

A SUMMARY OF CLIMATIC AND BEHAVIOURAL DATA ON GEOCHELONE SULCATA



Published in French in 'La Tortue' 1988 – 2006

Translation by Jenny Robins for the Tortoise Trust. www.tortoisetrust.org

This data is an unedited summary of raw data contained a series of comprehensive articles published in French in the journal 'La Tortue' over many years. This is uniquely reliable data in that it was written and compiled by people who have worked in the field with this species for more than two decades. The full articles are very well illustrated and contain a wealth not only of basic data, but extremely valuable commentary and first-hand observations of this species in the wild. It also paints a catastrophic picture of rapid population decline in recent years to collection and desertification.



(1) LA TORTUE No 9 OCT 88

- SEE MAP

- Arid habitat (45 Celsius in shade in April) far from fresh water sources, difficult to access, does not rain every year.

- Lives in Rameroue area in the FERLO

(2) LA TORTUE No 10 FEB 89 JEAN-PIERRE POUVRAEU

- Males can weigh 100ks, females 60 max

- Mating can occur several times a day & several days running with the same female

- Can lay several times in several days in different places, probably to foil predators

- The female lays her eggs using her back legs that she bends to soften the landing of the eggs Using them like a funnel. She then covers them with 4-5 cms of earth. Then she wets the nest with water that she has on either side of the cloaca. It appears that this is important for the eggs themselves. She then lays 2 or 3 more on the surface of the nest and then blocks up the nest completely and waters again. May be a ploy so that predators take the few and don't look any further.

- At birth measure 20mm long x 47mm wide in general. Growth is very rapid. Great difference in size of juvenile and full adult size



Typical arid habitat . Note dry grasses.



(3) LA TORTUE No 10 JUNE 1989 J.P. POUVREAU

- SANDY REGION, NEARLY DESERTED, SCATTERING OF TREES AND DRY GRASSES.
- Between Dec & March violent winds & sand storms, especially in Feb & March windiest months in Senegal. Also coldest period with very low temps at night.
- In April can be 40 Celsius in shade at midday in the Ferlo.
- Sulcata active for a great part of year.
- When period of wind stays hiding in hole
- From Dec-April can be seen in daytime
- From May-Sep, very hot period, goes into semi-estivation. In day stays in hole protected from sun. Hole can be 5m deep. Comes out very early or even at night to feed.
- Instinctively digs very deep burrow. It is primarily a place of protection & estivation.
- This burrow, necessary for its survival, has unfortunately an inconvenience it makes the tort easy to find both by animal predators & humans.
- Adult can weigh between 40-100kg and due to this bulk the animal shifts heaps of sand, leaving tracks like jcb caterpillar marks. This makes his burrow easily identifiable especially as it is often located at the foot of a tree.
- This excavation also attracts carnivores and poisonous snakes (naja and desert viper)
- Jan 1989 temp variation from 12 Celsius at 7 am to 35 Celsius at 3.00 pm.



(4) LA TORTUE N°13 JAN 1990

-Males have similar behaviour as Gopherus when mating. Both species Fousseuses and habitat & way of life similar.& morphologie.

-The males "Fght for the Lady" One male on seeing another coupling with a female will rush forward regardless of spectators and separate the "lovers". He will provoke the other male and a fierce fight will ensue. The highly developed forked gular makes for resounding jousting. With locked gular they violently try to turn each other over. This combat most often ends with one of the males either being overturned or running away.

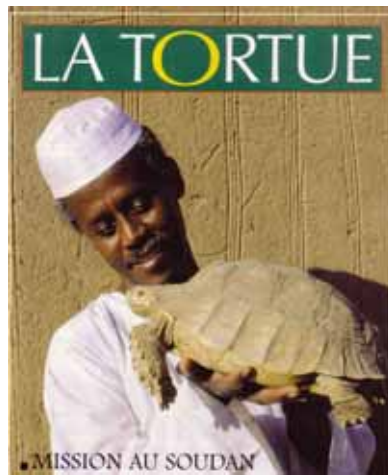
- Very often in the wild this will lead to the death of one of the combatants. This would appear to be a "waste" for the species, a sort of behavioural error. The gular is often so long and developed that it actually impedes the animal. The tortoise can only carry its head on one side of this fork or the other. This would seem to be a negative adaptation hindering the animal. Strange evolution?





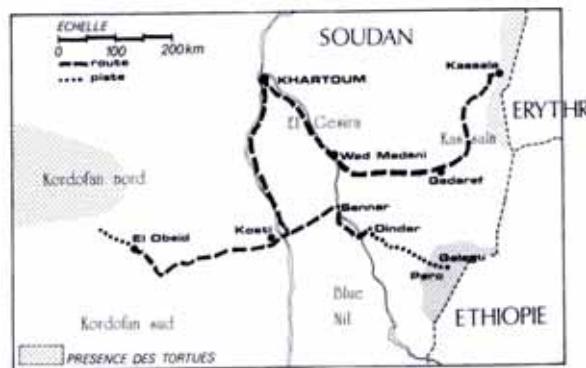
(5) LA TORTUE No23

- Sulcata live in band 500 kms wide crossing central Africa from W to E.
Mauritania, Senegal, Mali, Nigeria, Tchad, Sudan & Ethiopia (Latitude 20 Degrees north)

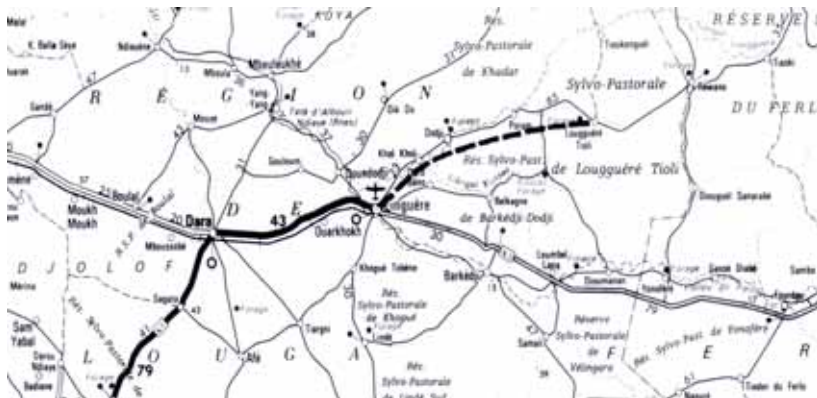


- In Senegal lives between Gambie and Senegal rivers
- In Ethiopia seems to be partially eradicated
- In Sudan possible that relatively large populations survive
- Tchad, Nigeria & Mali has become rare, no longer seen along Niger
- Mauritania very few - climate more Sahara than Sahel

Only place where found in original biotope is in triangle between RICARD TOLL, DJOURBELL and HAYE on Mali border



- About 30 specimens were released at RESERVE DES SIX – FORAGES also at RESERVE DU DOLI
- At slightest alert they rush to their shelter & burrow as fast as they can to bury themselves
- Live in vast territories with a low density per km²
- Calculated maximum of 10,000 specimens in whole territory
- Species which digs the deepest burrows, some more than 4 metres long burrow with fore paws with short, very rapid jerky movements
- Live like hermits in subterranean “palaces” which they will sometimes share with jackals, jerboas & vipers
- Hydric qualities similar to Camel; urine in powder, capacity to drink in one go more than 15% of its body weight
- Mating impressive! Bangs, bellows, forepaws deeply “rooted” on female. Surprising violence for such a blithe animal
- Dates and length of laying season..... Senegal seasons fairly regular, alt btwn dry & wet “winter” corres to our summer....wet between July & oct. due to this thermal regularity the laying can be widely spread out thro the yr & depending on the frequency of the rains, incubation can vary from weeks to several months
- Breeding in Feb/March, laying in april, sometimes also from nov to feb
- Lay about 20 eggs although large females can up to 30 this is max poss
- Eggs 40mm , 35g approx
- Incubation: 100 days for hatchings just after first rains, but can take 5 to 6 months if thermic disturbances due to early rains
- Opportunistically omnivorous- succulents, fruits, grasses also left overs & waste, lizards, crickets, gerboas and also carrion & rooting foodstuffs



(6) LA TORTUE No 35 AUG 1996

- Sanitary Centre at Sangalkam plus nurse for juveniles 110 animals plus 95 babies at end of July, more expected, plus Village des Tortues at Noflaye is developing.
- Typically 14-21 eggs per female -40-65g (6x more than Hermann egg)
- Incubation 97-190 days - average 110
- Laying season Dec to April, 2 per female
- Hatching Jun, Jul & Aug. Juveniles arrive just before the rains which aids survival due to hydration opportunities and plentiful shoots and grasses “in natura”.
- Contrary to European tortoises who lay in a hard and often clay substrate, these are laid in soft sand allowing easy exit and no need to soften ground
- The laying females were those reintroduced in 1995 from Holland, Mauritania and Paris. Animals had therefore completely adapted to new environment.
- Adults liked peanut leaves dry and not very nutritious

(7) LA TORTUE No 36 NOV 1996

- Sexual maturity 10-12 for males, bit more for females
- Continues to grow rapidly until 20 years.

(8) LA TORTUE No 44 NOV 1998- B DEVAUX

- Appears that no longer any surviving in natural environment. Practically no juveniles found in the wild. Conservation programme to be started & monitored by gamekeepers & villagers in RANEROU village
- See map.

(9) LA TORTUE No 48 NOV 1999- B DEVAUX interviews THOMAS DIAGNE

-Sahel means "shore" in Arabic and well describes this land between the dunes of Mauritania and the wetter southern part of the country

sahel has varied biotopes ranging from the extreme desert aridity to the 1st savanahs of Niokolo-Koba.

One of main roles of Sulcatas is the dispersal of seeds of local flora . Faidherbia albida, Acacia raddiana, Boscia senegalensis, Zizyphus Mauritania. They are gt fertilisers –compost and the passage thro their diges-tive system facilitates the germination of certain seeds.

(10) LA TORTUE No 49 FEB 2000 B DEVAUX

- Researching if genetical diff between sudan sulcata and Senegal. Only visible diff is slight

Shell slightly less orange than in Senegal, Mali, Mauritania sand in Sudan greyer and more earthy not enough evidence yet

(11) LA TORTUE No75 NOV 2006

-Spectacularly powerful animals

- Takes dried grasses and straw into burrow as food store in dry season cf. 1904 Captain Vallier

- Known as the tortoise that cries - eyes often irritated by sand

- Most expressive and dynamic of big torts; galaps, aldra. sulcats

- Excessively fearful, most curiosity of them, contrary to others who will hide for hours in their shells, sulcatas cannot resist putting an eye and then head out minutes after having puffed with rage at being handled, defying intruder that disturbed them.

- Pprobably the tortoise the closest to humans, cooperative behaviour, e.g., large male came to slap B. Deveau's leg with gular both friendly and aggressive to show he wanted human attention, others come and will place paws in lap out of friendliness.

- Hate being manipulated

- A Cadi (researcher) says; these tortoises follow a cycle. One tortoise can live in several burrows, that several can live in the same burrow and that a tortoise can occupy a hole that it did not dig. Also they have a very precise knowledge of the countryside and the places where a certain number of burrows can be found. In the event of a landslide or the destruction of a hole by the rains, they are capable of walking 5 km to find an old burrow. With telemetric equipment it has been shown that the animal will find a precise burrow straight away, directly.

- Tortoises captive bred in Senegal at Noflaye appear to adapt to the wild but test will be if they still know how to burrow in dry season 2007. A. Cadi has reservations about the possibility of European captive bred sulcatas adapting to their original natural environment and if they can't he questions their reproduction in captivity.

- There was release in July 06 in the reserve of Katane. The torts were fitted with radio-transmitters, students track them daily. This experiment will continue for one year to observe the ability of this species to adapt when returned to its original environment. End Nov 06 only one tort had not been found. The others have stabilized, dug holes and put on weight, indicating good adaptability. Researchers will continue to track each tortoise until end 2007.

GEOCHELONE SULCATA IN SENEGAL / Page 14

Bernard DEVAUX

The Sahelian tortoise is a fascinating creature yet nothing has yet been done for its conservation. A few months ago SOPTOM was contacted by Tomas Diagne of the René Dumont Foundation, who proposed to set up a conservation programme for the species in Senegal. The team on the ground appeared to be well motivated, so I decided to spend three weeks out there to see what could be done.

Status: Few studies have been done on this species and these mostly in the Sudan (Z.n. Mahmoud, D A El Naim, J L Cloudsley-Thomson and B D Stearns). For our part we proceeded by means of interviews and enquiries with a range of contacts. First the scientific officers of the National Parks, at the IUCN, at Orstom and Ifan. Then with the local populations in the towns and villages, and above all the native Wolofs, Tuaregs and the Peuls, who seemed to provide the best information. In Senegal the animal has completely disappeared from the coastal region and along main roads. There are many captive animals but these are all adults. People say "there are no more in the wild". In fact the species is still found in its Sahelian habitat at Ferlo and Doli, but even there the Peuls claim to see them only rarely, while before they were common. Above all they say they never see juveniles any more. Throughout our journey we clearly gained the impression that *Geochelone sulcata* was common up to Independence and still in good numbers during the 1960s and 70s but has become rare in the last decade wherever man is present. This is due to the classic causes of desertification, collection and agricultural development, particularly rice fields.

Distribution: In Senegal the species occurs only between the rivers Gambia and Senegal. It was still common north of Niokola-Koba but we learnt of much deforestation in that area with a resultant decline in wildlife. The only zones where populations remain are described by the triangle between Richard Toll, Djourbell and Haye on the Mali frontier.

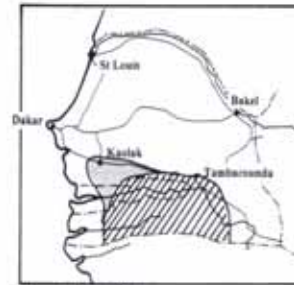
Our journey: We were most strick by the extreme aridity of the countryside and the extent of desertification. Even at Niokola-Koba and Djouj wildlife was rare. But the reader must not imagine that Senegal is unattractive. On the contrary, the landscape around St Louis and Richard Toll is of great beauty, rugged with a reddish hue and scattered thorn scrub and distant baobabs. In the smallest of villages we were mobbed by smiling children, and we were impressed by the sumptuously coloured clothes of the women, the friendliness of the whole population. The Senegalese are warm and dynamic people. One can hope for good results with local teams.

The Sulcata Programme: For the last two years the René Dumont Foundation has been devoted to the fight against under-development, to reforestation and the conservation of biodiversity. It was in this respect that it contacted SOPTOM. We met with all the people who could inform us about tortoises and advise us on possible actions. Many thanks are due to the officers of the National Parks, the Guembeul Reserve, IUCN, Orstom and Ifan. In the field I soon appreciated the various realities our project would face.

The first essential step is currently underway to set up a Sponsorship Committee, comprising leading Senegalese scientists and international experts. The project involves the following:

- Information; a brochure written in French, Wolof and Arabic to be distributed to people on the ground, to tortoise keepers and anyone concerned.
- Research; a 5 year study will be launched, in which students from the University of Dakar will interview local people to establish an exact picture of the distribution of *G.sulcata*. A parallel study will be carried out in other countries within the species' natural range.
- Restocking programme; like at Gonfaron, a special centre will ensure the production of a base stock of animals. We already have 9 animals but it will be easy to recuperate many more. An area of 15 hectares is available and we await the final agreement of the Ministry. We hope to achieve a production of 100 tortoise each year, which will be destined for reintroduction to the wild.
- European centre; The Agadès Centre, near Marseille, will take charge of European stock, which will be bred and the juveniles repatriated to Senegal.
- Releases; The reintroduction sites will not be decided for another 5 years with the Senegales National Parks. there are several possibilities, perhaps existing sanctuaries at Ferlo or Doli. But the best is to set up a vaste new Sahelian reserve, for all the wildlife of this habitat, managed and protected like other parks. The President of the Republic has recently suggested such a reserve and SOPTOM is strongly in favour of this solution.

SOPTOM will assure the funding of the operation in its initial stages but international support will also be needed. The proposed centre will be open to visitors (45 km from Dakar on the "little coast") and that will generate funds for the programme. For Senegal the centre will be a benefit in attracting tourists, giving a dual boost to the local economy and the native wildlife. Furthermore the project will allow us to understand more about this fascinating animal, Africa's largest tortoise and the only one in the world to dig such large burrows - sometimes up to 6m deep. We also hope these positive initiatives will deter the traffic in these animals. Many people helped me during my visit and I thank them all. For further details please write to me at Gonfaron.



Répartition 1998
 certaine possible

C'est un animal discret et peu actif dans la journée, sauf au moment des pluies. Il s'active surtout le soir, et parcourt en longues enjambées (ses pattes sont longues et hautes, **PHOTO ci-dessus**) les milieux humides afin d'y manger des escargots, des invertébrés et des animaux morts ou parfois des fruits tombés. Cette espèce supporte des zones plus arides que les autres *Kinixys*, et peut même s'enfouir en saison sèche, pourvu que le sol reste humide.

Le rituel amoureux de cette espèce est violent, et s'affirme pendant l'hivernage. Les mâles s'affrontent fréquemment. Pendant l'accouplement, le mâle se dresse presque verticalement derrière la femelle et émet de nombreux soupirs pendant le coït, qui dure assez longtemps. La ponte est observée après les pluies, de novembre à avril, deux ou trois fois dans la saison. Les oeufs sont peu nombreux (2 à 5), mais de taille importante (42mm/34mm). L'incubation dépend de l'humidité du sol, et l'émergence peut intervenir un an après la ponte.

C'est une tortue également consommée dans son aire de répartition, mais beaucoup moins ces dernières décennies, sans doute aussi parce qu'elle se fait rare. Des aliments de substitution s'imposent (poulets surtout), tandis que progresse le niveau économique du pays, ce qui limite la prédation sur la faune sauvage.

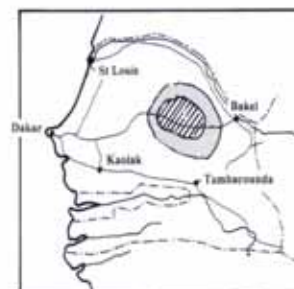
laisserait à penser que cette espèce n'existe plus en milieu naturel. Il faut pénétrer profondément dans le Ferlo (vers Ranerou) pour découvrir un milieu encore intact, et des tortues sauvages. D'après les villageois et les gardiens de troupeaux, l'animal est encore assez présent dans toute la partie sud du Ferlo Nord, et dans la partie Nord du Ferlo Sud. Mais elle aurait également disparu de la Réserves des Six-Forages, trop parcourue par d'immenses troupeaux.

Dans la nature, on ne trouve pratiquement plus de juvéniles, ce qui est inquiétant. Des plans de renforcement et de réintroductions sont envisagés dans le cadre du programme SOS SULCATA, mené par la SOPTOM et la FRD, avec l'UICN du Sénégal. Les lâchers s'effectueraient dans les années prochaines. Une surveillance de ces lâchers serait assurée par les agents des Eaux et Forêts et par les villageois de Ranerou. Une véritable coopération est mise en place avec les autorités de ce village, afin que les réintroductions soient un succès.

Il reste que l'avenir de cette espèce n'est pas rassurant. De grande taille, très appréciée par les Sénégalais comme animal de jardin (heureusement moins mangée aujourd'hui), elle ne doit sa survie qu'au biotope aride et isolé où elle survit. Dans tous les pays de sa répartition, la situation est la même.

Geochelone sulcata (Miller, 1779)

L'étymologie en est simple : "*geochelone*" pour tortue de terre, et "*sulcata*" pour sillonnée. Cette tortue est largement décrite et présentée dans cette revue, puisqu'un programme de conservation la concerne au Sénégal. Nous représenterons seulement ici la carte de répartition actualisée. Toutes les populations résiduelles signalées il y a trente ou quarante ans, non loin de la nationale menant à St-Louis, dans les faubourgs de Dakar, et dans les faubourgs de St-Louis, ont disparu. Une exploration rapide du Sénégal



Répartition 1998
 certaine possible

The source of much confusion. In common with many other areas of Africa, there are extremely sharp delineations in local climates even within a relatively short distance. This is graphically illustrated above, where it will be noted that *Kinixys belliana* (Bell's hingeback) is found in the zone bordering the river but does not occur in the arid, interior, while *G. sulcata* is only found in the semi-arid interior and is not found at all in the more humid zones of the coast or in riparian habitats. This needs to be taken fully into account when discussing distribution and climate.