

THE ORICLE

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THE CIRCLE OF LIFE

After some 20 years at the helm of ORI, Prof Rudy van der Elst is preparing to retire. True to form, this will be a carefully planned and executed undertaking.

Rudy's replacement has already been identified, and started working at ORI on the 1st June. The Director Designate, Dr Larry Oellermann will work closely with Rudy over the next few months, gradually assuming his responsibilities, whilst trying to absorb some of the wealth of institutional knowledge that Rudy represents.

Larry considers himself to be somewhat of a "prodigal son", a Durbanite on a voyage of discovery who jumped at the opportunity to return home to work in KwaZulu-Natal and the Western Indian Ocean. He remembers telling his Grade 4 teacher that he "wanted to be a marine biologist when he grew up", after a seminal visit to the old Sea World aquarium on the Marine Parade. Being somewhat single-minded, he focussed his school career on achieving this goal.

After graduating from the University of Natal (Durban) with a BSc in Biological Sciences in 1984, he travelled to Rhodes University to study for an Honours Degree with the Department of Ichthyology & Fisheries Science (DIFS).

"I went for a year and ended up staying for fifteen; Grahamstown is a bit like Brigadoon," he notes wryly. Nevertheless, they were fruitful years, during which time he earned an MSc in Ichthyology and a PhD in Fisheries Science.

"My academic development seems quite unusual at first glance," he notes.

"I wanted to become a marine biologist, started off as a freshwater ichthyologist, and ended up in marine aquaculture; but there was some logical progression involved".

His Honours project was supervised by Prof Paul Skelton at the JLB Institute of Ichthyology, and investigated the feasibility of using karyology (chromosome morphology) to try to unravel the taxonomic complexities of the southern African *Barbus* genus of freshwater fishes. This mini-project pointed the way for an MSc on the same topic, focussing on the large yellowfish of the region.

Following the genetic theme into his PhD project, Larry looked at the karyology of the African sharptooth catfish, the vundu catfish and their reciprocal hybrid crosses, under the supervision of Prof Tom Hecht of DIFS. "The hybrid turned out to be an awesome aquaculture species, and my PhD became more about investigating its aquaculture potential than its genetics", Larry explains.

After completing his PhD, he was asked to stay on at DIFS to develop and manage an IDC-funded marine tropical fish research hatchery. ORI had embarked on a marine tropical fish hatchery project at the same time, and it was then that he got the opportunity to visit and work with ORI in a professional capacity.

The project ran for five years, during which time he met Julia, his future wife, and they moved to Cape Town together in 2000. He started out consulting to the aquaculture industry in southern Africa, but became increasingly involved in the support activities for Marine & Coastal Management's medium-term rights allocation process.

During this time Rhodes University asked him to set up and manage a branch of its environmental consulting company, Enviro-Fish Africa (Pty) Ltd, in Cape Town. "This was a very exciting period for me," Larry enthuses. "Not only were we involved with the fisheries rights allocation issues, but we were also setting up the BCLME socio-economic suite of projects, and I was managing a multi-disciplinary team including fisheries scientists, economists, social scientists and lawyers from four different countries; a rather complex mix!"

Towards the end of this period, Larry received a fateful phone call from Paul Nichols, the FAO Special Advisor to the Namibian Minister of Fisheries & Marine Resources.

"Paul asked if I would be willing to apply for the position of Commonwealth Fund Technical Co-operation Expert for Mariculture in Namibia. The timing was perfect; the BCLME projects were coming to an end, so I applied."

He was appointed on 1st May 2006, and was based at the University of Namibia's Sam Nujoma Marine & Coastal Resources Research Centre (SANUMARC), in Henties Bay. "Basically, my role was to try to help develop mariculture research in Namibia, but first I needed to get all the relevant people to communicate with each other" explains Larry.

"I became a regular face at committee and association meetings, eventually chairing the Namibian Mariculture Association for four years."

Once he had an idea of their needs and expectations, he developed a research programme and designed and implemented the construction of an N\$5.5 million mariculture research laboratory at SANUMARC. In 2008 the Vice Chancellor of the University asked Larry to take over the Directorship of SANUMARC, in addition to his advisory role. "I agreed, mainly because the position gave me more leverage within the University structure, but also because it allowed me to broaden my scope, to become involved in marine and coastal resources issues beyond mariculture".

"The advertisement for Director Designate of ORI was a bolt from the blue" Larry recalls. "To be honest, I never really felt an affinity for the cold Atlantic coast; the thought of moving back to the warm East Coast and the familiarity of family was too much to resist, no matter how well things were going in Namibia. And then there's the whole circle of life thing... ORI ignited my passion for fish and set me off on my career path; it's taken 30 years, but I've achieved my childhood ambition of working at ORI at last".



ORI Director Designate, Dr Larry Oellermann

The Oricle is an informal newsletter produced to keep our friends and collaborators informed about our current activities.

FOCUS ON KWAZULU-NATAL'S SMALLER ESTUARIES

KwaZulu-Natal has many estuaries: 73 to be precise. While the larger systems of St Lucia, Durban Bay and Richards Bay are the most visible and impressive, it is in fact the many smaller systems that deserve more attention.

Collectively they account for a wealth of marine biodiversity, marginal areas and refuge for marine organisms. Most of these systems are intermittently open to the sea, adding to their already ecological complexity with remarkable fluctuations in environmental conditions.

In addition to such natural variability, stochastic events and human impacts add a further dimension of spatial and temporal influence.

In a recent MSc study undertaken by Catherine Stow, and supervised by Fiona Mackay, 31 of these sensitive estuaries were studied by analysing the changes in the macrozoobenthos¹ in relation to these many fluctuations.

'Change' was measured as spatial and temporal community differences such as species composition, abundance and diversity. Standard quantitative sampling techniques were employed, with simultaneous measurements of ambient physico-chemical and sediment characteristics

Using historical records it emerged that over the past decade the macrozoobenthos had changed significantly within the same estuary. Furthermore, community composition did not reflect a north to south progression of predominantly tropical



Terebia granifera, an invasive Asian snail (above).

to more temperate species. Instead, community structure was influenced by recolonisation after disturbances but varied according to the condition of the estuary including the state of the estuary mouth. The inference being that the normal biogeographic distribution patterns have been disrupted by poor management of our estuaries.

The recolonisation of two urban and two non-urban estuaries following a stochastic flood disturbance was investigated in more detail. It emerged that urban estuaries can indeed recover after disturbance (as in the aManzimtoti estuary), but only if the water quality and flow is within reasonable limits.

Extreme-disturbed estuaries, such as the Little Toti, simply do not recover and become unstable, often then being more receptive to alien invaders.

The findings highlighted the need for improved estuarine management especially relating to water quality, flow manipulation and mouth condition. It also revealed that there is no "one type fits all" when it comes to estuarine management.

Each type of estuary needs a tailored management approach. Moreover, the effectiveness of using macrobenthos as indicators in environmental monitoring and detecting the loss of ecological functioning and biodiversity in estuaries in the long- and short-term was successfully demonstrated.

¹ small animals that live within the soft bottom



Above: typical acrozoobenthic animals found in smaller KZN estuaries



Examples of an urban estuary, aManzimtoti (above left) and a non-urban estuary, Injambili (above right)

INTERNATIONAL COASTAL SYMPOSIUM (ICS) 2011

The 11th International Coastal Symposium was hosted by the Institute of Marine and Coastal Sciences, University of Szczecin (Poland), which celebrates its 20th anniversary.

The ICS is an international coastal conference founded in 1991 by the Coastal Education & Research Foundation. This prestigious conference takes place every two years and attracts a wide range of top coastal scientists who present and discuss the latest coastal issues.

The 11th meeting of ICS was well attended by 500 delegates from 42 countries. As the only sub-Saharan delegate, Bronwyn Palmer flew more than just the ORI flag.

The 25 themes ranged from coastal management and coastal tourism to remote sensing and GIS applications, with a combination of oral and poster presentations being given in parallel sessions.

There were a number of papers presented on the impact of and modelling of extreme storms and potential sea-level rise. This is indicative of the fact that, like KwaZulu-Natal, other coastal areas are faced with the possibility of increased storminess and extreme events in the future in recognition of climate change.

Our presentation was based on recent collaborative work undertaken on the KZN Coastal Vulnerability Index (CVI) by ORI, the KZN provincial Department of Agriculture, Environmental and Rural Development (DAE&RD) and other coastal specialists. The CVI was undertaken as a desktop study to assess the potential vulnerability of the KZN coast to coastal erosion and extreme events, such as the event that occurred in March 2007.

The CVI has been converted into a user-friendly GIS decision support tool for coastal managers and it is hoped that this tool will assist with proactive coastal management and the reviewing of development applications in the coastal zone in order to



Participants at ICS 2011. From Left: Professor Mike Phillips (Swansea Metropolitan University, Wales), Bronwyn Palmer (ORI), and Chris Makowski (Vice President: Coastal Education & Research Foundation).

protect both the functioning of the coastal zone and developments that take place.

The paper was well received and other countries are hoping to apply the method to their sections of coast, which will serve as a good test of the methodology.

All papers presented at the ICS have been published in two tomes of a special addition of the Journal of Coastal Research, which includes more than 400 papers. A copy is available in the ORI library.

A REGIONAL APPROACH TO CLIMATE CHANGE IN THE WIO



With the advent of COP 17 in Durban later this year, the recent WIOMSA-sponsored regional conference on climate change was timely and innovative. A formal statement was agreed to at this event which was hosted by Mauritius.

Known as the Baclava Declaration, it sought to harmonise opinions and approaches amongst leaders of the region. Some 145 senior diplomats and experts from 16 countries endorsed the Declaration. Here are some highlights.

Although Africa contributes a negligible amount of greenhouse gas emissions (less than 4% of global output), it is the most vulnerable to the adverse impacts of climate change, largely due to the inadequate adaptive capacity and prevailing poverty of the region.

WIO countries are particularly at risk, especially the least developed countries and small-island developing States - for some potentially a threat to their very survival. The more than 60 million people that inhabit the coastal zones of the WIO region are clearly at the frontline of climate change and variability, and are likely to suffer disproportionate impacts from ocean warming, sea level rise, extreme storm events and ocean acidification.

Paradoxically, the ocean environment also provides opportunities for mitigation of climate change.

Oceans and coasts can make a positive contribution in mitigation of global warming through the environmental services

they provide, including their role as natural carbon sinks and in regulating climate and temperature. Hence priority must be given to ecosystem-based approaches to coastal and marine development, including marine protected areas.

The maintenance and rehabilitation of natural carbon sinks in coastal areas, coastal woodlands, mangroves forests, sea grass beds and coastal wetlands should be included in climate mitigation protocols.

While many potential solutions and adaptations to deal with global warming and climate change have been identified, few (if any) proposals deal with the politically-sensitive aspect of burgeoning population growth as a driver of climate change. However, the Baclava Declaration makes it clear that moderating population numbers, preferably through poverty alleviation and community upliftment, should be a key feature of any strategy to ameliorate climate change and its impacts.

Notwithstanding the huge challenges presented by climate change, the co-ordinated global efforts now being promoted can also provide a vehicle and opportunity for wider research support, including a more equitable and sustainable development path for many smaller countries of the WIO. In part this can be achieved through the improvement of partnerships, such as the strengthening of the Nairobi Convention.

(visit www.wiomsa.org)

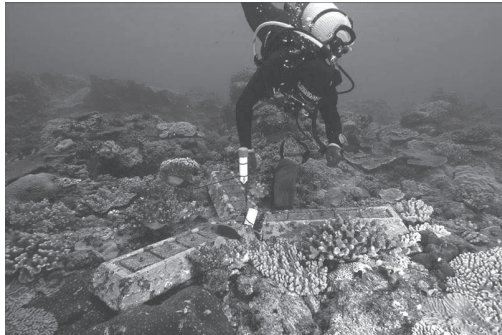
STUDENT CORNER

Two students in ORI's coral reef portfolio, are in the final stages of completing their Masters theses.

Supervised by Michael Schleyer of ORI and David Glassom of UKZN, **Justin Hart's** MSc is titled: Coral recruitment at Sodwana Bay, South Africa: research methods and dynamics.

Reefs along the Maputaland coastline constitute the most southerly coral-dominated reefs of Africa. Coral research has been conducted on these reefs since the early 1970s. However, clear understanding of important reef processes still remains to be achieved.

Coral recruitment has been identified as one of the core processes involved in the maintenance of reefs and has been the focus of Justin's research. In doing so, he aims to determine the extent of coral recruitment within the core coral community on Two Mile Reef (TMR).



Furthermore, recruitment onto different settlement surfaces and the effectiveness of fluorescent photography as a rapid *in-situ* recruit detection technique was investigated.

Justin Hart inspecting an experimental settlement structure

Ashley Grimmer's thesis, also supervised by Michael Schleyer and David Glassom, is titled: Accretion versus bio-erosion of the Matupaland reefs

The high (30°S) latitude reefs of Southern Africa, namely those in the iSimangaliso Wetland Park, are not considered to be true coral reefs, but rather coral communities growing as a thin veneer on late Pleistocene sandstone.

While the coral communities carpeting the reefs are diverse and illustrate apparent growth rates comparable to those in tropical accreting coral systems, they are non-accretive. The processes behind the apparent lack of accretion and the role of reef erosion thus merit study.

In this regard, an assessment of the state of the Maputaland reefs is of particular importance. The tourism industry in the area is thriving; the site provides a biologically diverse and unique habitat in local marine waters; and the driving factors behind these reefs will provide an ideal model for the response of tropical reefs to future climate change and ocean acidification.

Ceramic and marble tiles, as well as ceramic tiles conditioned with crustose coralline algae (CCA), were placed on TMR during two consecutive six-month sampling periods.

Before removal, fluorescent photographs were taken of the artificial settlement surfaces and the surrounding natural substratum to determine how recruitment varies between the artificial surfaces and the natural substratum.

Retrieved tiles were analysed to determine the identity, size, density and relationships between recruits with surrounding biota on settlement tiles. Results showed that recruitment is dominated by a single coral family and varies in space and time. Importantly, the settlement of larvae was also shown to vary on different settlement surfaces, indicating that the choice of such surfaces for experimental work is crucial.

Fluorescent photography was capable of detecting small recruits *in-situ*. However, microscopic examination revealed that a significant proportion of recruits were still undetected, thereby showing important limitations associated with the fluorescent photography technique.

This study was the first localized coral recruitment study to be conducted on TMR and the results obtained provide valuable insight into coral recruitment dynamics and methods used to study this process.

The aim of Ashley's research is thus to investigate the processes which hinder accretion on the Maputaland reefs by assessing several physico-chemical parameters along with the balance between coral growth versus erosion in both the physical and biological context.

The apparent mechanisms which drive these processes are being quantified and related directly or indirectly to reef accretion and/or erosion.



Ashley Grimmer's research involved regular dives on the Maputaland reefs

SOME RECENT PUBLICATIONS INVOLVING ORI STAFF & STUDENTS

- Cyrus, D., Jerling, H., MacKay, C.F. & Vivier, L. 2011. Lake St. Lucia, Africa's largest estuarine lake in crisis: Combined effects of mouth closure, low levels and hypersalinity. *South African Journal of Science* 107 (3/4): 13p.
- Guerreiro, J., Chircop, A., Dzidzornu, D., Grilo, C., Ribeiro, R., van der Elst, R.P. & Viras, A. 2011. The role of international environmental instruments in enhancing transboundary marine protected areas: An approach in East Africa. *Marine Policy* 35: 95-104.
- Palmer, B.J., van der Elst, R.P., MacKay, C.F., Mather, A.A., Smith, A.M., Bundy S.C., Thackeray Z., Leuci R. & Parak, O. 2011: Preliminary coastal vulnerability assessment for KwaZulu-Natal, South Africa. *Journal of Coastal Research*, Special Issue 64: 1390-1395.
- Steyn, E. & Schleyer, M.H. 2011. Movement patterns of the East Coast rock lobster *Panulirus homarus rubellus* on the coast of KwaZulu-Natal, South Africa. *New Zealand Journal of Marine and Freshwater Research* 45 (1): 85-101.

ORI is the research division of the South African Association for Marine Biological Research (SAAMBR)