

Project Proposal by Ágnes Farkas 2009

Feeding ecology of the free-ranging chacma baboons in the Wildcliff Nature Reserve, focusing on the role of the *Acacia mearnsii* in their diet



Summary

Study will be conducted on the feeding ecology of chacma baboons (*Papio ursinus*) found in the Wildcliff Nature Reserve, South Africa, for the period of 5 months, from end of February until end of July 2009.

Alien invasive plant species such as the black wattle (*Acacia mearnsii*), are invading and threatening the pristine natural ecosystem of Wildcliff, therefore the eradication of them is becoming a serious issue. At Wildcliff live two baboon troops that have been observed consuming parts of these trees, particularly the seeds which have been also found in their scat (recently observed by Paula Pebsworth, 2008). These

sturdy seeds have to be dispersed of actively. Baboons could be an important agent in the dispersal of them.

They have a very diverse diet and highly adaptive foraging behavior. Habitat alteration through clearing the alien vegetation is having an effect on the availability of the food sources. Spatial and temporal responses of the troops to the habitat change are to examine.

The study will clarify the degree of importance of the alien species, particularly of black wattle (BW), in the diet of the baboons at Wildcliff, as well the role of baboons in the ecology of BW.

Introduction

The Wildcliff Nature Reserve has an area of 955ha and is located in the Cape Floristic Region in the Langeberg Mountains which is home to the world's greatest non tropical concentration of higher plant species. This unique environment has a high endemism of plants, 70% of them occurring nowhere else in the world. Because of its enormous species richness and endemism it is considered as a biodiversity hotspot. (Myers *et al.* 2000).

Despite the low nutrition-soil conditions, Wildcliff gives home to a high diversity of plant species. Different biomes can be distinguished within its area: mountain fynbos, afro-mountain forest, wetland, renosterveld, grassland meadows and alien vegetation such as stands of black wattle and *Pinus pinaster* (Fust, 2008).

The representatives of the old world monkeys at Wildcliff are the approximately 70 individual chacma baboons which are crucial elements in this complex ecosystem.

Through the expansion of agriculture, forestry and urbanization in the last century, the area became vulnerable to the spread of alien species. Black wattles have spread heavily into fynbos habitats, affecting them seriously. The control of the invasive vegetation began about 100 years ago, devoting the most attention to the eradication of black wattle by the organization "Working for Water" (The Working for Water programme). It aims to conduct invasive-plant management

considering both the environmental and socio-political benefits. (South African Journal of Science, 2004)

Wildcliff Nature Reserve collaborates with this organization to force back the expansion of black wattle and other “invaders” in its area.

Black wattle (*Acacia mearnsii*)

Black wattle is native to Australia and had been introduced to South Africa for commercial purposes such as timber and tannin more than 150 years ago. The species became invasive because it competes with the local flora in many aspects. The huge closed canopies shade the vegetation underneath, as well as intercept precipitation resulting in decreased stream flow. (Adair, 2002)

Black wattle produces large number of hard-coated long-lived seeds, which consist of 50% carbohydrate, mostly in the form of starch (Hegarty, 2001). The seeds are dispersed by wind, water and fire. They are quite small but tough and will survive the digestive system of small animals that also actively disperse them (Milton, Dean and Richardson, 2003). Larger mammals, such as baboons, could potentially show preference for the nutrient/sap rich wattle over the native flora. They would contribute therefore to the spread of this invasive alien species.

It is chain-sawing, ring-barking and also herbicide spraying used to control the growth and spread of the BW stands at Wildcliff. Approximately 20-30 hectares have already been cut (Giddy pers.comm.). During ring-barking, the bark (from a height of 0, 75-1m) is removed, causing the slow death of the tree. After ring-barking the tree is still able to transport water and minerals and therefore it is a remarkably slower process compared to felling.

Chacma baboons

Chacma baboons occupy a larger habitat than the other sub-species and form an important component of local ecosystems (Henzi and Barret 2003). They are eclectic omnivorous (Whiten et al. 1987). They show preference for fruit in general. They consume a wide variety of plant species and may only eat a single part, ingesting only the flowers, seeds or leaves of each (Barrett, 2000). For complementation of protein intake they tend to consume animals.

They could potentially play a determinant factor in dispersing the seeds of alien tree species such as these of BW. The function of chacma baboons in dispersal of seeds from the alien *Pinus pinaster* has already been proven in preliminary study. (Richardson et al, 2000).

Even though researchers have observed the baboon troops eating BW at Wildcliff on several occasions (Lucket, Sloan, Giddy, Fust, Paula Pebsworth) and in other nature reserves (Marais, 2005) as well, there is still not much information about the exact function of BW in the diet of baboons.

Baboons' time budget is fairly predictable. They spend most of their time feeding, and the rest of the budget filled out with moving between available food sources, traveling to sleeping sites, resting and socializing (Whiten *et al.* 1991). Time devoted to foraging can vary between dry and wet seasons as a consequence of differences in the availability of nutrition-rich foods. Seasonal changes are the most conspicuously on the availability of fruits and seeds. Baboons force to sustain the same quality of food across seasons, foraging selectively for high quality items during the dry season (Marais, 2005).

The foraging behavior of baboons adapts to any environment and to utilize whatever food is available (de Vore, Hall 1965). They move very flexibly within individual home ranges,

depending on the availability of food within the various plant communities growing in the area. Baboons exploit these different plant communities when appropriate food is available. Their foraging strategies allow them to select and consume food types which are higher in nutrients and easily digestible, throughout the year.

Alteration in their habitat could have a consequence of searching for other food sources to complete dietary requirements. They exhibit highly adaptive foraging behaviour, especially when suitable alternative food sources are introduced into the ecosystem.

It is supposed that the carbohydrate and protein level of the selected foods are of major importance (Hill 2002). Fruits and seeds are generally high in both components (Altmann et al. 1987, Barton et al., 1993, Kunz, 2007).

Baboons' preference for fruits and the high mobility in their home ranges mean that they play an important part in the seed dispersal of woody plants (Slater, du Toit 2001). In South Africa, baboons play a crucial role also in spreading the seeds of fynbos plants, thus helping to preserve the diversity of the Cape's unique floral kingdom.

Seed dispersing by primates is a mutualistic "game". The plant provides food for the animal that in exchange disperses the seeds. Swallowed seeds are transported in the gut then defecated some distance from the parent plant. This process can affect the germination positively and in some species also can decrease the germination time (Lambert 2001). Getting more distanced from the parent plant through transport by primates could increase the survivorship of the seeds in most of the species (Connell, 1971).

Recent observations on the troop at Wildcliff confirmed seeds of *Acacia mearnsii* in the dung of the baboons (Paula Pebsworth pers.comm.). Seeds were almost always intact what would indicate that baboons do not act as seed predators for this plant species but as dispersers.

Dr. Bernard Slippers and Mr. Brett Hurley, researchers of The University of Pretoria (2007) investigated the correlation of baboon damage and insect infestation of pine trees. First it has been thought that they strip the barks in search for insects to eat but the researchers found that healthy pine trees would not provide so high number of insects under their bark which could declare that baboons strip the bark only for the nutritional value of these insects.

Fust (2008) noted that baboons strip the bark of BWs while foraging on them at Wildcliff. This noxious manner may have consequences also for the conservation strategies of the forest industry of South Africa, of which Black Wattle is a central component.

Understanding complex plant animal interactions becomes ever more important as we begin to appreciate the direct economic and conservation consequences of the ecological roles that primates play in the forest dynamic (Lambert, 2001).

Objectives of the project:

- Habituation: because the two troops are not fully habituated yet and their shiness make the observations difficult, at first it would be of high importance to continue the habituation process to obtain good quality data. The aim is the identification on individual level
- Spatial and temporal analysis of habitat and food preferences of the baboons
- Collection of data to determine and predict the responses of the baboons' troops to the changing habitats
- Determine the role of BW in the diet of the troops and the role of baboons in the spread of BW

Method Outline:

- Photos will be taken of each individual for later identification and compilation of a photo album of the population.
- Behavioural data: all behaviour will be noted using continual scan method.
Foraging data: record each food species they consume and where they consume it. When feeding on black wattle document the location of the tree using GPS, state of the tree (approx. age, diameter) and whether it has already been ring-barked. From this could be followed the decline of the trees in the coming years.
Measure the time spent eating, note part(s) which were eaten.
- Analysis of nutrition value of the seeds of BW
- Collection of scat opportunistically. Analysis of faecal samples to determine the seed dispersal ability of baboons concerning the alien vegetation at Wildcliff. .

References

- Adair, R. (2002). Black Wattle: South Africa Manages Conflict of Interest. CABI Biocontrol News March 2002, 23 (1).
- Altmann, S.A. Post, D.G and Klein, D.F.1987. Nutrients and toxins of plants in Amboseli, Kenya, Afr. J.Ecol.25:279-293
- Barton, R A : Whiten, A : Byrne, R W Chemical composition of baboon plant foods: implications for the interpretation of intra- and interspecific differences in diet. Folia-Primatol-(Basel). 1993; 61(1): 1-20
- Brown, L.R., Marais, H., Henzi, S.P, Barrett, L.. 2005.Vegetation classification as the basis for baboon management in the Bourke's Luck Section of the Blyde Canyon Nature Reserve, Mpumalanga.Koedoe 48(2):71-92 Pretoria
- Connell, J.H. (1971) On the role of natural enemies in preventing competitive exclusion in some marine animals and in rain forest trees. Den Boer, P.J., Gradwell, G.R. (eds). Dynamics of Populations. Centre for Agricultural Publications and Documentation, Wageningen, The Netherlands.
- De Vore, I.,Hall, K.R.L. 1965. Baboon ecology. Primate behaviour: field studies of monkeys and apes, ed. I. de Vore. New York. Holt, Reinhart & Winston
- Henzi, S.P., Barrett, L. 2003. Evolutionary ecology, sexual conflict, and behavioural differentiation among baboon populations. Evolutionary Anthropology 12: 217-230
- Hill, R. A. ,R.I.M. Dunbar, 2002. Climatic determinants of diet and foraging behaviour in baboons. Evolutionary Ecology 16: 579-593

Marais, A.J. 2005. Resource utilisation of the chacma baboon in different vegetation types in north-eastern mountain sour veld, Blyde Canyon Nature Reserve. Research Dissertation. University of South Africa

Milton, S.J., Dean W.R.J., Richardson, D.M. 2003. Economic Incentives for Restoring Natural Capital in Southern African Rangelands. *Front Ecol. Environ.* 1(5): 247-254

Myers, N., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B., Kent, J. (2000) Biodiversity hotspots for conservation priorities. *Nature* 403: 853-858.

Joanna E. Lambert. 2001. Red-Tailed Guenons (*Cercopithecus ascanius*) and *Strychnos mitis*: Evidence for Plant Benefits Beyond Seed Dispersal. *International Journal of Primatology*, Vol.22., No.2:189-201

Kunz, B.K., Linsenmair, K.E. 2006. Changes in Baboon Feeding Behavior: Maturity-dependent Fruit and Seed Size Selection within a Food Plant Species. *International Journal of Primatology*

Pascal Fust. 2008. Function and use of cheek pouches in cape chacma baboon (*Papio ursinus orientalis*) population in Cape Floral Kingdom, South Africa. Research Dissertation, Napier University

Richardson, D.M., Allsopp, N., D' Antonio, C.M., Milton, S.J., Reinmanek, M. 2000. Plant invasions- the role of mutualism, *Biological Reviews*, 75:65-93

Richardson, D.M., van Wilgen, B.W. 2004. Invasive alien plants in South Africa: how well do we understand the ecological impacts. *South African Journal of Science* 100 January/February 2004/45-51)

Slater, K., du Toit, J.T. 2001. Seed dispersal by chacma baboons and synoptic ungulates in southern African savannas. *South African Journal of Wildlife Research* 32 (1): 75-79 (2002)

Whiten, A., Byrne, R.W., Henzi, S.P. (1987) The behavioural ecology of mountain baboons. *International Journal of Primatology* 8:357-388.

Whiten, A., , Byrne, R.W., Barton, R.A., Waterman, P.G., Henzi, S.P., Hawkes, K., Widdowson, E.M., Altmann, S.A., Milton, K., , Dunbar, R.I.M. 1991. Dietary and Foraging Strategies of Baboons. *Philosophical Transactions: Biological Sciences*, 334(1270): 187-197

Websites:

Hegarty, E. 2001. Edible Acacias, Bush Tucker, Available from:
<http://www.sgapqld.org.au/bushtucker18.html>

Management of invasive alien plants a proposed classification of invasive alien plant species in South Africa is available from. Working for Water programme: <http://www.dwaf.gov.za/wfw/>

Pascal Fust. 2008. Baboon behaviour study at Wildcliff-Baboon observation log,

Sloan, K. 2008. Baboons at Wildcliff: Habitats and Behavior and

Sloan, K. 2007. Baboon observation Log, are available from: <http://wildcliff.org/research>

The Forestry and Agricultural Biotechnology Institute:

<http://www.fabinet.up.ac.za>