

## Loggerheads and leatherbacks in the Western Indian Ocean

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### Introduction

This is a rare opportunity for me to provide an overview of loggerhead and leatherback conservation in the Western Indian Ocean. Despite the fact that I was personally an integral part of the conservation effort for some 40 years I was not there at the beginning. All credit must go to the late Peter Potter, a senior officer in the then Natal Parks Board, the provincial conservation authority of the then Natal, South Africa, who, in 1963, responded first to complaints about turtles being killed on the beaches of what was then known as Tongaland (it is now known as Maputaland but I shall refer to Tongaland throughout the paper) just south of the Mozambique border. Peter sent a ranger Hennie van Schoor, and two students John Bass (now Dr.) and Humph McAllister and it was their first publication (McAllister *et al.* 1965) that laid a solid and inspiring foundation to the 45 year old programme on loggerheads and leatherbacks in South Africa.

Formal conservation organisations in South Africa were dominated by large mammal issues for nearly 80 years. There was considerable political strength in the promotion of large mammal conservation and this is clear when you consider that the first four

formal protected areas set aside for large mammal conservation in Africa took place in Natal in 1895.

It is thus quite remarkable that one of these early protected areas had a marine component, the St Lucia system which, having been static in size for nearly 70 years suddenly started to attract attention (with the turtle programme providing one of the most important and visible catalysts), and over 35 years was expanded to include two marine reserves, several extensive terrestrial areas and is now known as the iSimangoliso Wetlandf Park, South Africa's first World Heritage Site (Natural) declared in 1998. The park now covers 325000 ha with 220 km of coastline including all the turtle breeding beaches.

The localised lack of enthusiasm for the project in the early Sixties led to my becoming aware of political undercurrents within conservation which have proved both supportive and damaging to turtle conservation. The successful protection of the turtle beaches in South Africa has been achieved firstly by fighting entrenched political conservatism, persisting to successful conservation results and then using the successful turtle story to political advantage to enhance protection.

In 1965 as an ex-Game Ranger recently launched into university studies and willing to take any vacation job offered, I accepted a chance to visit the Tongaland area to take part in what was to become quite famous as “The Turtle Survey”. My fellow students were John Bass and Mike Mentis, later to become Professor of Botany at the University of the Witwatersrand. In fact the turtle survey became a sort of testing ground for some of the most capable biologists produced in South Africa in the Sixties. For the most part at that stage they were not an impressive sight but some went on to become acclaimed in such fields as elephant biology, shark biology, botany, ornithology, ichthyology, and large mammal ecology.

As Mike, John and I were the first to find some recoveries of animals tagged in the first two seasons we were inspired with the challenge of learning more and began advocating a much more intensive programme of study with improved equipment (Hughes *et al.*, 1967).

Our recommendations were accepted and the net result was that the survey became one of the longest running programmes involving loggerheads and leatherbacks in the world with some of the most extensive tag returns.

### **The first meetings of the MTSG in Morges, Switzerland**

It was in preparing for an improved effort that contact was first made with the late and much lamented Professor Archie Carr whose early scientific papers and popular books on turtles provided considerable stimulus to our efforts. He was an encouraging and enthusiastic correspondent and he was instrumental in persuading IUCN to establish a Marine Turtle Specialist Group the first Meeting of which was held in March 1969. There were effectively 12 of us gleaned from across the world of which Peter Pritchard and I were the youngest.

The first gathering was memorable for meeting some wonderful and stimulating scientists and it was noteworthy for its open discussions. It would come as a considerable surprise to many of you here that one heated argument revolved around the

fact that my pictures (each of us had to produce a slide show and I started first because South Africa was a completely unknown quantity at that time) showed the beautiful clear water normally found off our breeding beaches. I was immediately challenged by Joop Schultz from Surinam who said that turtles only nest in dirty water (which they do in Surinam!). This may sound exceeding strange to turtle biologists today but it does serve to illustrate the very limited knowledge of the group at that time (see IUCN publications).

The first meeting can best be summarised by saying it ended with tremendous enthusiasm and goodwill and we all returned to our regions determined to expand our efforts.

The second meeting held in Morges in 1971 ended somewhat differently despite the fact that there were some outstanding reports submitted and the first serious attempt was made to understand the challenges and potential of turtle farming.

The soon-to-be extremely divisive politics of turtle conservation was experienced almost immediately and the emergence of ego-driven ambition became destructive. The meeting ended badly after there was a shameful misuse of some very senior but naïve members to try to exorcise an office bearer. The process was so distasteful to me that I began to become concerned how easily conservation effort can be severely damaged by individual zealotry and instead of the unified position that was the product of the first meeting we have since suffered from the division of turtle conservation into two camps, those that see sustainable utilisation as a tool of conservation and those to whom the very thought of using sea turtles at all is anathema.

At this time the general philosophy and goal of the Natal Parks Board was to encourage the owners and occupants of land outside of protected areas (roughly 90% vs 10%) to take an interest in the conservation of whatever biodiversity was not inimical to their occupational interests. (It is impossible to get sugar farmers to live in peace with elephants!!). This was long before the term “sustainable use” came into fashion but the philosophy was exactly that. In fact I would suggest that South Africa has created

the most successful wildlife industry in the world by pursuing this goal which, whilst recognising the consumptive and economic role played by the hunting industry, is a direct result of the philosophy and determination of the formal nature conservation bodies of South Africa.

Encouraged by the early writings of Archie Carr who described the green turtle as “The Buffalo of the Sea” and later enthused about turtle dishes and considered the future of turtle farming (Carr, 1967) which matched precisely the philosophy of our organisation, it was therefore to me absolutely correct that sea turtles should be regarded as biodiversity elements extremely worthy of conservation effort but with a firm intention of ensuring that they would make a contribution to improving the lot of local people. Especially that of the amaThonga people in whose tribal area the turtles nested.

As with many other species with which we worked, it was agreed that at this stage our primary goal would be to prevent any further killing and restore the nesting populations to a higher level than we found them in 1963. Actual targets were set for total nesting numbers after which the Board would consider giving the local people access to sustainable use programmes. As far as loggerheads are concerned this was a regular nesting population of at least 500 females...a target that we have reached only in the last few years.

Happily, however, the need to kill sea turtles or to eat their eggs appears, for the most part, to have declined and the sea turtles are recognized, even by the local amaThonga, to be a valuable economic resource now benignly used for tourism.

### **The Cayman turtle farm & sustainable use as a conservation tool**

In the early Seventies the Cayman Turtle Farm was struggling to find its feet but was beginning to attract a great deal of negative attention in parallel with an upsurge of protective legislation in the United States which began to take on the characteristics of a crusade. The IUCN was encouraged to investigate the farm, its goals and practices, and had a number of us undertake the task. It was a wonderful

experience but I was as equally appalled by the negativity towards the farm by US turtle workers as I was with the impressive work being carried out on the farm. I saw considerable benefits for turtle conservation if the farm proved successful and the recommendations to IUCN although concerned about certain threats did not reject the positive potential of the enterprise.

Regrettably this carried no weight with the US conservation lobby which launched bitter attacks on the farm and indeed have continued to oppose every opportunity of saving sea turtles through sustainable use to emerge over the past thirty years. The Corail turtle farm in Reunion Island was effectively closed down by over zealous anti-sustainable use elements in France and of course the Convention on International Trade in Endangered Species (CITES) has become a convenient tool to nail down the coffin lid on any innovative enterprise involving sea turtles.

In my view this has been a series of golden opportunities missed and quite likely a massive loss of knowledge which might one day have become immensely valuable. It also engendered a degree of complacency in the influential US which is not justified. The human population of this world continues to rise at an alarming rate and we have no justification for believing that sea turtles have been saved forever no matter how many protected populations we may have.

I do believe however that the combined efforts launched throughout the world by the establishment of the Marine Turtle Specialist Group was a remarkable and laudable achievement by IUCN which has greatly improved the global survival prospects of sea turtles and inspired a massive global endeavour embracing many thousands of individuals.

South Africa is very proud to have been a part of that effort.

### **Highlights of the South African programme**

#### *Establishing population trends*

It is my firm opinion that important biodiversity programmes should be the responsibility of a state

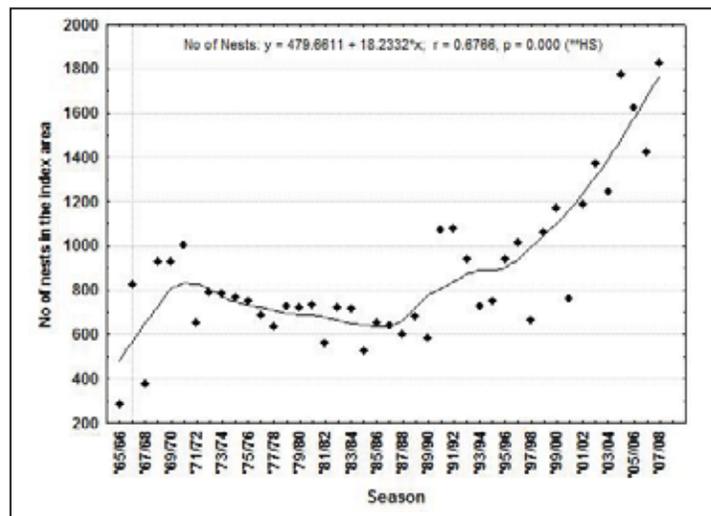
or federal institution. Only by having a long term commitment by an appropriate authority can you confidently expect sound and dependable results.

This in no way decries the efforts of NGOs in the role of conservation awareness, protection and indeed support, as we have had in South Africa from bodies such as the Worldwide Fund for Nature (especially WWF-SA).

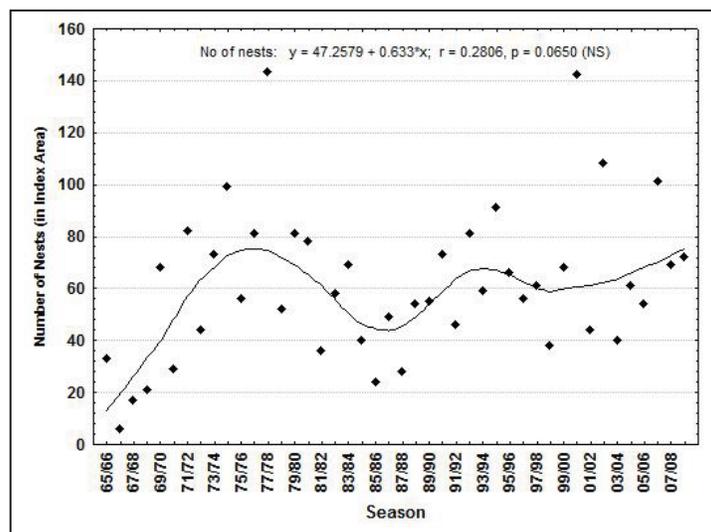
It has always been a feature of the Tongaland turtle programme that it never tried to apply mathematical models to establish annual nesting numbers. Annual

counts have been based on actual animals handled using standard sampling methods and more recently observed nesting records. The purpose of the method ensured that we did not end up with a series of variable models which changed from year to year. The difficulty is ensuring that your managers adhere to the same sampling methods year by year and to convince them that attaining new tagging records was not the main purpose of the study but having comparable data year after year was.

The trends in Figures 1 and 2 are therefore a fair reflection of the results of this 45 year endeavour.



**Figure 1:** Long term trends in nesting activity of loggerheads in Tongaland survey area 1965 – 2008. (Courtesy Dr Ronel Nel)



**Figure 2:** Long term trends in nesting activity of leatherbacks in Tongaland survey area 1965 – 2008. (Courtesy Dr Ronel Nel)

*Post nesting movements*

Like many programmes we started using tags that were less than ideal but despite the shortcomings of many tags we started to accumulate regular and valuable information on inter-season and intra-seasonal intervals the results of which persuaded us to question the accepted wisdom that all turtles exhibited regular between season nesting intervals (Hughes, 1976, 1981). We also gradually accumulated considerable information on between season migrations demonstrating that Tongaland was the most important nesting site in the Western Indian Ocean for loggerheads and leatherbacks and attracted turtles from great distances. In the case of loggerheads our longest recovery shows a minimum distance from the nesting ground as 3500km. These recoveries involved primarily flipper tags but with the advent of satellite transponders better understanding of the migrations was achieved especially in the case of leatherbacks. Here I must record the splendid cooperation of the University of Pisa, Italy and the South African Department of Marine and Coastal Management, without whose help we would never have known just how extensive an area is covered by leatherbacks. At least one of our leatherbacks has travelled in excess of 20 000 km over a ten month period as well as recording a maximum dive of some 940 metres whilst feeding. It is clear that there is no fixed pattern of post-nesting movement of leatherbacks (see for example Luschi *et al.*, 2006).

*In pursuit of the 'lost year'*

Archie Carr coined the now famous term 'the Lost Year' to describe the fact that no information was available on the movements and distribution of hatchlings after they left the nesting beaches. In Tongaland, in 1971 we initiated a programme of marking hatchlings using various tags (none of which were successful but we were in good company as even Archie Carr had a failure with magnets (Carr, 1967b)) and eventually settling on mutilation tagging of loggerheads by excising coded pairs of marginal scales each year (Gaustella & Hughes, 1995). This programme ran for 31 years and saw the eventual release of some 327811 marked hatchlings, an average annual effort of 10575 hatchlings notched.

Recoveries of marked hatchlings demonstrated that the 'lost year' was driven by the movements of the Agulhas Current and further that there was an annual leak of loggerhead genes into the Atlantic Ocean (Hughes, 1978).

Later DNA studies confirmed these results (Bowen *et al.*, 1994).

*Age to maturity studies*

As a result of regular sampling of turtles captured in the anti-shark network along the Natal coast it was established that after leaving the shores of South Africa loggerheads returned to the coast only when they reached a carapace length of some 60cm. (Hughes, 1974a). We had no idea, however, as to how long this took nor indeed how old the animals were at nesting maturity. What we were able to demonstrate was that there was a distinct change in feeding ecology at this stage when the animals ceased to feed on surface food alone and started diving (Hughes, 1974b).

The hatchling tagging programme, especially once we had settled on the coding system and could be more certain that an animal could be recognisable on maturity, eventually provided annual samples of females returning at first maturity allowing Jenny Tucek to critically analyse the data to ascertain that Tongaland loggerheads have a mean age at maturity of 21.6 years (Tucek, *pers. comm.*).

If it takes 15 – 25 years to reach nesting maturity it is highly likely that it takes between 7 and 12 years for the turtles to grow to 60 cm in the open ocean.

*Economic benefits of the programme*

As mentioned earlier one of the primary concerns was see the turtles grow in numbers and then to bring economic benefits as we, in the Natal Parks Board, had achieved from the growth and sale of our large mammal populations and indeed from the sound management of our more popular sport fisheries.

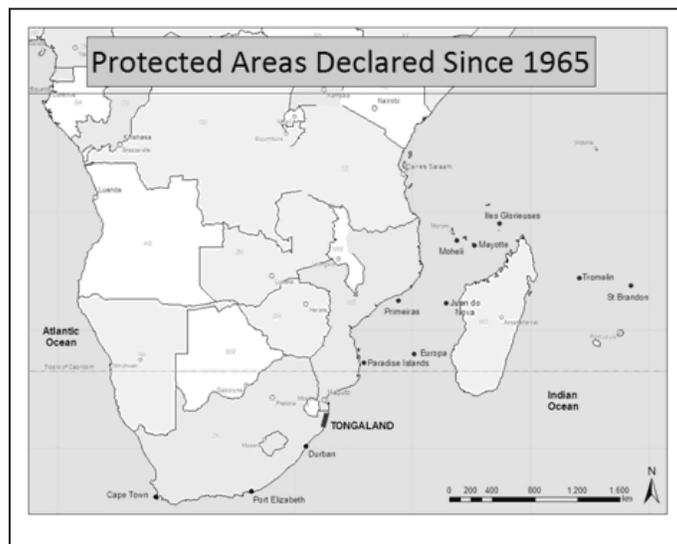
The first direct benefit that flowed from the expanded turtle programme saw the regular employment of

some 20 members of the local tribal people for the duration of the programme. This may not sound like much of a benefit but when there is NO other source of employment this was indeed significant. What is more, as the years passed a loyal and supportive cadre of local staff formed an integral and invaluable part of the turtle survey.

As early as 1973 plans were drawn up for the development of the coastline (Hughes, 1973) but this had to be preceded by enhanced protection and better controls over development along the coast where the turtles nested. By 1986 almost the entire coastline was formally protected and the private sector was invited to establish additional tourist facilities and thus create more jobs.

Today there are five full concessions (walks and

vehicles) and two walking concessions granted annually for turtle viewing which indirectly and directly provides employment to many local people and indeed both of the walking concessions are drawn from the Tembe Community the members of which are neighbours of the turtle beaches. The total contribution to the park's revenues from these concessions exceeds R 500 000 annually and the total contribution of the tourist industry associated with the turtle nesting season runs into millions of Rands. A significant portion of these funds flows into the local communities through direct employment, the formal Tourism Levy originally started by the Natal Parks Board (and continued by its successor Ezemvelo KZN Wildlife), and some innovative Trust Funds that must be established by tourism operators within the protected area.



**Figure 3:** Nesting sites of sea turtles in the region proclaimed as protected areas since 1965.

### *Cooperative projects*

During the past 45 years the turtle conservation programme has become one of the most iconic nature conservation programmes in South Africa. Not only has it attracted a significant measure of pride for the ordinary South African but it is has contributed to programmes in numerous other areas and, I would like to think, has made a positive contribution to conservation efforts elsewhere. It has been directly involved in the establishment of

programmes in Mozambique, Mauritius, Kenya, the Islamic Republic of the Comoros (see for example Bruton *et al.*, 1989) Eritrea, Bangladesh, Angola and Reunion Island (France) and its dependencies as well as cooperating (often for our benefit) with sister programmes in Malaysia, Australia, Japan, Surinam and the United States.

In fact we take particular pride in the outstanding community conservation efforts of the people of Itsamia in the Comoros for their work on green

turtles and even greater pride in the creation of the Kelonia Institute in Reunion (the successor to the Corail Turtle Farm).

### *Influence and benefits*

The popularity and influence of the turtle programme in Tongaland has been dramatic and, in 1982 certainly contributed to the prevention of the establishment of a deep water harbour in the heart of the turtle nesting grounds in Tongaland (Hughes, 1982). This, as a matter of interest, prompted a ten year programme of translocating 20 000 eggs per year from the threatened northern part of the coast to deep within the proclaimed marine reserve some 100 km further south.

1993 saw the end of a campaign to prevent the mining of heavy minerals in the dunes of what was later to become the iSimangoliso Wetland Park, South Africa's first World Heritage Site. The turtle programme also played a role in the success of this campaign.

Without in any way suggesting that it was the direct result of South African effort I would modestly suggest that the loggerhead and leatherback programme in South Africa since its inception was influential in the establishment of 10 important protected areas in the South Western Indian Ocean (see Figure 3).

### **Conclusions and acknowledgements**

No single achievement described today has come about simply as a result of any single person or group of people. Whatever good has come from the South African turtle protection programme is a product of hundreds of people starting with the local staff, both permanent and temporary, of the Natal Parks Board and its successor Ezemvelo KZN Wildlife, who have walked thousands of kilometres over the years and without whose dedication and enthusiasm the basic data would not have inspired the help, cooperation and support received from so many other bodies. These formal agencies have always carried the lion's share of the financial and logistical costs of the programme.

Additional and invaluable financial help has come from the Worldwide Fund for Nature, both International and, almost without interruption, from South Africa, through the original South African Nature Foundation (starting in 1969) and, more recently, through its successor, WWF – SA. Other funding contributors have been the Gulbenkian Foundation, Lisbon, the Oceanographic Research Institute, Durban, the African Wildlife Society, Richards Bay Minerals and Wilderness Safaris, to name a few of the most prominent contributors.

Scientific support and participation in the programme has come from the University of Natal, the University of Durban-Westville, (now combined as the University of KwaZulu-Natal), Rhodes University, the University of the Witwatersrand, Stellenbosch University, the University of Cape Town, the Nelson Mandela University and the Universities of Pisa, Italy and Swansea in Wales. The contribution made by the Oceanographic Research Institute, Durban and the Department of Marine and Coastal Management, Department of Environmental Affairs and Tourism, South Africa have been substantial and over a long period.

The recognition received from international bodies has made an enormous contribution to the state acceptance of the programme and I should like to record my appreciation of the World Conservation Union (IUCN), the Ramsar Convention, the World Heritage Convention, and the Convention on Migratory Species and especially for its Indian Ocean and South East Asia Memorandum of Understanding (IOSEA).

Two more expressions of emotion are necessary from me. Firstly my thanks to my many colleagues, lay and scientific, local and international, who have enriched my association with the sea turtles. There are just too many to list here but there is not one of you whose contributions will be forgotten. Without you my life would have been so much poorer and the success of the turtle programme so much reduced.

What can one say to thank the sea turtles, these wonderful animals, whose biology, ecology, relationship with man and his culture, and simple endearment have sparked a veritable industry of

passionate support and a flood of scientific results that have added an admirable chapter to the book of knowledge and relations between Humankind and animals.

By the very presence of so many scientists and conservationists here today it is clear that the story is far from ended. There remains much to be learnt and much to be done. Part can be done by direct participation in turtle conservation and part must be done by reducing the speed of human population growth and improving the lot of the poorer people round the globe. There is no such thing as single-

issue conservation, the destinies of both humans and turtles are inseparable and success will follow only if everyone involved in turtle conservation addresses problems with an open mind in pursuit of innovative and ultimately successful outcomes. What is needed for any successful conservation endeavour is a sense of balance, for it is all a question of balance.

Finally my thanks to Colin Limpus, firstly for a life-long friendship and for inviting me here, and the Western Pacific Fisheries Management Council, Hawaii for funding my participation.

### Literature cited

- Bowen, B.W., N. Kamezaki, C.J. Limpus, G. R. Hughes, A.B. Meylan & J.C. Avise. 1994. Global phylogeography of the loggerhead turtle (*Caretta caretta*) as indicated by mitochondrial DNA haplotypes. *Evolution* 48 (6): 1820 – 1828.
- Bruton, M.N., G.R. Hughes, C.D. Buxton & R.E. Stobbs. 1989. Recommendations on marine conservation in the Federal Islamic Republic of the Comoros. JLB Smith Institute of Ichthyology. Grahamstown. Investigational Report 34: 104pp. illust.
- Carr, A. 1967a. So Excellent a Fishe. The Natural History Press, Garden City, New York, pp:1 – 248.
- Carr, A. 1967b. No one knows where the turtles go. *Nat.Hist* 76: 41 – 59.
- Gaustella, L.A. & G.R. Hughes. 1996. Notching of loggerhead turtle hatchlings as an aid to loggerhead turtle research. Internal Report, Oceanographic Research Institute, Durban. 1 – 20 illust.
- Heydom, A.E.F. 1978. Ecology of the Agulhas Current Region: An assessment of biological responses to environmental parameters in the south-west Indian Ocean. *Trans.roy.Soc.S.Afr.* 43 (2): 151- 190.
- Hughes, G.R., A.J. Bass & M.T. Mentis. 1967. Further studies on marine turtles in Tongaland, 1. *Lammergeyer* 7: 5 – 54.
- Hughes, G.R. 1973. Report to the Department of Bantu Administration and Development on the possible role of sea turtles in the utilization of the Maputaland Coast. Confidential Report, Oceanographic Research Institute, Durban. Pp 1- 11.
- Hughes, G.R. 1974a. The Sea Turtles of South East Africa. I. Status, morphology and distributions. Investigational Report, Oceanographic Research Institute, Durban 35: 1 – 144 illust.
- Hughes, G.R. 1974b. The Sea Turtles of South East Africa. II. The biology of the Tongaland loggerhead turtle *Caretta caretta* L. with comments on the leatherback turtle *Dermochelys coriacea* L. and the green turtle *Chelonia mydas* L. in the study region. Investigational Report, Oceanographic Research Institute, Durban 36 : 1 – 96 illust.
- Hughes, G.R. 1976. Irregular reproductive cycles in the Tongaland loggerhead sea turtle *Caretta caretta* L. (Cryptodira: Cheloniidae). *Zoologica Africana* 11: 285-291.
- Hughes, G.R. 1981. Nesting cycles in sea turtles – Typical or Atypical? In: *Biology and Conservation of Sea Turtles* (ed. K. Bjorndal), pp 81 – 89. Smithsonian Institution Press, Washington D.C.
- Hughes, G.R. 1982. The beacon fades at Bhanga Nek. *African Wildlife* 36 (4 – 5): 131 – 134.
- Luschi, P., G.R. Hughes, J.R.E. Lutjeharms, P. Lambardi, R. Mencacci & G.C. Hays. 2006. A Review of Migratory Behaviour of Sea Turtles off South-Eastern Africa. *S A J Science* 102: 51 – 58.
- McAllister, H.J., A.J. Bass & H. van Schoor. 1965. The marine turtles of Tongaland. *Lammergeyer* 3 (2): 10 – 40.