discussed earlier which helped prioritize the environment in the running of local businesses.

5.1.2 **Areas of Impact and Evaluation**

In this section there will be an evaluation of the different major areas of impact being tracked through the environmental management system. These areas were presented in chapter 3 and will be further evaluated in this section.

5.1.2.1 **Waste Production**

Waste production is one of the areas of impact associated with Aalborg Zoo that has created the most diversity and trouble to track. It is not all of the wastes produced that are giving troubles, there is a method in place that has been working fine for the hazardous wastes which are required by law to be sorted and tracked. The recyclables are also sorted and dealt with a fair amount of ease. It is the general trash that is sent to the district heating that is creating most of the problems. There has been a sharp increase in the amount of general trash production at Aalborg that can be seen in figure 3-3. After the minimum output in 2004 since the implementation of the environmental management system in 1998 there has been a steady rise. What is creating this sharp increase in trash production? The correlation analysis done in chapter 3 between visitation

and trash production only showed slight correlation so it is not the sole contributor to the trash increase.

Aalborg Zoo's employee who is in charge of the operation and upkeep of the environmental management system cannot explain this sharp increase in trash production. It was noticed that there has been an increase in visitation so this might contribute to the increase; therefore bins have been placed around the zoo for the visitors to sort their bottles and cans from the general trash. The employees of the zoo hope this will help ease the problem. After all, a large percentage of visitors to the zoo pack their own lunches to picnic, and if the zoo can get them to sort the bottles and cans out of the waste of their lunches it should create a noticeable decline over the course of a season.

Aalborg Zoo's planners set a goal of 5% reduction of trash production from 2007-2008. The results have not yet been published but it is very important for them to have reached this goal. One of the major functions of an environmental management system is continual improvement. This increase of trash has been going on for a few years now, they must be able to respond to the problem, otherwise the system is not functioning correctly. There was a reduction in the amount of visitors in the high season, which is spring and summer, this past year (2008) so it should be interesting to see if that has an impact on the trash production.

5.1.2.2 **Electrical Consumption**

Electrical consumption is one of the areas of impact at Aalborg Zoo that they are most excelling at tracking. This may not be evident from figure 3-6 since there has been a general increasing

trend in electrical consumption since 2004. This is because the zoo has been expanding and adding new displays and animal enclosures. As was said in chapter 3 the increase around 2005-2006 was due to the addition of the South American house and the African Village. After conducting interviews and observing the technical department at the zoo one can come to the conclusion that they are trying very hard at locating 'hot spots' or areas of negative impact on the electrical use at the zoo. They are installing new meters all over the zoo and in each individual house. The results of the first full year tracking each individual houses usage will be finished for 2008 and will help the zoo figure out a plan to decrease the usage (Nielsen 2008). It is a matter of planning (install individual meters on all buildings around the zoo), do (install the meters), check (read meters on a regular basis), and act (evaluate hotspots and come up with a remedy). They just need to analyze the data and figure out what to do about the hotspots.

5.1.2.3 **Water Consumption**

Aalborg Zoo excels quite well in their monitoring and utilization of their water usage. As was shown in figure 3-7 they experienced a sharp decrease in water consumption after the onset of the environmental management system and then reached a sort of plateau which has been going on since 2000 with exception of minor fluctuations. This is impressive since the zoo has expanded since 2000 yet manages to keep the water consumption relatively constant. This is due to their modern water filtration systems in the hippo and polar bear enclosures, the water recycle system in the bird cages, and the utilization of rainwater. The technical department does a good job of checking the systems and monitoring consumption in order to catch problems before they get out of control, for example the leak in the polar enclosure that was discussed in chapter 3.

It is hard to make suggestions for improvement in water consumption issues at Aalborg Zoo when they can keep their consumption relatively constant even when they are expanding. All that can be said is they should set small goals for reductions in consumption and through utilization of their monitoring system they should find areas around the whole zoo that can make small improvements which will eventually add up to continual improvement.

5.1.2.4 **District Heating**

Aalborg Zoo has done a lot to reduce their district heating consumption. As was discussed in chapter 3, they have begun to recirculate the hot water through their heaters multiple times before pumping it back to the station. This has made a very positive impact on their consumption of district heat, as well as the many small things done around the zoo discussed in chapter 3. The main problem they face in this aspect is expansion. With the addition of the South American house which was built between 2005 and 2006 there came a huge increase in district heating consumption. This is because this particular house needs to be kept at a fairly high temperature (at least compared to normal Danish temperatures.) The managers in Aalborg Zoo must keep an eye on this enclosure and analyze for potential to reduce the amount of heat needed to keep it suitable for the animals inside. They should check for the potential to improve the insulation and make the entrance to the enclosure better at holding the heat in.

5.2 Education at Aalborg Zoo

In this section the education department at Aalborg Zoo will be analyzed. First it will be analyzed from the perspective of a partial AISHE audit which analyzes the sustainability of the education department. The education department will then be analyzed with the purpose of evaluating the potential of incorporating the department into the current environmental management system at Aalborg Zoo.

5.2.1 Partial AISHE Audit of Aalborg Zoo's Education Department

In this section a partial AISHE audit will be conducted. Before that a few definitions will be given.

5.2.1.1 Definitions and Discrepancies

The concept of sustainable education can be defined in a variety of ways. It should not be taken in the literal meaning of the term sustainable education because it is not defining the sustainability of the actual teaching process meaning it will be present for a long time. (Roorda 2001) The basic definition of sustainable education is:

Sustainable education is education which contributes effectively to the sustainable development of society.

This basic definition is quite ambiguous and it is quite important to further elaborate on what is incorporated in this process. For this we have another, more elaborated definition of what is included in sustainable education.

Sustainable education is education in which students acquire knowledge, insight, and skills about:

•Environmental problems

•Limited resources

•Technological opportunities and limits

•Social-cultural opportunities and limits

•Infrastructural opportunities and limits

•Policies leading to sustainable development

(Roorda 2001)

The above definition includes common issues that are focused upon in past studies and programs on sustainable education. It is not the perfect definition, there are always some issues that are not included, but this is quite thorough. The AISHE method includes one more definition that focuses on making the sustainability of education measurable. This is a more functional or operational definition. This simple definition is:

Sustainable higher education is education which, when measured using AISHE, is judged as sustainable (Roorda 2001).

AISHE was described in chapter four and therefore is known as an auditing instrument. It is the results of these audits that let one know the sustainability of the educational institution. There is a discrepancy here when using the AISHE method to evaluate an institution like Aalborg Zoo's education department. The AISHE method was developed and is supposed to be used for

institutions of higher education. How can this be applied to Aalborg Zoo's education department?

An institution of higher education is commonly known as a college or university. It is higher than the basic compulsory education. Aalborg Zoo's education department is not an institution of higher education.

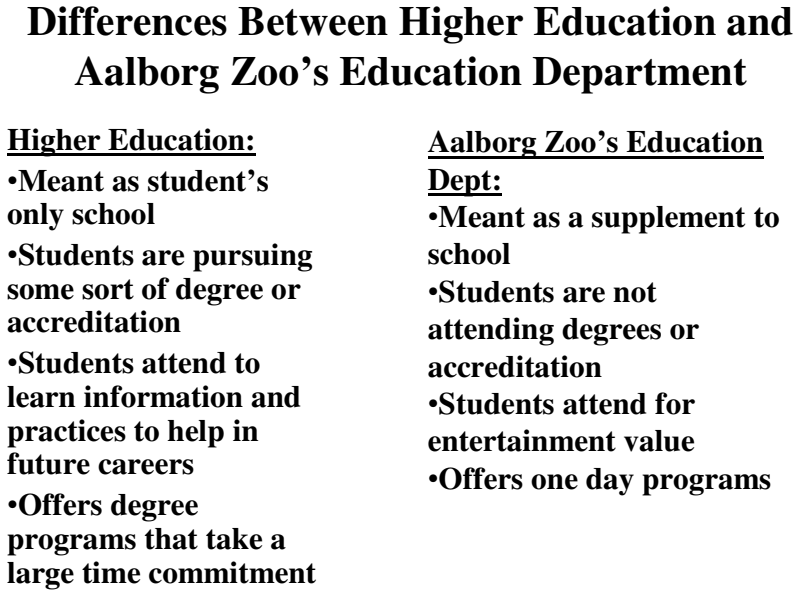


Figure 5-1 States the differences between higher education and Aalborg Zoo's education department

Aside from the criteria listed above Aalborg Zoo's education department is not a particularly large institution. The zoo only employs three people full-time devoted to the running of the education department. This does not include the few interns they have coming and going at most

times in the department. Higher education institutions vary in size from small to large, but one would be hard pressed to find an institution of higher education with only three employees.

So as we can see the AISHE method is not specifically designed for an institution such as the one at Aalborg Zoo. Aalborg Zoo is not an institution of higher education. This does not mean that one cannot use the AISHE method to conduct a partial or informal evaluation of the sustainability of the programs at Aalborg Zoo. This is because many of the criteria that are used for evaluation in an AISHE audit can be applied to any educational institution. This is not to say that there are no problems with applying AISHE to Aalborg Zoo. Many categories are inapplicable to Aalborg Zoo's education department, for example in developing the policy with respect to sustainability. This is applicable to an institution of higher education put you will not find Aalborg Zoo's education department have the children visiting their zoo help them develop their policy with regard to sustainability. It is simply not logical, unlike a higher education institution where the students are studying sustainability more in depth and have more experience with such issues.

5.2.1.2 **Partial AISHE Audit**

A true AISHE audit is done in a survey fashion using two meetings with each participant. Participants are usually from the staff but can also use former graduates of the institution. In this informal, partial audit results will be drawn from studying the educational department and past interviews with staff. Each of the 20 criteria used to evaluate the sustainability of the institution is divided into 5 stages of effectiveness/sustainability, with the 5th degree being the most

sustainable. The following are 8 criteria that are the most relevant to Aalborg Zoo's education department. The rest are much too focused on higher education.

1. Vision

Vision, in this context, means the organization or management's vision on sustainable development in general and/or in its fields of expertise. (Roorda 2001) When evaluating Aalborg Zoo's vision on sustainable development and more specifically with their field of expertise, they are quite progressive. They teach sustainability through their courses offered by teaching about endangered species and habitat destruction and through the course offered that describes the function of their environmental management system. This leads to the conclusion that they are in the 4th stage when it comes to vision in an AISHE audit. This is described as "the vision development about sustainability and the translation of it in a concrete policy takes place in interaction with the professional field and with the secondary education." Aalborg Zoo interacts professional through EAZA and international breeding programs. In the case of Aalborg Zoo's educational department they are secondary education themselves, but they interact heavily with primary education through the different school groups visiting. This difference takes place because AISHE was designed for an institution of higher education.

2. Policy

Policy, in this context, means a translation of their vision into concrete plans to do something with their vision. (Roorda 2001) Aalborg Zoo does a good job of translating their vision and goals into a concrete policy that is attainable or can be worked at. This leads to the conclusion that they are at the 4th stage when it comes to policy in an AISHE audit. This means at according

to the 4th stage that external parties are involved in their policy towards sustainability. Activities related to this policy are developed and performed together with these external parties on a regular basis and the sustainability policy is long term related. EAZA is very heavily involved in their policy towards education and sustainability. Their policies, along with the points associated through their involvement with EAZA, are developed together through the participation of their educator Morten Smetana and his work done in the past and ongoing collaboration with EAZA. Their policy on sustainability and the awareness and well being of endangered species and habitats are set from a long term perspective.

3. Communication

Communication, in this context, takes place within the organization and with the outside world. (Roorda 2001) Aalborg Zoo is quite clear about its stance on sustainability and this view is spread quite well throughout the zoo staff through meetings, the running of its EMS, and preparations for questions from the auditor of the EMS. Some of the states of evaluating the communication of sustainability through the AISHE method are hard to apply with certainty to the Aalborg Zoo educational department. As said earlier this is because the method is designed for an institution of higher education. It can be said that Aalborg Zoo's educational department has achieved at least the third AISHE stage with relation to communication. According to AISHE this means that the management has knowledge about the opinions and education of sustainability held by its staff and students, and this information is used to shape the communication about sustainability. Aalborg Zoo has an advantage regarding its small size when it comes to communication. Almost every employee has a say which can be seen by their informal audit of the sustainability of the zoo in general, that was conducted when it was decided

to go for a certified EMS. Every employee was involved in this audit and gave suggestions for areas of improvement. It can still be seen today with the interaction of managers with the employees that are more involved in the everyday functioning and upkeep of the zoo and the data keeping for the EMS. Data keeping of the EMS involves communication of the technical manager who is responsible for the EMS and the technician who collects the data on a weekly and monthly basis.

It can be seen in the education department when they plan new classes and displays and their constant interaction with EAZA, and different new focuses they will teach the students who come to the education department. All the programs they teach have to do with sustainability and current threats that affect the animals they are teaching about. It is always clear what the employees know with regard to the animals and issues being taught.

4. Internal Environmental Management

This AISHE criteria is quite straightforward. It depends on the existence of a functioning environmental management system and how well it is integrated into the function of the institution and education. This is important in education because it is an example of how an organization takes care of its environmental problems and it can be used as an educational tool. (Roorda 2001) According to the criteria set out it can be said with confidence that Aalborg Zoo has achieved the third stage according to AISHE with regard to internal environmental management. This means that there is a functioning environmental management system, there is an annual environmental report published (internally but soon to be public), and the environmental management system is used intentionally for educational purposes. It has fulfilled these requirements because they do have a functioning EMS, the zoo had some trouble in the

past publishing a yearly environmental report but there is a goal to change that since their last audit (Nielsen 2008), and the education department does offer a course explaining the existence and function of the EMS. Aalborg Zoo was very close to achieving the fourth stage according to AISHE in this category, except that one of the requirements would be that the EMS would include a traffic plan for their personnel (transportation management), but Aalborg Zoo does not do this.

5. Network

Network, in this context, means that the institution maintains permanent contacts with companies and other organizations having expertise with regard to sustainability. (Roorda 2001) These contacts are used to increase the expertise of the staff. Aalborg Zoo has network ties throughout the zoo world and natural world through EAZA and other professional fields. These ties are imbedded in the curriculum of the Aalborg Zoo education department. This puts them in the third stage according to AISHE in the network category which means the curriculum contents with a focus on sustainability are aided by the networks they maintain. The expertise in this network is transferred to the organization and the education. This is true of Aalborg Zoo because many of the special displays set up in the education department are done in collaboration with EAZA, who also give much of the expert knowledge. The network is also extremely important in deciding the curriculum.

6. Expert Group

The expert group, in this context, means that there is a permanent group of staff members that posses a deep knowledge about sustainable development. This is a tough category when it comes

to Aalborg Zoo and their education department because they are a small zoo with a staff of only three full-time employees in their education department and also the fact that they are not an institution of higher education. Therefore it is tough to rank them in this category since unlike high education institutions that have many different departments of expertise, Aalborg Zoo has a small education department to teach about relevant issues to the zoo. With that in mind, it is possible to rank Aalborg Zoo's education department at least in the second stage according to AISHE in this criteria. This means that there is a group of staff members who keep their knowledge of sustainability up to date in their own and related fields and this group is involved in educational development. The group of staff members would be the education department themselves who are constantly making new displays and seasonal educational specials offered to their visitors. Almost all of these programs are relevant or about endangered species and habitats. In order to teach these lessons and programs the staff must maintain a high level of knowledge on the animals they are teaching, but also their habitat and how preserve them. This is all tied in with sustainability within the context of the zoo.

7. Staff Development Plan

Staff development plan, in this context, refers to the need for the knowledge of the personnel regarding sustainability to be kept up to date and at a high level. (Roorda 2001) With regard to Aalborg Zoo's educational department, it is hard to say how high they prioritize sustainable development in general because the zoo focuses more on the staff's knowledge in their particular field regarding the lessons they teach. Fortunately the lessons they teach deal much with conservation, endangered species, and habitats which have a lot to do with sustainable development. They stay knowledgeable with regard to their programs and lessons, but there is no

specific plan regarding sustainability and minimal knowledge known by staff. With this in mind, according to AISHE criteria, Aalborg Zoo would be in stage one regarding a staff development plan. This means that staff development in sustainability depends on individual initiatives.

8. Educational Methodology

Educational methodology, in this context, means the education is 'reflective.' (Roorda 2001) This means the methodology is designed is such a way, that the education contributes to the development of characteristics in the students that are essential for a sustainable attitude and behavior. Aalborg Zoo's educational department definitely excels in this category due to the heavy contact they facilitate between their students and the natural world. The lessons they teach and the experiences they provide are primarily meant to help create a sense of respect for the natural world and the animals that inhabit it. For this criteria according to the AISHE method, Aalborg Zoo's educational department will fall in stage five. This means that in the course of the student's education they receive this kind of feedback from a variety of actors in society. A student who visited the educational department at Aalborg Zoo and learned a lesson will have learned about conservation and proper respect for the environment. This will be reflected later in their life when they encounter a choice whether it be in their education or career where they have to decide to make a choice that would be more sustainable (friendlier to the environment) or the other, easier way. Hopefully they will have learned earlier in their education, influenced by the lesson at Aalborg Zoo, and chosen a path that will be more sustainable. This doesn't happen for all students who visit the zoo but many are influenced by the hands on approach of learning there which encourages them to live more sustainable.

6 Conclusions

In this chapter conclusions will be drawn from all the information and issues presented throughout the paper. First off conclusions will be drawn about the operation of the environmental management system in general. Next conclusions will be drawn about the educational department's operation and its relationship with teaching sustainability. Then the issue of incorporating the educational department at Aalborg Zoo into the environmental management system will be discussed.

6.1 Performance of the Environmental Management System

Aalborg Zoo has been running their environmental management system for a little over ten years now. Over the course of its functioning many issues have been found and addressed. These issues were presented and discussed in previous chapters, which brings us to the question; is the current environmental management system at Aalborg Zoo working effectively?

Over the ten years of operation Aalborg Zoo has never failed to receive certification. This makes it is hard to say it is not working when a professional certified auditor recertifies the zoo after a two day inspection. This is not to say there are areas that need improvement. In general though, Aalborg Zoo has kept their environmental management system running and achieved reductions in impact all throughout its facilities in all areas of concern. There are a few suggestions that need to be made that were brought up by the auditor the last time they achieved recertification.

First off, Aalborg Zoo must work hard to update and publish its environmental report **every year.** Before the last recertification the report available on Aalborg Zoo's website was a few

years old which is unacceptable according to standard environmental management practices. The report, along with Aalborg Zoo's environmental statement must be clear and easily available to the public, let alone the auditor that is recertifying the environmental management system. After asking the person in charge of the environmental management system, they took notice of this issue when the auditor brought it up and has since then updated the information and report. They have not published a report yet for 2008 and should work hard at doing so as soon as possible. It is very important for this lack of updating not to happen in the future.

Second off, clear goals to be achieved through the environmental management system must be stated for the public and actively pursued. It can be quite easy for an organization to get comfortable with the basic operation of the environmental management system and just do enough to keep the data, without trying identify and improve areas of concern. This may have happened or was beginning to happen at Aalborg Zoo and was pointed out by the auditor because there were no clear goals given. One of the main points and aspects of environmental managements systems is continual improvement. Impacts and outputs should not plateau after the initial affects of environmental managements systems are achieved. Managers and companies must work at identifying hotspots and continually improving them. Over the course of the existence of the environmental management system at Aalborg Zoo, the zoo has expanded and incorporated new building to the facilities that needed to be incorporated into the system. This may have taken focus away on improving the way the system runs before. The zoo must not be distracted by changes in the facility and focus on creating clear goals that are published along with the environmental report. Since the last audit Aalborg Zoo has published goals on their website. The goals are for 2007 though and need to be updated. The zoo had no goals published in 2008 and due to the lack of update on their environmental report around the time of New

Year's, no goals have been published for 2009. Continual improvement of the environmental management system should not just come to an institution, it needs to be planned and worked at.

Aalborg Zoo should also develop some sort of system to track transportation related to the functioning of the zoo. As of now there is no management system at the zoo that keeps track of transport related to employees traveling to and from work, transport related to the functioning of the zoo, business trips related to the zoo, transport around the zoo in gas powered golf carts, etc. This sort of system has been put in place in many other organizations with existing environmental management systems and has seen success through decreases in travel or finding more sustainable ways of traveling. Maybe this issue will draw more attention in the future but as of now there seems to be no interest in developing it.

Aside from these suggestions Aalborg Zoo has a well functioning environmental management system. It is easily able to track all impacts related to the functioning of Aalborg Zoo and achieves successful ISO 14001 certification year in and year out. As a small to medium size organization like Aalborg Zoo, they are easily able to make changes and adapt to new needs. It is necessary for them to adapt and make the changes that are necessary to publish an environmental report every year and set themselves focused goals on reduction so the environmental management system just doesn't become a passive thing just to have, but not use for improvement.

6.2 Aalborg Zoo's Education Department and Sustainability

Aalborg Zoo's education department does an excellent job of teaching the students about the natural world. They do a good job of teaching their students about values and respect towards the natural world around them. Projects have explored the effect of teaching values towards the natural world to young students and have had positive results in the way the children have developed a deeper respect towards nature. (Lewis et. al. 2008) When coupling this with sustainability students learn at an earlier age and are more likely to consider this issues when making decision later in their life. Aalborg Zoo's education department's mission is to teach the students about the species housed at the zoo and threats that are affecting them in the natural world. This is related closely to sustainability because sustainability focuses on leaving the natural world in the same state for future generations. So Aalborg Zoo is teaching sustainability in another way, yet the need to do it in an exciting way. For example, when asked why they don't go further with the message of sustainability and teach students about things they can do at home to change their habits to more sustainable ones, the employees said the visitors who come to the zoo don't want to be told they are doing things wrong at home and their lives, they want to learn about the animals (Nielsen 2008). What the zoo really wants their students to take home about sustainability is how they can help endangered species and protect habitats. This should be there main focus when dealing with sustainability because it is relevant to the animals being housed there and the type of entertainment their visitors are paying to have by being there.

According to the abbreviated AISHE analysis done in the last chapter Aalborg Zoo's education department does a fairly good job of teaching and being sustainable. They have a good vision about how they want to help sustainability through teaching about endangered species and the threats they are facing. This is aided through their interaction with primary schools and professional organizations. They have a concrete policy that was aided in development by their

interaction with EAZA and are continually working with them to optimize their displays and classes. There is an existing environmental management system that the education department must be aware of and knowledgeable about due to the class they have to teach about it. They are aware of the environmental impacts that are being tracked and regulated due to it and this reflects when they teach lessons about environmental management or sustainability in general. Aalborg Zoo's education department excels greatly in their teaching methodology. They give students a hands-on interaction with the natural world through the use of live animals in their lessons and bones and furs from deceased animals. This gives the students a respect for the animals and values towards the natural world that is unachievable without having lives animals to interact with on site.

Without being to fanatical, the staff of the education department should explore some ways of incorporating things the students can do at home or in their lives to create a more sustainable lifestyle. This can be done even while sticking to the purpose of the education department which is to give people knowledge about wildlife and how to protect endangered species. This needs to be done in a gentle manner because obviously the students come to be entertained as well as to learn.

6.3 Incorporating Education into the Environmental Management System

Incorporating Aalborg Zoo's education department into the environmental management system is quite hard to do quantitatively. Qualitatively, the zoo can write a small report about the classes the department is teaching, the issues covered in the classes regarding sustainability and respect for the environment, and they can talk about how many students they teach yearly. They can

include this in their published environmental report along with their other data regarding their efforts to reduce their environmental impact. But how do you judge the impact, or decrease in environmental impact teaching each student creates?

Using a method similar to AISHE but more suited towards a secondary education institution Aalborg Zoo can evaluate the material they are teaching in their lessons and rate it on a scale similar to AISHE in its applicability towards sustainability. This can be multiplied by the amount of people they teach yearly in their department. But how do you judge what issues and values the students took home with them? You cannot give these students exams or exit surveys because the education department at the zoo is for entertainment value. The children and other students that go there don't want to have to take tests and surveys; also the education department has a policy of no books. So it is very hard to quantify the impact that the teaching is having on the environment like the rest of the issues track in the environmental management system. Therefore, in order to include the work being done by the education department into the environmental management system of the zoo, it is recommended that it is done through a report to be included in the yearly environmental report. This report should include an evaluation of the courses being taught with regard to their content and its relevance to sustainability and respect for the environment. They should also include the number of visitors they teach every year. Unfortunately they will not be able to quantify the effect it is having on the environment compared to for example, reducing the production of trash by 1 ton every year, but they will be able to make a case that teaching these young students environmental values at an early age will help them make valuable decisions later in their life that will positively affect the movement towards sustainable development and respect for the natural world.

References

Aalborg Zoo Homepage http://www.aalborgzoo.dk (accessed many times)

Bydam, Rikke *Email Conversation with Rikke Bydam, Environmental Coordinator of Copenhagen Zoo* August 18th, 2008

Cheremisinoff, Nicholas P. and Bendavid-Val, Avrom *Green Profits: The Manager's Handbook for ISO 14001 and Pollution Prevention* Butterworth-Heinemann 2001

Danmark Statistik, www.statsbank.dk (accessed April 2008)

European Association of Zoos and Aquariums *EAZA Education Standards* Approved by EAZA council on Sept 22nd, 2001

Hancocks, David. *A Different Nature: The Paradoxical World of Zoos and Their Uncertain Future* University of Los Angeles Press 2001

Jørgensen, Tine Herreborg and Remmen, Arne *Environmental Management Systems* Taken from Tools for Sustainable Development, 2007

Kørnøv, L. Thrane, M. Remmen, A. and Lund, H. *Tools for Sustainable Development* Published by the authors and Aalborg Universitetsforlag, 2007

Lewis, Elaine. Mansfield, Caroline and Baudains, Catherine *Getting Down and Dirty: Values in Education for Sustainability* Issues in Educational Research, 18 (2), 2008

Merriam Webster Online Dictionary http://www.merriam-webster.com/dictionary/correlation+coefficient (accessed November 2008)

Nielsen, Erik *Interviews with Erik Nielsen* 13/2/08, 6/6/08, 18/6/08, and 26/11/08

Pielou, E.C. *After the Ice Age. The Return of Life to Glaciated North America* The University of Chicago Press 1992

The Quality Network www.quality.co.uk (accessed October 2008)

Roorda, Niko *AISHE Auditing Instrument for Sustainability in Higher Education* Dutch Committee for Sustainable Higher Education in cooperation with the Dutch Foundation on Sustainable Higher Education and the Dutch Ministry of Environmental Affairs, 2001.

Sammalisto, Kaisu and Lindhqvist, Thomas *Integration of Sustainability in Higher Education: A Study with International Perspectives* Springer Science and Business Media, LLC 2007

Smetana, Morten *Interviews with Morten Smetana* 13/2/08 and 26/11/08

Smetana, Morten *Using Live Animals* Powerpoint presentation from the educational department

Smithsonian National Zoological Park. Facts on Hippos
http://nationalzoo.si.edu/Animals/AfricanSavanna/fact-hippo.cfm (accessed November 2008)

United States Department of State www.state.gov (accessed April 2008)

Whitelaw, Ken *ISO 14001 Environmental System Handbook* Butterworth-Heinemann 1997

Woodward, David and Labonte, Robert *Reducing poverty Sustainably, in a Carbon-Constrained Future* Institute of Population Health, University of Ottawa 2008

Yin, R.K. *Case Study Research. Design and Methods* 3rd Edition Thousand Oaks: Sage Publications 2002

Appendix A: Aalborg Zoo's 2007 Environmental Report

Forord

Aalborg Kommune indbød i 1997 en række virksomheder til at deltage i en vækstgruppe med henblik på gennem workshops og møder at fokusere på miljøet og de miljøbelastninger, som virksomhederne er ansvarlige for.

På den baggrund blev forbruget i Aalborg Zoo kortlagt i efteråret 1998. Kortlægningen viste bl.a et forbrug på 40.000 m3 vand, 800.000 kwh el og 35.000 m3 fjernvarme.

I marts 1999 blev Aalborg Zoo således miljøcertificeret efter DS/EN ISO 14001, som den første zoologiske have i verden.

Efter seks år med et velfungerende miljøledelsessystem, kan det nu konstateres, at der er opnået betydelige reduktioner i forbruget og dermed også en stor økonomisk gevinst.

Facts om Aalborg Zoo

Aalborg Zoo blev indviet i 1935 og er i dag én af provinsens største helårsåbne turistattraktioner med et besøgstal på 392.000 i 2007

Zoo´s areal udgør 8½ ha, som stilles vederlagsfrit til rådighed af Aalborg Kommune. Zoo er en selvejende institution, der årligt modtager tilskud fra stat, og kommune.

Aalborg Zoo har mere end 1.547 dyr fordelt på 140 arter. På årsbasis er der beskæftiget ca. 55 medarbejdere.

Formål

Aalborg Zoo´s vigtigste formål er naturbevarelse, direkte gennem internationalt samarbejde omkring avl, forskning og genudsætning i naturen og indirekte gennem formidling af viden om truede dyr.

Miljøledelse i Aalborg Zoo

Aalborg Zoo blev i 1999, som den første zoologiske have i verden, miljøcertificeret efter DS/EN ISO 14001. Miljøledelsessystemet er certificeret af Dansk Standard.

Der er udarbejdet en miljøhåndbog, der beskriver Aalborg Zoo's miljøpolitik, målsætninger og mål for det eksterne miljø. Håndbogen er med virkning fra den 1. marts 1999 gældende for alle medarbejdere i Aalborg Zoo.

I håndbogen er retningslinierne for Aalborg Zoo's miljøaktiviteter og miljøledelsessystemet beskrevet. Miljøledelse er den ledelsesform, hvor arbejdet med alle havens væsentlige

miljøpåvirkninger bliver inddraget i den daglige ledelse og de daglige arbejdsrutiner i form af overvågning af miljøforhold og løbende miljøforbedrende aktiviteter.

Et miljøledelsessystem udstikker rammerne for, hvordan man styrer de aktiviteter, der kan resultere i miljømæssige belastninger. Systemet giver en systematisk kontrol af Aalborg Zoo's miljøforhold.

Miljøledelsessystemet skal sikre, at Aalborg Zoo virkeliggør miljøpolitikken, miljømålsætninger og miljømål for derigennem til stadighed at forbedre sig på miljøområdet.

Miljøpolitik

Formålet med Aalborg Zoo's miljøpolitik er at sikre, at ansatte i Aalborg Zoo motiveres til stedse at have det eksterne miljø for øje, således at arbejdet tilrettelægges på en måde, så miljøet tilgodeses i videst mulig omfang – til glæde for Aalborg Zoo, for det omliggende samfund og den danske natur.

Aalborg Zoo ønsker at medvirke til, at alle forhold, der har relation til driften af zoologisk have, udføres til størst mulig gavn for miljøet. Aalborg Zoo ønsker derfor en kontinuert forbedring af miljøforholdene og som minimum at overholde alle gældende love, som Aalborg Zoo er omfattet af.

Aalborg Zoo ønsker at fokusere på den miljømæssige belastning primært i forbindelse med forbruget af el, vand og varme, således at Zoo's samlede belastning af miljøet reduceres mest muligt.

Endvidere ønsker Aalborg Zoo at fokusere på affaldssortering, således at den gennemføres til størst mulig gavn for miljøet.

Miljøforholdene vil løbende blive forbedret under hensyntagen til økonomisk formåen og den til enhver tid værende teknologiske udvikling. 4

Aalborg Zoo vil ligeledes aktivt kommunikere vedrørende havens miljøforhold og opfordre underleverandører til at arbejde mod minimal miljøbelastning.

Aalborg Zoo ønsker, som en naturlig del af den formidling, der sker mod publikum og skoleelever, at øge informationsadgangen for eksterne grupper til at følge med i målinger og resultater.

Aalborg Zoo's miljøpolitik gennemgåes hvert andet år i marts måned næste gang i år 2008 og formidles til medarbejderne ved udlevering af et eksemplar af politikken. Politikken er offentlig tilgængelig, og kan rekvireres ved henvendelse til zoologisk have eller kan downloades på www.aalborgzoo.dk

Miljømålsætning

Aalborg Zoo vil, hvor det er teknisk og økonomisk forsvarligt:

- Fokusere på miljøemnerne energi, vand og affaldssortering.
- Minimere forbrug af el, varme og vand ved optimering af nuværende anlæg, anvendelse af vedvarende energi samt tillige (gen)anvendelse af regn- og procesvand.
- Anvendelse af energibesparende køretøjer og arbejdsredskaber i den interne arbejdsgang.
- I videst muligt omfang forsøge at anvende produkter, der har mindst mulig miljøpåvirkning i arbejdsprocesser for derved at mindske omfanget af miljøbelastningen. Herunder anvende Svanemærket papir tilPR og markedsføringsmateriale.
- Hvor muligt anvende FSC-mærket træ, der sikrer bæredygtig skovdrift, bæredygtig økonomi og social bæredygtighed. For andre materialers vedkommende bør det sikres, at de på tilsvarende måde er fremstillet efter de mest miljørigtige metoder, hvilket i begge tilfælde kan ske efter forudgående henvendelse til leverandører.
- Generelt tilstræbe, at leverandører motiveres til at anvende miljørigtig indpakning og emballage af de varer Aalborg Zoo modtager, og i det hele taget begrænse indpakning og emballage til det mest nødvendige materiale.
- Ved fremtidige ny- og tilbygninger tilsikre, at nærværende målsætning opfyldes, således at såvel rådgivere som entreprenører gøres bekendte med de krav, der opstår som følge af miljøpolitikken for Aalborg Zoo.

Miljømål 2007

- Nedbringelse af vandforbrug i isbjørneanlæg med 5 %
- Nedbringe forbruget af fjernvarme i tropehus ved Syd. Afd. med 5 %
- Nedsætte strømforbruget i Administrationsbygningen
- Nedsætte forbruget af el i Tropehuset
- Brug af miljøvenlige farvepatroner i ny printer

Miljøredegørelse

I 2007 er der i henhold til miljøhandlingsplanerne gennemført en række miljøtiltag.

Vandforbrug ved Isbjørne

Forbruget af vand i isbjørnebjørneanlægget var i 2006 på 5283 m3 og i 2007 er det faldet til 3465 m3. Det er en besparelse på 1818 m3 eller 34 %, det store fald skyldes at vi fandt en utæthed i et af de store trykrør der fører vandet fra isbjørnenes bassin og ind til vores filter, desuden havde bassinbunden sat sig visse steder og disse sætninger blev ligeledes repareret

Nedbringelse af fjernvarmeforbruget i tropehuset i Syd afd.

Ved at opsætte en anden varmeveksler er forbruget i huset faldet fra at være på 3917 m3 i 2006 til 3463 m3 i 2007, det er en besparelse på 454 m3 eller 11.6 %

Nedsætte strømforbruget i Administrationsbygningen

Vi har ikke fået sat de strømskinner op der skulle kunne give den besparelse vi var ude efter, men vi smider ikke ideen væk, men overfører den til 2008 og håber på at det kan gennemføres der. Vi har ikke en klar formodning om hvile besparelser der kunne komme på tale men håber at det ville kunne ses på vores forbrug

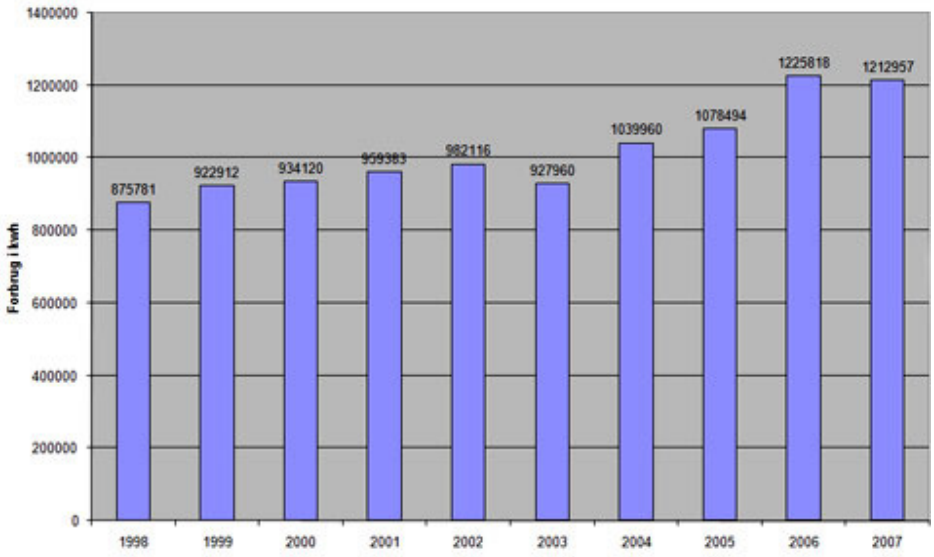
Nedsætte forbruget af el i tropehuset

Besparelsen skulle ske ved at vi nedsætter driftstiden på de pumper der bruges til filtersystemet ved vores krokodiller, men vi løb ind i nogle problemer af teknisk karakter og i stedet for at lave noget som måske/måske ikke duede valgte vi at vente og overføre målet til 2008

Brug af miljøvenlige farvepatroner i ny printer

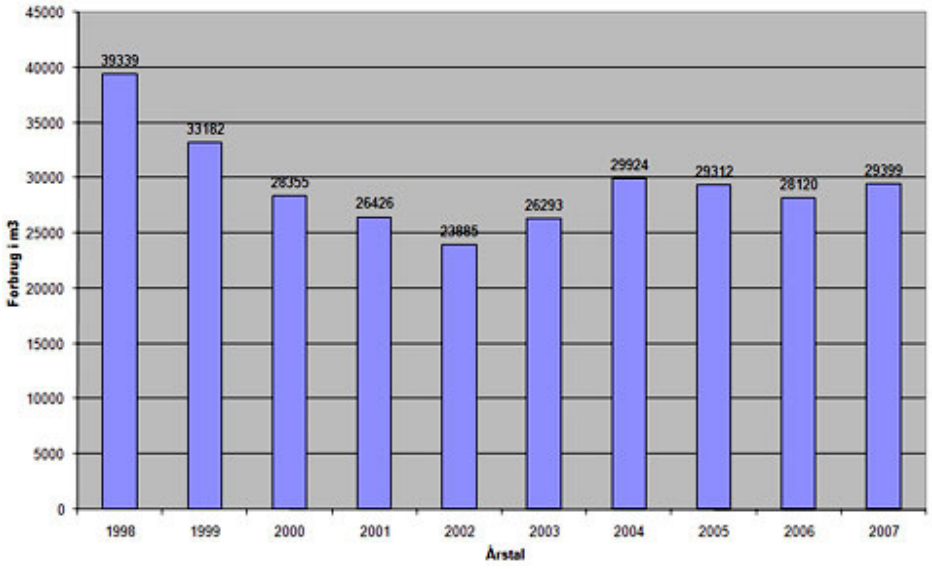
Vi har anskaffet en ny printer, hvor brugte farvepatroner kan bortskaffes som alm. dagrenovation og ikke som før, hvor det var kategoriseret som farligt affald, desuden er der også ifølge leverandøren en lille elbesparelse i forhold til den gamle printer.

Elforbrug



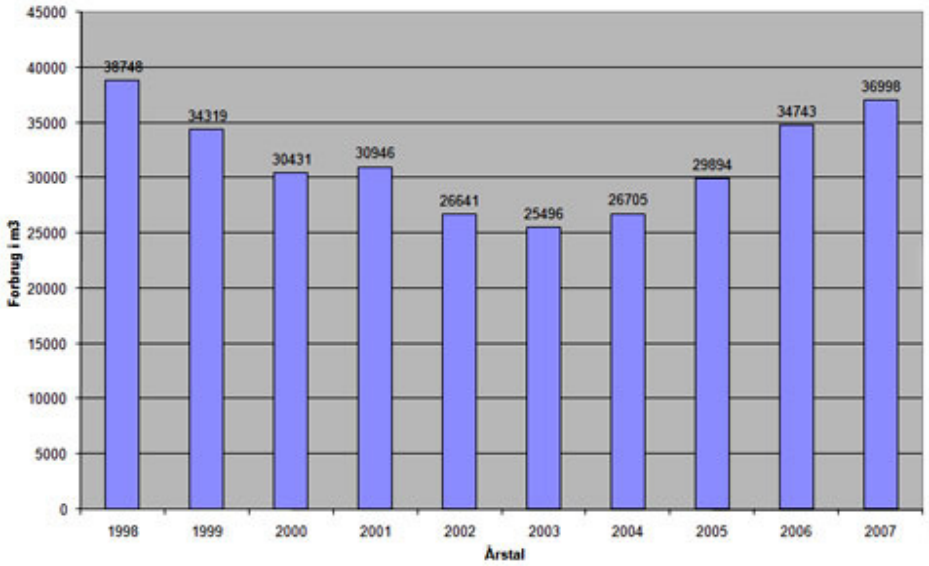
I forhold til 2006 er forbruget af el faldet med 12861 kwh, det er så lille et fald at det er svært at udpege hvilket sted besparelsen er fundet sted, men elforbruget har vi meget focus på hele tiden.

Vandforbrug



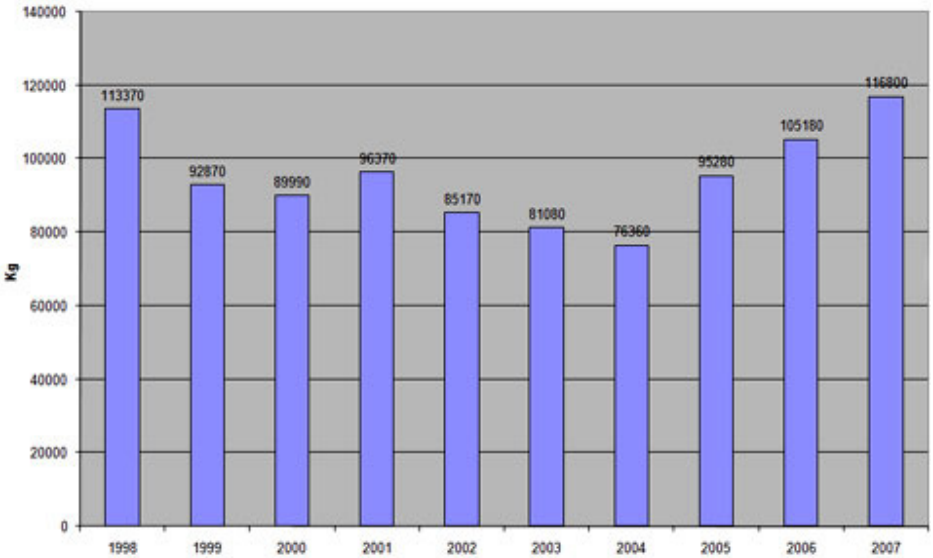
Forbruget af vand er steget med 1279 m3 fylding af bassin

Fjernvarme



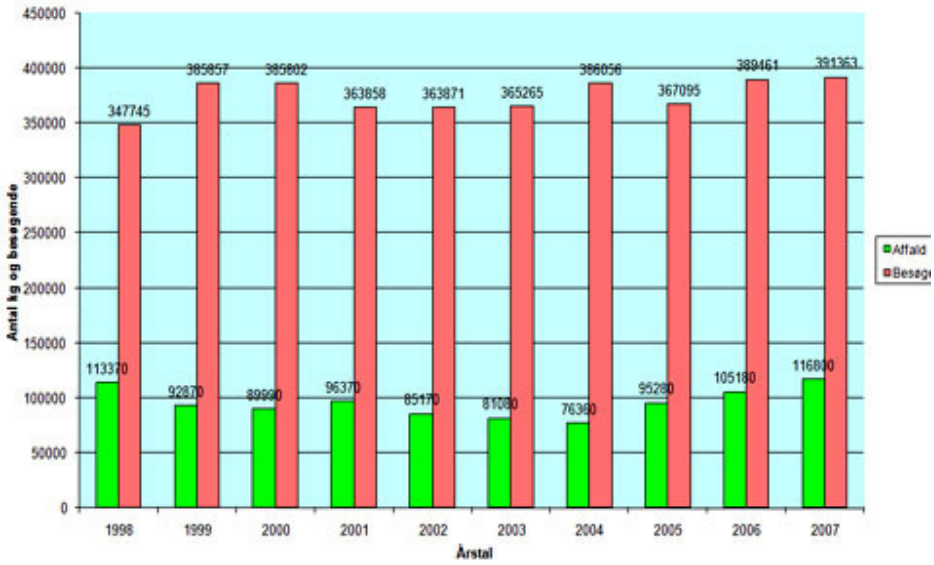
Fjernvarmeforbruget viser en stigning på 2255 m3 og den største bidragyder til denne stigning er den afrikanske landsby og det var forventet.

Affald



Mængden af affald varierer meget fra år til år, da det bl.a. afhænger af, mængden af de gratisvarer vi får, men en stigning af gæster har også indflydelse

Affald i forhold til besøgende



Aalborg Zoo sorterer affald i følgende fraktioner:

Industriaffald; Papir/pap, jern og metal, frugt og grønt, betonaffald, have- og parkaffald samt kødaffald.

Farligt affald; Maling, trykimprægneret træ, pærer og lysstofrør, glas, kanyler og medicinrester, batterier, spildolie, elektronikaffald.

Den resterende mængde affald, der ikke kan sorteres i ovenstående fraktioner, køres til forbrænding. Der er sket en stigning på 11620 kg i forhold 2006 svarende til 11.1 % .

Gødning fra dyrene køres ud til en lokal landmand. Dog bliver gødning fra rovdyr og aber sendt til forbrænding af veterinære hensyn

Uddannelse og træning

Morten Rom som er ny auditor har været på kursus i. Erik Nielsen har deltager i mødeaktiviteter i miljøgruppen i DAZA-regi, Nyansatte får en grundig gennemgang af miljøledelsessystemet og får desuden udleveret en folder, der i korte træk fortæller om miljøet og arbejdsmiljøet i Aalborg

Zoo. Desuden bliver der hvert år afholdt et møde for at det samlede personale kan få en orientering om hvorledes det er gået med miljøarbejdet det pågældende år

Eksterne henvendelser

Der er stadig stor interesse for at høre mere om, hvorledes miljøledelse praktiseres i Zoo.>

Formidling

Skoletjenesten tilbyder som en del af undervisningstilbudene undervisning i emnet "Miljøet i Aalborg Zoo"

Naturbevaring/Det eksterne miljø

Det eksterne miljø arbejde får en stadig vigtigere rolle i de zoologiske havers arbejde. Således opfordrer WAZA (World Association og zoos and Aquarias) i deres rapport fra 2005 alle verdens zoos til at integrere miljø og naturbevaring i alle områder af zoos arbejde.

Aalborg Zoo arbejder fortsat med Projekt Payamino i samarbejde med Payamino stammen. Samarbejdet går i korte træk ud på at bevare stammen skovområde på ca. 600 km, som et levested for dyr og mennesker.

Der er et stort pres udefra for at udnytte de naturlige ressourcer i området i form af tømmer, guld og olie, men indtil nu har stammen holdt stand. Det har de kunnet fordi projektet har kunnet tilbyde dem et alternativ til de penge, som bl.a. olieselskaber tilbyder, men også fordi vi har støttet undervisningen i landsbyen og har gjort dem mere bevidst om værdierne.

Aalborg Zoo finansierede i 2005 en forskningsstation, som benyttes af vore samarbejdspartnere Glasgow og Manchester universiteter. Sammen med Aalborg og Århus universiteter søger de at klarlægge områdets biodiversitet. Forskere og studerendes ophold er desuden en vigtig indtægtskilde for stammen.

I 2003 indførte vi en affaldsordning i landsbyen i et forsøg på at forhindre at plastic, flasker, batterier m.m. skulle ende i skoven og floden. Samme ordninger er selvfølgelig indført for besøgende, studerende og forskere i området. Al affald sejles tilbage til byen Coca.

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Appendix B Summary of Interview with Erik Nielsen 6/6/08

1) Do you have figures on the number of visitors visiting the zoo annually?

Electrical Consumption Questions

2) Since 1998 there has been an increase in electrical consumption, with each year having a greater consumption amount than in 1998 and a large increase from 2005 to 2006. What would you accredit these increases to?
3) Do you have any plans to reduce electricity consumption through any sort of plans or programs? Changes in practice or materials? Alan has detailed figures

Garbage Production Questions

4) After the implementation of EMS in 1998 there was a fairly steady decrease in garbage production, until 2005 when an upwards trend of garbage production began. In 2007 there was more garbage produced than in 1998. What do you think is the reason for this increase in the past few years?
5) Is there anything being done to alleviate the production of garbage?

Interview about consumption answers

1. Increase in electrical consumption from 2005-2006 is due to the South American house and the African village. South American village was introduced mid-year (during summer). African village has many buildings and pumps.
2. Meters have been installed in almost every house now to record electrical consumption and can find out where the hot spots are. Started last year.

3. Main electrical meters are read every week and specific house meters are read every month.
4. Affald increase. Packaging from free food from distributors. Lots of stuff is wrapped in plastic which adds up to a lot. Have a target to decrease 5% of affald. Made agreement with distributors that they should call before delivering all the old food. Do not describe in detail in the project because they want to keep good relations with their distributors and donors.
5. Cannot explain increase of affald from 2004 to 2005
6. Compare affald from 1998 to 2007

Appendix C Summary of Interview with Morten Smetana and Erik Nielsen 13/2/08

1. Environmental Boxes- Made Five boxes in the past, not functional right now. About energy savings things, electrical saving bulbs, about freezer in carnivore place running on air instead of water, box about ISO 14001, also about waste sorting (teaching kids about which waste is what).
2. Need approval for what I do in display. Politics…
3. Morten works with EAZA on sustainability and conservation. Standards on education regarding these issues. *Look up these standards. Morten is working with them about how to find facts regarding these issues. They need a place to share these points with other members of EAZA, maybe through the website…
4. Aalborg and Copenhagen are frontrunners in EM at zoos. Aalborg's small size gives them the benefit of adapting and initiating new policy easier.
5. Morten would like the biologists to look into more what will happen to the animals in the wild with climate changes effects. He thinks this work hasn't been done. *maybe something to work within the education building. Have to have some facts in order to talk about the effects of climate change or make it clear that it is hypothesis.
6. Morten, "amphibians are affected strongly by climate change. They are getting diseases. They are studying this now." Mikkel, "Check out nature journal to get information."
7. Erik, "Maybe pick one species like the polar bear and make a story with the facts." Basically be careful about what you say about how climate change affects the animals so we don't give the visitors the wrong information. *Be reliable!

8. 10% of population of earth visits zoos every year. 125,000,000 visiting zoos every year in Europe. Huge impact. If they portray the story together all of them then they can make a difference.
9. Make things that the whole family has to work with. Make things where the children have to call the parents over to help them with.
10. Get funding from local foundations. Make plans to get the environmental boxes to get going with the project.
11. They want a standard for the normal science and the interactive science around the zoo. A way to recognize it.
12. Mikkel, "A detailed report of what the displays could be (no money needed) or a material displays (depending on the funding)."
13. "Product is entertainment and education." "Agenda is to teach people about the issues related to climate change & environmental impacts."
14. Nearly 2 million people visiting the zoos and aquariums in Denmark a year!
15. Local Norjylland people are different from Copenhageners. Erik, "Local people don't want to be told how to live their life when they come to the zoo." E.g. farmers don't want to be told to save water and respect the environment.
16. ~10 or less groups of people come every year to get a guided tour about ISO 14001.
17. Display has to be fun, reliable, not so time consuming. Things break at the zoo.
18. Make a homepage for kids educating about issues related to this project.
19. Make a project proposal about what the project.

Appendix D Summary of Meeting with Education Department (Morten Smetana) 13/2/08

-2 classrooms. 10,000 students educated every year

-Analysis of evolutional features related to habitat

-Amphibians are slow/low energy compared to mammals warm blooded/high energy

-Maybe compare it to sustainability

Low energy/long life compared to high energy/short life

-How to learn from animals?

Bio insulation (blubber)

Teeth (scissor/tiger)\

Lightening bugs (chemical lighting is low energy)

Penguins (Hydrodynamic)

-Education

-22 subjects

-Morten would like to incorporate climate change

-worst case scenario vs. best case scenario with reference to endangered species

Appendix E Summary of Interview with Erik Nielsen 26/11/08

1. Find out specific organizational structure of Aalborg Zoo
2. Find out detailed history of environmental initiatives throughout the course of the EMS
   Ex. When was water recycling device put in the bird cage? Hippo water cleaner? Energy saving lightbulbs? Large decrease in trash in the beginning of EMS? Large decrease in district heating?
3. Take pictures of 'Affald Sorting' out by the technical shed
   a) You described earlier that there is significant trash created by recycled food from distributors. Do you have figures on how much food is donated?
4. Why was the Environmental Management system put in place in the first place?

5. Do you set forth targets of reduction of impacts every year? F.x.
   a) Find out what year the 5% reduction of trash production is going to be compared to…
6. Is there an environmental manual/report published each year?
7. Do you keep track of transport associated with the zoo?

Education Questions:

1. What is Aalborg Zoo's Mandatory education policy?

Summary

1. Organizational Structure
   Board- City council, tourist organizations (take care of whats going on in the tourist industry in Northern Jutland), erhvervsliv (Private sector, business community representatives, in order to reflect what's going on in the community)
2. Director- One person
3. Leader Group- Leader from the zoo store, Peter- leader of the technical dept., Curator leader-keeps track of what's going on with animal keepers, Administration rep.-

Ques 2.

1. The board and the director(different director than today). Because they were invited from the city council to participate in a group because they wanted to put the environment on the scheme, so they invited different companies including Aalborg Zoo to participate. It

was running for half- full year. After that the board and director decided they wanted to go for ISO 14001. Aalborg Zoo is the first zoo in the world to have ISO 14001.

Ques. 3

1. 4 things in env. Boxes were made instantly (first things done). Also many small things around the zoo. Waste sorting. They mapped all the things they do over a two week period and measured/ weighed everything and out of the catalog they figured out where things need to be done. Elec, water, district heat, waste sorting were four things they want to focus on from now until the future. Also all the keepers came with ideas/ proposal of things they want to do.
   District heating: The company that delivers the hot water for heating allowed Aalborg Zoo and citizens of Aalborg to take water that is running back to heating place and reuse it again for heating. Cuts down a lot on consumption. Valve replacement, magnet valves put on everywhere. Also insulation. Changed any electric heaters into district heaters. Difficult for Erik to give a timeline on initiatives because "they did a lot everywhere at that time" (track 5, 10min00sec)

Ques. 4

1. They do not keep track of how much food is donated from food distributors. Sometimes 3-4 pallets come at once, and then sometimes it goes for a month without donated food. They buy food every Friday.
   Normally compared to year before in targets in reduction. D.S. want them to update their homepage more with targets in reduction and environmental reports. They also want them to tell what they did the year before. Publish environmental report on homepage. Not so happy about it.

Ques. 5

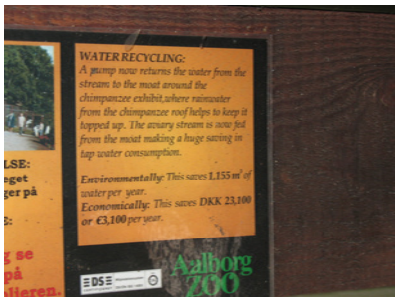
1. Want to make their zoo vehicles run on Rapseed oil, 'bio-fuels,' but it is up to the directors and leaders to make it happen. Need $$$ to do it. They are planning on sitting down shortly after Christmas to discuss what they want to do with the EMS in the short, medium, and long term.

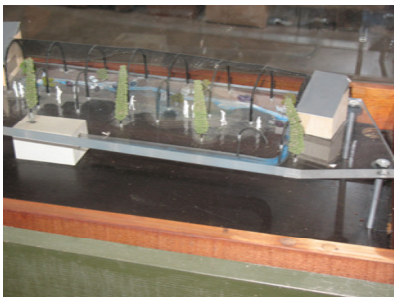
Ques 6.

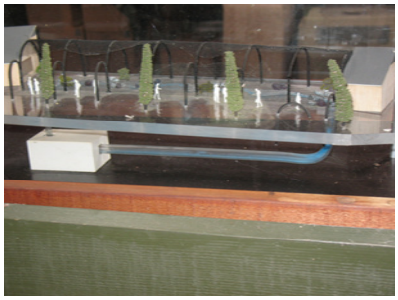
1. The affald figures represent the trash that is sent out to make district heating out of. New thing that they initiated is trash cans out among the park for visitors to sort their cans and glass bottles. The dolphin is for can and the brown bear is for glass bottles. Sometimes they fill containers with with lots of brand affald and it fills lots of weight towards this

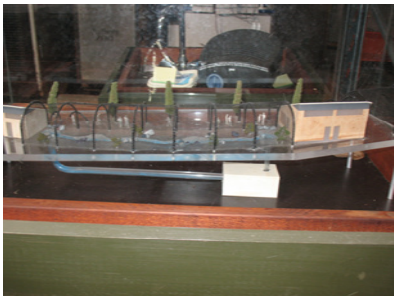
amount. Only animal waste that goes to brand affald is from the monkeys and the carnivores for the sake of avoiding bacteria spreading.

Appendix F Pictures of Environmental Boxes





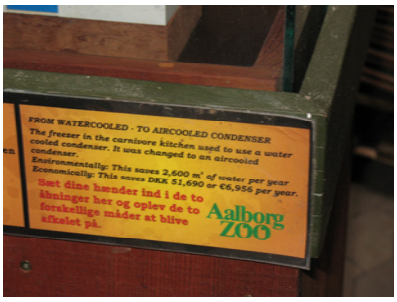





Spar på strømmen!
I Aalborg Zoo er der blevet monteret følere (bevægelsessensorer) eller tænd/sluk ure, hvor det er praktisk.
Desuden bruges der lavenergipærer rundt omkring, hvor det kan lade sig gøre.
Her kan du se, hvor stor forskellen er i kroner og ører på en almindelig elpære og så en elsparepære, når de har været tændt lige længe.

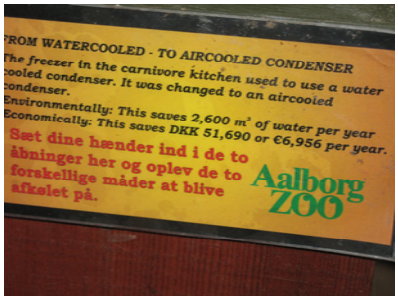

From normal light bulbs to energy saving light bulbs, timers, meters and sensors
Here you can see the difference between the cost of a normal ligtbulb compared with a saving light bulb
DS
CERTIFICERET
DS/EN ISO 14001
Aalborg Zoo


Kroner


FROM WATERCOOLED - TO AIRCOOLED CONDENSER
The freezer in the carnivore kitchen used to use a water cooled condenser. It was changed to an aircooled condenser.
Environmentally: This saves 2,600 m³ of water per year
Economically: This saves DKK 51,690 or €6,956 per year.
Aalborg Zoo


en vandkølede kondensator i rovdyrhuset er
dskiftet med en luftkølet kondensator.
Tidligere brugte kondensatoren store mængder
vand til nedkøling. Ved at udskifte kondensatore
med en luftkølet kondensator er der opnået en
mærkbar besparelse.
Miljømæssig besparelse: 2.600 m3 pr. år
Økonomisk besparelse: kr. 51.690 pr. år.


ryseren i rovdyrkøkkenet
er mange måder at afkøle på. Hvis du får det for
rmt; kan du tage overtøjet af eller f.eks. åbne et
ndue.
rovdyrafdelingens køkken, hvor der er en stor fryser,
bruges der en kondensator. Den fortætter ved
edkøling frondampe til væske i et lukket kredsløb
og producerer derved kulde.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Sæt dine hænder ind i de to åbninger her og oplev de to forskellige måder at blive afkølet på.
Aalborg ZOO


1 2 3 4 5
Affaldssortering
Jern & metal
Metal-scrap


6 7 8 9 10
Tryk-imprægneret træ
Pressuretreated wood
Pap & papir
Paper & cardboard
Affaldssortering
Prøv om du kan finde ud af, hvilken gruppe affaldet hører til. Du skal trykke på de to rigtige knapper på samme tid og pæren vil lyse.


2
6
7
4
8
9
5