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THE CHAGOS - UNIQUE ARCHIPELAGO IN THE MIDDLE OF NOWHERE

Straddling the equator and broadly overlying the mid-Indian Ocean Ridge are a scattering of extremely remote islands, the Maldives, Laccadives (or Lakshadweeps) and Chagos.

These archipelagos lie almost in a straight line and are influenced by the westward flowing Indian Ocean Equatorial Current which, on reaching the East African coast, in turn drives the Somali, Mozambique, East Madagascar and Agulhas Currents. It is thus likely that the islands, and especially the Chagos group, provide an upstream staging point for gene flow of biota such as corals to the western Indian Ocean, leading to their distribution via the southernmost of these currents to KwaZulu-Natal waters.

The Chagos islands are a self-administering British Indian Ocean Territory. However, they are also islands with a history of social concern with Chagossian communities exiled to Mauritius in order to make way for the British and US military bases located at Diego Garcia, on the main island.

The islands' remoteness and security cordon have contributed to their relatively poorly-studied environment. However, the tight security has also provided protection for the coral reefs which appear to be largely undisturbed.

At the invitation of the authorities, a multi-national expedition was invited to monitor the health of the reefs. Sponsored by the British Foreign and Commonwealth Office, an invitation was extended to ORI's Michael Schleyer to join this rare opportunity.

While many aspects of the reefs received attention, the ORI effort was two-fold. Genetic material of selected coral species was firstly collected to provide "outlier" information for the ORI TRANSMAP studies on reef connectivity. Soft coral biodiversity and abundance was the other area of focus and representative collections were made during dives in which digital photo-transects were recorded. These were backed up with close-up underwater photographs to ensure the correct identification of both the preserved specimens and the photo-transects to be analysed in the laboratory.

Diving Chagos reefs is simply spectacular. They are accreted coral atolls that rise from great depths, consisting of vertical walls shelving off to reef tops that often enclose sandy lagoons or shallow coral outcrops and pinnacles. The reefs proved to be in excellent condition with an abundance of corals. Although, the shallower reaches did reveal a bleaching impact caused by the 1998 El Niño Southern Oscillation, there were good signs of recovery. Working underwater proved highly distracting, with frequent visits from manta rays and various types of sharks, including giant nurse sharks.

A day off from the intensive diving was mandatory each week to ensure diver safety. This provided opportunities for visits to the different islands. Unfortunately, little of the indigenous vegetation remains after extensive planting of coconut palms. On some islands large colonies of sea birds were prevalent, especially boobies and frigate birds, that forage widely in this tropical ocean. However, on some islands rat infestations had depleted many of the birds. The expedition team successfully turned its skills to de-ratting, eliminating many of these pests from one of the worst-affected islands.

Of course it is enjoyable to visit such splendid environments, but the crunch comes when the considerable material has to be worked up! Thanks to ORI's Angus Macdonald and Dorota Starzak, significant progress in genetic analysis has already been made, providing valuable "upstream" markers for genetic connectivity studies between the reefs within the TRANSMAP area.



A shallow reef top with a fine garden of tabular corals.

The soft corals have been identified, yielding 34 known species in 21 genera, as well as at least two new species and possibly a new genus yet to be described. The digital photo-transects are being analysed to establish the coral community structure in terms of diversity, abundance and overall reef health. Not only will the results make a contribution to the formulation of a management plan for the conservation of these unique island ecosystems, but they will add to the understanding of the Agulhas-Somali Current Large Marine Ecosystem programmes being initiated this year.

IT IS CALLED “DEVELOPMENT”...



Photograph courtesy of The Court House Museum

Much has changed in just over 100 years! Large, utilitarian vessels have replaced the romance (and hardship) of sail ships. The Point, too, has undergone radical changes. The first photograph (above), taken in the 1890s shows a busy Durban harbour just prior to the Anglo-Boer War. In the centre of the photograph is the old customs house, while the tower behind is the hydraulic power station that supplied electricity to the expanding area.

One hundred and ten years of development is show in the second photograph (below), taken in June 2007. The arrow marks the site of the customs house and, in particular, note the high rise development along the Embankment and the Berea.



DURBAN HARBOUR TODAY

Durban harbour is considered to be the busiest port in Africa, with more than 4 000 ships, 44% of South Africa's breakbulk cargo and 61% of the country's containerised cargo handled annually. Durban has the largest container terminal in the southern hemisphere. But this port is – or was – also one of South Africa's finest estuaries. King Shaka had a favourite spot on the Bay, early artists painted grand vistas of the vegetation and early Durban residents drew great benefit from this estuary with its mangroves and three feeder rivers.

Surveys undertaken by Day and Morgan fifty years ago reported a great biodiversity while subsequent studies by ORI and others demonstrated the valuable nursery functions of the Bay.

With "development" has come a range of mixed blessings. Shorelines have been transformed largely into concrete wharves, the mangroves reduced to a single stand, and many of the rich sand banks deepened for navigation. Yet, somehow, the biology of this great estuary has shown remarkable resilience and, despite an overall loss, a considerable biodiversity remains.

Development marches on with the need for economic advancement in KwaZulu-Natal being unquestionable, but with an equal need to do so in an environmentally-sustainable way. Extensive plans are underway to widen the harbour entrance by 100m and to greatly expand the container terminals in the port. These will have far-reaching environmental consequences which require wisdom and environmental stewardship on the part of those individuals who make the decisions.

ORI has embarked on several smaller studies to assist in this decision-making. A study on the biodiversity of the soon to be destroyed North Pier and an assessment of the benthic biota of the Bay are already underway.

While scientific data can be used to reflect change, photographic images capture another dimension as seen alongside (left). The benefits of developing the Port of Durban can be measured in terms of economic goods and services, but the resultant loss of environmental goods services may be more difficult to calculate – yet these are likely to be equally important and with longer term consequences for the future development of KwaZulu-Natal.

FIELD WORK ... TRANSMAP STYLE!

Somewhere behind me, I could hear groans of lamentation over a shoe lost to the mud. Ahead was a stand of trees so dense it seemed impenetrable. I thought I was facing the estuary, but wasn't sure. It might not seem easy to be lost in an area the size of a few football fields, but I succeeded with ease.

The sun was down, hordes of vicious malaria-laden mosquitoes were attacking all the bits of me that weren't coated in mud and I'd yet to think about where we'd be sleeping that night. Just an average day on a TRANSMAP field trip!

It's not meant to be like that. The key to successful field work is good planning. Certain criteria are established and meticulously adhered to when planning TRANSMAP field surveys:

1. The trip must be planned for at least one day less than is needed to do all the work.
2. All the work must be completed.
3. At least one of the species to be collected must be completely unknown to anyone on the trip.
4. At least one of the locations for collecting must be a 'first time visit' for everyone on the trip.

Extreme weather, new untested methodologies and malfunctioning equipment are necessary additions to these expeditions.

Give it its due though, none of it was boring. Whether trying to outrun the waves on rocky shores scrambling through hippo-infested mangroves or catching crabs on the soggy mudflats, there was always something to make the trip memorable.

The last round of TRANSMAP fieldwork in March and April provided plenty of fine examples. After sampling the rocky shores near St Lucia in a one day dash from Durban, Marius Els and I set out on what should have been a more sedate trip to Manzingwenya to do the same at Black Rock and Dog Point. We had planned the sampling to coincide with the best spring tides of the year. Alas, they also coincided with the days that saw large sections of the KZN coastline pounded and trashed by

huge waves, northern reaches not excepted. Two metre drops to the beach where there had previously been gentle slopes, casuarina trees collapsing onto the beach which was littered with bulbs from eroded dune vegetation and a low tide line that was somewhere up around the barnacle zone, once wave surge was factored into the equation.

Every now and then some tufts of algae would indicate the area where we were meant to be sampling, and we became proficient at scraping the area of a quadrat in the average period between waves. Nonetheless, we can testify that bouncing over barnacles and oysters on one's backside is not all that relaxing. It all seemed worthwhile though, sitting around the evening's fire at Darrel's Dive Camp, watching him toss geckos to a friendly genet while bushbabies ate bananas off the dining table.

The last sampling trip was to sample mangroves at Mlalazi, with Mark the "now I know why I'm not a biologist" Volgenau. He'd handled the mud, the mosquitoes, counting trees in endless quadrates, scrabbling for crabs of specific gender and remained good natured. But being blown back and forth across the river by a howling wind, in a canoe that was all but impossible to steer, while bemused locals watched from the bank and wondered how long it would be before we were capsized, seemed to test the limits of his equanimity. We found the areas we needed, though, and completed the work expertly.

But one chore remained - nothing to do with fieldwork – we were determined to see the rare and secretive palm-nut vulture. It seemed unlikely – I had just about sent my neck into spasm trying to search the tops of the raffia palms while driving, to no avail. But all was saved! Early the next morning a beautiful palm-nut vulture was perched on a bench overlooking the estuary. While sitting on a bench is probably not its usual perch, it didn't surprise me ... after all, this this was a TRANSMAP field trip!

David Glassom

ORI is one of twelve international partner institutions in a scientific initiative, TRANSMAP, to strengthen collaboration in East African marine parks conservation. The project is funded by the EU Sixth Framework.

OBITUARY

LEX FEARNHEAD

Lex Fearnhead, a good friend and colleague of SAAMBR, passed away recently following a prolonged illness.



After Kearsney College, and several years working in a medical laboratory, Lex skippered a dhow off Zanzibar while simultaneously completing his studies at Wits University.

Lex (left) joined ORI in 1970 to study the physiology of gill membranes in fishes under high salinity regimes at St Lucia.

In 1974, after establishing the new Aquarium of Haifa in Israel, Lex returned to join the Sea World staff in pioneering the development of our Dolphinarium. As assistant director he made a significant contribution to the development of SAAMBR.

Lex took on yet another challenge when he joined the then Natal Parks Board as head of their coastal and marine division. Here too he imparted his wisdom and introduced many innovative ideas.

Always ready for a new challenge, Lex took on a major new opportunity in the running of Cape Town's new Two Oceans Aquarium. Lex was faced with huge challenges in this new venture, but made a spectacular success of running this fine facility.

During his retirement, Lex remained active in the aquariology field but later suffered several health setbacks.

Lex's passion for life (including fine and unusual food), his contagious and positive approach to problems and good friendship will endure. Lex was 69 and leaves his wife Jane and daughter Heather.

STUDENTS' CORNER

ORI congratulates staff member, Dr Paul de Bruyn (right), who was recently awarded his PhD by the University of KwaZulu-Natal.

The title of Paul's thesis was "A novel application of operational management procedures in the fisheries management of the oyster (*Striostrea margaritacea*) in KwaZulu-Natal waters, South Africa.



SELECTED RECENT PUBLICATIONS

- CELLIERS, L., BULMAN, R., BREETZKE, T. & PARAK, O. 2007. Institutional mapping of integrated coastal zone management in KwaZulu-Natal, South Africa. *Ocean Yearbook* 21: 365-404.
- CELLIERS, L., MANN, B.Q., MACDONALD, A.H.H. & SCHLEYER, M.H. 2007. A benthic survey of the rocky reefs off Pondo-land, South Africa. *African Journal of Marine Science* 29 (1): 65-77.
- MANN, B.Q. 2007. Reassessment of the seventy-four *Polysteganus undulosus* stock after a ten-year moratorium. Oceanographic Research Institute, Durban: 22p. (ORI Unpublished Report 244)
- PRADERVAND, P., KHUMALO, M., KUNENE, P. & MANN, B.Q. 2006. Boat Launch Site Monitoring System: 2005 annual report. Oceanographic Research Institute, Durban: 75p. (ORI Data Report 2006/1)
- RAMSAY, P.J., SCHLEYER, M.H., LEUCI, R., MULLER, G.A., CELLIERS, L., HARRIS, J.M. & GREEN, A.N. 2006. Innovation Fund Project 24401: the development of an expert marine geographical information system to provide an environmental and economic decision support system for proposed tourism developments within and around the Greater St Lucia Wetland Park World Heritage site.
- MKATSHWA, L. 2006. Research papers relevant to integrated coastal zone management in KwaZulu-Natal published in the journals: *Ocean and Coastal Management* (Elsevier) vol.47(1-2) to vol. 49(3-4); *Estuarine, Coastal and Shelf Science* (Elsevier) vol. 59(1) to vol. 67(4); *Coastal Management* (Taylor & Francis) vol. 32(1) to vol. 34(2). Oceanographic Research Institute, Durban: 21p. (ORI Technical Report 2006/1)