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***Giraffa*: Tall tales from the wild and captive world!**

Jambo!

The first issue of “Giraffa” for 2009 comes at a time when there is more work on the species occurring across the continent than I have ever known before, coupled with a recent flurry of giraffe births in zoos across the world.

The dedicated efforts to manage populations ‘appropriately’ in the *ex-situ* environment is improving daily. It is also encouraging to see how much interaction is happening within the giraffe community — a vast improvement on previous times.

Inside this ‘bumper’ issue we have tried to pull together a broad range of findings, outputs, stories and updates of the good, the bad and the ugly of all things giraffe. The lead story, followed up by another article in this issue, reports on the first ever Population Habitat and Viability Analysis undertaken on a giraffe population, and specifically the ‘endangered’ West African giraffe. This was a great first step for getting government, conservation organizations and communities alike to better understand the plight as well as the importance of conserving this magnificent population.

It is extremely positive to see the number of giraffe conservation efforts that are occurring across Africa, however sadly not all is good news: there is an article on illegal hunting of Masai giraffe in their Tanzanian stronghold and on the efforts of conserving the remaining giraffe in the Garamba NP, DRC.

As for the captive world, stimulation and training is the key to giraffe management and a great overview of what goes on ‘behind the scenes’ helps us to appreciate the hard work of keepers. Obviously, housing a giraffe is not all it appears as you walk past them at your local zoo...

And lots more stories and tales for you to peruse. So sit back, pull up a comfy chair and get reading. I hope you enjoy this issue of “Giraffa” and I look forward to sharing more news from the giraffe world in the Xmas edition!

Julian—Chair, IGWG



IGWG Mission Statement

Preserving the evolutionary potential of all giraffe populations utilising:

- Morphometric and molecular genetic analysis
- Behavioral ecology
- Population dynamics
- Landscape conservation
- Zoo and wild management strategies
- Awareness and education
- Scientific and popular communications

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... And much much more...

Population and Habitat Viability Assessment (PHVA) workshop for the West-African giraffe subspecies (*Giraffa camelopardalis peralta*)

Arnaud Desbiez and Kristin Leus

IUCN Conservation Breeding Specialist Group

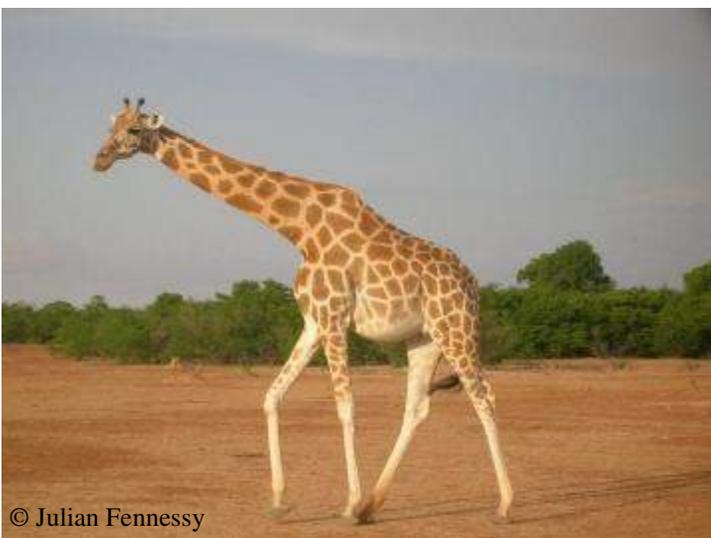
In the 19th century the distribution area of the West-African giraffe subspecies *Giraffa camelopardalis peralta* still covered a large part of the Sahel region from Senegal to Lake Chad. Currently, the last surviving representatives are largely restricted to the “giraffe zone”, an area of about 84.000 ha in the Kouré region of Niger (about 60 km to the east of the capital Niamey). This area is not classified as a protected area and contains roughly 30 villages with a population of more than 45.000 inhabitants. The West-African giraffe has recently been listed as Endangered by the IUCN Red List (www.iucnredlist.org). Threats include among others degradation and destruction of their habitat for firewood collection

and agricultural activities, poaching, giraffe-human conflicts due to damages to crops, road kill and potential disease risk through close contact with domestic livestock. Various governmental and non-governmental organisations have already succeeded to bring back the subspecies from an all time low of less than 50 individuals in 1996, to currently about 200 individuals. Actions taken have included human development programmes, generation of funds and employment for local communities through ecotourism, education and awareness projects and yearly monitoring of the giraffe population with the aid of photo identification.

From the 29th of September until the 3rd October 2008 a Population and Habitat Viability Assessment (PHVA) was conducted for the last population of West-African giraffes in Niamey, Niger. The PHVA was one of the final steps in an ongoing process of develop-

ing a “Long Term Conservation Strategy for the Giraffe in Niger”. The IUCN/CBSG (Conservation Breeding Specialist Group) was invited by the “Programme Régional Parc W” of ECOPAS (Ecosystèmes Protégés en Afrique Soudano-Sahélienne) and the Government of Niger to facilitate the PHVA and build a Vortex computer simulation model to assist decision making. Funding for the workshop was provided by the European Community Fund for development.

The PHVA process is designed to broaden stakeholder involvement and enhance information sharing across disparate scientific and social domains. Using participatory methodologies and Population Viability Analysis (PVA) based on VORTEX, specific recommendations and conservation actions were developed and presented by the participants themselves during the workshop sessions. The PHVA workshop dynamics includes splitting the group of participants into topic-based multi-stakeholder working groups and reconvening in plenary sessions to present results from working group deliberations and discussions. The final outcome of a PHVA Workshop is a conser-



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PHVA workshop for the West-African giraffe subspecies *cont.*

vation action plan developed and endorsed by all present stakeholders.

A total of 40 participants representing all the stakeholder groups worked in five different working groups: 1. agriculture and biodiversity, 2. use of trees/wood and the habitat of “brousse tigré”, 3. science and potential catastrophes for the giraffe population, 4. valuing the giraffe and environmental awareness, and 5. harmonisation of all interventions on behalf of the giraffe, its habitat and the human inhabitants. After a plenary session to identify from each of the participants what they felt were the most important challenges for the survival of the giraffes, each working group further explored the finer issues of the challenges in their field and identified goals and actions that they felt were needed to tackle these problems.

Group 1, discussed the challenges linked to agriculture and biodiversity. Alassane Makadassou, Siaka Oumarou, Moumouni Jigo, Issaka Houdou, Hamadou Adamou, Karim Saley, Moussa Kailou, Inoussa Maman Maârouhi and Maire Harikanassou participated in this group. They identified poverty, population growth, creation of new villages and lack of economic opportunities as causes for the in-

crease of unsustainable agricultural practices, loss of biodiversity and increase in human/giraffe conflict in the Kouré region. Actions proposed to restore biodiversity, decrease the impact of agriculture and human/giraffe conflict include, capacity building, modernising and improving agricultural outputs by organising and planning production, new harvest techniques to reduce crop destruction from



giraffes, reforestation and planting of native trees, shrubs and grasses, soil restoration actions, family planning and searching for alternative incomes for local communities. Improving the sustainability of agricultural practices and restoration of natural habitats would benefit both giraffes and local populations.

Group 2 discussed the use of trees/wood and the habitat of “brousse tigré”. Ali Abdoulaye Gaziba, El Hadj Mahamane

Abdou, Maman Sani Issaka, Mohamed Moumine, Hama Oumarou, Ali Mahamane, and Isabelle Ciofolo participated in this group. They found that the lack of control over the exploitation of wood resources and the failure of wood rural markets were one of the factors responsible for habitat degradation in the giraffe zone. Lack of other economic activities and monitoring of natural resources increased these problems. Actions suggested by the group include management of natural wood and pasture resources and reforestation, improvement of agricultural and pastoral practices, increase alternative revenues for local communities particularly for woodsmen, implementation of micro-credits, promotion of alternative energy resources, classification of the

forests in the plateaus Trays of the Kouré and Fandou regions as protected areas, strict control of sales of wood and its transport, closing the rural markets, research and better monitoring of wood resources in giraffe zone. A better control of human occupancy and use of the land as well as strict control over use of natural resource was suggested.

Group 3 discussed science and potential catastrophes for the giraffe population. Saley Hamidine, Boubacar Djibo Boubac

PHVA workshop for the West-African giraffe subspecies *cont.*

car, Rick Brenneman, Jean-Patrick Suraud, Julian Fennessy, Ibrahim Bello and Philippe Chardonnet participated in this group. Despite research on the giraffes being conducted since the 1980s there is still a serious lack of information. In particular information on giraffe habitat, carrying capacity of habitat for giraffes and the distribution and movements of giraffes throughout the region are still poorly understood. Genetic research on the population is still at its initial stages. The group also focused on identifying and quantifying the potential impact of catastrophes that could impact the population. Results were used for the vortex model. Four major types of catastrophes were identified and evaluated: political, human induced, wildlife health and epidemics, and natural catastrophes such as droughts. The group highlighted the fact that such catastrophes have wiped out fragmented populations of wildlife throughout Africa. Future research actions were proposed and included identification of giraffe core range, study on giraffe movement, measure of habitat carrying capacity for giraffes, identification of key resources, research of disease transmission between cattle and giraffes, the current research on population dynamics and habitat must be continued as well as the continuous moni-

toring of the population and habitat. The need to create a scientific data base to share research findings, publications and reports on giraffes was emphasised. Discussions on how to best prepare for potential catastrophes highlighted the need to establish other giraffe populations away from the Kouré as an insurance against potential catastrophes.

Group 4 discussed valuing giraffes and environmental awareness. Alioune Sylla Aladji Boni, Boubacar Abdou Dade, Omar Issaka, Soumeila Sahaidou, Moussa Haoua, and Ousmane Seydou participated in this group. Although giraffes are an important symbol for Niger, the potential of giraffes for tourism is still not well exploited due to insufficient information, organisation, infrastructure and capacitated guides. In addition, the giraffe image is used by large companies which make no financial contribution to giraffe conservation. This unique mammal must be valued and the groups proposed a series of actions to create a new tourism strategy for the giraffes. A study on the current and potential economic revenues generated by giraffes needs

to be conducted, tariffs to visit the giraffe zone and legislation need to be harmonized. Lodges, meals for tourists and arts and craft need to be developed. New circuits and safaris need to be planned and revenues generated by the giraffes need to be distributed in a equitable manner. Community participation needs to be stimulated and village committees created to fully manage and share the potential touristic value of the giraffes. Environmental awareness is key to increasing the value of giraffes in the local communities. A national giraffe day, educational materials, more giraffe related signs and introducing the giraffes in the school curriculum was suggested as action to promote giraffes in Niger.

Group 5 discussed harmonisation of all interventions on behalf of the giraffe, its habitat and the human inhabitants. Abdou



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PHVA workshop for the West-African giraffe subspecies *cont.*

Malam Issa, Boubacar Amadou, Paolini Carlo, Hassane Mamadou, Dovi Omer, Djibo Saley Boubacar participated in this group. Lack of consultation and coordination of activities most likely due to a lack of a common strategy have led to a failure to promote coherent actions and their follow up. The group also discussed the lack of appropriate land planification and division. The group proposed several actions that would lead to a transparent participatory conservation strategy for the giraffes and the sustainable development of local communities in the giraffe zone. The PHVA workshop is a key element of this process. In addition actions of capacity building, land planning, and consultation of all stakeholders, strategies for adopting clear public policies in favour of giraffe conservation and sustainable development of local communities in the giraffe zone were discussed.

Description and details of actions from each group can be found in the final report (<http://www.cbsg.org/cbsg/workshopreports/>). Overall it was very clear in this workshop that the fate of the last population of West African giraffes is closely linked to the fate of the human populations in the giraffe zone. Projects promoting the sustainable livelihood, health and education of the local population are key to the long term conservation

of giraffes.

During and after the workshop a Vortex computer simulation model was constructed to test the viability of the population under different circumstances and management scenarios (see vortex article, this issue). Both the results of the multi-stakeholder working groups, and the results of the computer model will serve as the basis for the creation of a long term action plan for the Niger giraffe, planned in 2009.

Acknowledgements

We would like to thank all the participants of the PHVA for their time, commitment and enthusiasm. The workshop was fully funded by the European Commission development fund (7 ACP RPR 742 and 9 ACP ROC 13). A special thanks to the Niger administration and to Alioune Sylla ALADJI-BONI, regional coordinator, Moumouni KARIMOU, financial manager and Soumeila Sahaidou for the collaboration and to ECOPAS project for organising the workshop and taking care of logistical matters in Niamey. Rick Brenneman, Philippe Chardonnet, Isabelle Cioffolo, Julian Fennessy and Jean Patrick Suraud for their valuable contribution. Many thanks to Barbara Giannuzzi Savelli for all the logistical

support, translations and help in organising the workshop.

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Illegal hunting of giraffes: news from northern Tanzania

Megan Strauss, University of Minnesota

The giraffe is the national symbol of Tanzania. It is also one of few mammals in Tanzania not available for tourist hunting. In northern Tanzania, there are several indications that giraffes are declining in number. For example, in the Serengeti ecosystem giraffes declined from an estimated 10,600 in 2003 to an estimated 5,200 in 2006 (TWCM 2008). This decline in giraffes is mirrored across the border in Kenya's Maasai Mara National Reserve (Ogutu *et al.* 2009). In Tanzania, we suspect the decline in giraffes is due to changes in resource availability combined with illegal hunting. The magnitude of illegal hunting and its role in driving changes in giraffe population dynamics is poorly understood.

The Arusha Times reported that in 2007, 210 giraffes were slaughtered in a 10-month period in West Kilimanjaro corridor in northern Tanzania (Nkwame 1). Hunters target giraffes for meat, hide and tail hair. A more recent motivation for hunting giraffes is a spreading fallacy that consumption of giraffe bone marrow or brains can treat HIV/AIDS (see for instance "Giraffe brains sold as HIV-AIDS cure hoax" 1). Giraffes are hunted with guns, dogs and snares and the choice of technique appears to vary by region. The use of dogs has been reported in the

Katavi-Rukwa ecosystem of western Tanzania, where poachers may remove as much as 40% of the giraffe population each year (Caro 2008).

In the Serengeti National Park, where the author conducts research, poachers target giraffes with wire snares suspended in the

tree canopy. While most snared animals do not survive, some escape. Animals that escape can sustain lacerations from the tightening of the snare.

Figure. Neck scarring from snares. Wire snares produce deeper and more uneven wounds.



Illegal hunting of giraffes: news from northern Tanzania *cont.*

It is the policy of veterinarians in the Serengeti to remove snares, a process which requires immobilization of the animal. The proportion of giraffes in a population with scarring from snares (see Figure 1) serves as one index of poaching activity. In Serengeti, we're also interested in the amount of giraffe meat consumed by locals near the protected area as well as changes in poaching effort. We expect adult males to be more susceptible than females to snaring given their propensity for feeding higher in the tree canopy.

It is important to carefully monitor illegal hunting of giraffes across range states. Where giraffes are targeted we need to address several issues. First, we need to determine the local motivations for hunting giraffes. Second, we need to develop reliable measures to track giraffe poaching activity. Such measures are essential to determine whether poaching in any given area is sustainable or if management action is required.

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Giraffes of the Garamba National Park, Democratic Republic of Congo

Amube N.J., Antonínová M., Hillman-Smith K.

In the last century numerous taxonomic schemes have been developed for giraffes (Brown *et al.* 2007). In Central Africa we can nowadays find giraffe (*Giraffa camelopardalis*) in 4 countries (Hassanin *et al.* 2007). Giraffes of the Democratic Republic of Congo (DRC) are problematic in view of sub-species classification, as they were originally referred to as *G.c. congoensis* but no unknown in light of the above mentioned work. The giraffe populations from Cameroon, Chad, Central African Republic and Southwest Sudan are all considered to be *G.c. antiquorum* (Hassanin *et al.* 2007) although this too remains to be fully explored. Garamba National Park is one of the oldest national parks in Africa, gazetted in March 1938 and covers 4,900 km². It is situated in the north-eastern corner of DRC and shares its northern border with South Sudan. The Park is surrounded by three Hunting Reserves that represent 7,200 km² of protected areas (Figure 1). In 1981, the Park became an UNESCO's World Heritage Site in danger in recognition of its unique value, mainly of its threatened population of Northern white rhinoceros (*C.s. cottoni*) – now possibly extinct, and Congolese giraffes (*G.c. congoensis*). The Park also supports important populations of elephant and buffalo. Commercial and

subsistence poaching are the major threat facing the conservation of the park mainly due to the political unrest and uncontrolled flow of weapons and ammunitions in the region. The general situation is being kept gradually under control.

Distribution and habitat preferences

In the DRC, giraffe are exclusively found in Garamba National Park. Earlier investigations have highlighted that giraffes were common in the south-eastern sector of the Park and that their distribution ex-

tended towards the north, even along the Congo-Sudan border. In contrast, they were quite rare in the western zone of Park where they were severely hunted by local communities (De Saeger 1958). Nowadays, groups of giraffes are concentrated in the southern sector of the Park and in areas that extend to the Mondo Missa and Gangala na Bodio Hunting Reserves that are more wooded than the park (Figure 1) (Amube 2007). Giraffes are found in the open bushland dominated by *Nauclea latifolia*, *Piliostigma*

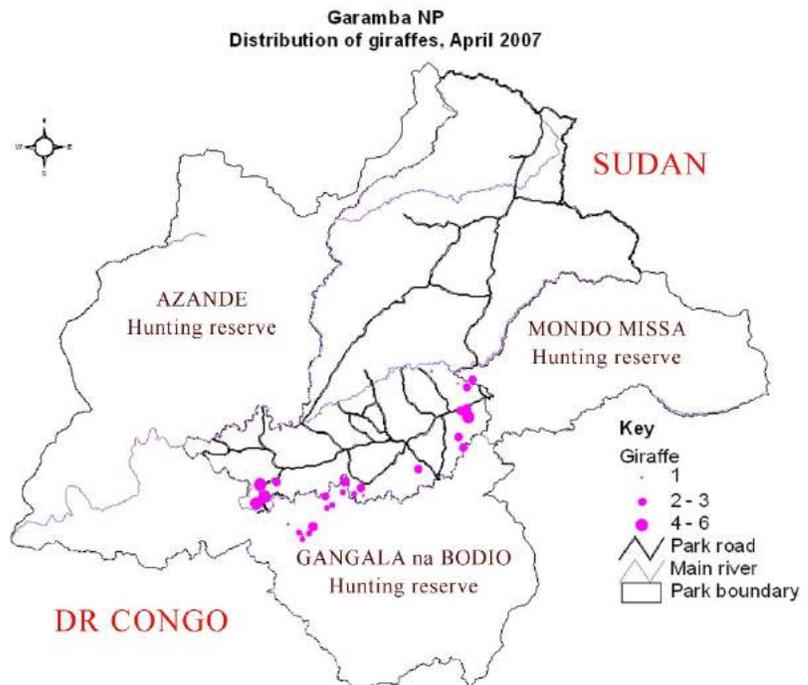


Figure 1: Localization of Garamba National Park and the 3 Hunting Reserves, as well as the spatial distribution and herd size of giraffes in 2007.

Giraffes of the Garamba National Park, Democratic Republic of Congo

cont.

thoningii and *Bridelia spp.*, although about 37% of the total foliage browsed by giraffe was *Acacia sieberiana* and *Zyziphus senegalensis*, despite the fact that these two plant species are poorly represented in the Park (Amube 1989).

Population trends

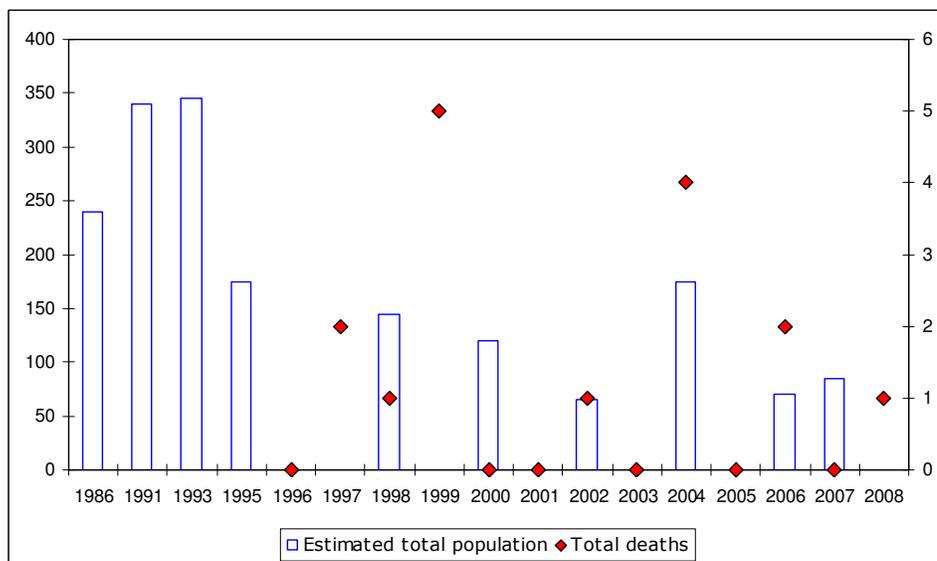
Giraffes were observed in the several hundreds during the early 1960s (de Saeger 1958), but during the last decades, the population numbers have decreased from about 345 individuals in 1993 to 62 individuals in 2002 (Hillman-Smith et al. 2003). The total aerial count of southern part of Garamba NP and part of adjacent Hunting areas in April 2007 indicated 85 individuals remain in the Park (Figure 2).



According to Amube (1989), the sex ratio of Garamba giraffes in 1989 was 1:1.2 (M:F) and the proportion of adult indi

viduals, subadults and juveniles was 15:1:4. Group size ranged between 2 - 22 individuals.

Figure 2: Variations in the giraffe population size and mortality in Garamba National Park from 1996 to 2007.



Threats

The Mondo tribe living in the Mondo Missa Hunting reserve traditionally have protected giraffes because of their beliefs, in an ethnological way, that consumption of giraffe meat causes leprosy to members of their family. However, possession of giraffe tail hair is of great social status to the Mondo traditional chiefs (Mambo Bantu, pers. comm.). Unfortunately, Christianity and evolution of society has changed traditional and well rooted customs, leading people to abandon these

Giraffes of the Garamba National Park, Democratic Republic of Congo

cont.

ancestral ways. Historically, poaching was the major threat of giraffes in Park (Figure 2) (Amube 1989). The killing of giraffes in the Park and adjacent hunting reserves is usually perpetrated by poachers mostly coming from remote areas for bush meat trade and using automatic rifles (de Merode 1998). Additional to poaching, there is the influence of lion or leopard predation on the giraffe population. Sometimes the identification of the cause of the death is difficult because of the scavengers presence and quick carcass degradation during the rainy season.

Conclusion

The major aim of Park's creation has been the protection of the ecosystem as a whole with the northern white rhinoceros and giraffes as the key species it supports. Population of giraffes in Garamba NP have always been impacted by poaching resulting from the war both in Sudan and DRC, and the subsequent flow of automatic rifles and ammunitions in the region. The Park's conservation has been received significant support from various international conservation agencies through the national Congolese Institute for Nature Conservation. Today, the Park receives financial support from European Union and Spanish Cooperation.

Although the area is still under the pressure of war conflict from the Lord Resistant Army from Uganda, the conservation activities have started to be implemented again. Not only the anti-poaching activities are being undertaken, but also monitoring and research activities have recommenced. A new research programme on the ecology of the giraffe population is also planned for 2010, while continued annual census will be undertaken during next dry season which will extend and add onto the data collected in 1989 and help to protect Garamba giraffes for the future.

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Community based giraffe conservation & poverty alleviation in Garissa, Kenya

Approaches, Challenges and Achievements

Ali A. Hussein, Giraffe Sanctuary Manager

Background

The Garissa Community Giraffe Sanctuary (GCGS) falls within the immediate suburban environment of Garissa Town, bordering the dry dusty Bour-Algi village in Garissa District, Kenya. The village located 3km south of Garissa Town, found itself, in the early 1990s, at the centre of a surprising influx of giraffes. These were internally displaced and migrant giraffe from the border areas, seeking safety following the collapse of the Republic of Somalia.

With exceptional reception, more giraffe continued to arrive from far areas of Garissa district as poaching was still rampant in Somalia. Initially 30 individuals arrived, however, in less than 4 years, the population in the Sanctuary increased to over 300 individuals. The giraffe are true beneficiaries of the tolerance of the local people, essentially habituated to human presence in the area. Currently, the giraffe move freely between human settlements, or stoop to drink from close to where the local women are drawing water. Villagers came to view these giraffes – there are now nearly 400 of them now, treating them with respect as fellow members of the community. A small number of tour-

ists, particularly UN and the strong NGO work force in the area, go on 'safari' to see the giraffe, dumbfounded by an extraordinary acquaintance of trust that seems to have developed between them and the locals.

Sanctuary Management

In 1995 four community members formed a community based organisation at the village level to offer protection not just for the giraffe, but for other mammals as well. The group lead by Mr. Hassan Afey became a strong voluntary force and proved to be remarkably dedicated in undertaking regular wildlife patrols and de-snaring sweeps. The concluded Trans-boundary Environmental Project (TEP), funded by the European Commission and implemented by Terra Nuova in association with Arid lands, has – since June 2003 – supported the first phase of the Sanctuary development, and the Sanctuary was transformed from a single CBO affair to a participatory community owned project.

A number of activities were undertaken, including stakeholder analysis, exposure tours, and organization capacity assessment leading to the formation of strong

interim management committee, appointment of 14 community scouts and formal recognition of the Sanctuary by both the Kenya Wildlife Service and the County Council of Garissa, and the subsequent registration certificate for the Sanctuary. With these efforts, more members were recruited from neighbouring villagers mainly: Annam, Qabobey, Bula Wanawake, Jarirot, Hanjoley, Bour Algi, and Bula Sheikahmed, leading to a broad acceptance and appreciation of conservation and ecotourism among the pastoral Somalis in Kenya.

The historical livelihood activities for these communities include: livestock rearing & trade, charcoal burning, quarrying/sand harvesting, fuel wood sales, building poles harvesting, and poaching among others. As one can imagine, not all of these are compatible to conservation. Since Terra Nuova left in September 2007, I remained with the community and currently work as a volunteer, working closely with the Sanctuary warden and the Board of Directors. Based on my experience in community issues and a local community member, I try hard to network on behalf of the community and the giraffe through my online diary that links

Community based giraffe conservation & poverty alleviation in Garissa, Kenya

Approaches, Challenges and Achievements

cont.

the front line of conservation to the rest of the world. I update and maintain the Sanctuary blog hosted by 'WildlifeDirect' to create awareness and fundraise for the Sanctuary:

www.giraffesanctuary.wildlifedirect.org

I also manage all of the Sanctuary's activities and co-ordinate official visits from government agencies, donors, film crews, journalists, researchers, NGO's and other approved official guests. Most of all, I develop project proposals and manage the 14 Scouts and other support staffs in liaison with the Sanctuary Warden. To date we have managed to obtain one laptop from this initiative and raised some little funds, although not enough to meet the Sanctuary needs and the requirements.

Wildlife and Ecotourism Potential

Wildlife & Habitat diversity

The area is an Acacia-Commiphora dominated woodland with scattered bushes/thickets. Apart from the Reticulated giraffe (*estimated at 400 individuals*), other wildlife species include: Gerenuk, Lesser Kudu, Cheetah, Hippopotamus, Guinea-fowls & other passerine birds, Common Zebra, Warthog (declining population due to poaching), Ostriches (Somali race),

Hyena (common and striped), and Lions . Two critically endangered species, mainly Grevy's Zebra and the African wild dogs, have been occasionally reported.

Ecotourism products and potential

Natural resources (forest, wildlife, water, etc.) are inherent and appropriate targets from which communities can derive livelihood improvement and income generation activities that can lead to a positive long-term impact on poverty with a significant contribution to the millennium development goals.

The ongoing development of the Garissa Giraffe Sanctuary is a deliberate effort to develop a nature based business that will contribute towards uplifting the economic status of the local community in tandem with the MDG goal – 1: Eradicating Extreme Poverty and Hunger, with poverty currently rated at 58% in Garissa, compared with an average of 73% for rural and 65% for urban populations. The income generated from the project will enable children to be educated, many of who are not attending school or have dropped out. The literacy rate of 15 – 24 years olds in the area stands at 26.1% with the average years of school attendance being 4 years.

The area has a great potential for natural resource use as alternative incomes, especially in the rural pastoral areas and at the same time involving communities in natural resources management and conservation, hence ensuring sustainable use of natural resources by communities living adjacent to it. Some of the unique ecotourism products that can be developed in this area include: camp sites, botanical gardens, Somali cultural museum/centre, nature trails, camel rides, boat riding, cultural bandas, as well as the famous religious festivals such as the Eid and Moulidi festivals which are huge attractions in areas like Lamu and Zanzibar.

The Bour–Algi community has many active women with a rich cultural heritage that can be used to develop outstanding cultural products e.g. craft village, cultural centre that will bring women on board ensuring incomes to support the household economy and provide education for the girl child, thus realizing the MDG goal - 3: Gender Equity and Empowerment of Women. Currently in Garissa, Female Net Enrolment ratio stands at 7.4% with Female Primary School Transition rate 45.1 % (MDG

Community based giraffe conservation & poverty alleviation in Garissa, Kenya

Approaches, Challenges and Achievements cont.

Profile data for Garissa 2003 -2005).

Current situation and Challenges ahead

Currently in this unique wildlife habitat yet a potential ecotourism hotspot, has not been exploited to benefit the local's despite the allotment of land to conserve the existing wildlife and habitat diversity. There is no development plan in place to direct settlement and safe guard the existing ecological diversity. The proposed sanctuary area is a trust land held in trust for the local community by the Garissa County Council (GCC) as provided by Cap 208 of the laws of Kenya.

Several efforts have been made by the TEP in collaboration with local CBOs and other partners like NEMA, KWS, WCK, geared towards environmental education campaigns and active ecological data gathering & monitoring to create awareness among stakeholders and local community on the threats to existing rich wildlife and habitat diversity. However, the fact that the sanctuary does not generate any income to the locals is a major setback in winning their support.

Instead, communities members engage in unsustainable land and resources utilis-

ation practises. Most evident are; charcoal burning targeting the Acacia trees, over grazing, blockage of access routes for wildlife and livestock to watering points by farming community, increasing human settlement in the area and wood and fuel wood harvesting. Also key catchments areas are under threat from uncontrolled grazing and human settlement. Despite the unique location of the sanctuary and accessibility (the main road from Garissa to Ijara), the area lacks a developed tourism support infrastructure and neither does it fall within an established tourism circuit. Albeit, the area is occasionally frequented by the curious tourists and no levies are charged neither. As a manager and supporter of this initiative, this makes me a worried man.

Appeal for Assistance: support & implementation of the Sanctuary's next phase

Following the conclusion of the Terra Nuova project, activities in the Sanctuary have come to a stand still, simply due to the fact that we were not able to attract the attention of donor organisations in the area as they are concentrating on the humanitarian and the refugee crisis at hand. The key thematic areas that will form the next phase of the Sanctuary, and are the highest

priority include:

- Capacity building (physical and human resource development)
- Development of tourism related infrastructure and livelihood programmes
- Building Networks and Partnerships for the sanctuary and ecotourism products.
- Establishment of ecological monitoring and research unit in the sanctuary.

On behalf of the community and the Sanctuary, I would like to appeal to interested organisations, well wishers and individuals to come to the support of this Sanctuary and secure the land for the giraffes. You can reach us at:

Contact:

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Sanctuary Manager

Garissa Community Giraffe Sanctuary,
P.O. Box 993 • 70100 • Garissa • Kenya

Email: shindeye2000@yahoo.com

ph: +254 722 772113

www.giraffesanctuary.wildlifedirect.org

Or contact the Giraffe Conservation Foundation through the following:

Email: Julian.Fennessy@gmail.com

Website: www.giraffeconservation.org

The Advantages of Proactive Reinforcement Training With Captive Giraffe

Amy Phelps & Lisa Clifton-Bumpass, The Oakland Zoo

The unique anatomy and physiology of the giraffe brings many unique challenges to the captive management of the species. Their sheer size and species specific needs complicate routine husbandry practices and anesthesia becomes extremely dangerous. Currently, medical treatments are typically accomplished either by placing the giraffe inside a mechanical restraint or squeeze device, as in the TAMER by Fauna Research, or by forcing the animal to comply by utilizing equipment such as movable wall or hallway panels. Because of the historic physical risks involved in standing sedations and anesthesia with giraffe, the Oakland Zoo giraffe collection is currently managed by the practice and application of reinforcement based training methods which allow the animal to willingly participate in many procedures without physical restraint. All behavior management and routine husbandry care of the animals is anticipated and trained for by using the methods from the science of Behavior Analysis relying on the least invasive, and minimally aversive practices and procedures to create behavior change. This allows staff to anticipate the specific care and needs of individuals within the collection and proactively train

behaviors that facilitate medical husbandry and daily management. Excluding emergency or surgical procedures, animal management and veterinary staff are able to work as a team in concert to treat and manage various conditions with less distress to the giraffe, as their participation in the procedure is both voluntary and cooperative in nature and a part of their regular routine. Proactively training behaviors allows the management program to plan and prepare for unpredictable emergencies and succeed when the staff and animals are presented with unusual circumstances. Additionally, routine reinforcement training conditions strong positive emotional responses to interaction with humans and novel equipment. or change, describe and predict behavioral outcome.

The core of the Oakland Zoo giraffe management program is a reinforcement training skill set required for shaping and chaining simple and complex behaviors that develop the giraffes' behavioral flexibility, effectively providing them with the tools needed to thrive in the captive environment. Today's reinforcement training and behavior modification is rooted in the science of Behavior Analysis (BA), which is the scientific study of behavior.

BA attempts to understand behavior, measure responses or change, describe and predict behavioral outcome. The key-stone to the Oakland training program is a process called "Microshaping" in which the trainer creates a systematic series of incremental behavior changes allowing the learner to function in the training environment at high rates of reinforcement and high success rates (90% and higher) as the muscle movements of the behavior are rewarded.

In short, reinforcement training uses an audible tone (whistle or clicker often referred to as a bridge or cue) to mark behavior that is selected for food reinforcement, sometimes called a reward. The food reinforcers used are selected based on dietary needs and choice hierarchy of the individual. The reinforcement is hand delivered by a skilled training assistant who is standing on a ladder outside the enclosure to maintain protected contact safety standards.

Giraffe are often considered a "flighty" species that demonstrate fright/flight fear responses to all novel stimuli introduced into the captive and wild environment (referred to as neophobia). The foundation

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of the Oakland Zoo giraffe training program is a series of simple shaping games taken from modern science based positive reinforcement companion animal training. These shaping games are used throughout the giraffe training and are relied on to build a strong training foundation and as a tool for assessing and developing the giraffe's learning style.

Individuals labeled as nervous or fearful often exhibit a flight response. In the captive environment, a panicked flight or freeze response often results in significant injury to the animal and increases the risk of injury to the animal care staff. We have learned that by employing shaping games, learners develop into individuals who are highly adaptable in an ever-changing environment, less accident-prone, and are better prepared for unexpected events, sounds and items such as windblown trash entering their environment.

The core shaping procedure is an adaptation of a game created by Karen Pryor, "101 Things To Do With A Box," (also called "101 Things") which is a popular tool within the companion dog clicker training community.

"This training game is derived from a dolphin research project in which I and others participated, "The creative porpoise: training for novel behavior," published in the *Journal of Experimental Analysis of Behavior* in 1969." (Karen Pryor)



101 Things To Do Game

In this game, the learner is introduced to a wide variety of novel objects such as traffic cones, hula hoops, medical equipment, a ball, a laptop computer, stuffed toys and carefully prescreened strangers. Each training session presents a new learning opportunity to train interaction with a diff-

erent non fear-inducing object. The novel object/person is presented in a manner that allows the animal to choose to interact with the object in order to have access to reinforcement.

The careful conditioning of animal interaction with novel objects through tiny steps and stages is the core principle of the shaping game. In the "101 Things" game, the trainer shapes simple behaviors that encourage the animal to interact in some way with novel stimuli. Through a series of successive, incremental approximations the trainer may build the behavior from looking at the novelty to touching it with the muzzle, smelling the object/person to pushing the cheek against an ophthalmoscope, rolling an object on the ground with it's nose or foot, or placing a foot inside a hula hoop resting on the ground.

"101 Things" has also been adapted into "The Stranger is not a Danger" game (also known as "Stranger Danger"). In this training protocol, unknown or unfamiliar humans are used in the same manner as novel objects. For example, the trainer has the carefully screened stranger stand in a location where the giraffe can

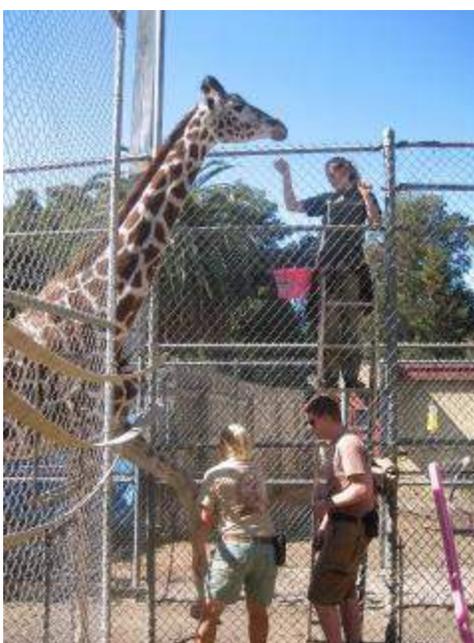
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be bridged and reinforced for turning its head in the direction of the new person. The starting point for this exercise is determined by assessing the distance (or point) at which the onset of fear for the learner can be measured. As the giraffe's noticing or looking at the stranger takes on a more relaxed posture, the "stranger" is moved forward in small increments within the animal's comfort zone.

After the "stranger" is within a comfortable distance, they can also be used as training targets, shaping the giraffe to touch the person's hand or arm with the muzzle. Our "Stranger Danger Game" allows the trainer to generalize interacting with unfamiliar individuals, people wearing unfamiliar clothing or veterinary clothing, and equipment, effectively creating a positive conditioned emotional response to both known and unknown people. Both 101 Things and Stranger Danger interaction procedures prepare animals for unforeseen emergency examinations by consulting veterinary staff, introduction to new keeper staff and volunteers to the area, as well as ensuring a high level of positive and cooperative giraffe participation with public feeding opportunities.

Additionally, Stranger Danger and 101 Things creates a strong reinforcement training foundation that supports the building of other behaviors that allow keepers to control the giraffe's body movements relative to the captive environment, and position the animal for access to their body (effective in both free and protected contact management systems). The giraffe learns to position its body using specific movements on cue. Keepers train the giraffe to move forwards or backwards on the verbal cues "move up" (take 1 to 2 steps forward), and "back up" (take 1 to 2 steps backward). Hip and shoulder "move-in" behaviors are



Tiki Stretch

established on both the right and left sides of the body, allowing keepers to move the animal sideways. The giraffe's position is maintained using a stay or station behavior. Body targets are established to control the position or placement of the nose, cheek, neck, chest, and knees, allowing keepers to slightly angle or adjust the giraffe's body with refined, deliberate body movements. Giraffe are taught that each foot has an assigned different target (differentiated by shape, texture, and color); the target then becomes the cue for a specific foot placed in an exact location with duration. The purpose of the foot target behaviors is that they facilitate the specific placement of the feet for the application of topical treatments, detailed examination of minor injuries, proper foot positioning for high quality radiographs, and other hoof care procedures. Other verbal cues that benefit the management of the individuals within the herd are the recall (come when called) and name recognition which allow specific animals to be called into holding yards off of the exhibit reliably and expediently.

Early on in the giraffe's learning history, a series of basic, non-invasive behaviors are trained. These behaviours are target based

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in nature and serve as the building blocks towards more complex and invasive procedures. Before basic medical husbandry behaviors, such as eye exam or monitoring respiration with a stethoscope can be accomplished, the giraffe must be conditioned thoroughly in order to be comfortable while being touched by both humans and medical equipment. The previously discussed training games used to condition the giraffes to novel stimuli facilitate the use of medical tools and equipment like otoscopes, small dental tools, and flashlights in the herd's general care. Our experience has demonstrated that the Oakland Zoo giraffe generally exhibit greater relaxation when being touched on the head and neck region and an increased level of fear or stress related body language when keepers manipulate their legs and feet, systematic tactile desensitization procedures start at the head and work down the body.

For tactile body conditioning and manipulation, the giraffe is moved into a position allowing staff safe access to the animal while reinforcing a stay position during the systematic conditioning for touch related exercises. As physical exam, palpation, and manipulation of the abdominal



Dr G, Tiki foot exam

and urogenital regions may be necessary, giraffes are conditioned for specific medical examination protocols. Systematic desensitization and conditioning allows for transabdominal ultrasounds with pregnant cows, preliminary training for milking in preparation for potential hand rearing of a calf, and opportunistic free catch of urine samples for routine lab work. Training for physical interaction, basic exam related procedures, and foot target behaviors are the corner stones that contribute to the skills allowing diagnostic radiographs of the lower limbs. The giraffe is trained to place a specific foot on its corresponding target (with duration) while the radiograph plate and portable machine are moved into position, and the image is taken.

Proactive hoof care is a vitally important part of any captive giraffe management

program. Strict attention to foot care is a key component in keeping giraffes sound and active in the zoo environment. Training for hoof exam, trimming and filing procedures, begins with trimming from the ground, where the giraffe places the foot on it's corresponding target (with duration) while staff remove outer wall overgrowth take back the length of the toes as necessary. To accomplish more advanced trimming procedures that are therapeutic in nature, and to gain access to the sole of the foot, giraffes are eventually taught to lift a specified hoof off the ground following a physical cue, and to balance on three feet while maintaining that position. The foot lifting behaviors are shaped so that the giraffe supports all of their own weight and simply shifts their balance to stand on three legs. The lifted leg remains relaxed and keepers can manipulate the exact positioning of the leg for safe and accurate inspection, trimming, and filing.

As general anesthesia is of particular risk to this species, and as the captive geriatric population increases, it becomes of greater importance for exotic animal keepers to plan for and train more invasive and complex medical husbandry

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protocols. Training these sophisticated medical husbandry procedures requires moving beyond basic shaping, to more advanced shaping and chaining practices. Because the Oakland Zoo giraffes have a large reinforcement history built around the face and mouth as a result of the hand feeding practices and shaping games, training for these invasive procedures begins with teaching the open mouth behavior. As giraffes age, dental abnormalities are often found which develop into abscesses or points on the molars and premolars that can impede the animal's ability to eat normally, resulting in undesirable weight loss and ancillary general health erosion. It is important to be able to routinely examine the entire mouth without creating high levels of stress or risk to the individual.

Giraffes are trained to open their mouth following a visual cue and maintain the position while dental tools, small flashlights, or a hand is inserted to inspect the teeth, gums and tongue. In the event of food particles becoming lodged, the cooperative trained open mouth behavior allows staff to clean or brush teeth, and provide care and treatment of wounds in the mouth, and irritation or redness in the

gum tissue. Proactive dental care allows veterinarians to plan for anesthesia or standing sedation as necessary to manage and treat infections and other serious conditions that may arise.

The ability to draw blood and give injections without the use of chemical or physical restraint is an important tool in captive giraffe management. Blood samples are often required for lab work as part of a pre-shipment examination in preparation for moving animals between facilities. Specific values in the blood may need to be monitored when using drugs such as oral non-steroidal anti-inflammatories that carry the risk of potential negative side effects on the kidneys and other organs. In addition to blood work, animals often require injections to deliver necessary vaccines, contraception, antibiotics, or the use of disease modifying osteoarthritis drugs (such as glycosamonioglycans, Adequan[®] and Legend[®]) used in the treatment of geriatric or arthritic giraffes. Giraffes at the Oakland Zoo are trained for hand injection in large muscle masses as in the hindquarter and shoulder regions. These behaviors are achieved when the giraffe is trained to the auditory cue, "move in," signaling hip or shoulder placement at a hatch door in the

fencing. The giraffe then holds their position at the access hatch for the duration of the injection. The blood draw protocol is trained so that the giraffe voluntarily participates in the process of having blood taken from their jugular vein. The giraffe is conditioned to tolerate the pressure of the needle stick, while remaining in position and blood is collected. The hand injection and the jugular blood draw are performed in a holding yard where the giraffe is completely unrestrained and has the option to walk away from the training session at any time.

At the Oakland Zoo, several different types of non-traditional physical therapies are used in conjunction with traditional western medicine to treat various medical conditions and minor injuries, when authorized and supervised by veterinary staff. Acupuncture is used as part of the pain management plan for several different individuals who have suffered various injuries, from concussion fracture of the pedal bone, muscle and tendon tenderness, chronic disease processes such as ringbone and osteoarthritis, and arthrodesis or surgical fusion of the fetlock joint. As with hand injection training, the giraffe holds a stay position and allows the

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veterinarian to insert acupuncture needles into specific points along their shoulders, forelegs, and feet, which also facilitates injection of small amounts of vitamin B-12 into various acupuncture points as required.

The Oakland Zoo also employs stretching exercises; massage therapy, and chiropractic care as an adjunct to routine integral husbandry practices in order to maintain the physical health of the giraffe herd. Stretching is a form of physical therapy that increases the flexibility of the muscles and the connective tissue, and is used with a geriatric giraffe to help the muscles, tendons, and ligaments maintain elasticity, thereby reducing the risk of strains or pulls. Staff has trained specific giraffe to offer each of the front legs when given the physical cue. The behavior is shaped so that the leg can be extended out in front of the shoulder or folded under, requiring the giraffe to maintain balance on three feet throughout this process. These cooperative treatments are done in protected contact, without restraint or confinement, and the giraffe can choose to walk away from the training session at any time. The giraffe often self stations at the treatment location, in the correct posi-

tion for the stretching process and offers her front leg without being cued, when no food reinforcement is present in the environment. This requesting behavior occurs when the geriatric giraffe experiences increased discomfort as measured by limping, shuffling, muscle tension, spasm, edema and swelling of the joints.



Mabusu Giraffe, Eye Treatment

Massage therapy is a common treatment for equine athletes and potential benefits include enhancement of the animal's muscle tone, increased range of motion, reduction in localized edema, stimulating circulation, and the release of endorphins. Equine sports massage therapy is routinely used in various veterinary-approved pain management protocols. Staff members use the "stay" behavior to hold the giraffe in position and the massage therapist gains access to the giraffe's body using step stools and ladders through protected contact barriers.

Appropriate conditioning and desensitization for tactile palpation prepares the giraffe for the handling required in a basic physical examination, but the body work associated with massage requires greater pressure and varying hand positions. Training for massage therapy prepares the giraffe for the different types of touch, management and manipulation of their body often associated with more invasive veterinary procedures.

Anticipating the specific needs of giraffes within the collection, and proactively training behaviors that facilitate medical husbandry for these individuals, prepares staff and animals for unforeseen medical emergencies. By identifying the husbandry and management trends in the captive setting, core training is identified which supports treatments and care, and is integrated into the daily management practices. For example, the adolescent 2 year-old bull giraffe in the herd, Mabusu, presented to keepers with a moderately serious laceration to the lower eye-lid, exposing the subcutaneous fatty and muscle tissue layers. Having only been part of the Oakland Zoo's herd for just over one year, Mabusu's training history consisted of two primary shaping games: the 101

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“Things To Do With Your Head”, and “Stranger is Not a Danger”. His participation in these games allowed for the building of a strong reinforcement history that included his face, the closeness of strangers, and the interaction with novel looking and smelling objects. Previous to the injury, no invasive eye care protocols had been trained or undertaken. As a result of the injury, the immediate emergency first aid care required flushing and the application of eye antibiotic ointments followed by routine medical evaluation requiring examining strangers to come within inches of his face, prolonged close examination the eye with a pen light, thorough eye flushing, twice daily application of antibiotic ointments, and regular examination by staff. The process of teaching “101 Things” and “Stranger Danger” allowed for Mabusu to avoid dangerous anesthetic procedures and invasive surgery. As a direct result of the conditioning to new people, targeting his face, and exposure to novel objects resulted in reinforcement history that allowed Mabusu adapt quickly and enabled the close examination of his eye by the zoo's visiting veterinary eye specialist.

The extensive training program at the

Oakland Zoo has facilitated the building of bridges between zoo staff, advanced expertise from non zoo specialties and the research community, and has provided unique treatment mechanisms for coping with unforeseen medical difficulties. The trained voluntary jugular blood draw enabled the zoo to participate in a nutrition study, and provided staff with the ability to pull blood to assist another institution in boosting the immune system of a hand reared giraffe calf. Tactile training for palpation of the abdominal and urogenital region allowed staff to hand milk an injured giraffe calf in the event that she was unable to care for her newborn calf. Most recently, The Oakland Zoo has participated in the preliminary stages of a giraffe EEG (electro encephelogram) study with initial findings and the first recorded brain activity.

The voluntary participation in medical and husbandry procedures as a result of positive reinforcement based training and Behavior Analysis has many direct benefits for the animals. Positive reinforcement based training can be successfully employed in both free and protected contact systems. It is an effective management tool for facilities that use a restraint device as well as for

for facilities that do not have access to restraint equipment. It is recommended that all zoological facilities exhibiting giraffe employ mechanical restraint devices capable of facilitating standing sedation or general anesthesia as a treatment mechanism for surgical procedures that cannot be accomplished by training. However, effective training procedures reduce the need for physical force typically used to gain compliance. Reinforcement training can be used in all environments including a restraint or chute, without the use of the device's squeeze capabilities, by employing the chute as a hallway, allowing safe access to the animal's body.

Careful training for medical procedures by keeping the process voluntary in nature for the giraffe, has demonstrated less measurable distress associated with the protocol, equipment and specific staff. The animal does not struggle, fight or attempt to escape, and the process is conducted with a higher degree of safety for both the giraffe and the humans involved. Giraffes who are conditioned to a wide range of novel stimuli and environmental conditions demonstrates a strong conditioned emotional response to all aspects

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of their captive environment. They exhibit a quantifiable reduction in the fight or flight response and are less reactive to “unexpected sights and sounds” overall. The Oakland Zoo has found that methodical training systems have multiple benefits. By thoroughly conditioning animals, they become safer to work while in close proximity, and have fewer accidental injuries resulting from spooking or bolting.

In conclusion, reinforcement training shapes animals that are less stressed, who present a greater repertoire of natural behaviors while on exhibit, making them better ambassadors for their wild counterparts to the visiting public. Additionally, thorough conditioning allows both the animal and keeper staff to have the tools necessary to provide for the needs of animals without creating avoidable distress, allowing animals to thrive and function well in the captive environment. Effective and humane care entails an understanding of the natural history of the species, species ontogeny, and reinforcement training skill sets. This planning prepares the giraffe for potential husbandry and medical issues in advance, instead of addressing emergencies as they arise. Preparation for the unanticipated events

that can develop throughout the animal's life protects the individual from unnecessary risk and emotional distress.

References

- Ramirez, Ken. *Animal Training*. Chicago: Shedd Aquarium, 1999.
- Behavior Analysis in Animal Training 5/29/09 www.behavior.org/animals
- www.clickertraining.com/node/167 (101 Things)
- www.clickertraining.com/node/1627 (Micro Shaping)

Resources

- Animal Cognition – www.animalcognition.net
- Cambridge Center for Behavioral Studies – www.behavior.org
- Applied Behavior for Animal Training Courses
- www.learningaboutdogs.com (internet based shaping and Microshaping courses)
- www.naturalencounters.com/trainingEducation.html
- [www.sheddaquarium.org/adult_programlistings.html#ADULT PROGRAMS](http://www.sheddaquarium.org/adult_programlistings.html#ADULT_PROGRAMS)
- www.legacycanine.com/workshops/chicken-camps.html

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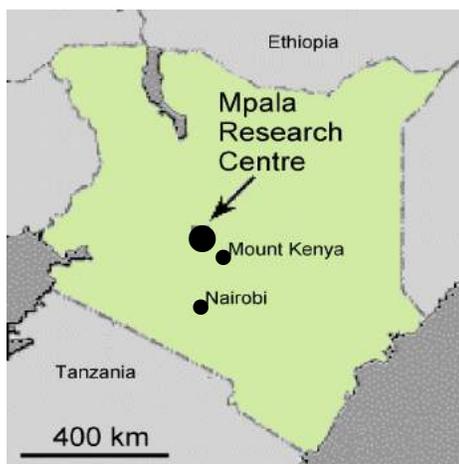
The behaviour of reticulated giraffe in the Laikipia district of Kenya

Bryan Shorrocks, University of York

This short report details some preliminary observations on the behaviour of reticulated giraffe (*Giraffa camelopardalis reticulata*), in the Laikipia region of central Kenya. Our main study involves the social networks of these giraffe (Shorrocks & Croft 2006, 2009).

The Study Area

The Mpala Research Centre is located in the Laikipia District of central Kenya. The property (2,200 ha) is situated northwest of Mt. Kenya, 50km north of the Equator, and 50km from Nanyuki town. The property is contiguous with the Mpala Ranch, a far larger tract (20,000 ha) that is also available for research. The Laikipia area is dissected by the Ewaso Ng'iro river and its tributaries which arise in the Aberdare Mountains and Mount Kenya.



Methods

Continuous sampling was performed on 57 focal individuals. This involved observing individual giraffe for a continuous specified time of 10 minutes, and recording all instances of their behaviour in a number of categories. This was repeated, on different occasions, for the same focal individuals which could be recognised by their neck code (Shorrocks & Croft 2006, 2009). From test observations to determine the range of behaviours performed by these giraffe, we determined that the 'foraging' category could include the consumption of vegetation at 5 different height categories. These heights were measured relative to a giraffe in the field. They were: (1) above nose level (muzzle horizontal), (2) nose level, (3) from below the nose to half neck level, (4) half neck to shoulder level (neck more or less straight with back, and (5) below shoulder level (neck bent below line of back (see Figure 3). The other behaviour categories that were recorded were 'vigilance', and 'travel'. 'Vigilance' was recorded when an individual was stationary, not feeding and looking around. Travel included any movement between periods of 'vigilance' and feeding sites.

Additional information recorded at each sampling location included the time of day,

the habitat type, the giraffe group size (Shorrocks & Croft 2009), the age class of each focal giraffe (adult or young), the sex, and the estimated distance between the observer and the focal giraffe. Habitats were classified as (1) open (open ground with a few sparsely distributed trees or shrubs), (2) semi-open (many trees and shrubs but with fairly large patches of open ground), or (3) dense (little open ground visible, with a dense covering of woody vegetation).

Results

Activity budgets

The proportion of time allocated to foraging ($F_{1,55} = 0.46$, $P > 0.05$), vigilance ($F_{1,55} = 0.67$, $P > 0.05$) and travel ($F_{1,55} = 0.59$, $P > 0.05$) in adults and young did not differ significantly. Similarly, the proportion of time allocated to each behaviour category did not differ significantly between morning and afternoon ($F_{1,55} = 0.08$, $P > 0.05$; $F_{1,55} = 0.08$, $P > 0.05$; $F_{1,55} = 0.02$, $P > 0.05$). Overall, however, giraffe spent more time foraging than they did being vigilant ($t_{56} = 5.94$, $P < 0.001$) or travelling ($t_{56} = 3.44$, $P < 0.05$) (Figure 1). The proportion of time spent travelling was significantly greater in open habitats than in areas of dense vegetation ($F_{2,47} = 3.49$, $P < 0.05$)

The behaviour of reticulated giraffe in the Laikipia district of Kenya

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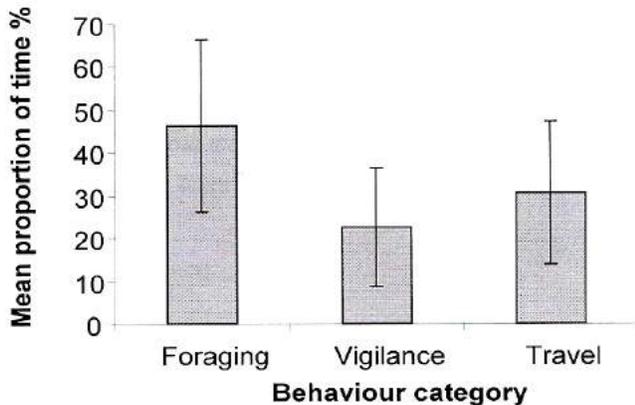


Figure 1. Mean proportion of time spent in different behaviour categories.

Figure 2). It is interesting to note that vigilance and foraging increased as the vegetation became denser (Figure 2), although the difference was not significant. ($n = 28$, $r = -0.14$, $P > 0.05$; $r = 0.16$, $P > 0.05$; and $r = 0.02$, $P > 0.05$ for foraging, vigilance and travel respectively).

There were no significant relationships between distance from observer to focal giraffe, and their time allocation to different behaviours

Feeding height. Giraffes spent a significantly greater proportion of their foraging time feeding at heights between shoulder and nose level, than observed above nose level and below shoulder level ($P < 0.001$) (Figure 3). Proportions of time allocated to feeding at different heights

did not differ significantly between adults and juveniles ($P > 0.05$) (relative to their size), morning and afternoon ($P > 0.05$), or between different habitat types ($P > 0.05$).

The majority of the feeding sites were *Acacia mellifera* (60%), followed by *A. brevispica* (20%), *A. etbica* (15%) and

A. nilotica (2%). Non-acacia species accounted for 3% of feeding sites.

Group size. There were no significant relationships between the giraffe group size and proportion of time spent foraging, being vigilant and travelling ($n = 26$, $r = 0.175$, $P > 0.05$; $r = -0.04$, $P > 0.05$; and $r = -0.09$, $P > 0.05$, for foraging, vigilance and travel respectively).

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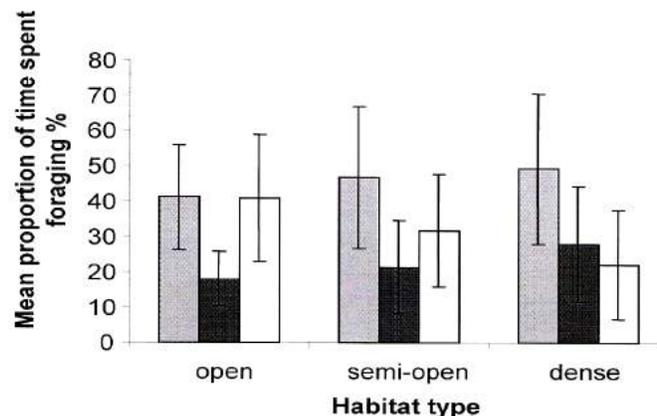


Figure 2. Mean proportion of time spent foraging (light grey), being vigilant (dark grey), and travelling (white) in different habitats.

The behaviour of reticulated giraffe in the Laikipia district of Kenya

cont.

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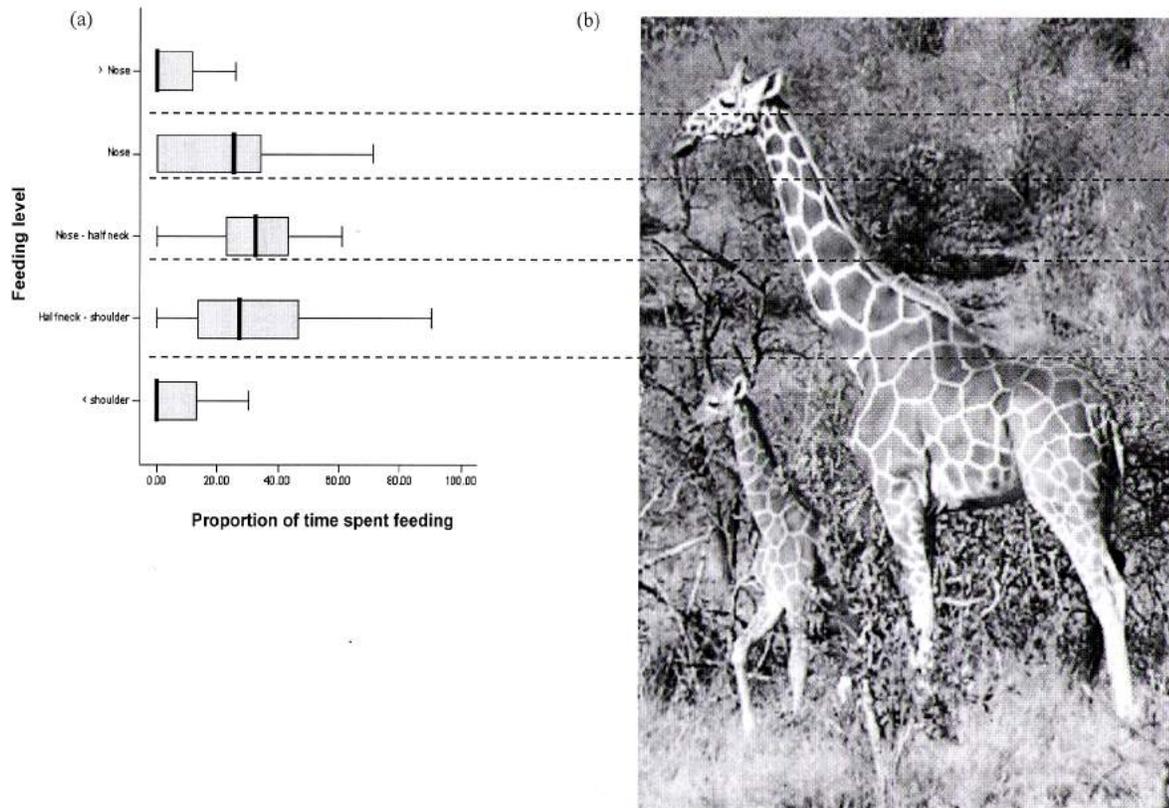


Figure 3. Giraffe feeding heights. (a) Proportion of time spent at different levels. Box-whisker plots indicate median (black bar), quartile (boxes) and range (whiskers) of data for each feeding height category. (b) Location of feeding height categories superimposed on an adult reticulated giraffe.

Population Viability Analysis of the population of West-African giraffes (*Giraffa camelopardalis peralta*) in Niger

Arnaud Desbiez and Kristin Leus

IUCN Conservation Breeding Specialist Group

Computer modelling is a valuable and versatile tool for quantitatively assessing risk of decline and extinction of wildlife populations, both free ranging and managed. Complex and interacting factors that influence population persistence and health can be explored, including natural and anthropogenic causes. The simulation software program Vortex (v9.92) was used to examine the viability of the giraffe population in Niger. Vortex is a Monte Carlo simulation of the effects of deterministic forces as well as demographic, environmental, and genetic stochastic events on small populations. Vortex models population dynamics as discrete sequential events that occur according to defined probabilities. For a more detailed explanation of Vortex and its use in population viability analysis, see Lacy (1993, 2000) and Miller and Lacy (2005).

During the Population and Habitat Viability Assessment (PHVA) that was conducted for the last population of West-African giraffes in Niamey, Niger from the 29th of September until the 3rd October 2008, organised by “Programme Régional Parc W” of ECOPAS (Ecosystèmes Protégés en Afrique Soudano-Sahélienne) and the Government of

Niger and funded by the European Community Fund for development, a VORTEX simulation model was constructed for the population of West-African giraffes.

The aim of the simulation model constructed for the population of West-African giraffes (*Giraffa camelopardalis peralta*) in Niger was to test the viability of the population under three different circumstances of threats and management actions. The overall goal for the population was considered to be : A close to 0% probability of extinction for the total population of West-African or Nigerian giraffes and in the short term, a population growth such that the subspecies moves from being Endangered (Fennessy and Brown, 2008) to Vulnerable according to the 2001(version 3.1) Categories and Criteria of the IUCN Red List of Threatened Species (IUCN, 2001).

The IUCN/CBSG (Conservation Breeding Specialist Group) modelers Kristin Leus (CBSG Europe) and Arnaud Desbiez (CBSG Brasil) interacted intensively with the model input group which included Jean-Patrick Suraud, Philippe Chardonnet, Isabelle Ciofolo, Julian Fen-

nessy, Rick Brenneman, Carlo Paolini and Djibo Saley Boubacar. They also took into account results from the other working groups, as well as published literature and reports, to design a baseline model that simulated the giraffe life history from 1996 till the present (to validate the model). This base line model was later adapted to test the future viability of the giraffe population under different circumstances, according to scenarios suggested by the modelling input group. Further post workshop modelling was carried after the workshop.

From September 1996 onwards, the giraffe population has shown a steady increase and the situation in terms of both biological and human factors is representative for the situation today. The baseline model was adapted to reflect results of the censuses. The results of the adapted baseline model presented a stochastic yearly growth rate of 10.38% per year which, when standard deviations are taken into account, appears not too different from the growth rate based on census results. Details of the values of each parameter used in the baseline model are available in the Vortex report.

Population Viability Analysis of the population of West-African giraffes (*Giraffa camelopardalis peralta*) in Niger *cont.*

In order to test the sensitivity of the model to changes in various demographic rates, alternative scenarios of the adapted baseline model were run, whereby in each scenario one parameter was changed to either a minimum or maximum value. Variations in the age of first breeding for females, the percentage of adult females breeding per year and the sex ratio at birth, as well as a shorter reproductive lifespan, and increased mortality of adult females, appear to have larger effects on the stochastic growth compared to changes in the other parameters. Improved estimates of these parameters through the field research can help improve the reliability of future modelling exercises for this giraffe population. As expected, females appear to be a big driver of the growth rate in this population and better estimates of female demographic values in general would be beneficial.

Status quo Model (current situation, no further loss of habitat)

The zone giraffe is thought to have a carrying capacity of 300 individuals, however it is thought likely that should the carrying capacity in the zone giraffe be reached, animals will move into a larger area, called the expansion zone (north of Niamey until the Balleyara region, and to

the south reaching the Gorou Bossanga Forest near to the town of Gaya close to the border with Benin) which was estimated by the modelling input group to be able to hold another 700 individuals. Three types of “Vortex-catastrophes” were identified and modeled: ecological events, political events and disease outbreaks. It is presumed that when the population size (N) nears the carrying capacity (K) of the zone giraffe (300 individuals), poaching might increase because there might be more human/giraffe conflicts. In addition, it was felt that mortality in general would be higher in the expansion zone. It was thought that dispersal from the zone giraffe to the expansion zone would occur only if the carrying capacity of the zone giraffe has been reached. After 150 years (about 12 giraffe generations), the metapopulation had a probability of extinction of **14.2%**. The giraffe population in the status quo scenario is therefore unsustainable. The fact that giraffes can disperse into the expansion zone when the zone giraffe is at carrying capacity is beneficial, as the probability of extinction of the zone giraffe on its own (32%) is much higher than that of the zone giraffe in the dispersal scenario (15%) or the whole metapopulation in the dispersal scenario (14%). Regardless of what the exact dispersal rate between the

zone giraffe and the expansion zone might be, further modeling shows that it is crucial to have a core population in the zone giraffe where mortality is low. The catastrophes are a large contributor to the overall probability of extinction. Ensuring human intervention when catastrophes happen, such that at the worst only medium effects on survival occur, is of large benefit to the survival chances of the population. The metapopulation only has a probability of extinction of **1%** if the worst catastrophes are mitigated.

Habitat degradation

Habitat loss so far has been estimated at 50-80% over the last 20 yrs (or 2.5-4% per year). A model was created to test what will happen if this rate continues for another 10 years. Relatively speaking, maximum intensity catastrophes without mitigation have a much larger effect on the probability of extinction of the metapopulation, than a continued gradual, small scale, habitat loss of 2.5-4% per year over the next ten years. If habitat loss continues longer than 10 years and/or has a higher intensity, it significantly reduces the survival chances of the metapopulation (probability of extinction between 16%-20%).

Population Viability Analysis of the population of West-African giraffes (*Giraffa camelopardalis peralta*) in Niger *cont.*

Third population

More modelling (in cooperation with giraffe and translocation specialists) is necessary to test the relative efficiency of various alternative translocation scenarios (e.g. frequent small translocations versus a few larger ones, age and sex composition of the translocated individuals, different carrying capacities of the area of the new population etc). We would need to search for an approach that does not increase the probability of extinction of the population in the zone giraffe, while at the same time creating a new population with a close to 0 probability of extinction. However, for this report we wished to test in first instance, if the creation of a third population (in addition to the zone giraffe and the expansion zone) holds benefits for the viability of the Niger giraffe population as a whole. Results showed that creating a third population provides extra safety against non-mitigated, or unsuccessfully mitigated, catastrophes of highest severity and allows for a larger total population to be maintained.

Summary of Recommendations

1. Develop monitoring systems such that high severity catastrophes can be detected early and preventively develop intervention plans to mitigate the effects of the

most likely high severity catastrophes, so they can be put into practice immediately when such catastrophes take place.

2. Maintain the conservation and development actions in the zone giraffe, so that a safe, low mortality core population of giraffes can be maintained at all costs.

3. Ensure that it is possible for giraffes to disperse from the zone giraffe into the expansion zone and ensure, when necessary through conservation and development actions, that the mortality in the expansion zone is brought within, or stays within, the range used in this model (this implies checking current habitat and human activity conditions in the expansion zone and monitoring the population in the expansion zone from the moment relatively large numbers start to disperse from the zone giraffe into the expansion zone).

4. Establish a third giraffe population in a secured area such as the W park, as extra insurance against high severity catastrophes and in order to increase the total population size that can eventually be maintained. This should however only be done after careful study to identify the most efficient and safe translocation scenarios (how many animals, of which sex and age classes, how often

etc) and methods, and in full consideration of the IUCN guidelines for reintroduction. This region should have a carrying capacity of at least 500, and preferable somewhat more, individuals.

5. A. Carefully monitor the rate of habitat loss, so this can be entered more carefully into the model.

B. Ensure that relatively small and gradual habitat loss (2.5-4% per year) is largely stopped within about 10 years (but of course, the sooner the better). Even if the probability of extinction is not immediately affected with gradual, small scale habitat loss, it does have an influence on the number of animals that can eventually be maintained in the population.

C. Try to stop larger scale habitat loss as soon as possible, and avoid very large scale infrastructure developments, especially in the zone giraffe and especially if they occupy a significant portion of either the dry season or rainy season region.

6. Continue and where possible improve the methods/resolution of the monitoring of the giraffe population in the zone giraffe, and later also in the expansion zone, such that the reliability of the life history values entered into the Vortex

Population Viability Analysis of the population of West-African giraffes (*Giraffa camelopardalis peralta*) in Niger *cont.*

model increases. More reliable estimates of sex and age specific mortalities rates would be especially valuable.

The complete modeling report can be downloaded on the CBSG website <http://www.cbsg.org/cbsg/workshopreports/> and VPJ files of the models can be obtained upon request to the authors.

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Influences of anthropogenic activities on the giraffe (*Giraffa camelopardalis*) population of Omo National Park

Pascal Fust

Wildlife in Eastern Africa is strongly influenced by human presence, threatened by the resource needs of the steadily increasing human population. Ethiopia, counting more than 77 million inhabitants in 2005, is one of the most populated countries of Africa. Nevertheless, according to official data, 16% of the country is under governmental protection. As a result, protected areas (PA's) can no longer provide full refuge for wildlife from the increasing human effects. Driven by the need for food and other resources such as fuel-wood, the rural population of Ethiopia seeks to access more and more of the (fertile) lands inside the PA's. As a result, human-wildlife conflicts are inevitable, and knowledge about the ecological impacts of these interactions is highly important for the sound management of the PA's, the people and wildlife.

An overview: giraffes in Ethiopia

Giraffes *Giraffa camelopardalis* have never been abundant in Ethiopia, partly because the large portion of the country being covered by high-altitude montane and afroalpine ecosystems (~26% of the total surface). In 1971, the total number of giraffe in Ethiopia was estimated by the government at between 1000 and 2000 individuals (Dagg and Foster 1982). Ten

years ago, East (1999) approximated the number of giraffes in Ethiopia to be 160 Nubian giraffes (*G. c. camelopardalis*) and around 140 reticulated giraffe *G. c. reticulata*. Estimated current numbers - as no official census has been taken recently - indicate that giraffes are almost extinct in this country. A small population possibly remain in the Omo-Tama and Borena areas alongside the border with Kenya (Tadesse Hailu, Ethiopian Wildlife Society Organisation, pers. comm.), whilst some *G. c. reticulata* and *G. c. camelopardalis* may survive in the Ogaden region bordering Somalia and the region of Gambella in the west of Ethiopia, respectively (Zealelem Tefera, Zoological Society Frankfurt, pers. comm.).

During an aerial survey in May 2006 across Omo National Park in the south west of Ethiopia 11 giraffes - supposed to be Rothschild's (*G. c. rothschildi*) - were counted and resulted in an estimation of total 28 animals, thereby revealing that the population was heavily depleted and endangered in the area (Ian Stevenson, African Parks Conservation, pers. comm.). Therefore, the conservation of the giraffes of Omo NP was seen as a key point for the park management, and research for a proper management of this species was

classified as highly important.

As a result, in August 2007 a research study was established to investigate the influence of human presence on habitat preference of giraffe in Omo NP, and the level of disturbance towards the giraffe.

Methods

The entire area of potential giraffe habitat was classified by a human-impact factor (HIF), which was based on the intensity of the impact on giraffe, i.e. whether the human appearance had temporal (vehicles, nomadic herders) or permanent (agriculture, camps, village) character, and on the abundance of activities within a radius of 2.5 km.

The locations of giraffe encounters were then put into relation with the HIF.

Finding an adequate method for studying the stress level as a result of disturbance proved to be tricky in wild giraffe. Tarlow & Blumstein (2007) evaluated seven methods to quantify anthropogenic stressors in wild animals and the result showed best results for invasive techniques such a cardiac response and level of glucocorticoids. As darting wild giraffes for taking samples implicates

Influences of anthropogenic activities on the giraffe (*Giraffa camelopardalis*) population of Omo National Park *cont.*

both a high risk for the animal and enormous logistical and financial resources, a non-invasive solution was chosen i.e. by measuring the proportion of vigilant behaviour in the activity budget. Therefore, observations of giraffe activity have been recorded every minute by scan sampling of focal animals in observation sessions of 30 minutes. To minimize the influence of the presence of the observer on the animal's activity, recordings were started at least 30 minutes after the first contact with the animal.

Results

Data recorded between mid-August and December 2007 showed that the giraffe used only a small part of the available habitat area e.g. one group living in the northern part of the park had been located in an area covering approximately 80 km² – 20% of the total potential habitat. Giraffe were observed mostly in areas of mixed vegetation of open savannah interspersed by *Acacia* dominated thicket. As shown in figure 1, there was no overlap between the area where giraffes had been observed and areas of human activity, confirming findings of prior studies on giraffes in Namibia (Leggett *et al.* 2004) that showed a general avoidance of areas of increased anthropogenic disturbance.

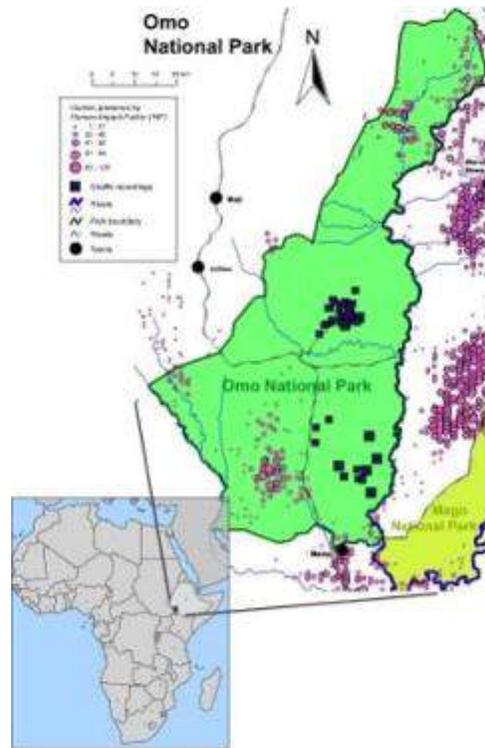


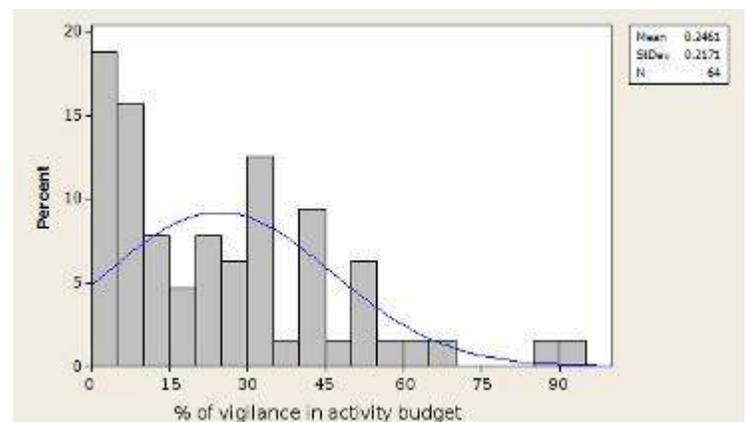
Figure 1. Giraffe observations and human activity in Omo NP (giraffe- dark squares; people- purple circles)

The study of giraffe behaviour indicated that vigilance made up a highly variable part of giraffes' activity budget, represent

ing an activity taking between 0 and 93% of the time. Most of the records were in the range of 0 – 35%, with a mean of 24.6% ± 21.7% (n=64), as shown in fig 2.

This value was much higher than what had been documented in other populations e.g. up to 2% in the Namibian population, as stated in Fennessy (2004), indicating that the animals might have suffered from elevated levels of stress. Even though it might have been influenced by the fact that the animals have not been habituated, analyses showed that the vigilance did not generally increase with shorter distance (300 – 2400 m) between the observer and the giraffe, as might be expected under low habituation conditions. Statistically, other factors that influenced the percentage of vigilant behaviour in the activity budget was wind strength, cloud cover and temperature.

Figure 2. Histogram of percentage of vigilant behaviour in giraffe activity budget



Influences of anthropogenic activities on the giraffe (*Giraffa camelopardalis*) population of Omo National Park *cont.*

While slight wind reduced the time spent on vigilant behaviour, denser cloud cover and higher temperatures acted together to bring about increased vigilance of the giraffe. Due to lack of overlap of the area used by the giraffes and the area of human activities, it was not possible to statistically analyse the direct influence of human activities on the behaviour of the giraffe.

Conclusion

The study provided valuable data about the habitat use of the giraffe in Omo NP. The stress level of this population seemed to be above the levels of other giraffe populations, even though a final conclusion would need to take into account the influence of reduced habituation of Omo NP's population and include a bigger part of the population than what had been possible during this study.

Nevertheless, it seemed important to keep low disturbance level in the late hours of a day (afternoon and evening), as feeding activities increased in frequency towards the cooler time of day.

Although the collected data indicated a minor risk of habitat overlap between giraffe and livestock, the importance of

water resources and disease transmission from livestock onto wildlife needs to be studied further.

This study has demonstrated the difficulty of assessing stress level via the degree of disturbance of the giraffe by human activities. Currently, there is no easy method (compared to methods like hormone level measurements, etc.) to measure directly the degree of disturbance, unless there is continuous and current data on the human activities in the area. Therefore, based on the distribution data of human activities in Omo NP, there was only a minuscule overlap of habitat use of livestock and giraffe. However, additional data recorded by the scouts clearly identifies frequent use of the giraffes' habitat by man. This gap of data would need to be filled by ongoing surveys of the area.

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2008 giraffes in Niger!

Jean-Patrick Suraud

International Giraffe Working Group and ASGN

In less than a century, giraffes in West Africa existed in their several thousands distributed across most of the countries in the region - Chad to Senegal, but were dramatically reduced to 50 individuals in 1996 centred close to Niamey, the capital of Niger. Such a decline was mostly a result of poaching, habitat loss and habitat fragmentation. In 2007, Brown et al., published a genetic study which highlighted the last giraffes of West Africa are the unique representative of the *peralta* (sub) species. Among the 6 giraffes (sub) species identified in the Brown et al. study, the *peralta* are the most endangered. This unique population have the particularity of living in a non protected area, without predators, and sharing the habitat with the local people and their livestock. With such a low number of individuals, it was important to undertake ecological monitoring of the population including annual census, population dynamics, home range, genetics etc.

The 2008 giraffe census

The aim of the census is to have a better understanding of the population dynamics of giraffes in Niger by:

1. Counting every individual
2. Realising an individual identity card for each giraffe
3. Determining the sex and ages class

distribution of the population . Like the previous years, the censuses result from a collaboration between ASGN (Association for Saving the Giraffes of Niger), The Niger Environment Minister, Ecopas, Peace Corps volunteers and Canadian students. The mission was supervised by the French conservationist Jean-Patrick Suraud, ASGN scientific advisor. The census took place during the rainy season

Results

(July-September) as the population aggre-

gates during this period in the Koure and Fandou plateaus, 60km east of Niamey. Since 2005, the method is a total census of the population using photo identification. Every animal has a unique spot pattern allowing easy and recognizable individual identification using the right and left profiles of each.

Discussion

The individual identification allows us compare the demographic data of the census results. The analysis of the results

Table 1: Results of the 2008 census and dynamics of each counted individual

	Adult	Sub adult	Young	Calf	Total
Males	45	13	23	8	89
Females	68 *	11	21	4	104
Total	113	24	44	12	193
					193

*30 females appeared pregnant

- 193 individuals were photographed and identified in 2008
 - 34 calves at least were born between 2007 and 2008 census
- 96% of the individuals photographed in 2007 were photographed (identified) again in 2008.

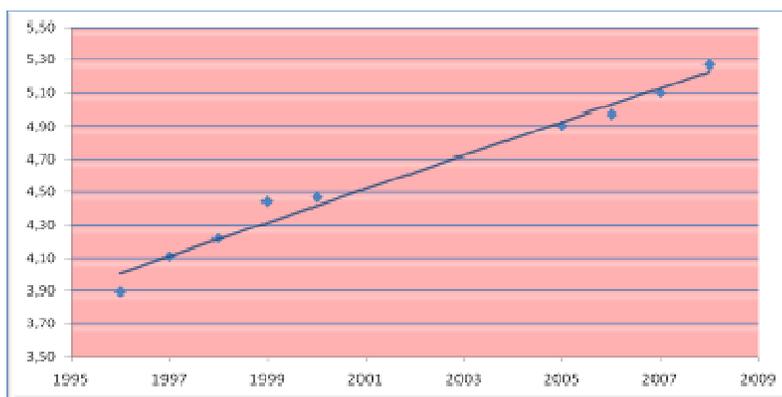


Figure 1: Log of the number of giraffes since 1996, considering the censuses realised by photo identification.

2008 giraffes in Niger!

cont.

since 2005 show a very important female survival rate (>90%) and an amazing recapture rate - approximately 97%. These results indicate that the census was essentially a total count. Based on the 2008 census, the population is still growing in number with a significant growth rate of approximately 12%. Fig 1 shows that since 1996, the population has increased exponentially. The Niger giraffes appear to be typically recovering after the large scale poaching which reduced their numbers so dramatically: high growth rate with large proportion of young.

Many others aspects of the demography of this unique population like survival rate per class of ages, comparison of demographic and census growth rate, generation time or allometry among the ungulates will be written up in due course. Threats to this unique population are ever present and increasing: destruction of the habitat through new cultivated lands, uncontrolled wood cutting and human-giraffe conflict. As per the latter, two giraffe at least were poached between 2008 and 2009. Moreover, the population seems close to saturation with respect to habitat availability. Indeed, exploration of the giraffe into new areas has increased and individuals are often reported very far from their usual range. As a consequence

of the habitat saturation, the long term survey realized by ASGN proves that since the end of 2008 a sub population of giraffe was created in Fandou region. Fandou is a zone where a small part of the population, around 20 individuals, used to stay during the rainy season (since the end of the 90's), and come back with the rest of the remaining population in the Dallol's during the dry season. However, since 2008, these giraffes remain all year in the Fandou region as there is good acacia habitat during the important dry season. This sub population does have contact with the principal population with some individuals migrating between the areas during rainy season at least.

The critical population size to 'escape' the endangered status, following IUCN criteria, should be at least 400 individuals. We are still far from this number. Considering the increasing threats on the Niger population we expect that the 12% annual growth rate will not continue much longer. If nothing is done soon for the protection of the giraffe's habitat, the population will never reach the 400 individuals, and as such the likelihood of the last giraffe being gone from this landscape is still real!

Perspectives

In September 2007 ASGN began an important monitoring program of giraffes in Ni-

ger, with already very interesting results on population dynamics, home range, food quality, etc. Despite all its efforts ASGN scientific component has very important financial difficulties, in particular to finance salaries. If no solution is found very quickly, all the scientific program will be give up. This would be very dangerous for this the giraffes of Niger, as we still need more ecologic data to build an appropriate management plan of the increasing giraffes zone.

Conclusion

The giraffe population of Niger continues to grow in number at a remarkable annual growth rate of 12%. Although the situation for the giraffe at the moment is tolerable, many factors indicate that giraffe's population is close to reaching potential carrying capacity. We are at a key period for the population recovery. ASGN and its partners will continue its work to conserve the most emblematic mega fauna of Niger, but without an appropriate management plan of the giraffe zone in collaboration with the community and other key stakeholders, all its efforts may be in vain.

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Recently Published Research

Shorrocks, B. & Croft, D. 2009. Necks and networks: a preliminary study of population structure in the reticulated giraffe (*Giraffa camelopardalis reticulata* de Winston). *Afr. J. of Ecol.* 47, Early View, January 2009.

This paper describes a method of scoring the neck pattern of reticulated giraffes as a simple code that can be searched for in an Excel spreadsheet. This enables several hundred individual giraffe to be recognized and repeatedly found within a database. Possible sources of error are described and quantified. Data on group size, dispersal within groups and social network patterns are described. The latter is facilitated using Ucinet 6.85 for Windows, a software package that helps to visualize and analyse such networks.

Mitchell, G., van Sittert, S.J. & Skinner, J. D. 2009. Sexual selection is not the origin of long necks in giraffes. *J. Zool.*

The evolutionary origin of the long neck of giraffes is enigmatic. One theory (the 'sexual selection' theory) is that their shape evolved because males use their necks and heads to achieve sexual dominance. Support for this theory would be that males invest more in neck and head growth than do females. We have investi-

gated this hypothesis in 17 male and 21 female giraffes with body masses ranging from juvenile to mature animals, by measuring head mass, neck mass, neck and leg length and the neck length to leg length ratio. We found no significant differences in any of these dimensions between males and females of the same mass, although mature males, whose body mass is significantly (50%) greater than that of mature females, do have significantly heavier (but not longer) necks and heavier heads than mature females. We conclude that morphological differences between males and females are minimal, that differences that do exist can be accounted for by the larger final mass of males and that sexual selection is not the origin of a long neck in giraffes.

Mitchell, G. Robert Goetz: A pioneer of the study of the physiology of animals in the wild. 2008. *Transactions of the Royal Society of South Africa.* 63(2): 182-185

Studying the physiology and behaviour of free-living wild animals was impossible until the technology to capture wild animals and to make measurements in the field was developed. A pioneer in this field was Robert H. Goetz who, having completed medical degrees in Germany and Switzerland, took up an appointment as a research scientist in the J.S. Marais Surgical Re-

search Laboratory at the University of Cape Town in 1937. His expertise was in cardiovascular physiology and pathology and he became interested in giraffe physiology. The features of the giraffe cardiovascular system are unique and ensue from their long necks. In 1954 and 1956 Goetz organised two scientific "safaris" to the then Northern Transvaal to study giraffe physiology and showed that "taking the lab to the animal" was feasible and that the capture of wild animals using drugs carried by "darts" was possible. Since that time these technologies have become commonplace throughout the world and they can be regarded as amongst the most significant advances ever made in the biological sciences. Goetz emigrated to the USA in 1957 where, in 1960, he performed the first ever successful coronary bypass procedure, a procedure that is ranked as one of the ten greatest discoveries in cardiology.

Mitchell, G. & Skinner, J. D. 1993. How giraffe adapt to their extraordinary shape. *Transactions of the Royal Society of South Africa.* 48(2): 207-

We measured the carotid blood flow, and carotid and jugular pressure, and calculated resistance in the head up and head down position in a young giraffe. Resistance to flow increased during and head

Recently Published Research *cont.*

Raising and did not decrease as others have suggested. Relating this finding to the unique anatomy of the giraffe cerebral circulation we concluded that in the head-down position blood flow to the head is relatively uncontrolled but when the head is raised, intense extracranial vasoconstriction occurs which directs carotid blood via the occipito-vertebral anastomosis to the brain, thus preventing 'fainting'. We also compared body and brain temperature in two giraffes. Body temperature varied by up to 6C and brain temperature was up to 3C lower than body temperature. This difference implies a very effective nasal cooling system. We measure respiratory tract temperature in three giraffe and found that over a distance of 70 cm temperatures fall 7.0C. A proposition that skin patches act as heat dissipating windows was also tested. Temperatures under patches and non-patches were measured at the depths of anastomotic channels (15 mm) and subcutaneous vessels (30 mm). Our data support the 'window' proposition. At 15 mm depth patch temperature is below rectal temperature while non-patch temperature at this depth is similar to rectal temperature. At 30 mm depth patch temperatures are lower than non-patch temperatures and non-patch temperatures are greater than rectal temperatures.

Fennessy, J. 2009. Home range and seasonal movements of *Giraffa camelopardalis angolensis* in the northern Namib Desert. *Afr. J. of Ecol*, 47, Early View, 2009.

Estimates of home range size of giraffe in the northern Namib Desert were on average larger than those in other populations. In particular, the largest individual home range of any giraffe bull (1950 km²) was recorded – correlated with low population density, reduced forage density and increased searching for receptive cows. The predominant pattern of movement was linear, along the riparian environments, however, large-scale irregular movements into tributaries and other areas were also recorded. Smallscale movements by bulls into the mountains above the Hoarusib River as well as by cows into the northern tributaries of the Hoanib River were observed. Seasonal movements of giraffe were not as distinctive as those in other giraffe populations. Small-scale habitat segregation was observed in the Hoarusib River study area with giraffe cows foraging only in the Gomatum River during the hot-dry season. The first ever study of GPS satellite collared giraffe provided some of the highest resolution data on giraffe movements to date, including strong biphasic movement behaviour of giraffe over 24-h periods.

Mitchell, G., Bobbitt, J.P. & Devries, S. 2008. Cerebral perfusion pressure in giraffe: Modelling the effects of head-raising and -lowering. *Journal of Theoretical Biology* 252: 98–108.

Loss of consciousness caused by positional changes of the head results from reduced cerebral blood flow (CBF). CBF is related to cerebral perfusion pressure (CPP). CPP is the difference between mean arterial pressure (MAP) at the head and intracranial pressure (ICP). The positional change of the giraffe head between ground level and standing upright is the largest of all animals yet loss of consciousness does not occur. We have investigated the possibility that an increase in CPP protects giraffe from fainting, using a mechanical model that functioned as an anatomical U-tube. It consisted of a rigid ascending "carotid" limb, a collapsible "brain" tube drained by a rigid, "vertebral venous plexus" (VVP) tube, and a collapsible "head" tube drained by a collapsible tube representing the "jugular vein". The descending tubes could be rotated relative to the "carotid" tube to be horizontal, or at 30°, 45°, and 60° to the vertical to simulate changes in head position. Pressure at the top of the "carotid" tube was intracranial MAP, at the top of the "VVP" tube was ICP, and the difference CPP. In the simulated

Recently Published Research

cont.

“head-up” position and a fluid flow rate of 4 Lmin⁻¹, CPP was 170 mmHg. With the VVP tube horizontal, CPP fell from 170 to 45 mmHg, but increased to 67mmHg at 301 “down”, to 70mmHg at 451 “down” and to 75 at 601 “down”. The fall in CPP in the head-down positions resulted from a decrease in viscous resistance in, and dissipation of pressure to, the “head” and “jugular” tubes. These data provide an estimate of cranial pressure changes in giraffe during positional changes of the head, and suggest that an increase in CPP plays a significant role in maintaining CBF during head-raising and that it may be an important mechanism for preventing fainting in giraffe.

Mitchell, G., Maloney, S.K., Mitchell, D. & Keegan, D.J. 2006. The origin of mean arterial and jugular venous blood pressures in giraffes. *Journal of Experimental Biology*. 209: 2515-2524.

Using a mechanical model of the giraffe neck and head circulation consisting of a rigid, ascending, ‘carotid’ limb, a ‘cranial’ circulation that could be rigid or collapsible, and a descending, ‘jugular’ limb that also could be rigid or collapsible, we have analyzed the origin of the high arterial and venous pressures in giraffe, and

whether a siphon assists blood flow occurs. When the tubes were rigid and the ‘jugular’ limb exit was lower than the ‘carotid’ limb entrance a siphon operated, ‘carotid’ hydrostatic pressures became more negative, and flow was 3.3 l min⁻¹ but ceased when the ‘cranial’ and ‘jugular’ limbs were collapsible or when the ‘jugular’ limb was opened to the atmosphere. Pumping water through the model produced positive pressures in the ‘carotid’ limb similar to those found in giraffe. Applying an external ‘tissue’ pressure to the ‘jugular’ tube during pump flow produced the typical pressures found in the jugular vein in giraffe. Constriction of the lowest, ‘jugular cuff’, portion of the ‘jugular’ limb showed that the cuff may augment the orthostatic reflex during head raising. Except when all tubes were rigid, pressures were unaffected by a siphon. We conclude that mean arterial blood pressure in giraffes is a consequence of the hydrostatic pressure generated by the column of blood in the neck, that tissue pressure around the collapsible jugular vein produces the known jugular pressures, and that a siphon does not assist flow through the cranial circulation.

Mitchell, G. 2009. History of giraffes: the origins of the scientific study and classification of giraffes. *Transaction of the Royal Society of South Africa*. 64 (1):1-13.

Giraffes have been known for many thousands of years from rock art and Egyptian artefacts, displayed by Roman emperors at games and triumphs between 46BC and AD274, and briefly exhibited in the zoos of the Italian City States in the 15th Century, yet they remained in the realm of mythology until, in 1764, Ryk Tulbagh, Governor of the Cape Colony, sent a skin and a drawing of a giraffe to Holland. This was the first evidence of their existence to reach Europe for 280 years. Philip Carteret took a copy of the drawing to England in 1769 where it was published by the Royal Society of London, and this drawing became the image that entered the encyclopedias of natural history emerging at that time. In 1780, more skins, drawings, skeletons and notes were sent to Holland by Robert Jacob Gordon, and were taken to England by William Paterson. Other specimens were sent to France by Francois Le Vaillant, and to England by William Burchell. The specimens sent to England were largely ignored.

Recently Published Research *cont.*

Those sent to Europe were studied by Arnout Vosmaer and Jean Allamand in Holland and by the Comte de Buffon and Etienne Geoffrey-St Hilaire in France. Recognition of the unique taxonomic position of giraffes was the significant outcome of these studies. The specimens prompted the import of living giraffes and the first of these was sent to France in 1826 and to England in 1827. Two publications on giraffe anatomy and reproduction by Richard Owen, first Director of the British Natural History Museum, put the study of giraffe biology on a sound scientific basis, and initiated the more detailed study of giraffes which has lasted nearly 200 years.

Mitchell, G, van Shalkwyk, O.L. & Skinner, J. 2006. The calcium and phosphorus content of giraffe (*Giraffa camelopardalis*) and buffalo (*Syncerus caffer*) skeletons. *J. Zool. Lond.* 267: 55-61.

Osteophagia, variable serum calcium (Ca) and phosphorus (P) concentration, high serum alkaline phosphatase activity, a high growth rate, and a large skeletal mass, all suggest that Ca and P requirements and availability are finely balanced in giraffes. The mineral content of some marker bones in skeletons obtained from

adult male giraffes (browsers) and adult male African buffaloes (grazers of similar body mass) were compared to assess the idea of critical Ca and P balance. Our results show that the P concentration of plasma varies more than Ca concentration, and that the Ca content of giraffe bones (0.196 ± 0.01 g/g) and buffalo (0.202 ± 0.006 g/g) varies more than P content (0.095 ± 0.002 in both). The average Ca and P content of the bones analysed was similar in both species (Ca=[similar]20.0%, P=[similar]9.5%). Giraffe skeletons, however, contain three times more Ca and P than do buffalo skeletons. This translates into a 1.5–2.0 fold higher Ca requirement for giraffes, with which they seem to cope effectively by selection for Ca-rich, dicotyledonous, browse. Sources of P to meet requirements are not obvious and a seasonal deficiency of P is a more likely cause of observed osteophagia than Ca deficiency. Giraffe rib P density, the best measure of P balance, of 0.142 ± 0.01 g/cm³ is, however, above the deficiency threshold. Bone mineral content (Ca and P) correlates well with bone density and shows only slight differences between adult males of the two species.

Mitchell, G. & Skinner, J.D. 2004. Giraffe Thermoregulation: a review. *Transaction of the Royal Society of South Africa.* 59(2):109-118.

The ability to maintain a relatively constant body temperature is central to the survival of mammals. Giraffes are found in relatively hot rather than cold environments, have a body temperature of $38.5 \pm 0.5^\circ\text{C}$, and must have evolved appropriate thermoregulatory mechanisms to maintain this temperature and to survive in their chosen habitats. Their thermoregulation depends on anatomical features and behavioural and physiological mechanisms. To minimize physiological thermoregulation giraffes orientate their bodies to optimize radiant heat gain and to maximize convective heat loss, and seek shade. Their long and slender, “dolicomorphic” shape by increasing body surface area without proportionally increasing their metabolic mass enhances heat loss mechanisms. Their ossicones are well vascularized and may also function as a thermoregulatory organ. The main physiological mechanism for achieving heat loss is evaporation. Giraffe nasal anatomy and their unique respiratory system can combine to cause high respiratory evaporative heat loss and, theoretically, cooling of jugular venous blood. Evaporation of sweat is another heat loss

Recently Published Research *cont.*

mechanism but has not before been reported to occur in giraffes. We have analysed the anatomy of giraffe skin and show that it contains many active sweat glands, and that the size of these glands is significantly greater under patches than it is elsewhere. Giraffes therefore can and in some circumstances will sweat. When combined with the anatomy of the blood vessels supplying patches these data further support the idea that patches are thermal windows. We conclude that giraffe have evolved an array of thermoregulatory mechanisms, mostly to achieve heat loss, which make them well adapted to hot and arid environments.

News, Stories, Articles Abstracts &

We are interested to hear from individuals, institutions, non-government, government and zoos who are working with, in and/or on giraffe with the intention of including it in this forum. If you have some interesting findings, news or observations please submit or request further information from the editor:

Julian.Fennessy@gmail.com

Tall Tales—updates from the giraffe world!

A new era for giraffe conservation — the Giraffe Conservation Foundation

Quite surprising in this day and age, and at a time when information on this species is becoming more prevalent than ever before, the first registered giraffe conservation organisation in the UK (and most likely the world) has been established: the Giraffe Conservation

Foundation (GCF) [UK Charity, registered number 1129334].

The GCF concept started in 2008 through a range of discussions and ideas, but mostly as a result of the enthusiasm of the Board of Trustee members and their desire to improve the knowledge and protection of the species. In early 2009 the GCF was registered and its founding Board of Trustee members consists of Greg Edwards (Chair), Rebecca Caudle, Julian Fennessy, Mary Rice and Andy Tutchings.

The GCF vision is that of: *"A sustainable future where all giraffe populations and (sub)species are protected and secure in the wild"* while as an organisation, GCF's purpose is dedicated to securing a future for all giraffe populations and (sub) species in the wild.

The Giraffe Conservation Foundation mission is to:

- Promote the importance and profile of giraffe conservation on the international stage.
- Secure viable, and protect existing, habitat for giraffe and other wildlife.
- Support dedicated and innovative re-



search to better understand giraffe ecology, conservation and management.

- Establish the current status of all giraffe populations and (sub)species to support and inform their conservation and management.
- Identify key threats to giraffe and innovative ways to mitigate these.
- Develop a world class network of individuals and organisations dedicated to securing the future of giraffe.

- Provide a platform and forum for giraffe related research, conservation and management discussion.

- Increase awareness about the plight of giraffe.
- Promote and support giraffe conservation initiatives and work collaboratively with local communities to develop a sustainable future

for both people and wildlife.

- Establish GCF as the key focal organisation for giraffe conservation and management.
- Maintain a close working relationship with the IGWG to provide comprehensive educational and technical support.
- To be the leading international organisation for giraffe conservation and management.

We look forward to supporting Africa's giraffe and their future!

For information go online or contact us directly.

Website: www.giraffeconservation.org

Email: info@giraffeconservation.org

Tall Tales—updates from the giraffe world! *cont.*

Inside Nature's Giants—the giraffe UK, Channel 4, July 20 2009

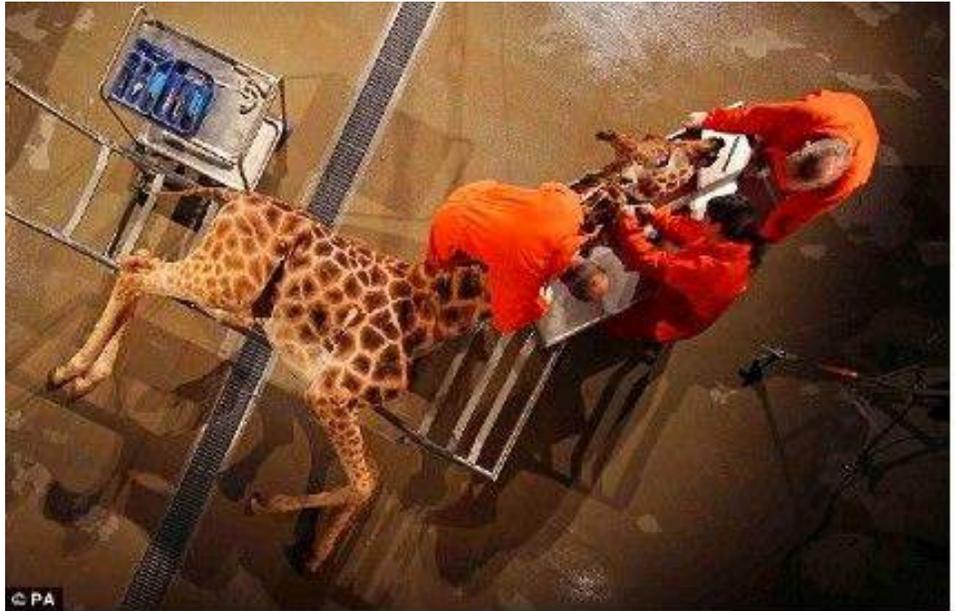
A new four-part Channel 4 science documentary series is set to uncover the anatomical secrets of some of the animal kingdom's most extraordinary species.

Made in co-operation with the Royal Veterinary College, **Inside Nature's Giants** will use dissection, CGI and wildlife photography to demonstrate from the inside out how millions of years of evolution have enabled four species – the elephant, giraffe, crocodile and whale – to thrive in their environmental niches.

The series is believed to be a first for British television and features experts in anatomy, evolution and animal behaviour from around the world who join a team from the Royal Veterinary College, the oldest and largest veterinary college in Britain. Evolutionary Biologist Richard Dawkins also contributes.

The experts explore such questions as whether the giraffe's neck evolved to help them feed on higher leaves or as a weapon of courtship and how crocodiles developed a low profile to help them lie in wait for their prey with just eyes and nostrils above the water.

The series, made by leading independent



production company Windfall Films, also includes an extraordinary on-location dissection of a 16-tonne, 65-foot Fin Whale.

Channel 4's Commissioning Editor for Science, David Glover, said: "Traditional wildlife films tell you how animals behave and how they fit into their environment – but they stop short of revealing the changes that have taken place inside their bodies to allow that behaviour in the first place. This series offers an alternative take on natural history, giving viewers a unique chance to see for themselves how evolution has shaped the anatomy of some of nature's most magnificent animals."

Professor Alun Williams, Professor of Pathology and Infectious Diseases at the

Royal Veterinary College, who appears in the series, added: "These distinctive animals came to the college for the purposes of post-mortem examinations, which gave the opportunity to study their anatomy in detail. In working in partnership with other experts from around the world, our examinations gave an added dimension to our teaching. As the UK's largest veterinary school, the RVC has always taken a pioneering approach to teaching and research in veterinary science and to encouraging public interest in our work.

"The programmes help to demonstrate why wild animals are so fascinating and what can be learned for future research that can improve their lives and their environment. Maximising the educational

Tall Tales—updates from the giraffe world! *cont.*

value of the post-mortems through the series will help in extending the knowledge of anatomy and pathology for those in the veterinary and science sectors, for animal keepers and for the general public.”

For more information contact Matthew Robinson at: matthew@mrtvpr.co.uk or [ph: 0121 777 4277](tel:01217774277) or [07909 684 746](tel:07909684746).

Social organisation of giraffe Populations

The social organisation of animals relates to many facets of a population’s survival and reproduction, such as the type of mating system that exists, competition for resources, anti-predator behaviour and the development of cooperation or dominance strategies. Social structure also influences the partitioning of home ranges and the way in which genes or social information can be transferred throughout a population. It can also contribute to the evolution of animal communication and higher cognition and will dictate how a population will respond to decimation by predation or disease. The social organisation of a species is therefore a vital component of its life history, yet social relationships are still poorly understood for many species.

This study will document the social relationships of ~135 adult female giraffe in Etosha National Park, Namibia. The project will be undertaken over a 3 year period, with 12 months field work commencing in April 2009. Data collection will include individual identification; analysis of preferred associations and maintenance of relationships between individuals; genetic analysis of relatedness; home range analysis; recording behavioural budgets to investigate the benefits of being with ‘friends’; and social network analysis. The results of the research will highlight the factors that are important in giraffe social organisation.

A rapidly developing technique in the study of social organisation in animals is ‘social network analysis’. Network analysis enables us to analyse social relationships at the population level, rather than only looking at interactions between pairs of animals. As such, it will become a beneficial tool in wildlife management in the future as it can provide a great deal of information about how a disease will spread through a population of animals. For example, if one or two individuals are pivotal in joining otherwise separate social groups, removing those central individuals from the network may slow the spread of the disease from one social group to

another. Alternatively, if the population is composed of discrete groups of individuals that preferentially associate with each other but not with other groups, wildlife managers could be reasonably confident that disease would be retained within individual groups and not quickly spread to others. As such, the information gained about the social network of giraffes from this study will provide valuable information to assist in the management of giraffe populations.

From a conservation and management perspective, it is necessary to understand the importance of giraffe’s social structure for any future relocations of giraffe Africa-wide. Past studies of elephants have shown that relocations are more successful if the entire elephant family is moved, rather than random individuals. Little is published about the effect of translocations for giraffe families and this study will provide important information for conservation efforts. In addition, knowledge of the giraffe’s social network and social behaviours will enable us to predict a population’s response to anthropogenic change, through an understanding of how habitat loss or removal of certain individuals may affect the social structure.

Tall Tales—updates from the giraffe world! *cont.*

If you would like to know more about the project, please contact Kerryn Carter, PhD Student, University of Queensland, Australia at: k.carter@uq.edu.au

“Looking Up” - Smithsonian article

Jennifer Margulis's article, "Looking Up" – the cover story of the November 2008 issue of Smithsonian Magazine on the last herd of *G.c. peralta* giraffes in Niger, West Africa, has been chosen by science writer Nathalie Angier and co-editor Joshua Cohen to be included in a forthcoming anthology (Harper Collins publisher) called BEST AMERICAN SCIENCE WRITING 2009.

The article can be read online at:

<http://www.smithsonianmag.com/science-nature/wildlife/30705979.html?imw=Y>

If you would like to know more about the article, please contact Jennifer Margulis at: jennifermargulis@jeffnet.org

WCS Magazine No Longer!

Wildlife Conservation Magazine, published as part of the Wildlife Conservation Society, has – along with hundreds of other magazines and newspapers in the United States – decided to cease publication altogether. As champions of wildlife worldwide and good friends to the gi-

raffes, this magazine is a loss to everyone who cares about large land mammals.

Giraffe in Waza NP, Cameroon

Source: Omondi, P., Mayienda, R. & Tchamba, M. 2007. *Total Aerial Count of Elephants, Giraffes, Roan Antelopes and other Wildlife Species and Ostrich in Waza National Park, Cameroon*. WWF – Central Africa Regional Office.

Waza National Park is located near (south of) Lake Chad in the department of Logone and Chari, Northern Province of Cameroon and lies between 11°00'-11°30'N and 14°30'-14°75'E. It covers an area of approximately 170 000 ha (conservation area of about 1700 km²) with an average altitude of 300-320m, rising to 500m on the rocky outcrops around Waza village.

The park lies in the Chad depression in an area of low relief with no permanent rivers. Soils are mainly ferruginous tropical with various catenas, hydromorphic soils and vertisols.

The climate of the region is semi-arid, with a dry season extending from October to May. Rainfall is irregular, with an annual mean of 700mm. The mean annual temperature is 28°C. December is the coolest

month, with a mean monthly minimum temperature of 16°C and a mean monthly maximum temperature of 33°C. April, just before the first rains, has a mean monthly minimum temperature of 21°C and a mean monthly maximum temperature of 45°C.

The vegetation comprises open *combretaceous* shrub savanna with *Sclerocarya birrea* tree savanna, *Combretum* and *Terminalia* shrubs and stands of *Hyphaena thebaica*; *Anogeissus leiocarpus* woodland on sandy soil; *Lannea humilis* open grass savanna with short annual grasses, sparse trees and stands of *Mitragymna innermis* forming small islands around temporary waterholes; and *Acacia seyal* tree savanna on black clay soils which are saturated with water in the rainy season. The latter vegetation type is slowly spreading as the area gradually dries out. The Yaéré floodplains is populated with perennial grasses such as *Vetiveria nigitana*, *Oriza longistaminata*, *Echinocloa pyramidalis*, *E. stagnina* and some herbaceous legumes including *Sesbania pachycarpa*. Water continues to be one of the most serious problems for Waza. Recently, important dry season waterholes have been created and managed in the floodplain zone.

Tall Tales—updates from the giraffe world! *cont.*

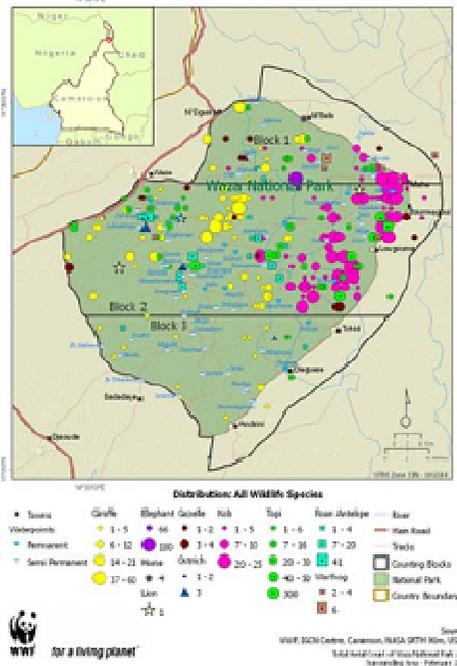


Figure 1: giraffe locations are in yellow

Giraffes tended to occur in high number in the central portion of Waza NP – 75.8% (Block 2) (see Figure 1), though they were seen widespread in low number across all except the eastern section.

It appears that giraffe may be restricted primarily to the *Acacia seyal* zone, which is probably explained by the fact that *Acacia seyal* is its primary food item.

The giraffe population in Waza NP—approximately 604, as well as other wild-life, has significantly declined from the 1991 estimate by Tchamba & Elkan (1995). This decline is possibly attributed to the level of pressure by livestock and the illegal activities in and adjacent to the park.

IGWG Website—it’s coming!

The International Giraffe Working Group’s (IGWG) website project has had a long gestation, but it is finally moving forward into the design phase. The goal is to build a website that will be useful to students doing giraffe research, giraffe researchers, conservation policy makers, and giraffe enthusiasts in general. The IGWG hopes to have the website operational by the end of this year.

The website will feature a “field guide” to the currently recognized giraffe subspecies with photographs, illustrations, and scientifically accurate information on the morphology, geographic range, and natural

history of each. The “State of the Giraffe” report will provide the latest known and estimated census information and conservation status for each giraffe subspecies. Other features will include current news and updates on giraffe research and conservation projects being conducted by IGWG members and a newsletter archive.

Future features that we plan to build into the website include giraffe conservation activities for children, video updates and blogs from giraffe field projects across Africa, as well as a comprehensive giraffe bibliography.

If you have any questions about the IGWG website or suggestions for website features and design please contact David Brown at reticgiraffe@yahoo.com.

Table 1: Total Aerial Count (numbers and distribution) – February 2007

Number and density of the giraffe population in the Waza National Park, Cameroon

Species	Number (census blocks)				Density (census blocks)			Density (census zone)
	Blocks				Blocks			Mean±SE (95% CL)
	1	2	3	Totals	1	2	3	
Giraffe	99	458	47	604	0.247	0.444	0.087	0.26±0.103

Tall Tales—updates from the giraffe world! *cont.*

Giraffe kill in Samburu National Park, Kenya

First time safari goer Niek Zillinger Molenaar was visiting Samburu National Park in Kenya earlier in the year when he saw an amazing wildlife spectacle. A young giraffe with a broken leg literally walked one metre beside some lion who were lying under a tree. When the opportunity presented itself, the following occurred:

And you can now watch it online at : www.youtube.com/watch?v=KfBjpbar7yg



Tall Tales—updates from the giraffe world! *cont.*

Flesh-coloured tongue in an Angolan Giraffe (*Giraffa camelopardalis angolensis*)

Giraffes are known to have a dark coloured tongue (Figure 1). The free end of the tongue, as well as the under surface is nearly 'black' because of the dark pigment beneath the epithelium (Dagg & Foster 1976). The reason for this is unknown but it has been suggested, that the pigment protects the foraging tongue from the negative effects of the sun (Dagg & Foster 1976).



Figure 1: Nearly black tongue of an Angolan Giraffe at Dortmund Zoo.

Dortmund Zoo is one of only few zoos worldwide, that keeps Angolan Giraffes (*Giraffa camelopardalis angolensis*). Among others, this subspecies is characterized by its lighter fur colour (Krumbiegel 1971).

One of the animals at Dortmund Zoo, a young male called 'Uzoma', has an even lighter coat colour than the other Angolan giraffe. Furthermore, Uzoma shows another peculiarity: his tongue colour differs from that of other giraffes. Uzoma's tongue is flesh-coloured, not dark (Figure 2). He was born on 7th of January 2008 at Dortmund Zoo. His parents, Mugambi and Rahima, both had the same father and hence are half siblings (Figure 3). Consequently, Uzoma has only three grandparents. Two of them were wild born giraffes, whereas the third one is a F1-descendant of another two wild



Fig. 2: Flesh-coloured tongue of an Angolan Giraffe at Dortmund Zoo.

born animals. Because of the overall light coloured fur pattern as well as the missing pigment in his tongue, it could be assumed, that Uzoma has a pigment abnormality, which could be due to inbreeding .



Figure 3: Bloodline of the giraffe Uzoma.

References

- Dagg, A.I. & Foster, J.B. 1976. The giraffe its biology, behaviour and ecology. Krieger Publishing Company, Malabar, Florida.
- Krumbiegel, I. 1971. Die Giraffe. A. Ziemsen Verlag, Wittenberg, Lutherstadt.

If you would like to know more, please contact Florian Sicks, Zoo Dortmund at: fsicks@stadtdo.de

Twins— Bioparc Zoo Doué la fontaine

From our knowledge, and up until February 2007, only 22 giraffe twin births had been recorded in captivity, with the survival of both twins recorded in five cases only (with one twin only mother fed

Tall Tales—updates from the giraffe world! *cont.*

and the second bottle-fed by the keepers). Anaïs, the mother was 16 at the time of giving birth.

Both babies have been doing well. Bachir, the young male was sent to Lyon zoo in France last January and Kimba, the female, who we expect to be sterile, will stay



here in her family group.

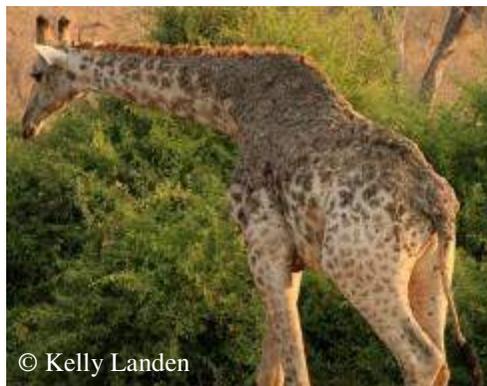
If you would like to know more about these twins, please contact Pierre Gay, Director, at: pgay@zoodoue.fr

Botswana's Bumps!

Kelly Landen from Elephants Without Borders in Chobe NP, Botswana sent

through the below photo, which shows a giraffe with some significant skin disease.

Based on photo recognition by the Vet School at Onderstepoort, South Africa, it



was suggested that the warts could be papilloma virus which has turned into sarcoïd. Apparently, there is no vaccine. However, as this was going to press a new colleague of Kelly's indicated that if it was papilloma virus then a Canada IVT (Immuno Vaccine Technologies) company had already developed a vaccine which they use to protect women against cervical cancer.

It is important to note that the above giraffe, as well as a few others with similar warts in the Chobe NP, seem to be fine!

If you have any possible information about the disease or are keen on helping, please contact Julian Fennessy at: Julian.Fennessy@gmail.com

Photos, Photos, Photos—PLEASE!!!

Giraffe pelage patterns vary widely across their range, whilst pattern characters have been widely used in the description of subspecies. The IGWG have convened a taxonomy working group to review the complex taxonomic history of the giraffe and try to establish an accepted working classification integrating genetic, morphological and pelage characters.

One element of the taxonomy working group's work is to 'truth' the subspecies descriptions based on pelage patterns. To do this we need as many photographs of giraffe as possible and we would welcome the contribution of any digital photographs taken in the wild. The ideal photograph would be taken from the side, but any photo of reasonable quality will be useful; photographs showing the spot patterns of the legs are especially valuable. Our goal is to build a library of photographs of giraffe pelage patterns from all known untranslocated giraffe populations across Africa so the locality must be known reasonably accurately too.

If you have giraffe photos that you are willing to share, or would like further information about this project, please contact Dr. Russell Seymour, taxonomy working group co-chair, at: Rhinocerus@hotmail.co.uk.