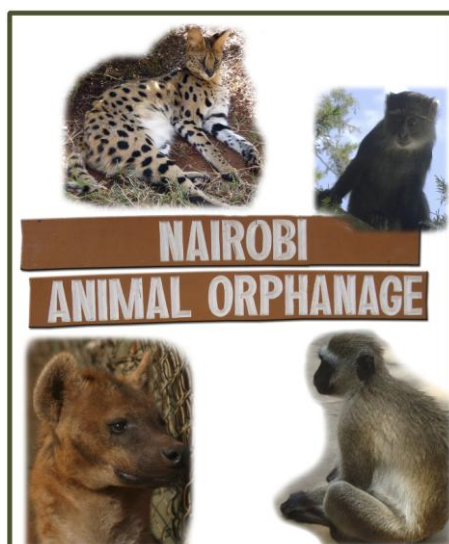




Inventory and evaluation of Nairobi Animal Orphanage – focusing on spotted hyena, serval, Sykes' monkey, vervet monkey and on educational elements

Inventering och utvärdering av Nairobi Animal Orphanage – med fokus på fläckig hyena, serval, Sykes' apa, grön markatta och på utbildning

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Inventering och utvärdering av Nairobi Animal Orphanage – med fokus på fläckig hyena, serval, Sykes' apa, grön markatta och på utbildning

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Bachelor thesis, 15 HEC, Ethology- and Animal Welfare program

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Summary

The present BSc thesis is part of a newly established collaboration between the Swedish zoo Skansen and Kenya Wildlife Service (KWS), and constitutes of an inventory of the Nairobi Animal Orphanage (AO). As a refuge for wild animals found orphaned, abandoned or injured throughout Kenya, the AO has grown over the years and reached an unsustainable point where external help is needed for solutions and improvements. The aim of the inventory is to specifically consider the husbandry and enclosures of spotted hyena (*Crocuta crocuta*), serval (*Felis serval*), Sykes' monkey (*Cercopithecus albogularis*) and vervet monkey (*Chlorocebus aethiops*) and with the aid of facts about the species, estimate how well their biological needs are satisfied. Different educational elements are also reviewed since one of the main purposes of the AO is for education. The practical part of the thesis was carried out during three weeks at the AO outside Nairobi, Kenya. Enclosures were measured, photographed, sketched and documented. In addition staff was interviewed and husbandry routines as well as visitor behaviour was observed for evaluation. The results here reveal that in general for the selected species, enclosures along with some of the husbandry routines are in need of extensive changes to improve animal welfare. There is an overall lack of environmental and behavioural enrichments as well as sufficient space for the animals. The educational parts at the AO are unorganized and inconsistent but have an immense potential considering the sheer number of visitors it can affect. Possible solutions and improvements of enclosures, husbandry and education practises are discussed. The urgent needs for enrichments and in some cases alternative social constellations are proposed. Furthermore, some approaches and developments to enhance the education capacity at the AO are suggested. The economical limitations for this facility are a serious issue, which is why Skansen can become an important resource as well as a guide to improve and promote good animal husbandry and welfare.

Sammanfattning

Det här examensarbetet är del av ett nyligen etablerat samarbete mellan Stiftelsen Skansen och Kenya Wildlife Service (KWS), och består av en inventering av Nairobi Animal Orphanage (AO). Som en fristad för vilda djur som har blivit föräldralösa, övergivna eller skadade runt om i Kenya, har AO vuxit över åren och nått en ohållbar punkt där extern hjälp behövs för lösningar och förbättringar. Syftet med inventeringen är att specifikt titta på djurhållningen och hägnen för fläckig hyena (*Crocuta crocuta*), serval (*Felis serval*), Sykes' apa (*Cercopithecus albogularis*) och grön markatta (*Chlorocebus aethiops*) och att med hjälp av fakta om arterna bedöma hur väl deras biologiska behov tillfredsställs. Olika element inom utbildning inventeras också eftersom ett av AO:s huvudsakliga syften är just utbildning. Den praktiska delen av arbetet utfördes under tre veckor i AO utanför Nairobi, Kenya. Hägn mättes, fotograferades, ritades av och dokumenterades. Vidare intervjuades personal och djurhållningsrutiner samt besökares beteende observerades för utvärdering. Resultaten här visar att generellt för de valda arterna, behöver hägnen tillsammans med en del av rutinerna extensiva förändringar för att förbättra djurens välfärd. Det saknas miljö- och beteendebrikning liksom tillräckligt med utrymme för djuren. Utbildningsdelarna i AO är oorganiserade och inkonsekvent men har stor potential med tanke på den stora mängd besökare som kan påverkas. Möjliga lösningar och förbättringar av hägn, djurhållning och utbildningsmoment diskuteras. Vidare föreslås några tillvägagångssätt och utvecklingar för att höja utbildningskapaciteten i AO. De ekonomiska begränsningarna för anläggningen är ett allvarligt hinder där Skansen kan bli en viktig tillgång så väl som en guide för att förbättra samt förespråka bra djurhållning och välfärd.

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1. Introduction

1.1. Background

Kenya Wildlife Service, Skansen and Nairobi Animal Orphanage

This project was issued by the Swedish zoo Skansen which has initiated a collaboration with Kenya Wildlife Service (KWS).

The KWS is a state cooperation which is similar in its operating range, to the Swedish Environmental Protection Agency. It is an organization within nature and wildlife management and one of their goals is to offer information and education in order to enhance the understanding of Kenyan wildlife. Their interest is to continuously develop and improve their work in these areas. Knowledge regarding the handling and husbandry of wild animals is limited which is why the KWS contacted Skansen with the aim to exchange experiences and resources.

The foundation of Skansen was established 1891 and is an open air museum and zoo located in Stockholm. One of their aims is to contribute to the protection and conservation of biodiversity with emphasis on the Scandinavian flora and fauna. Skansen promotes public education as a basic element of their goals.

The Animal Orphanage (AO) is a long running facility located outside Nairobi at the KWS headquarters. The AO was established in 1964 and was originally a refuge for wild animals that were found orphaned, abandoned or injured throughout Kenya, both in protected and non protected areas. The exhibit grew in an unplanned way as well as the number of animals that are displayed in the facility. Animals are kept for treatment, rehabilitation and in rare occasions reintroduced to nature. Most of the animals remain the rest of their lives at the Orphanage for educational purposes. The current objectives of the Orphanage according to the KWS are:

- To give care and sanctuary to animals that have been abandoned or lost their mothers either through poaching, predation or natural causes.
- To promote public interest towards wild animals by exhibiting the variety of species domestic in Kenya.
- For education and research purposes.
- To rehabilitate and when possible reintroduce animals into the national parks.

The present BSc thesis is part of a newly established collaboration between Skansen and KWS, and constitutes of an inventory of the AO. The inventory was conducted by me and two other students at the KWS. In each BSc thesis parts of the inventory will be specified and suggestions for improvements will be presented in the discussion. Three themes are also elucidated, one in each thesis. The two other BSc theses concern:

- Black-Backed Jackal, Lion, Patas Monkey and the organization of Animal Orphanage. (Lindmark, 2009)
- Cheetah, Congo Grey Parrots, Yellow Baboon and Olive Baboon and the rehabilitation at Animal Orphanage. (Sommer, 2009).

This BSc thesis deals with the inventory of Spotted Hyena (*Crocota crocuta*), Serval (*Felis serval*), Sykes' Monkey (*Cercopithecus albogularis*) and Vervet Monkey (*Chlorocebus aethiops*). It will also review how the educational purposes at the AO are managed.

1.2. Animal species

1.2.1. Wild animals in captivity - general

To keep wild animals in captivity, some general implications are frequently encountered. Many of those stimuli experienced by species in the wild are non-existent in the captive environment. Possibilities to forage, hunt, search for a mate or shelter are seldom given, which leads to boredom and inactivity (Wooster, 1997). For good welfare to be achieved, it is important for the animal to be able to express natural behaviour. If this is not possible, stereotypic behaviours can evolve. Stereotypic behaviour or abnormal repetitive behaviour can be described as repetitive behaviour induced by frustration, repeated attempts to cope and/or Central Nervous System dysfunction, and suggest frustration (Mason *et al.*, 2007). To prevent or abolish these behaviours and enhance the welfare, many facilities that keep animals in captivity employ environmental enrichment (Meehan & Mench, 2007). Enrichment is defined as a change in content, structure or husbandry of enclosures and/or animal care (Mason *et al.*, 2007).

1.2.2. Spotted hyena (*Crocota crocuta*)

The Spotted Hyena (*Crocota crocuta*) is the largest and most common of the hyenas and is distributed all over Africa south of Sahara except in rain forest (Estes, 1991). In undisturbed savannah and plains it is the most abundant large carnivore (Watts & Holekamp, 2008). In the following text, the name hyena will refer to the spotted hyena.

Hyenas live in territorial social groups called clans (Frank, 1986a). They usually inhabit communal dens in caves or crevices, but can equally dig their own burrows (Kingdon, 1997). Females are dominant to males in the clan and they are constantly resident, with their ranks inherited. Males leave the clan in a gradual manner at puberty or even before, to find new groups. To do this, they may move for considerable distances. A hyena clan accordingly has a stable line of matriarchs along with unrelated males staying for varying periods of time. They have been shown to have very variable territory and clan sizes depending on the habitat (Frank, 1986a). In areas with preys in abundance, a clan can have over a 100 members. An average territory is about 30 m², but can be doubled in less prey-rich areas (Kingdon, 1997). Territorial defence include vocal displays and scent marking around kills and at the den. Fights with neighbouring clans is only seen where the hyena density is very high and the pressure on prey increases (Trinkel *et al.*, 2004).

Hyenas are efficient hunters able to kill ungulates several times their size. Herbivores with a weight of 350 kg are the main prey. Larger animals like buffaloes and even giraffes can also be pursued at times. Spotted hyenas are as good at scavenging carrion, either by actively stealing it from other carnivores or simply eating the leftovers. They are extremely opportunistic, capable of changing prey depending on current abundance, or to scavenge, taking advantage of seasonal altering resources (Cooper *et al.*, 1999). Hyenas hunt in groups

as well as solitarily. Hunting group size varies with the type of prey they are hunting. Spotted hyenas have been observed chasing prey for many km. It takes years of practice for young hyenas to reach high hunting success rates (Holekamp *et al.*, 1997).

Their mating system is polygynous, but with the most dominant male mating most of the females while residing in the clan. *Crocuta* females have strongly masculinised genitalia and high circulating androgen levels. Elevated levels of female androgens are correlated with aggressive behaviour and high individual rank. Neither age, size or time spent in a new clan determines male status, instead this depends on the behavioural characteristics of the individual. Aggression among males is rarely witnessed (Frank, 1986b). With a total number well over 10,000 animals, the spotted hyena is of 'Least Concern' on the IUCN red list, even though it is declining both outside and within protected areas (IUCN, 2008).

1.2.3. Serval (*Felis serval*)

The serval (*Felis serval*) is a small felid and inhabits savannahs all over sub Saharan Africa. It has the longest legs relatively, compared to all other cats (Kingdon, 1997). It has a preference for grasslands in proximity to forests and fresh water. Servals are solitary animals that sometimes hold overlapping territories (Estes, 1991). Females and males both scent mark their home ranges (Kingdon, 1997). They spray or squirt urine on objects as well as rubbing their faces. Scats are randomly placed on frequently used paths and the territory is patrolled, mostly by males. Servals reach sexual maturity at two years. Male offspring are chased away when they have reached one year, while females are accepted much longer.

Dusk and dawn are when the serval is most active. The diet consists of all kinds of rodents and other small mammals as well as birds, reptiles, insects and even fruits once in a while. If prey is plentiful, the serval stays within a fairly small area, but it can easily travel six km per night if it needs to. When a quarry has been found, the serval makes a big leap to land with the front paws on the victim. To catch earth dwelling animals, it reaches deep into holes with its long fore limbs (Estes, 1991). It can spend some minutes playing with a rat or small bird before consuming it. If a larger kill has been achieved, parts of it will be cached for later needs (Kingdon, 1997).

While the female is in estrus, she may spend several days together with a male, hunting, resting and mating. Gestation last for around 10 weeks and the litter normally consists of two to three young. The main competitors to servals are the larger carnivores such as spotted hyenas. They avoid encounters by hiding in high grass. Hence without cover, servals would be extremely vulnerable (Estes, 1991). Although it has declined from large areas of its former range, the serval is not listed as threatened, but "least concern" at the IUCN Red List (IUCN, 2008).

1.2.4. Sykes' Monkey (*Cercopithecus albogularis*) and Vervet Monkey (*Chlorocebus aethiops*)

The classifications of *Cercopithecus*, the family to which the Sykes' monkey belong, are not perfectly clear or agreed upon, which is why some of the information gathered is taken from studies of different closely related subspecies.

Cercopithecus inhabit all kinds of forests in eastern and southern Africa. They prefer the middle zone and are not very tolerant to strong sunlight (Estes, 1991). *Cercopithecus* have frequently been seen in troops of 13-27 animals. Only one adult male, with many adult females, sub adults and young is the common composition. Young males emigrate to live a solitary life for a short period of time. They are selective feeders, eating mainly fruits and foliar, but also insects when there is a shortage of fruits. Almost all of their time is spent in trees (Rudran, 1978). Territories are defended by all members of the troop and have average areas between 60 to 70 ha (Kingdon, 1997).

Vervet Monkey (*Chlorocebus aethiops*) is the second most common African monkey and compared to many of its relatives it prefers the drier habitats that open savannahs offer. Group size differs over a wide range, but a typical troop is composed of around 20 individuals with several adult females and males together with many young and sub adults (Struhsaker, 1967). Vervets are intermediate seasonal breeders and the menstrual cycle lies on an average of 32 days (Else *et al.*, 1986). Vervet monkeys are diurnal, foraging mostly on the ground during the day and sleeping in trees during the nights. They are opportunistic omnivores, feeding mainly on plants, insects, smaller vertebrates, chicks and eggs. Some trees can provide different kinds of food all year round while other types of food are some very seasonal. They have clear preference for certain parts or stages of ripeness in fruits, seeds and berries they consume. Vervets commonly forage actively searching through their environment, lifting sticks, rocks, dung etc. in the pursuit of food (Struhsaker, 1967). In a group of vervets both female and male dominance hierarchies exist. Unlike males, females stay in the group they were born and establish organized matriline. Agonistic behaviour of high ranked individuals is common against intruders (Schuster *et al.*, 1993).

Sykes' and vervet monkeys have been seen feeding in the same trees and having physical contact. (Struhsaker, 1967) Even though these monkeys are declining, mainly due to habitat loss and deforestation, they are still wide spread and not listed as threatened, but as "least concern" on the IUCN red list (IUCN, 2008).

1.3. Education

Captive wild animal facilities are a great arena to promote conservation-awareness programmes (Mallapur *et al.*, 2008). But although education is extremely important for threatened species that are represented in zoos, it should always be kept in mind that entertainment is what actually draws visitors to zoos. In times when conservation issues are of rising concern, the part that zoos are playing seems to be a never ending discussion. To deliver messages of conservation problems and strategies to visitors is often where a major part of their efforts are put. The challenge is to still keep an interesting atmosphere for the visitors, since they may have varied expectations. In order to do this, zoological facts, conservation issues, and animal displays have to be presented in an organized and well thought through way (Ross & Gillespie, 2008).

There is always a fine line between appreciation from the audience and welfare of the animals. The visitors' impact may be of positive nature as a type of stimuli, or of negative nature provoking stress or fearful reactions (Birke, 2002). These are all elements that need to be reviewed for the sake of how education at the AO is affected of and affecting animal behaviour.

In what environment and context the animals are displayed is an important part of the education (Fernandez and Timberlake, 2008). The aim is to enhance natural behaviours by

keeping animals in a naturalistic setting, which will facilitate better understanding of the animals' origin to the visitors. To display animals in an environment as realistic as possible, the audience can be better taught the importance of habitat conservation. Other ways information is passed on to visitors in zoos, is through exhibits where people can get a more or less interactive display of how animals function and behave. Exhibits can be conducted in different ways with either separate information centres or a mixture of animal and information displays. To achieve effective education, the visitors' desire for enjoyment must be met and the best way to do it is through high quality displays (Puan & Zakaria, 2007).

To alter attitudes towards threatened species would appear very crucial in Kenya where human-wildlife conflicts are very common. The main purpose of the AO is, according to KWS, for education. To inform local children and adults about Kenya's wildlife and about conservation issues. Since this is such an important topic and needs to be executed in the best suitable way for it to be successful, an inventory of the current situation of the education at the A.O. was done and possibilities for improvements investigated and suggested.

1.4. Purpose

The aim of this BSc thesis is to:

- Find out and present how the enclosures and husbandry of spotted hyena, serval, Sykes' monkey and vervet monkey look like and function at the Animal Orphanage.
- Evaluate how the species' biological needs are fulfilled within the current management and propose improvements based on the inventory.
- Find out, present and evaluate how the educational purposes are met at the Animal Orphanage. Important aspects that need to be addressed are: *which kind* of education is prioritised for what kind of visitors, *how* the education is being presented to reach the chosen audience and what is the *purpose* with the education?

2. Method

2.1. Inventory

The practical part of inventory was conducted in Kenya during three weeks from the 16th of March to the 3rd of April in 2009. The original idea for the thesis was to solemnly inventory and evaluate animal enclosures with the aim to suggest improvements. However, early in the process of the practical inventory it was obvious that the improvements were needed on a higher level as well. Animal enclosures were inventoried and information regarding the individual animals, their feed and routines was collected according to plan. After completed inventory, the enclosures and species in most need of development were selected for a more thorough review as well as the educational elements. Since this project is a cooperation with two other students (Lindmark, 2009; Sommer, 2009), parts of the background and methodology have been worked through together.

2.2. Enclosures and animals

The enclosures were measured, photographed and documented in writing. A sketch was also drawn by hand over the enclosure.

All lengths, heights and widths of the enclosures were measured with a measure tape and recorded in centimetres. Doors, openings, roofing and interior such as small houses and platforms were measured when possible. If not, those measurements were estimated when needed. Distance between enclosure fence and security barrier as well as distance to neighbouring enclosures were measured. Photos were taken of the enclosure, beginning with the belonging information board and continue with an overview of the enclosure. Each side was photographed as well as the interior and the individual animals when possible. The sketch over the enclosure included the different measurements, shape of fencing and interior, location of trees, bushes, water facilities and interior. Angles of the enclosures were approximated and drawn out in the sketches. The enclosure's location in relation to the sun's rising position and other enclosures were also estimated. The sketches were then redrawn by hand according to scale.

Documentation of the enclosures and individuals included the following categories: *animals* (identification, number, age, sex, origin, time kept in Orphanage), *enclosure* (surrounding area, fencing, ground, vegetation, permanent and temporary interior, sleeping enclosure), *feed* (type, shape, supplements, frequency, feeding time, quantity, how it was given, origin), *enrichments*, *behaviour*, *improvements*. The detailed list of the documentation is available in Appendix 1. Information about the individuals was initially collected from the information boards by the enclosure. Further and additional information was gathered from the working staff. Employees were questioned regarding the animals they had the most knowledge of when they were available. Often, more than one person had to be questioned regarding the same animal or topic. Some information was also gathered from an animal record in excel format. None of the three sources of information were sufficient by themselves and therefore had to be compared and combined.

No ethological studies were carried out regarding the behaviour of animals. All the behaviours presented in the results are based on personal notes from occasional observations. Staff was also questioned when they had enough knowledge about the animals. Short video recordings were taken when behaviours or events of special interests occurred.

2.3. Educational elements

To inventory and evaluate how the different educational and informative purposes at the AO are working, they had to be addressed in more than one way. Firstly, the information boards and information centre were studied. Secondly, staff and authority persons were interviewed about the general education policies, visitor numbers, school class visits, information boards and other relevant issues connected to education at the AO. Thirdly, some of the school class visits were observed, photographed and documented. Due to wishes from KWS staff, no names will be mentioned in this BSc thesis.

3. Results

3.1. Spotted hyena at the Animal Orphanage

The AO is currently keeping two male hyenas in two separate enclosures. See figure 1 for a sketch over these enclosures.

Muriu is the oldest animal at the AO and was born 1985. Muriu's mother was a wild hyena brought in for treatment and later released. He is kept in an enclosure (fig. 2), which has an area of 142 m². This rectangular enclosure has a walkway on one side which gives the visitors a good overview, also into the small enclosure. A rocky hill, covered with tall grass, in the middle and towards the back of the enclosure covers the hyena when he is behind it. In connection to this enclosure is also the other hyena enclosure, with nothing between but wire mesh. On the opposite side is a narrow corridor, which the staff uses frequently. And across this corridor is a lion enclosure with one adult, male lion. The 210 cm high fence has a slight overhang and consists of rusty wire mesh, in double layers in some places, and wooden poles. There is no roof except for in one corner, which is made of wire mesh. One tall tree grows inside the enclosure with branches that does not give very much shade over the enclosure during the hotter hours. A great part of the ground is covered in tall grass. A concrete water pond is located in the front part of the enclosure and does not have any sun cover. The small enclosure (SE) in the back is made from wire mesh with metal sheet roofing. It has an area of 3 m² and a height of 150

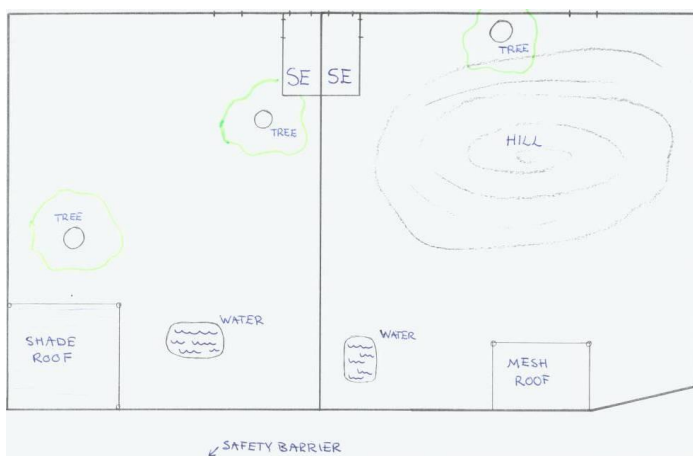


Fig. 1. Sketch over the two hyena enclosures.

cm with the only interior being a wooden pallet. The enclosure in whole gives a fairly run-down impression.

Muriu is obese but seems fairly healthy although he walks in an irregular manner. He was only seen active in the mornings during the inventory and spent most of the day lying in the small enclosure or on top of the hill. In the sunny part of the enclosure there is still very tall grass and Muriu was never observed in this part. Sometimes he stepped into the water pond for a quick bath. Through the fence he interacted with the neighbouring hyena by sniffing and licking. Staff persons sometimes stopped outside the enclosure to scratch him, which he clearly enjoyed. At one point during the inventory, Muriu was locked inside the SE and three young buffaloes were let into the enclosure to graze on the tall green grass growing inside.

The other hyena is also a male. Marcel is five years old and was born in the KWS Safari Walk. Marcel is kept in an enclosure (fig. 3) which has a walkway on one side and the whole interior is exposed to visitors. This enclosure is also rectangular with an area of 117 m²

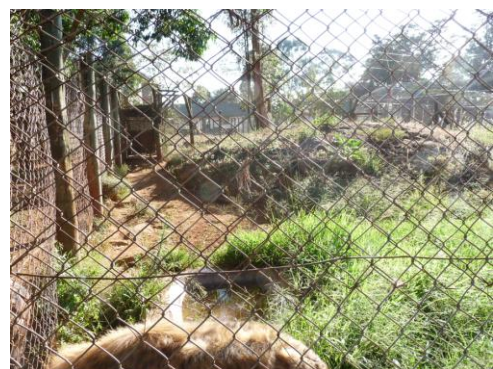


Fig. 2. Muriu's enclosure.

and is in close contact with Muriu's enclosure. On the opposite side, with a narrow passage in between, is an enclosure where three young cheetahs are kept at the moment. Servals and sokoke cats are kept on the other side of the walkway. The fence consists of rusty wire mesh and wooden poles and is 210 cm high. Grounding is 60 centimetres. The only roof is made from leafs and covers one corner. The ground is flat, red soil with almost no grass. Two large trees grow inside the enclosure and give plenty of shade. There is a concrete water pond in the front part, which also serves as drinking facility in the enclosure. A large but short and broken tree stump is standing in the enclosure. The SE in the back is made from wire mesh with metal sheet roofing and dirt floor, with an area of 3 m² and a height of 150 cm.

Marcel is a healthy looking hyena, but was often observed pacing, running and showing stress related behaviour especially when visitors were standing by his enclosure. Sexual behaviour was also observed whereby the hyena was standing on its hind legs, making thrusts with the pelvis towards a pole. The two hyenas were often seen interacting through the fence.



Fig. 3. Marcel's enclosure.

Both hyenas are fed ribs of beef six days a week. Muriu is given approximately 1.5 kg (including bone) per feeding and Marcel is given approximately 3 kg (including bone). The meat is served at 2.30 pm and is put inside the SE or outside in the big enclosure depending on how easy it is to get the hyena to enter the small enclosure first.

At present there is no enrichment work being done with the hyenas except for the occasional visit from a familiar volunteer which enters the enclosure to give one of the hyenas (mostly Muriu) a scratch.

3.2. Serval at the Animal Orphanage

The AO is currently keeping two servals in separate enclosures. See figure 4 for the sketch.

Ali is a male serval, probably born in late 1999 and had been smuggled out of Africa, rescued by a veterinarian in Abu Dhari and was later sent to the AO where he has been for nine years now. Ali's enclosure (fig. 5) is in close contact with two other enclosures on two opposite sides, one that keeps a white-tailed mongoose and one that contains a pair of sokoke cats. The other two, parallel sides are facing walkways. Hyenas and cheetahs are kept across one walkway. There is total insight into the 65 m² enclosure, except for inside the little house. The fence and roof is made from wire mesh and with double layers on the two sides

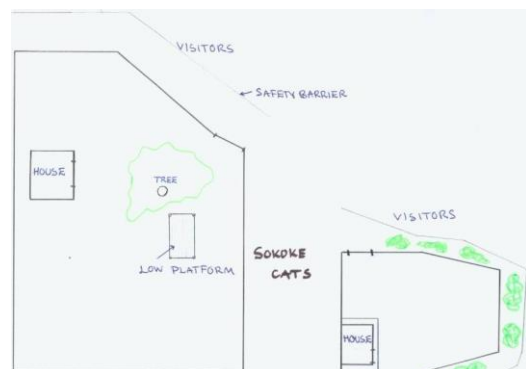


Fig. 4. Sketch over the two serval enclosures.

towards the close neighbours. Height of the fence measured 240 cm. The ground is flat with a sloping corner, mostly red soil and some weeds and grass. A medium sized tree grows inside the enclosure and provides good shade over the entire area. Permanent interior consists of a wooden platform in the middle and a constructed pile of small logs on which a little bell is hanging. A tall wooden house (area: 2 m², volume: 3,5 m³) with wire netting for window and the floor covered in hay, stands along one side of the fence with its door always open. There is a metal water bowl on the ground in the enclosure.



Fig. 5. Ali's enclosure.

During the inventory, Ali was observed pacing at times but mostly seen resting in the grass. He seems healthy.

Rosie, the other serval, is a female born in 2005 and comes from Narok. Her enclosure (fig. 6) has an area of 18 m² and is in close contact with the sokoke cat enclosure on one side. The rest of the enclosure is surrounded by walkways where hyenas and lions are kept on the other side. This means that there is total insight into the enclosure, even into the little house. The 240 cm high fence and roof is made from double wire mesh and the roof is partly covered with metal sheet. The ground is flat in red soil, weeds and grass and no other vegetation inside. Some small bushes grow outside the enclosure, but inside the safety barrier, on one side and provide some cover. This enclosure also has a tall wooden house (area: 1.23 m², volume: 1.9 m³) with small wire netted windows and hay on the floor. Remaining interior is a small dead tree with a little log leaning onto it. The loose metal water bowl is standing beside the house and is more often than not tilted by the serval.

Rosie appeared to be a very active individual which was observed running around and leaping in her enclosure almost every morning. The whole of her small enclosure was used.

The servals are fed beef steak, chicken and sometimes fish, approximately one kilogram (including bone) each, seven times a week, at 2.30 pm. The food is placed by staff on the ground or on the platform (in Ali's enclosure) or thrown inside for the serval to catch it.

As enrichment for the servals, a staff person enters the enclosure to play with toys every weekend.



Fig. 6. Rosie's enclosure.

3.3. Sykes' Monkey and Vervet Monkey at the Animal Orphanage

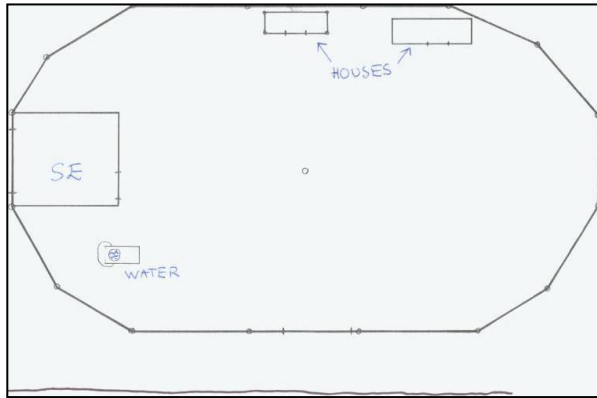


Fig. 7. Sketch over the Sykes' and Vervet monkey enclosure.

The AO currently keeps five Sykes' monkeys, five vervet monkeys and one hybrid of these species in one enclosure (fig. 7 & 8). There are four females and one male Sykes'. Among the vervets, three are female and two are male. The hybrid is female. None of the monkeys are neutered. The backgrounds of most of these monkeys are unknown and no information board exist in connection to the enclosure, neither about the species nor the individuals. Their oval enclosure is situated close proximity to other monkey enclosure which contains black mangabey and patas monkey. It has a total area of approximately 36 m² and the distance to the safety barrier on the front side is 125 cm. A cheetah is kept on the other side of the walkway that goes along one long side of the enclosure. It is dead end of the walkway. There is total insight except for inside the small houses. The fence is made from a combination of wire mesh and wire netting. Flat soil ground and half covered in hay and no vegetation. The only tree outside the enclosure gives a little bit of shade. Three horizontal wooden beams are situated at different levels in the enclosure. Two small, wooden houses are placed in the enclosure; one on the ground and the other elevated a metre and a half above the ground. The small enclosure (SE) is located within the big enclosure to one side; all sides are made of wire mesh and have metal sheet roofing. It also has some hay on the floor. The water facility is a trough built in a pile of rocks. On the ground are three loose metal bowls for feed and a concrete bowl.

The individuals appeared healthy and very active. They spent a lot of time foraging through the hay on the ground. The young ones played and all used the houses frequently.

Since none of these monkeys are neutered they have started to breed between the two species, resulting so far in one hybrid female. Wild ranging monkeys were observed in close proximity to this enclosure during the inventory. There is a hole in the wire mesh close to the roof, where the



Fig. 8. The Sykes' and vervet monkey enclosure.

youngest of the vervet monkeys can get through. It is frequently seen outside the enclosure and close to the other primate enclosures.

The vervets and Sykes are together given a total of approximately 6 kilograms of mixed greens and vegetables including: corn, avocado, orange, carrots, kales, pineapple, banana, cabbage, papaya, sweet potato, peanuts and sunflower seeds. The food is put into the bowls on the ground at 2.30 pm.

3.4. Education at the Animal Orphanage

General organization

According to the AO Senior Warden there were over 250 000 visitors at the AO 2008, which is the highest number they have reached so far. The trend is an ascending visitor number and the bulk of them constitutes of Kenyan children. The facility is open seven days a week from 8 a.m. to 6 p.m.

The majority of visiting school classes comes unannounced to the AO and most of them come on Fridays. This means there can be many different school classes within the AO at the same time. A school class pay the same price per person as a normal, residential visitor. According to the KWS, a school can beforehand book their visit if they want a lecture and a



Fig. 9. The Information Centre inside the Animal Orphanage.

guide during their visit. For this they pay an extra fee. KWS do not keep any record of from which schools the different classes come from, or if the same class are coming more than once.

Located inside the AO, is the Information Centre (fig. 9). It is a rather small, open building which inner walls are covered with different kinds of informative boards. These have facts regarding birds and their adaptations, about elephants, lions and some other species.

There is not really any template for the way the written information is presented, or for what it says. The Information centre also contains some animal skulls and horns.

The AO does not provide any map or brochure of the facility.

Information about species and individuals

One way the information is presented regarding the different species and individuals at the AO, is through information boards (fig. 10) located either on the safety barrier in front of the enclosure or directly on the fence of the enclosure itself. This information is only written in English. Almost all the enclosures have boards with interesting facts about the individual animals' origin and character, with exception for most birds and primates. The information regarding the individuals is naturally very inconsistent due to their different backgrounds. It is

written in neat handwriting, which can be difficult to interpret at times. Information regarding the species is found on a few enclosures and in the information centre. Additional information is in some cases written about a special feature or behaviour of a species. The information boards are currently being improved by certain staff (naturalists).

The actual display of the animals is of varying degree. All the enclosures provide good chances for the visitors of seeing the animals they hold. The wire meshing that all the enclosures are constructed from can be an annoyance for photographing but at the same time allow for the visitors to be closer to the animals. Some of the enclosures do not have enough shade during day, except inside the SE:s which normally are located in the back, which leads to the animals

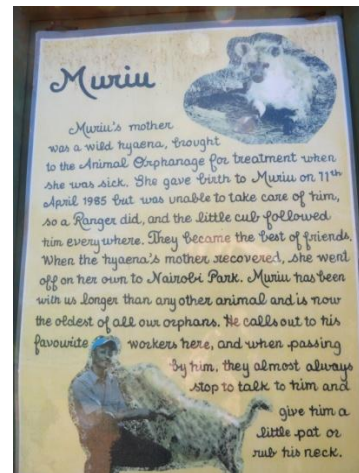


Fig. 10. Typical information board beside an enclosure.

being inactive and hard to see when inside the SE:s, during the major part of opening hours. The feeding time is the same for all species and is written on a board close to the entrance to inform visitors. Food is simply given to the animals either in chunks of meat or chopped up fruits and vegetables, easily accessible for the animals that finish their meal in a short period of time. According to KWS, the reason why the carnivores are fed every day is to always give the visitors a chance to witness the event.

The typical school class visit

From the observations made throughout the three weeks, the classes range from 20 to around 90 students and the ages from 5 to 13. When a class arrives at the KWS they line up outside the gates while the teacher/s pays for them. Then they go through the entrance and are usually lined up once more, holding hands. Sometimes the teacher is leading the way or at least pointing out in what direction the children are supposed to be walking, while other times the children are the ones who lead the way. More often than not, the children are very noisy and are running between the enclosures. The teachers sometimes tell them to be quiet and calm, usually with little effect. To provoke the animals' interest, the children call out and wave jackets or other available objects. The average time spent per enclosure seldom exceeds one minute, judged by observational estimations. Primates and big felids appeared to be of most interest, especially if they happened to show some activity. Some teachers talk a little bit about the animals in the enclosures and take the children to the information centre, depending on the age of the children. Most of the times, it appears to be very little guidance of the children through the AO.

4. Discussion

4.1. General

The Animal Orphanage facility provides visitors a unique opportunity for both foreign visitors and the local community to see Kenyan wildlife close up. The present inventory demonstrates the condition and appearance of a few selected species' enclosures, and to which degree educational purposes are achieved. Some common suggestions for the housing of the reviewed species can be made.

Both inactivity and over-aroused states expressed by the animals were observed during the inventory. It indicates poor welfare and can be misleading for public education (Mason *et al.* 2007). The intention of enrichments is to reduce abnormal or undesirable behaviours and encourage natural behaviours. In all cases, it is clearly better to try preventing stereotypic behaviours than attempting to eliminate already established patterns (Wooster, 1997). Although it already exist stereotypic behaviours in the AO which need urgent measures, new animals keep arriving and it is always good to have forward planning in the aim to improve the lives of future occupants. Obviously the welfare of the current individuals is still important and they can also play a role when it comes to testing and evaluating new enrichments.

The frequently observed stereotypic pacing can have been caused by multiple sources. In a study by Miller *et al.* (2008) pacing by tigers (*Panthera tigris*) was reduced by the insertion of shutters that obstructed their view of neighbouring tigers. They suggested that the pacing might occur because of the tigers' inability to interact with conspecific neighbours and that the obstructed view removed this motivation. For carnivores at the AO, such as the spotted hyenas and servals, to partially cover the wire mesh fence that divides two adjacent enclosures would be a relatively easy way to try reducing some of the pacing. If an animal can exert control over its proximate environment to some degree, this will improve its welfare. One significant thing that the captive animals cannot control is the number or behaviour of the visitors. To give the animals the choice to escape from the human gaze, partial screening towards the walkways could be put up, still giving visitors good chances of seeing the animals. This has been used in other zoos (Birke, 2002). The fact that the AO is open to visitors every day of the week, never gives the animals a quiet day. To introduce one closed day per week, could be good for both animals and staff, preferably on a day when the visitor number usually is low.

Clubb and Mason (2006) found that it tends to be the home-range and normal daily travel distance that can compromise captive carnivore welfare, to a higher degree than foraging techniques. This could mean that larger enclosures can be more effective than other enrichments, but probably a lot more costly and difficult to provide. At the AO, expansions of the enclosure to give the animals more space is a necessary improvement, not only for carnivores, but for more immediate progress behavioural and environmental enrichments are a good way to start.

Since the AO has many permanent volunteers, it appears to be possible to begin some smaller and economical enrichment programs. Aspects of the enrichment item that should be judged are safety, cost, practicality, sanitation, availability, novelty value and perception by visitors (Wooster, 1997). Behavioural enrichment can prove to be an efficient way to early detect sickness or injury in an animal. To keep enrichment effective, there must be a sufficient budget for staff and maintenance requirements to be met (Markowitz & LaForse, 1987). The nature of the enrichment should provide an appropriate level of challenge

to the species to improve welfare (Meehan & Mench, 2007). Much of the current enrichment at the AO involves keepers interacting with the individual animals. This is an inexpensive type of enrichment in a facility where the animals are tame; having been hand reared from an early age, and where the lack of space aggravates large naturalistic enclosures and one approach could be to actually use this feature in a larger scale. The purpose would not be to make 'pets' of the animals, but to use the tameness of the animals both for enrichment and visitor education. This can create interesting exhibits for the public (Wooster, 1997). Some appropriate individual animals can be selected for a close-contact kind of exhibition for children where seeing, hearing and touching will all be integrated in a memorable learning experience.

4.2. Spotted Hyena

Both enclosures need larger water facilities for bathing, but especially for Marcel, who was observed using his water frequently for this purpose. In addition they would need a separate water facility made for drinking, as not to soiling their drinking water by walking in it.

An artificial den could be constructed in a way that would give the animal a sense of protection as well as the visitors a sight into it through a one-way looking glass or camera. This will give a more naturalistic view of how the hyenas live. Other possible enhancements could be to build a platform, at least in Marcel's enclosure to give him a chance to a better view over the area and also a chance to find shade and cover underneath it.

The two hyenas are both kept solitary. For a species that live in clans of many individuals, being isolated from conspecifics can cause distress and poor welfare. Even though the conditions under which the AO are operating limit the extent to which kind of social groups the animals can be placed in, it is an interesting topic to address. To provide species-typical behaviours it is of great importance to keep captive animals in appropriate social groups. Studies have demonstrated how social deprivation can be associated with abnormal behaviours and chronic stress (Price & Stoinski, 2007). The ideal would be if the two hyenas at the AO could be kept in the same enclosure. According to the staff, Muriu and Marcel had been kept together some years ago, but the reason for separating them was not clear. If a union is to be undertaken, it will probably be best to do in a new enclosure, where none of the individuals have claimed earlier territory. This could be done by changing enclosure with another species in the facility. However, such a fusion always involves a big risk. Because of his age and condition it is possible that Muriu will not live very much longer and hence leave Marcel the one and only hyena at the AO. Therefore a future plan for hyena husbandry or reintroduction should be considered in respect to the different scenarios of either a solitary hyena or the arrival of new, orphaned hyenas.

Among carnivores, pacing is the most common form of stereotypic behaviour (Markowitz & LaForse, 1987). Except for the possible strategies earlier mentioned, feeding enrichment could be applied to try to diminish some of the frequently seen pacing. There does not seem to be very much enrichment tried on hyenas in the literature, but the things that have been used for other carnivores could most likely be assessed on hyenas as well. For instance, logs which have divots cut out of it can be placed in the enclosures. Inside the divots, meat can be placed and the hyenas will have to spend time searching, reaching and scratching for the food in the hollow log. Another simple enrichment can involve mixtures of frozen blood and water in blocks or balls, and possibly including meat chunks, that will take some time to ingest (Wooster, 1997).

Since the excitement around feed time was relatively low, and hyenas are physically equipped for shorter starvation periods, it would be possible to incorporate such periods at an irregular time schedule to generate more excitement in the procedure. However, stereotypic behaviour has been shown to increase on 'starve days' (Mason *et al.*, 2007). This put an even greater demand for feeding enrichment to be implemented for the hyenas. To avoid and reduce problems with overweight animals, meat with less per cent fat than beef can be used. If this is not possible, it is advisable to reduce the amount of beef the hyenas are fed.

4.3. Serval

Both serval enclosures are fairly small, especially that of the female, and need to be extended. If there is no other option, it could be an idea that the two servals change enclosures with each other, since Ali's enclosure is more than three times larger than Rosie's and she is younger and more active. That the two servals are kept solitary but in such close proximity to each other, might be both positive and negative. They get the possibility to at least see a conspecific while still living their solitary life. But the close and yet untouchable presence of another serval of the opposite sex, during estrus for instance, might be experienced as stressful.

Permanent water bowls are recommended since they can not be turned over. The tree in Ali's enclosure is a great asset for both shade and possibility to gain elevation for the serval. However, the shade encompasses such a large part of the enclosure there is reason to believe that more sunny areas are needed, and Ali was never observed using the tree in any way during the inventory. Small felines make good use of high platforms, especially when they are partially concealed (Wooster, 1997). Platforms would both enrich and expand the usable space considerably, as of now there is only one low platform in the male's enclosure and none in the female's.

The fact that the servals are fed entire birds sometimes is positive in regards to the given opportunity to express natural behaviour such as plucking feathers before eating. But the wide range of food which servals eat in the wild and with many meals per day suggests that to promote both better nutrition and more species-specific behaviours, more complex food enrichments are needed. A wider variety of food, including more whole body rodents and some fruits, and more frequent feeding times should also be considered. Markovitz and LaForse (1987) tested an artificial prey enrichment on servals, which consisted of transparent, acrylic tubes containing a toy rodent that was randomly pulled through at high speed by means of strings. Microphones were also installed and concealed in stumps where the tubes started, which produced synchronized, rodent-like squeaks before the toy was pulled through. Every time the serval pounced right on the prey, it was rewarded a piece of food. It was concluded in the same study that the enrichment significantly increased activity and contributed to previously non-existent species-specific behaviours such as chasing, leaping and pouncing. This could be an enrichment worth testing at the AO. Hanging food items in ropes attached to the roof is yet another way to make it more interesting and opportunity to jump (Wooster, 1997). If the ropes are elastic the enrichment could be even more effective, but care needs to be taken so the device cannot harm the animal while using it. Food can be put inside plastic tubes integrated with the enclosure interior, for the servals to reach inside and grab.

Another manner to enrich the environment is to use olfactory stimulation. Wooster (1997) presents many different scents that may be sprinkled or rubbed in the enclosure to

stimulate servals to sniff and explore their environment, using their highly developed sense of smell. Examples of such scents are: African civet musk, raw lanolin, vanilla, peppermint, cinnamon, nutmeg, oregano, lavender, animal faeces and blood.

4.4. Sykes' Monkey and Vervet Monkey

The way this primate enclosure is constructed and the group composition of the monkeys, makes it one of the better at the AO. The hay on the ground gives plenty of opportunity to forage, the height permits the animals to seek out view points and the mixture of adults and young of both sexes ensures social activity.

Obviously it is in urgent need of reparation, since the youngest of the vervet monkeys can escape whenever it likes to. The constant out-and-in going in itself possess a certain disease spreading risk to the monkeys and a safety risk to visitors because the monkey is curious of them and getting bolder with age.

There are both pros and cons with having the two different species together. They both live in larger groups in the wild, so they are given a more varied social life with more individuals in the enclosure. The group dynamics need to be studied closer to determine if it is working in a satisfactory way, or if aggressions or other agnostic behaviour occur frequently. Maybe having three males in the same enclosure will generate problems in the future. Since hybridization has occurred, neutering of the animals should be considered if it is to be prevented in the future.

Enclosure design features like complexity, shape, space and substrate influence behaviour of captive monkeys. Large, out-door, complex enclosures with the ground covered with sand, soil or grass are ideal. Strategic placement of fruits and other foods provides enrichment and platforms can be put up to use available space the best possible way (Mallapur, 2005). The present enclosure can be further developed with more platforms, ropes and other hanging interior to provide more climbing possibilities.

The two small houses are a good complement and offers escape from both people and other monkeys. It would be even better if there were at least one or two more similar houses to provide shelter for all the monkeys at the same time if that would be needed.

As for now, the monkeys' food is simply put in bowls on the ground. The hay-covered ground provides some foraging, inviting them to search through it every day. But more challenge to gain the food could be adequate to apply. The food pieces can for example be hidden inside logs or similar, with little holes for the monkeys to wriggle out. Some of the fruits can be given in whole pieces leaving the monkeys to figure out how to open them.

With the pure fruit and vegetable diet for theses monkeys, which in the wild eat lots of insects, it is questionable if a sufficient amount of protein is obtained or if too much sugar is consumed. Maybe the diet needs to be complemented with specialized primate pellets, or other protein sources. But first a proper analysis of the diet contents and blood samples from the animals should be done to clarify what and if anything needs to be added.

4.5. Education

Since KWS have stated many times that one of the main objectives for the AO is educational purposes, this is a topic of real interest and one that is important to develop and improve.

Studies have shown that zoo visitors do get conservation educated to some extent during their visit, and that they experience the visit as positive and as a recreational activity (Mallapur *et al.*, 2008). This suggests that education plays an important part of conservation strategies and that it is something worth pursuing to improve wildlife conservation. It is of uttermost importance that what KWS really wants to achieve with the AO is thoroughly thought through and conveyed to all staff and workers. They need to formulate what educational purposes the AO are to fill, how this will be performed and decide the most proper way to evaluate how well it is working in reality.

For both local and foreign visitors, a well worked through website could give a good first look at the AO. The current webpage, connected to the KWS website, does not give any information regarding the AO. Informative brochures at site, about the species and their conservation status can be another way to spread knowledge (Mallapur *et al.*, 2008). Also, a simple map over the AO facility would be advisable, even though the area is not overly large.



Fig. 11. A smaller school class visiting the Animal Orphanage.

The boards with information regarding the individuals might be easier to read if they were not handwritten. In some cases it could also be good to shorten the text to make it less immense and more accessible for children. In a study by Ross and Gillespie (2008) it was concluded that visitors with children spend less time reading information signs, than those without children.

Preferably there should be consistent information about all the species kept in the AO. They should be placed in connection to the species' enclosure and at a

height which makes it easy for both children and adults to read. To be certain the message is coming through to as many people as possible, the signs should be written in both Swahili and English, preferably with the species scientific name as well. Since moving and changing of animals and species are happening rather frequently, it would facilitate if the signs were easy to move or exchange. The information centre could be developed further with a greater focus on children. Important information to get through to both children and adults are: how are the different species orphaned? What can be done to prevent it? How do you know if a young animal really is orphaned and not just left to hide over the day by its mother? Why should private persons not take care of orphaned or injured wildlife?

To ascertain that school children (see fig. 11) learn as much as possible from their visit at the AO, there are several things to address. Firstly, instead of coming unannounced, a pre booking of a visit should be mandatory for schools to ensure a reasonable maximum number of visitors permitted into the AO. If there was a system and a recordkeeping of all the schools in Kenya at the KWS, they could organize so that all children can visit the AO maybe twice during their school years. One way would be to decide that all classes will come at certain ages. If a discount could be given for a school class and a KWS guide included, the message to be learned may reach many more people as well as increase the knowledge. Something that might lie outside the reach of KWS, but still is important, is preparations

before the visit. Many zoos have educational programmes for students and teachers in order to improve the local knowledge base, for example involving conservation lectures and documentary showing before a guided tour (Mallapur *et al.*, 2008). When a class registers a coming visit, the teacher can be advised to give a lecture in wildlife conservation. Well at the AO, but before entering, the KWS guide can give a brief introduction to AO, what it stands for and how it works. Here it would also be advised that some basic comportment rules are brought up and explained, such as keeping quiet and no running inside the AO. Disturbance caused by visitors indicates poor understanding of the affected animals (Mallapur *et al.*, 2008). If the class is very large, it should be divided into smaller groups and given a leader (teacher or guide) to each group. It has been shown that larger groups affect the behaviour of zoo animals and that they may not be habituated to loud noises produced by humans (Birke, 2002). During the tour of the AO, information about each animal and species and their threats should be presented in an adjusted way to make it interesting for the children. Games or little workshops can be a tool to make it more fun to learn about wildlife conservation. When the tour is finished and before the children travel home again, a short referral to what has been observed can be a way to make the impressions last longer.

The display of the animals is an essential part of how information reaches the visitors. There is a fine balance between keeping the animals' welfare at an acceptable level and keeping the interest of the visitors keen through visible animals. The lack of economic resources is a very limiting factor at the AO. That many of the animals are not kept in their species-specific social groups for example, is more or less impossible to change since the management cannot decide which individuals shall be taken in. But there are still methods and means by which the display of the animals along with their welfare can be improved without being too expensive. The obvious lack of enrichment in many enclosures, can contribute to a skewed view of the animals' natural habitats and behaviour. Implements that can be useful to improve this are the use of vegetation, water facilities, ground topography and such inside the enclosures. Placements of shades, food, platforms etc. can do a lot for how the enclosure will be used by the animals. If changes are to be made, there should be evaluations to investigate if the goals were achieved (Ross & Gillespie, 2008). When a new enclosure is going to be built or if an existing one is to be reformed, it is a good idea to have all these things in mind and maybe study the animal before hand, to be able to use the space as effectively as possible.

Another area where the AO could expand into is research. To commence collaborations with the academic world could be something that would benefit even more of the local people. Exchange between universities and zoos according to Fernandez and Timberlake (2008) exist to a diminutive extent, but needs to be increased. The zoos offer semi natural settings for studies to be conducted in, and the knowledge gained can help the zoos with various matters such as relevant housing, feeding and enrichment. If KWS encourages the local academic institutions to use the AO for basic or applied research, useful connections and new wisdom could be a positive outcome.

Before any greater changes or new projects are undertaken, more thorough evaluations of the current educational situation should be done. Ways to do so could be questionnaires for visitors and schools, studies of how visitors behave in the AO and interact with animals or exhibits. More exchange with other zoos, for inspiration and to learn new designs would be another resource to exploit.

5. Conclusions

What follows from this inventory is that it is clearly essential for the Nairobi Animal Orphanage to use all the available expertise that other organizations and zoos, such as Skansen, possess for support and knowledge in their conservation and public awareness programs.

They need to find ways to manipulate human - as well as animal behaviour in order to promote the welfare of their animals. It may be necessary to design exhibits that control the movements of people in such ways that large numbers of people cannot congregate in one spot, and in ways that discourage noise. The species' biological needs are not being seen to in a satisfactory way in the current management, but solutions are available for both short term and long term developments.

The fact that the AO was originally not meant to be a zoo in the normal context, but a temporary station for orphaned and injured animals has led to a facility where the space is extremely limited. The way it is operating today is in much more resemblance to a zoo, with the same individuals living their whole lives within the AO, but without the capability or structure of a zoo. This puts an even greater pressure on enrichment practices and from the enclosures inventoried in the present thesis, there is obviously a lack of such. A plan for enrichments and education policies should be conducted.

If the AO is to survive forthcoming challenges, they must evolve and continue to adopt new strategies to create awareness of their role in conservation by educating and inspiring visitors, as well as promoting animal welfare. The positive attitude of the AO staff and their willingness to make the animals' lives better has imprinted the impression that the economical issues can be overcome with the right guidance. Hopefully collaborations with Skansen and other parts will provide a good example for similar facilities in Africa.

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References

- Birke, L. 2002. Effects of browse, human visitors and noise on the behaviour of captive orang-utans. *Animal Welfare* 11: 189-202
- Clubb, R. & Mason, G. J. 2006. Natural behavioural biology as a risk factor in carnivore welfare: How analysing species differences could help zoos improve enclosures. *Applied Animal Behaviour Science* 102: 303-328
- Cooper, S. M., Holekamp, K. E. & Smale, L. 1999. A seasonal feast: long-term analysis of feeding behaviour in the spotted hyaena (*Crocuta crocuta*). *African Journal of Ecology* 37: 149-160

- Else, J. G., Eley, R. M., Wangula C., Worthman C. & Lequin R. M. 1986. Reproduction in the Vervet Monkey (*Cercopithecus aethiops*): II. Annual Menstrual Patterns and Seasonality *American Journal of Primatology* 11: 333-342
- Estes R. D. 1991. The Behaviour Guide to African Mammals.
- Fernandez, E. J. & Timberlake, W. 2008. Mutual Benefits of Research Collaborations Between Zoos and Academic institutions. *Zoo Biology* 27: 470-487
- Frank, L. G. 1986. Social organization of the spotted hyaena (*Crocuta crocuta*). I. Demography. *Animal Behaviour* 34, 1500-1509
- Frank, L. G. 1986. Social organization of the spotted hyaena (*Crocuta crocuta*). II. Dominance and reproduction. *Animal Behaviour* 34, 1510-1527
- Holekamp, K. E., Smale, L., Berg, R. & Cooper, S. M. 1997. Hunting rates and hunting success in the spotted hyena (*Crocuta crocuta*). *Journal of Zoology* 242: 1-15
- IUCN. 2008. IUCN Red List of Threatened Species. www.iucnredlist.org
- Lindmark, M. 2009. Inventory and evaluation of Nairobi Animal Orphanage - Black-Backed Jackal, Lion, Patas Monkey and the organization. Student report. Swedish University of Agricultural Sciences.
- Mallapur, A., Waran, N. & Sinha, A. 2008. The captive audience: the educative influence of zoos on their visitors in India. *International Zoo Yearbook* 42: 214-224
- Mallapur, A. 2005 Managing primates in zoos: Lessons from animal behaviour. *Current Science* 89, 7
- Mason, G., Clubb, R., Latham, N. & Vickery, S. 2007. Why and how should we use environmental enrichment to tackle stereotypic behaviour? *Applied Animal Behaviour Science* 102: 163-188
- Markovitz, H. & LaForse, S. 1987. Artificial Prey as Behavioural Enrichment Devices for Felines. *Applied Animal Behaviour Science* 18: 31-43
- Meehan, C. L. & Mench, J. A. 2007. The challenge of challenge: Can problem solving opportunities enhance animal welfare? *Applied Animal Behaviour Science* 102: 246-261
- Miller, L. J., Bettinger, T. & Mellen, J. 2008. The reduction of stereotypic pacing in tigers (*Panthera tigris*) by obstructing the view of neighbouring individuals. *Animal Welfare* 17: 255-258
- Puan, C. L. & Zakaria, M. 2007. Perception of visitors towards the role of zoos: a Malaysian perspective. *International Zoo Yearbook* 41: 226-232
- Price, E. E. & Stoinski, T. S. 2007. Group size: Determinants in the wild and implications for captive housing of wild mammals in zoos. *Applied Animal Behaviour Science* 103: 255-264
- Ross, S. R. & Gillespie, K. L. 2008. Influences on Visitor Behaviour at a Modern Immersive Zoo Exhibit. *Zoo Biology* 0: 1-11
- Rudran, R. 1978. Socioecology of the Blue Monkeys (*Cercopithecus mitis stuhlmanni*) of the Kibale Forest, Uganda. *Smithsonian Institution Press* 249
- Schuster, R., Raleigh, M. J., McGuire, M. T. & Torigoe, D. 1993. Rank, Relationships, and Responses to Intruders Among Adult Male Vervet Monkeys. *American Journal of Primatology* 31: 111-127
- Sommer, D. 2009. Inventory and evaluation of Nairobi Animal Orphanage - Cheetah, Congo Grey Parrots, Yellow Baboon and Olive Baboon and the rehabilitation. Student report. Swedish University of Agricultural Sciences.
- Struhsaker, T. T. 1967. Ecology of Vervet Monkeys (*Cercopithecus aethiops*) in the Masai-Amboseli Game Reserve, Kenya. *Ecology* 48: 892-904
- Trinkel, M., Fleischmann, P. H., Steindorfer, A. F. & Kastberger, G. 2004. Spotted hyenas (*Crocuta crocuta*) follow migratory pray. Seasonal expansion of a clan territory in Etosha, Namibia. *Journal of Zoology* 264: 125-133
- Watts, H. E. & Holekamp K. E. 2008. Interspecific competition influences reproduction in spotted hyenas. *Journal of Zoology* 276: 402-410
- Wooster, D. S. 1997. Enrichment techniques for small felids at Woodland Park Zoo, Seattle. *International Zoo Yearbook* 35: 208-212

Appendix 1.

Inventorial checklist

SPECIES:

IN CHARGE:

A. ANIMALS

1. **Identification**
2. **Number and ages of:**
 - females
 - males
 - young
3. **Origin**
4. **Time in Orph.**
5. **State of health**
 - before/after arrival
 - medical treatment
6. **Future plan for individuals**
 - reintroduction (when, where)
 - staying
 - reasons

B. ENCLOSURE

1. **Surrounding area** (neighbouring species, walks, etc.)
2. **Lengths of sides open to visitors and hotspots.**
3. **Size and shape**
 - displayed, back, outside, inside
 - gates (location, sizes, locks, sluices, security)
 - placement in relation to the sun
 - spotlights (during night)
4. **Fence**
 - material
 - height
 - design
 - grounding
 - security
5. **Ground**
 - material
 - topography
 - sand pits

- water ponds
6. **Vegetation**
 - type and size
 - numbers
 - species
 7. **Permanent interior** (size and material)
 - protection (wind, sun, rain, visitors)
 - platforms (natural and artificial)
 - feeding devices (mobile, permanent)
 - water troughs (mobile, permanent)
 8. **Temporary and mobile interior**
 - material
 - design
 9. **Small Enclosure (SE)**
 10. **Risk assessment**
 11. **Area per animal**

C. FEED

1. **Type and shape**
2. **Supplements**
3. **Frequency**
4. **Time of day**
5. **Quantity**
6. **How it is given**
7. **Placement in enclosure**
8. **Origin**
9. **Storage and handling of**
10. **Adjustments**
 - species
 - individuals
11. **Quality**
12. **Sources**

D. ENRICHMENT

1. **Type and material**

2. **Purpose**
3. **Use**
4. **Risks**
5. **Frequency**
6. **Permanent**

E. BEHAVIOUR

1. **Lack of species specific behaviours**
2. **Social organization**
3. **Stereotypes**
4. **Activities** (use of days/nights)
5. **Use of enclosure and interior**
6. **Sharing of space**
7. **Aggression and dominance**
8. **Tame individuals**
9. **Stress from visitors or other sources**

F. ROUTINES

1. **Supervision of animals**
 - good/bad overview
 - frequency
 - what is observed
2. **Cleaning**
 - ground, interiors, facilities, etc.
 - frequency
 - method
 - manure handling
 - equipment
3. **Journal keeping**
4. **Handling of individuals**
 - educational purposes
 - methods of capture
 - preparations and purposes with handling (reintroduction, taming)
 - handling of orphans or injured animals
5. **Rotation of species in different enclosures**
6. **Staff** (same persons doing different things)

G. HEALTH ASSESSMENT

1. **Parasites**
 - pressure
 - species
 - abundance
 - checks and control
 - deworming
2. **Vaccination**
3. **Veterinary routine controls**
4. **Health journal**

H. GROUND STAFF

- **Problems**
 - enclosures
 - handling (animals, feeding, cleaning)
 - visitors
- **Ideas and suggestions for improvements**
- **Background, education, time at Orph.**
- **Management**

I. VISITORS

1. **Behaviour of**
2. **Type**
 - age
 - locals/tourists
 - education/leisure

J. IMPROVEMENTS

1. **Areas available for extensions (m²)**
2. **Feed and water**
3. **Enrichments**