

# FSM-TIMES

FourStripedMouse

**Title:**

## **Ecology and Management of the Succulent Karoo**

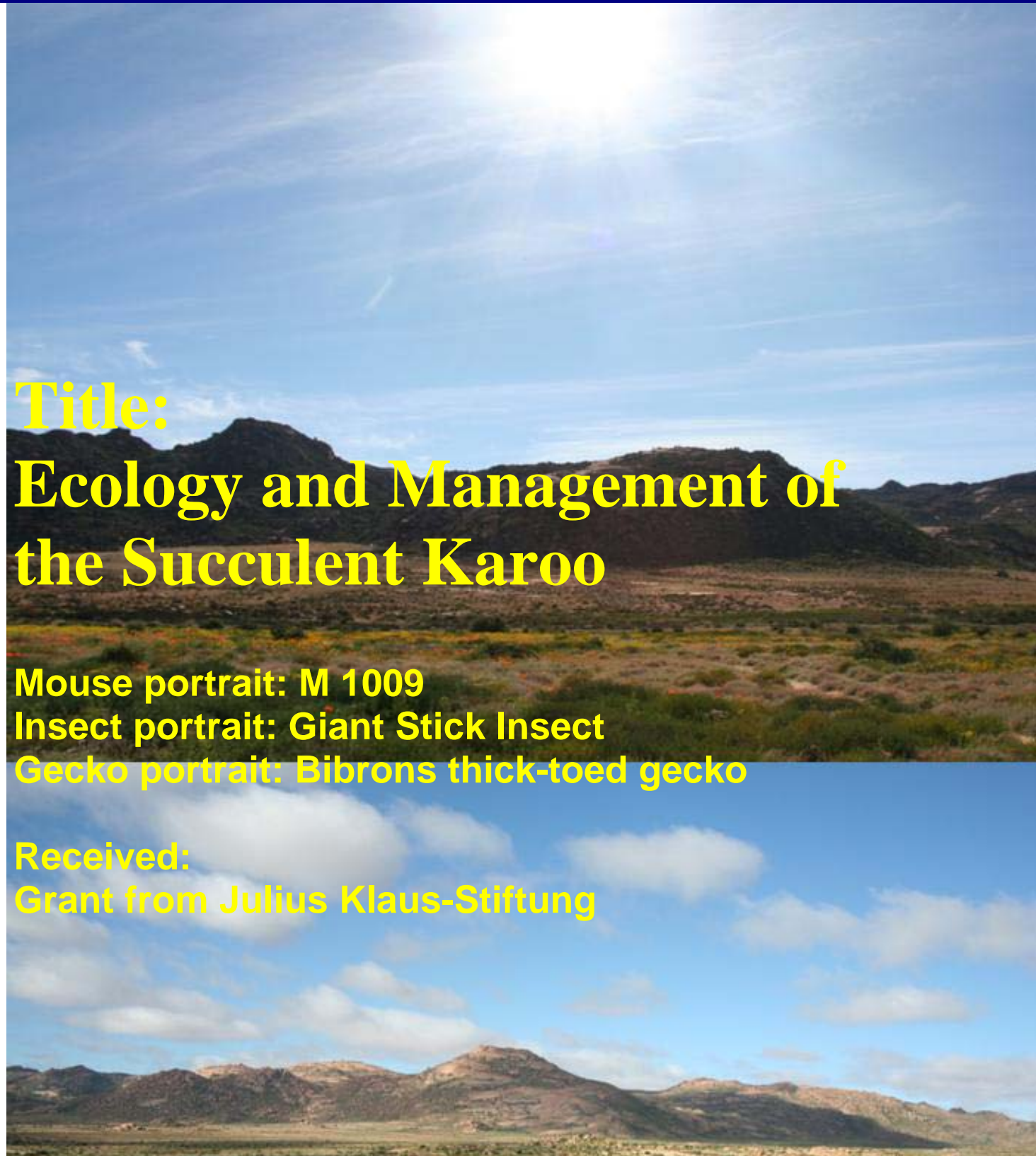
**Mouse portrait: M 1009**

**Insect portrait: Giant Stick Insect**

**Gecko portrait: Bibrons thick-toed gecko**

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## IMPRESSUM

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# WELCOME TO THE TWELFTH ISSUE OF THE FSM-TIMES!



The last three months were characterized by first hot and then cold weather. Finally the winter arrived and with it the rain. When

I came back to Goegap in June, I found the mice in a sorry state. More than 50% of the mice I had met in March were dead, mostly as a consequence of the hot and dry weather leading to a drought and nearly no food. While the first rain brought hope for new plant growth, it also brought a series of cold rainy days, when the mice had to stay in their nest, followed by very cold nights with the first frost of the year. For some of the starving mice that was too much and the hopeful rain was their undertaker.

But now nature is flourishing again, green seedlings can be seen everywhere, and plenty of mouse food starts growing. While many

mice are still underweight (less than 40g), I very much expect that by the end of July we wont trap any mice below 40-50g anymore. So, there is another exciting breeding season ahead of us and while the research station will for 10 days be inhabited by only two researchers (Maarten, the new research station manager and myself; and there are Brigittte and Apollo, but they don't do field work), the population of people doing research will increase to five in July, 6 in August and 7 in September. So we are prepared to watch what these little, clever striped mice are up to this year.

Kind regards,

*Carsten Schradin*

## THE DIFFERENT PLACES AND LOCATIONS

### **South Africa**

As the name says, it is the most southern country in Africa. South Africa lies at the Cape of Good Hope. The population of South Africa (40 million) consists of black South Africans (e.g. the Zulu), which represent 75% of the population. 12% are white, 8% coloured, and some are Indian, Malaysian or descendents of the San (bushman). South Africa is the only industrialized country in Africa with a very good infrastructure.

### **Succulent Karoo**

It describes a special vegetation type. It receives low rainfall in winter and is characterized by dwarf succulent shrubs and an amazing wildflower display in spring. It is a desert to semi-desert environment. Succulent Karoo is found in Namaqualand and southern Namibia. In the FSM-TIMES, the words succulent Karoo and Namaqualand are often used as synonyms.

### **Namaqualand**

It is situated in the northwest of South Africa, between Cape Town and Namibia. Famous for its wildflower display in spring, Namaqualand was one of the world's most important copper mining areas at the beginning of the 20<sup>th</sup> century. Nowadays the diamond mines are more important. Because of its dry desert like climate, agriculture is mainly absent and population density low. Namaqualand is part of the Northern Cape Province.

### **Springbok**

It is the capital of Namaqualand. Although Springbok has only around 20 000 inhabitants, it has shops for nearly everything, including two well stocked supermarkets. At weekends Springbok is very busy, when all Namaqualanders come here to do their shopping.

### **Goegap Nature Reserve**

Pronounced as "Guchap", this nature reserve lays only 20kms outside of Springbok. In spring it is visited by thousands of tourists that are attracted by its wildflower display. During other times of the year it is very quite and mountain zebra, gemsbok, springbok, aardwolf, mice and mice researchers live in peace.

### **Field Site**

This is the place in nature where the scientist collects his data. So our field site is where we observe the mice

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## **NAMAQUALAND-WEATHER**

By Edward Yuen

After a long, hot and dry summer, the winter has finally arrived here in Goegap. Temperatures have been dropping steadily since March, with the coldest night recorded so far at -1.8 °C in June. This means that, more than one morning, as we left the research station to go and do field work, we were welcomed by fogs and frost. However, winter in Goegap is not just about low temperatures, but it is first and

foremost about rain. The first thunderstorm hit us in April, but it lasted for only a couple of days with our rain meter barely reaching the 8.5mm mark. Though short lived this small spot of rain, brought some relief to our increasingly suffering field site and within few days of the rainfall the first few seedlings started to appear. Thought this was not enough to rejuvenate the ever more yellowing plants and we were left

wanted for more. It was in June that we finally got our prayers answered, when the first real rain of the winter arrived and, the rain fell continuously for 5 days with a good 28 mm of precipitation. The field site is finally on its way to recovery, and with it,

our skinny mice can get the break that they were waiting for so long.

The last three months	April	May	June
Minimum temperatures			
night	4.1	1.4	-1.8
day	14.5	11.1	10.2
Maximum temperatures			
night	19.7	18.5	13.5
day	39.4	33.7	26.4
Nights with frost	0	0	5
Rainfall in mm	8.8	5.7	50
Days with rain	3	3	9



The first thunderstorm of the year (E. Yuen).



A misty winter morning (E. Yuen).

## THE PEOPLE IN GOEGAP

*By Carsten Schradin*

In April and May, the old team consisting of Ivana as Research Station Manager, Ed as her right hand, and the very hard working field assistants Maia and Jane were keeping track of the mice. Jane and Maia left in May, but at the very

beginning of May the new Research Station Manager Maarten had arrived. Maarten had studied Animal Ecology at the University of Groningen in the Netherlands and finished with a MsC. Now he came to Goegap to replace Ivana and stay for

12 months as manager. Ivana had two months time to instruct him with all the different jobs the manager has to do, and she instructed him very well. Ivana and Ed left end of June, but will be back in August / September, when Ivana will start her own project which will lead to a PhD project, if we get the necessary funding until the end of this year. Middle of June the ABCs had arrived (Apollo, Brigitte and Carsten Schradin) to stay for 4 months in Goegap during the breeding season. So the research station is always very busy and we are enough people to keep track of the mice. One new development at the Research Station during the last

three months was the building up of a Wendy House as additional student accommodation. This was made possible by financial support from the faculty in Zurich (Mathematisch Naturwissenschaftliche Fakultät, University of Zurich). The Wendy House is 3x6m and has two rooms, 3m each. Four windows allow for enough ventilation during the hot summer months and insulation keeps it warm in winter. A little roof in front of it gives shade when sitting outside. This Wendy House is the new home of Ivana and Ed, who had to give the research station managers room to Maarten.



The team in June 2007: Ivana Schoepf (Research Station Manager), Ed Yuen (field assistant), Brigitte Schradin (first lady), Carsten Schradin (project leader) and Apollo Schradin (field baby) and Maarten Bleeker (new Research Station Manager).



Ivana and Ed outside and inside their Wendy House

## INTRODUCTION TO SOUTH AFRICA AND GOEGAP BY THE NEW RESEARCH STATION MANAGER

*By Maarten Bleeker*

First of all I would like to introduce myself, my name is Maarten Bleeker and I am appointed as Research station manager from the 1<sup>st</sup> of May, 2007 to 2008. I graduated my biology master in Groningen, The Netherlands, where I mainly worked on birds. My biggest interest is animal ecology. However, birds are too easy to study, and I want to learn more about mammals, especially the striped mouse! Here I will give you an overview of my first impressions of South Africa.

When I arrived in Cape Town I saw the big mountain peaks, the table mountain, and was very impressed. During the taxi drive to the city bowl I saw some extraordinary birds, e.g. glossy ibis. The fog was disappearing and the hot weather felt good, since I left Holland in spring. When I arrived in the city bowl I had to confirm my booking with the Intercape bus to Springbok.. However, I was here around 9 am and the bus only leaves at 5 pm.

This gave me some time to check the internet, tell my mom I survived the plane trip, and to drop my bags at the internet cafe. The guy at the internet was very kind like almost all the people I met, friendly and laughing and this made me feel very good and welcome. During my walk I saw many shops and a huge park that was full of plants, squirrels and birds, even bananas grew there!!!!

Furthermore, I saw many signs of which I had no problem to read. Most people spoke English to me, but also I noticed that some people spoke Afrikaans. Immediately I could understand about half the words they said. This is actually no miracle, I already knew that the Dutch arrived here around 1650 and that Afrikaans was a kind of broken Dutch, I would say drunken sailor Dutch. Anyways I am eager to learn this closely related language!

Coincidence and luck are always with me and this time it showed when I met a guy, Sam, from The

Netherlands, who I met once before in Belize (Central America), in 2003. He told me I had to see the park, some houses in the western part of the city and the little castle close to the park. I already had a look in the park and went for the castle, however, this was closed. Then I walked west and I saw some nicely painted houses, which had all very different colors. One was blue, the other pink and even another bright yellow. It was like I was walking in Ireland, of which I have seen some pictures from friends. After this little walk, and the travel, I was a bit tired and went back to wait for the bus. It was very easy to make friends. However they were not real friends. They knew I was a tourist and asked for money. Finally, the bus arrived and brought me to Springbok. I did not see a lot on the way because the sun went

down around 6 pm and I was tired so I slept a bit.

At about 2 am we arrived in Springbok. I was happy to get a ride with a kind lady, who brought me to the Springbok lodge. Here I thought it was possible to have a little sleep, however the lodge was closed. We had a little look around and again my luck did not turn its back on me. I found someone who was renting a room out. He called me "kaaskop", which means cheese-head, a real Dutch word for a Dutchman. I was laughing about his Afrikaans and he was laughing about my Dutch. I was very glad I could have a little nap before I would try to find Ivana and her team to bring me to Goegap Nature Reserve. When I woke up the room was empty and I delivered the key to the now opened lodge. No payment had to be made, all was good! When I arrived at the internet cafe I saw a

familiar face and knew it was Ivana. I introduced myself and was happy that we went shopping and afterwards to Goegap. During the ride to the research station I saw the first grazers, gemsbok, springbok and zebra. The field site looked rather dead, yellow brown bushes with hardly any trees. Of course this is because of the season and this will change when spring comes. I always go to a new place with zero expectation so I was stunned to see the grazers, 30 new bird species in one day and last but not least, the amazing facilities at the research station. We have electricity all day long, running water, hot and cold, and even very nice sleeping accommodations. The people are very nice, both at the office and at the research station. Also the mice in the field are very cute and they are an excellent study object. What more could I wish for? In the time that I spent here already, I have missed home sometimes. However I learn a lot about the mice and will know most of them by the end of April 2008. It is an amazing challenge in which I will put a lot of effort in to

### **How to become a field assistant?**

Only people with a biological background can become field assistants. These are students of biology, veterinary medicine or related areas. The work of field assistants includes: radio-tracking, trapping and marking of small mammals, behavioural observations, work at the research station, including maintenance, and much more. People interested in working as a field assistant for 2-3 months write an email to [info@stripedmouse.com](mailto:info@stripedmouse.com). Please write a short motivation and attach a CV. You will then obtain more information.



learn more and more and more!  
Yours Maarten

## **Goegap Nature Reserve**

**Accommodation: Guesthouse, bush hut, camp site.**

**4x4 routes, tourist route for all cars, two hiking trails.**

**Tel: +27 27 718 99 06**

**Fax: +27 277181286**

## HOME PAGE: STRIPEDMOUSE.COM

*By Carsten Schradin*

	April	May	June	Total last quarter
Visits of stripedmouse.com	3896	3830	4537	12 263
Downloads FSM-TIMES, SGM-Spiegel	590	560	205	1 355

## TITLE: ECOLOGY AND MANAGEMENT OF THE SUCCULENT KAROO

*By Mirjam Barrueto*

Some of the most conspicuous features of South African landscapes are the fences. Not only private property is fenced, but also communal land. Even national parks restrict access for humans and animals. To me, such boundaries suggest that the owner takes a specific interest in the area. In the more southern, greener parts of the country, the use of the land for agricultural purposes seems obvious. Driving north towards Springbok, where the land gets drier and the plants scarcer, I wondered how this land, the Succulent Karoo, would be commercially used. I thought of goats, sheep and ostriches, which I had seen further south in the little Karoo (actually part of the Succulent Karoo biome), as

cultivation seemed to be out of question in this semi-arid area. I knew of the importance of mining in this region. The occasional signs, which announced game parks and tourist lodges, pointed out alternative ways of making a living in Namaqualand. I started to think about the impacts such land use must have on the environment. Extreme ecosystems are extremely susceptible to over-use, as it is comparatively easy to disturb their balance. It might be a pessimistic view, but I was afraid the same problems might arise in the Succulent Karoo as in many other areas of our planet: unsustainable land use, depletion of the very resources their users' own survival depends on.



Fence in Namaqualand, left the Goegap Nature Reserve, right an overgrazed farm (C. Keller).

The Succulent Karoo is one of 25 global biodiversity hotspots: an area that is exceedingly rich in endemic species and particularly threatened by human activities. Given such international significance, I became even more interested in finding out how this region should be managed in order to ensure the long-term maintenance of its biodiversity, while promoting sustainable development for its human inhabitants. In fact, I believe that these two aims cannot be separated. National parks and nature reserves like Goegap, which conserve part of an ecosystem in a more or less pristine state, are undoubtedly very important. However, if they are only islands surrounded by degraded or

destroyed habitats, they cannot maintain biodiversity in the long term. Be it because of the pressure through the people living around it, or simply because a whole biome cannot be cultivated in an area the size of a couple hundred or even thousand square kilometres.

### **Characteristics of the Succulent Karoo**

In past issues of the FSM-Times you find a lot of information about the plants and animals that live in the Succulent Karoo. I will therefore concentrate on background information relevant for the management of this area.



Natural vegetation in Goegap Nature Reserve, after the ones overgrazed veld (formerly it was a farm) could rest for 10 years (C. Schradin).

Just looking at the latitude, one might think that the area should be a kind of savannah. However, the Succulent Karoo biome is primarily determined by low winter rainfall and extreme summer aridity. Because most grasses need rain in warm weather (which means in summer) for rapid growth, they are largely absent from the Succulent Karoo. Instead, the dominating plants are dwarf succulent shrubs. Yet even succulents, which make up 29 percent of all plant species in Namaqualand and are well adapted to its climate, need a certain amount of water to grow and reproduce. The average vegetation cover of perennial plants is therefore low and ranges between 15 and 20 percent. In spring, after the winter rainfalls, the picture is completely different.

Annual plants (wildflowers) grow rapidly, when water is available, and cover most of the otherwise bare ground between the perennials.

Vegetation cover, soil type and topography determine what happens to the water after rainfall. Roughly speaking, fertile soil, which is made of pulverised rock and organic matter, contains nitrogen and absorbs and holds water. In dry climates, the building of soil is a very slow process, because plants and animals are not equally active and productive throughout the year. Additionally, if the ground is not properly covered with plants, plant mulch or living crusts, wind and water quickly do away with whatever organic matter may still be there. This leads to rapid runoff of rainwater and even more soil

erosion. Plants have a harder time, then, and their seeds and seedlings become exposed and have less water available, which leads to a further decrease in plant cover. It is a vicious circle, indeed.

Let us now turn to the most important commercial use of the Succulent Karoo veld: livestock and game grazing. As mentioned above, grass is rather scarce in the Succulent Karoo, plant cover and productivity low. This means that even with most thoughtful management, there are limits to the long-term grazing capacity of a given piece of land. Also, as climate and rainfall vary between years, droughts as in 2003 occur, and might happen more often in the process of global warming. In such years, the capacity of an area obviously decreases. Extensive supplementary feeding can help through such conditions, but is expensive. On average, for the Succulent Karoo, the recommended size of land per one large stock unit (LSU<sup>1</sup>) per year is around 50 ha. Such low stocking rates are expected to be sustainable in the long term.



In the Succulent Karoo more than 10ha are needed to sustainably feed one single gemsbok, or 100ha for a herd of 10 gemsbok.

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<sup>1</sup> LSU: there are about 5.2 goats per LSU, 1.07 buffalos, 0.35 adult ostriches, 0.15 springbok ewes or 1.20 horse mares. As they use more energy per kg body mass, small animals are more expensive to run in terms of fodder consumption per kg meat produced.

### **Current state: Problems, Protection**

From the 116'000 km<sup>2</sup> that make up the Succulent Karoo, only 30'000 km<sup>2</sup> are still in a relatively pristine state (26%), and a meager 3.5 percent of the region is formally protected. The main land use forms are communal and commercial livestock and game farming. This takes place on an estimated 100'000 km<sup>2</sup> of land. In contrast to most other biodiversity hotspots, the Succulent Karoo is not very densely inhabited (4 people per km<sup>2</sup>, in contrast to 232/km<sup>2</sup> in Germany and 167/km<sup>2</sup> in

Switzerland). However, disturbance caused by humans can occur even in the absence of widespread human settlements, and this is the case here: Due to overgrazing, up to two thirds of the land used for grazing has been severely degraded. Overharvesting of the flora for the international trade in ornamental plants, and other economically important activities such as small and large-scale mining and agriculture along river corridors create additional problems: Pollution and land destruction, excessive diversion of water from rivers, probably also salinized soils.



Overgrazed veld has a lot of wildflowers in spring, but no vegetation at all during the rest of the year. The area in the picture is plain sand in summer.

Now, what exactly are the problems of overgrazing? Naturally, browsing animals change vegetation composition and cover: Trampling-sensitive plants make way for harder ones, which can hold their stance as long as there is not too much trampling. Plants with certain growth forms, like annuals and geophytes, increase on grazed areas, after large shrubs and leaf-succulents have decreased. As animals prefer certain species (selective herbivory), unpalatable and poisonous plants will take over if there is too much pressure on the edible ones. Here, it should be mentioned that not only goats and sheep can do damage to an area. Also indigenous game species must not be kept above the carrying capacity.

In Namaqualand communal and small farmers are very often limited to a comparatively small area (maybe a few 10'000 ha), so there is no space for seasonal, opportunistic livestock movements, the way the native mammals used to do it before the rise of the fence-era<sup>2</sup>. Consequently, most areas are not given any time to recover, as they are continuously grazed. Limited seed production of the edible species, as well as selective herbivory, lead to the discussed shift from palatable perennial vegetation to ephemeral vegetation. The outcome of which is an increased variability of annual plant production. Why that? Annuals only grow if

sufficient rain has fallen, and in drought years they simply do not germinate. This makes plant growth and thus food production very unreliable, and means, in drought years, either economic loss to the farmer, or makes expansion into new feeding grounds necessary.

As long as plant cover, independent of its grazing value, remains sufficient, the rain soaks into the soil and erosion is prevented. However, once the condition of the veld has fallen below a so-called *Veld Conservation Threshold*, even resting makes no difference anymore, and rehabilitation of the degraded area is very slow and very expensive.

Grazing, and the subsequent changes in vegetation structure, has also effects on wild animals, such as birds, small mammals and reptiles. High stocking rates have a negative impact on diversity and abundance of other vertebrate consumers. Small mammals can have, as was shown repeatedly, a large impact on plant diversity. The other way round, the diversity of small mammals in the Succulent Karoo appears to be determined mainly by perennial plant cover. The reasons for that might be the need to hide from diurnal predators (diurnal mammals are affected more by reduced shrub cover), and the fact that these plants make up a large proportion of the small mammals' diet, which, in this area, are mainly herbivorous. Granivorous species like some gerbils and some birds, in contrast, can take advantage of the increased amount of annual plants on heavily grazed lands, which provide more seeds.

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<sup>2</sup> In the 19th century, most farmers of Namaqualand moved to Bushmanland in the West in summer. Bushmanland receives summer rain and is part of the Kalahari region. In these days, the veld could recover better from livestock grazing.



Springbok are often kept on game farms.

In the Karoo as a whole (comprising the Succulent Karoo in the west and other types of Karoo in the east), there are currently two major land use trends. First, many economically nonviable small farms, which have been over-exploited in the past and are now not producing enough income to support its owners, are being consolidated to form large farming units for game ranching and ecotourism. These forms of land use are entirely based on the “natural capital” of the Karoo. Thus, much money has to be invested into restoration of wilderness and upgrading of destroyed habitats. For conservationists this is certainly

good news, if these new extensive properties are managed in a sustainable way.

The second trend goes into the opposite direction. In the past, in South Africa there were huge inequalities in access to and ownership of land, and many human communities were forced into small areas. The state is now, through its land reform program, trying to address these inequalities, in that it provides formerly private property to many previously disadvantaged or landless farmers, and returns land to those who were forced to leave their ancestral lands. Ownership of land certainly has many potential benefits

for these people. However, as we have seen earlier, splitting up a large unit into small areas is not necessarily the best thing to do. The smaller a farming unit the more difficult it is to allow some parts of it to recover from grazing and other use. Therefore, even though current land use policies aim at achieving greater fairness and sustainability, they are likely to fail due to degradation effects, which are a by-product of the ongoing population growth and the resultant increase in the intensity of land use.



Ostriches occur naturally in the Succulent Karoo, but only in very low numbers. In contrast, numbers on ostrich farms are extremely high. As ostriches eat everything including small seedlings they eat as a whole, and as they trample the land, they permanently damage and destroy the veld of ostrich farms.

### **General management ideas and considerations**

Given these facts, it seems difficult to impossible to manage one's own piece of Succulent Karoo in an ecologically responsible yet economically profitable way. And

many people from the Succulent Karoo have to rely on their land to make their livelihoods. Apparently, though, it can be done, if one follows certain rules. Rule number one: be precautionary and do not have over-ambitious plans and impossible dreams! South African legislation provides no single comprehensive environmental law, but there is a multitude of rules (Acts, Ordinances, Provincial By-laws) land users have to follow, which in fact often have the precautionary principle at their basis. Farmers-to-be should get to know the land they want to live off thoroughly, before they start with any other activity. Realistic assessment of the amount of natural resources, water, soil and vegetation, is obviously necessary to be able to make plans for further use. The two things I will discuss here are livestock grazing management and game management.

There are many different breeds of domestic livestock animals, from which to choose. Generally, the smaller an animal, the higher is its relative energy consumption. With this increased need for nutrient rich forage, the potential for selective grazing is also increased. By mixing herds (e.g. different sizes of animals, grazers, browsers), the pressure on certain plants and plant parts can be distributed more evenly. However, overlapping grazing preferences of the different breeds may have the opposite effect! Some animals are more problematic than others. Ostriches for example pull up and eat whole seedlings, including roots and everything.



Overgrazing is not only a problem of domestic animals. Game can damage the veld as well when kept in too large numbers.

There are different models of vegetation dynamics in the Karoo, none of which seems totally realistic to me. What most of the models basically say is that some of the changes or damages to the veld are easily reversible, while others need more than just rest, if a good veld state should be restored. The five main parameters in any grazing system, which should be varied according to the circumstances, are: *Stocking density*, which affects grazing intensity, trampling and hoof action. *Grazing period*, the amount of time the animals spend in one camp. *Rest period*, the crucial point in any system. *Herd composition*, which

determines the patterns of veld use. *Camp size*: who would not wish for more farmland!

Then, a farmer can either choose between continuous and rotational grazing. At low stocking rates continuous grazing can be a good solution, it is, however, precisely because of the low stocking rates, usually only used on game farms. Rotational grazing is distinguished through the length of the grazing period: short (< 2 weeks) and long (one to several months). The first usually requires highly intensive management (and infrastructure), as the animals have to be moved from one fenced camp to the next in short

intervals, and sometimes just one day too long in an area can do a lot of damage. In any case, close monitoring and record keeping are essential and adaptation is everything. Rainfall patterns for example highly determine the ability of the plants to recover, and taking advantage of opportunity windows to restore damages and giving rest to certain areas is crucial for success. Many of these mentioned points also hold true for game species. Historically, there were many arid-adapted and specialized species in the Succulent Karoo. Provided one can offer suitable habitat on one's land, even large animals like black rhinos can thrive and theoretically elephants, which ones roamed the dry riverbeds (like today the desert elephants in Namibia). It is recommended that introductions of animals into farms and ranches or nature reserves (the example of Goegap will be discussed later) should be based on this historical occurrence. However, following 300 years of stock farming, many areas in the Karoo are so severely degraded, that in many cases extensive restoration is necessary, before any wild animals can survive on its own.

Also game species can overgraze! Mixing the different species, and not overstocking are therefore as necessary here as in livestock farming. The grazer:mixed feeders:browser ratio that can be sustained is highly dependent on rainfall amount and patterns, which is very unreliable in the whole Karoo, so animals must be chosen which can, in drought years, switch from a grassy diet to a shrubby one. This is

especially true for the Succulent Karoo, as the availability of grasses there is very limited at any time. A large area generally includes more vegetation not only for feeding, but also suitable as cover for resting, breeding and predator avoidance. Big is better, in this case. Then, game species are usually more demanding than domestic animals, having specific social requirements, which must be met. Some are territorial, others occur in large non-territorial herds. In order to maintain a socially functional group for each species a minimum area is usually required. Therefore, to determine appropriate stocking rates, wild ungulates cannot just be converted into LSUs, because this concept ignores these specific additional requirements. Again, careful monitoring and adaptive management are the magical words. There is much more to consider, such as water provision, coping with drought, problem animals, camp design, strategies like joint management of large areas, and more. Other things would be interesting but are too specific and technical to discuss here, for example veld rehabilitation techniques.

## **Goegap**

What does all this have to do with the Goegap Nature Reserve? A lot, actually. In 1960, a local mining company donated 4600 ha of farmland to be converted into a nature reserve. The land was in a very bad state, however. Heavily overgrazed, it was not until 1970 that the first large mammals, the

gemsbok, could be reintroduced into the reserve. In 1996, additional land was bought, and the reserve reached its current size of approximately 15'000 ha. Again, this new land desperately needed time to recover and therefore remained fenced. It was only after 8 years, in 2002, that this new land could be opened for the animals. The vegetation is still not what it could (and should) be. Through an extensive veld-monitoring program, the land is being observed closely, as it is still recovering from years of overuse. Around the reserve, everything is farmland, which means the animals cannot migrate to better feeding grounds in the dry season, as would have happened before European settlement. Fortunately the reserve allows its large mammals to migrate in a limited form, as parts of it receives its rain in summer, and not, as in the Succulent Karoo, in winter (the reserve lies on the edge between the Succulent Karoo and the Bushmanland). The constant grazing pressure has its price, as I described earlier. Currently, there is

an estimated population of 172 LSUs in the reserve. 60% of the carrying capacity of the reserve would be 191 LSUs, which can be transformed into about 84 ha required per LSU. Translated into current animal numbers, this means that there are: 250 – 300 gemsbok (*Oryx gazella*), 200 – 300 springbok (*Antidorcas marsupialis*), 20 – 25 Hartmann's mountain zebra (*Equus zebra hartmannae*),  $\pm 70$  ostrich (*Struthio camelus*),  $\pm 30$  each of steenbok ( *Raphicerus campestris*) and klipspringer (*Oreotragus oreotragus*), and  $\pm 20$  duiker (*Sylvicapra grimmia*). These numbers should not grow too much, as the vegetation is very fragile. Active management is therefore necessary, as there are no large predators present in the park. Also, these low numbers mean that the animal's gene pool is very limited. The gemsbok, for example, all stem from 11 animals that were introduced as a group. Signs of inbreeding already appeared. The park management has to find a solution to overcome the limited stocking capacity.



There are about 25 mountain zebras in Goegap. At least 50 would be needed to avoid inbreeding, even 500 to avoid a decrease in genetic variability due to drift. But the reserve is not big enough to sustain such high numbers.

In the long term, the park management wants to reinstall a more natural ecosystem in the Goegap reserve. One way to do this would be through exchange programs with other parks and reserves, which would allow control of animal numbers without having to kill them, as well as ensure sufficient gene flow and thus reducing inbreeding. Also, reintroduction of once native mammals such as grey rehbock (*Pelea capreolus*), which will actually be brought to Goegap in a few months, and in future maybe even such fancy animals as rhinos, should help to establish a more natural balance. For such undertakings, however, the park's size would have to be increased considerably, which is not an easy task. Other long-term plans include the reintroduction of large predators, namely cheetah (*Acinonyx jubatus*),

which would take over the killing of sick and old animals and control their numbers in general. Of course, also their attractiveness to a broader public and through that more stable and sustainable visitor numbers play a role in the management's considerations. Up to now, visitors come to the reserve mainly in spring to watch the flowers, but obviously only in years of good rain.

The Goegap reserve therefore has the same problems and challenges as any farm in the area: limited size, history of overgrazing, erosion due to poorly planned and outlined roads, difficult terrain for animal and plant monitoring, poaching, and a very limited budget. Somebody willing to face these difficulties, however, can certainly make a lot out of these fascinating 150 km<sup>2</sup> of dry, rocky land.



Will there be cheetah in the distant future in Goegap? This is one dream of the reserve manager Maxie Jonk, who is fighting for it since years.

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[www.biodiversityhotspots.org](http://www.biodiversityhotspots.org)

## NEWS AND INFORMATION ABOUT PLANTS AND ANIMALS

### MOUSE PORTRAIT: M1009

*By Carsten Schradin*

<b>Mother: ?</b>	<b>Father: ?</b>
<b>Date of birth:</b> February 2005	<b>Date of death:</b> Disappeared end of March 2006
<b>Age:</b> 13months	<b>Cause of death:</b> unknown, disappeared
<b>Partners:</b> None, roaming male	<b>Immigrant!</b>
<b>Children:</b> unknown	<b>Grand-children:</b> unknown

**F: Female, M: Male**

I don't know where M1009 came from. I trapped him the first time start of July 2005, but then he was already an adult. I was astonished that he stayed until March 2006 at the field site, when he disappeared. Although he did not belong to any group he more or less stayed in the same area.. He was a loner, roaming over the territories of other groups. These groups consisted of one breeding male and several breeding females. But M1009 never managed to become a breeding male of any of these groups. I do not know why he did not simply leave, searching for another group into which he could have emigrated as a breeding male.

One reason could be that being a bachelor was not so bad at all for M1009. His home range overlapped with the home ranges of 5 groups: G6 (S214), G15 (S203), G3 (S124), G16 (S221) and G20 (S160). Furthermore, he bordered with the groups G4 (S192), G12 (B18) and G28 (S116). Theoretically, M1009 had access to the breeding females of all these groups, a total of 17 females, while a breeding male normally had only 1-4 females in his group. But did M1009 get lucky with any of these females? Unfortunately we do not know as we do not have any observational data on this topic. But we have the tail tip of M1009

preserved in alcohol as well as tissue samples from all other mice present at the field site at this time, i.e. the 17 breeding females, there approx.100 children and their breeding males. In the next years we will do paternity tests in our genetic laboratory in Zurich, a study for which we just got funding from the Julius Klaus-Stiftung in Zurich (see below). There are three reasons why we suspect he was at least partly

successful: 1. Striped mice females only mate with a male they know well, and as M1009 stayed for such a long time, surely all females knew him. 2. We radio-tracked him at the night of the 2<sup>nd</sup> September in the same bush as F876 from S160 and 3. We radio-tracked him at the 5<sup>th</sup> of September together with F570 from S124. But the real answer we will only have ones we analyzed the tissue samples in the genetic lab.

## INSECT PORTRAIT: GIANT STICK INSECT

*By Stella Miranda Treffler*

Once when we sat together at our weekly barbecue I saw a big winged animal struggle in the glowing fire. I just stared at it, but could not recognize what it was and wondered: "What is that???" Good luck: In contrast to me, Carsten had the state of mind to rescue the poor animal. Now we were able to see what it was: A male giant stick insect (*Phalophus reyi*). The males have fully developed hind wings, so they are able to fly. The wings are smoky brown with darker veins and light spots. Giant Stick Insects have a body length of 110mm, females even 250mm. Their bodies are dark brown, with rough, bark-like texture and pronounced double spike on top of head. If you have good eyes you can find them in trees and shrubs,



especially in warmer regions. Goegap seems to be ideal for them, because here are a lot of shrubs and in summer it is really warm. You may also see them in the morning on walls, when they were attracted to lights the night before.

**This was the last of five insect portraits written by Stella. The first portrait was published in the FSM-Times No.7 more than a year ago.**

## GECKOPORTRAIT: BIBRON'S THICK-TOED GECKO (*PACHYDACTYLUS BIBRONII*)

Von Ramona Pötzing

This gecko can be seen everywhere in and around the research station (for example in our rooms).

Identification: This is a large gecko (between 7 and 10 cm long). There are 10-12 scensors beneath the middle toes. The tail, which is about the same length as the body, has a fat base and is segmented, with regular transverse rows of strongly keeled scales. The back is dark buff to grey-brown or purplish-black with 4-5 indistinct, dark, wavy crossbands. The belly is white and the tail has 8-10 dark bands that are prominent in juveniles but fade in adults.

Biology and breeding: It is one of the most common Succulent Karoo geckos, they live on rock outcrops,

under loose tree bark and on houses, often in dense colonies. A wide variety of prey is eaten, including grasshoppers, ants, termites, beetles and even poisonous centipedes and smaller lizards. Two eggs are laid in a rock crack, under bark, etc.

Habitat: Succulent Karoo and Karoo.



## CONFERENCES, PRESENTATIONS AND PUBLICATIONS

### PUBLICATIONS

Schradin, C., Krackow, S., Schubert, M., Keller, C., Schradin, B., and Pillay, N. (2007). Regulation of activity in desert-living striped mice: The importance of basking *Ethology* **113**, 606-614.

### CONFERENCES AND PRESENTATIONS

Schradin, C. 24. Mai 2007. Paternal care in mouse and monkey fathers. Eingeladener Vortrag, Deutsches Primatenzentrum, Göttingen., Deutschland

# FUNDING OF RESEARCH: CALL FOR DONATIONS

## SUBSCRIBERS DONATION

We appeal to all subscribers of the FSM-TIMES to donate 80 Rand (10 Euro, 15 dollars) a year for research on the socio-ecology of small mammals in Goegap. Donations of more than 80 Rand are welcome and donors of 400 Rand (50 Euro, 75 dollars) will be mentioned in the next FSM-TIMES.

Donations will be used for the following purposes:

1. Scientific research on small mammals in Goegap, especially smaller research projects such as Diploma and PhD theses, which have difficulties in raising funds elsewhere.
2. Improving the infrastructure of the research station.

In the last issue of the FSM-TIMES of every year we will publish how much we received in donations and how the money was used.

Account details

South Africa  
Standard Bank  
Branch: Braamfontein  
Account name: Wits University  
Foundation  
Account No.: 002900076  
Branch code: 004805  
Swift code: SB ZAZ AJJ 00480502  
Please state L.2112 as reference.

Germany  
Carsten Schradin, KSK Esslingen,  
BLZ 611 500 20, Konto Nr. 7434686

Switzerland (deposits in Switzerland)  
Postkonto 80-643-0  
Finanzabteilung der Universität  
Zürich, 8001 Zürich  
Reference: Kreditnummer 37202508,  
Projekt Striemengrasmaus  
(it is very important that you state the  
Kreditnummer)

Switzerland (deposits from abroad)  
Zürcher Kantonalbank, Hauptsitz,  
CH-8010 Zürich  
Account No: 1100-0109-594 (BC 700)  
Finanzabteilung der Universität  
Zürich, 8001 Zürich  
Swift-Code: ZKBKCHZZ80A  
IBAN: CH51 0070 0110 0001 0959 4  
Reference: Kreditnummer 37202508,  
Projekt Striemengrasmaus  
(it is very important that you state the  
Kreditnummer).

## ACKNOWLEDGEMENTS

We are very grateful to the following people who donated and whose assistance contributed to the continuation of our research project.

**Julius Klaus-Stiftung** Switzerland: The Julius Klaus foundation, situated at the University of Zurich, Switzerland, supports the research project "Socio-genetics of striped mice" from Dr. Carsten Schradin with CHF 9000. In this project, three questions will be investigated, using tissue samples collected over the last 6 years:

1. Determination of paternity: Striped mice form polygynous groups with one breeding male and 2-4 breeding females. Roaming males also exist that are not member of a group but nests solitarily. However, so far it is unknown in how far polygynous males are capable to monopolize paternity within their groups. Behavioral experiments with free ranging males showed that breeding males are more aggressive towards their neighbors than towards strange males. This leads to the hypothesis that neighboring males are more successful in fertilizing females from neighboring groups than are roaming males, possibly due to the fact that females are more familiar with neighbors. Thus, for females it might be easier to choose their best mate from neighbors than from roamers. I want to determine paternity for 72 litters of twelve groups from two different years to test this hypothesis.
2. Determination of relatedness within females of communal groups: Females are the philopatric sex. The breeding season is in spring (August to October in South Africa). Females born during one year wait until the next breeding season the following year to reproduce for the first time. However, when more than three females survive per group, these communal groups often break apart: Two to four females remain in the natal territory, while a single or two females start their own group next to their natal territory. The question arises how females decide with which other female to form communal groups. My hypothesis is that females which stay together are more closely related to one another than to the other females of their group.
3. Genetic bottleneck: Annual survival probability of striped mice is relatively high for a small mammal with 30-50%. However, in 2003 a severe drought lead to a population crash with a mortality of 99%. I have tissue samples from before, during and after the drought and want to study the influence of this drought year on genetic variability in this population. For this I can use data from 1. and 2., but will have to analyze additional samples.

# THE MOUSE'S TAIL

## MONGOOSE AT RESEARCH STATION

We have now a mongoose living at the research station. She has her burrow at the fence to the north, were many years ago a colony of whistling rats was living that already did some of the digging. In the morning one can see her basking in the sun. Together with the wild cat

and the jackals she might be the reason why there are no wild striped mice left at the research station. In fact, it is the first year ever that there are no mice living here. Even in the drought year 2003, when nearly no mice had survived in Goegap, we still had a nice family living here.

## MOUSE IN SNAKE

In May when Maarten was radio-tracking a mouse he found a snake too. The radio-collared mouse was already halfway in the young puff adder that was not amused to meet

Maarten. She spit out the mouse and retreated. It was too late for the mouse, but at least we got our expensive transmitter back.

## NEW FRIDGE

Finally in June we got a new big gas fridge for the research station. The one I had bought in 2001 was giving problems, and with more students working here we also needed more fridge space. Surprisingly, the gas fridge was the same price as the one

I bought in 2001 (610 Euro or 820 US dollar; much more expensive than a fridge that runs on electricity, not gas), probably the only thing that did not increase in price over the years.

## SGM-SPIEGEL

The FSM-TIMES is also published in German, as the SGM-SPIEGEL. If you would like to receive the German version, write an email to: [info@stripedmouse.com](mailto:info@stripedmouse.com), please write „SGM-SPIEGEL Abo“ in the subject of your email