Benguela current news

THE NEWSLETTER OF THE BENGUELA CURRENT LARGE MARINE ECOSYSTEM PROGRAMME

The Benguela Current Commission

by Dr Mick O'Toole

The Benguela Current Commission Interim Agreement was signed by Angola in Luanda on 31 January 2007, paving the way for the first Ministerial Conference which will take place in Windhoek on 20 July. The Conference will be attended by Salomão Juheto Xirimbimbi, Minister of Fisheries (Angola), Abraham Iyambo, Minister of Fisheries and Marine Resources (Namibia) and Martinus van Schalkwyk, Minister of Environmental Affairs and Tourism (South Africa), along with their national delegations. The first meeting of the Management Board will take place the following day.

The main purpose of the Ministerial Conference will be to review the function, role and mandate of the Commission, to decide on the location and hosting of the Secretariat and to consider a programme of action to implement the ecosystem approach to management of the Benguela Current Large Marine Ecosystem.

The appointment of the Executive Secretary and the Ecosystem Co-ordinator, along with the support staff for the Commission will be discussed. A proposed operational plan and a budget for the Secretariat will be also be under discussion.

The embryonic Benguela Current Commission will require strong support over the next four to five years from both the GEF and other partners. This is especially important in order to strengthen the institutional support necessary for effective transboundary management and to put in place legal and governance mechanisms to restore depleted fisheries and reduce coastal degradation. It will also be necessary for the three countries to realign national policies, legislation and operational practices to ensure a transboundary approach to implementing ecosystem-based management.

The GEF have now approved funding to develop a new project entitled "Implementation of the Benguela Current LME Strategic Action Programme for restoring depleted fisheries and reducing coastal degradation". The project will support the institutional strengthening of the Benguela Current Commission over the next four years.

It is anticipated that the Project Document will be submitted to the GEF in August this year, and if it is approved, a further tranche of US$5.0 million (R35 million) will be forthcoming from the GEF. The funds will be specifically used to establish the structures and undertake the policy and management reforms needed to implement the ecosystem approach and to develop a fully fledged, legally binding regional Convention that would be self-financing and sustainable.

It is expected that the current BCLME Activity Centres in each of the three countries will serve as the

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Photo: Kolette Grobler

A large and very beautiful specimen of the jellyfish Chrysaora hysoscella *that washed up near Luderitz in Namibia recently. For more about jellyfish studies in the BCLME, turn to p.4.*

Ministers usher in the Benguela Current Commission

Four government ministers from Namibia and South Africa met at the Assembly of the Global Environment Facility to sign an Interim Agreement that led to the establishment of the Benguela Current Commission (BCC).

The BCC is the first commission of its kind in the world and lays the groundwork for Angola, Namibia and South Africa to introduce an ecosystem approach to managing the BCLME. This means that, instead of managing living and non-living resources at the national level, the countries will work together to tackle problems that affect the marine environment.

These photographs were taken at the signing ceremony, which took place in front of the spectacular predator exhibit at the Two Oceans Aquarium in Cape Town.

Simon Nhongo, Resident Representative of the United Nations Development Programme (UNDP) in Namibia welcomes delegates to the signing ceremony.

Minister Marthinus van Schalkwyk of South Africa and Minister Willem Konjore of Namibia celebrate the signing of the Interim Agreement leading to the establishment of the Benguela Current Commission. Deputy Minister, Pedro João of Angola, looks on.

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Dr Mick O'Toole

national focal point for the Benguela Current Commission and assist with facilitating communication and information exchange between the Secretariat and the national governments. The operation of these national co-ordination units would be supported by GEF through the new SAP Implementation Project.

It is also proposed that the activities of the Commission are supported by a data and communications manager and a training co-ordinator who would provide assistance to the Secretariat during the first few years of operation. Funding to cover the costs of these positions will be sought from partner countries and international institutions.

The scientific activities of the Benguela Current Commission will focus on rebuilding the hake, horse-mackerel and pilchard stocks in the BCLME and implementing ecosystem-based management to ensure long-term sustainability and conservation of fisheries, vulnerable species and habitats. The Commission will address science-based management activities such as transboundary fish stock assessment, marine protected areas, conservation of marine biodiversity and environmental monitoring to support forecasting of extreme events and climate change.

Annual assessments and audits of the state of the fish stocks, ecosystem health and the environment will be produced to provide the Commission with necessary information to make wise management decisions. It is also being proposed that the Commission should have a clearly defined training strategy and benchmarks to build the necessary capacity in the region to support the process of adaptation to an ecosystem-based management approach. It is expected that much of the core scientific work will be funded by the three governments and supported through partnerships with international institutions and donor countries. The fishing industries, marine diamond mining and offshore oil and gas sector are also expected to provide support to the Benguela Current Commission through partnerships in various project activities and participation in specific management and scientific working groups.

BCLME Chief Technical Advisor (Programme Coordinator)

Ministers sign the Interim Agreement, assisted by officials from the South African Department of Foreign Affairs.

Dr Abraham Iyambo, Minister of Fisheries and Marine Resources in Namibia signs the Interim Agreement.

Monique Barbut, Chief Executive Officer of the Global Environment Facility addresses the gathering.

A Comissão da Corrente de Benguela

por Dr. Mick O'Toole

O Acordo Interino da Comissão da Corrente de Benguela foi assinado por Angola em Luanda no dia 31 de Janeiro de 2007, abrindo caminho para a primeira Conferência Ministerial que terá lugar em Windhoek no dia 20 de Julho. A Conferência terá a participação de Salomão Juheto Xirimbimbi, Ministro das Pescas (Angola), Abraham Iyambo, Ministro das Pescas e Recursos Marinhos (Namíbia) e Martinus van Schalkwyk, Ministro do Ambiente e Turismo (África do Sul), bem como das suas delegações nacionais. A primeira reunião do Conselho de Gestão decorrerá no dia seguinte.

Os objectivos principais da Conferência Ministerial serão rever a função, papel e mandato da Comissão, decidir sobre a localização e acolhimento do Secretariado e considerar um programa de acção para implementar a abordagem de ecossistema para a gestão do Ecossistema Marinho da Corrente de Benguela.

Será ainda discutida a contratação do Secretário Executivo e Coordenador de Ecossistemas, bem como do pessoal de apoio para a Comissão. Para além disso, estarão em discussão um plano operacional e orçamento propostos para o Secretariado.

A fase embrionária da Comissão da Corrente de Benguela irá necessitar de um grande apoio ao longo dos próximos 4-5 anos, tanto do GEF como de outros parceiros. Este apoio é especialmente importante de modo a reforçar o apoio institucional necessário para uma gestão transfronteiriça eficaz e estabelecer mecanismos legais e de governação para restaurar as pescas empobrecidas e reduzir a degradação costeira. Será ainda necessário que os três países alinhem políticas nacionais, legislação e práticas operacionais, de modo a assegurar uma abordagem transfronteiriça para a implementação de uma gestão baseada no ecossistema.

O GEF aprovou recentemente o financiamento para desenvolver um novo projecto entitulado "Implementação do Programa

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Estratégico de Acção do LME da Corrente de Benguela para Restaurar as Pescas Empobrecidas e Reduzir a Degradação Costeira". O projecto irá apoiar o fortalecimento institucional da Comissão da Corrente de Benguela ao longo dos próximos quatro anos.

Prevê-se que o Documento de Projecto seja entregue ao GEF em Agosto deste ano, e esperamos que, se for aprovado, seja disponibilizada pelo GEF uma nova quantia de US$5.0 milhões (R35 milhões). Os fundos serão usados especificamente para estabelecer as estruturas e levar a cabo as reformas políticas e de gestão necessárias para implementar a abordagem de ecossistema e para desenvolver uma Convenção regional completa e legalmente vinculativa que seja auto-financiadora e sustentável.

Espera-se que os Centros de Actividade BCLME em cada um dos três países sirvam como pontos focais nacionais para a Comissão da Corrente de Benguela e dêem apoio na comunicação e troca de informação entre o Secretariado e os governos nacionais. O funcionamento destas unidades de coordenação nacional será apoiado pelo GEF através do novo Projecto de Implementação do SAP. Propõe-se igualmente que as actividades da Comissão sejam apoiadas por um gestor de dados e comunicações e um coordenador de formação, que dariam assistência ao Secretariado durante os primeiros anos de funcionamento. Procurar-se-á obter financiamento junto dos países parceiros e instituições internacionais para cobrir os custos destas posições.

As actividades científicas da Comissão da Corrente de Benguela concentrar-se-ão na recuperação dos stocks de pescada, sardinha e carapau no BCLME e na implementação da gestão baseada no ecossistema para assegurar a sustentabilidade e conservação a longo prazo das pescas, espécies vulneráveis e habitats. A Comissão irá debruçar-se sobre actividades de gestão baseadas na ciência, tais como avaliações de stocks pesqueiros transfronteiriços, áreas marinhas protegidas, conservação da biodiversidade marinha e monitorização ambiental para apoiar a previsão de eventos extremos e alterações climáticas.

Serão preparadas avaliações e auditorias anuais do estado dos stocks pesqueiros, saúde do ecossistema e ambiente, de modo a fornecer à Comissão a informação necessária para tomar decisões de gestão racionais. Propõe-se ainda que a Comissão deverá ter uma estratégia e marcos de formação claramente definidos para criar as capacidades necessárias na região e apoiar o processo de adaptação a uma abordagem de gestão baseada no ecossistema. Espera-se que a maior parte do trabalho científico central seja financiada pelos três governos e apoiada através de parcerias com instituições internacionais e países doadores. Espera-se ainda que as indústrias pesqueira, mineira diamantífera e de exploração petrolífera no mar alto e de gás dêem apoio à Comissão da Corrente de Benguela através de parcerias em várias actividades de projecto e participação em grupos de trabalho específicos de gestão e científicos.

Dr Mick O'Toole
Coordenador do Programa BCLME

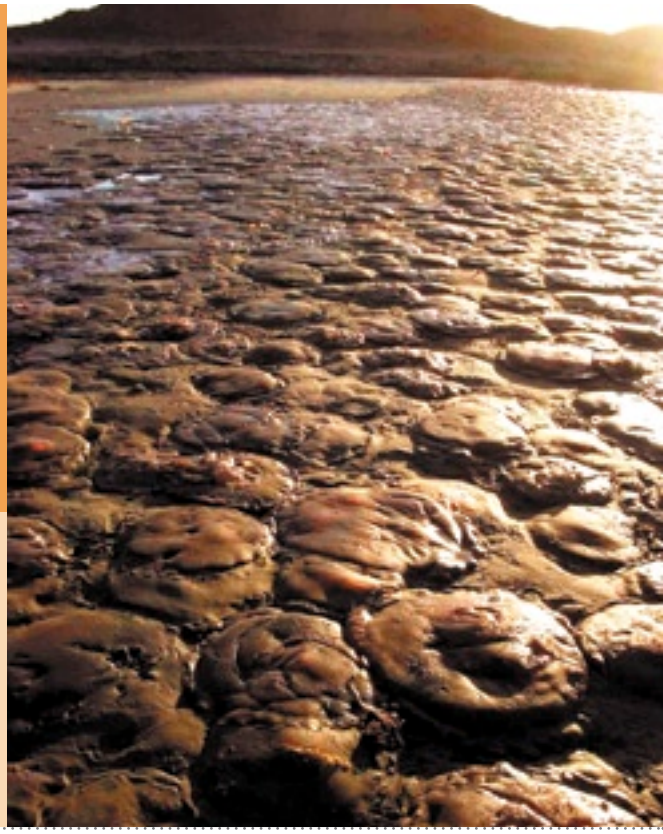
Jellyfish in the Benguela Ecosystem

It has been estimated that there were 12.2 million tons of jellyfish and only 0.8 million tons of small pelagic fish living in Namibian waters in 2003.

Now, a new research project seeks to investigate the links between jellyfish and pelagic fish in the BCLME.

The research is funded by South Africa's National Research Foundation and coordinated by Professor Mark Gibbons at the University of the Western Cape. Initial research will focus on genetic links between populations of jellyfish, as well as identifying jellyfish indicators of climate change. Laboratory research will focus on jellyfish reproduction and the growth characteristics and behaviour of the newly released medusae. For instance, it has not yet been clarified whether pelagic fish eat jellyfish or not.

Interested researchers, at the MSc, Phd and Post Doctoral level are urged to contact Professor Gibbons for more details: **mgibbons@uwc.ac.za**



A beach full of jellyfish. A mass stranding of large Chrysaora hysoscella ***occurred at Halifax beach, near Lüderitz in March. Although jellyfish wash-ups have occurred on Lüderitz beaches before, this event was of a much larger scale. The most abundant species were the large purple-red*** Chrysaora ***species. High densities of these jellyfish were also recorded at sea by researchers from the Ministry of Fisheries and Marine Resources during routine rock lobster surveys.***

Photograph courtesy of Kolette Grobler, MFMR, Namibia.

Stakeholder workshop kickstarts SAP implementation project

In 2000, government ministers from Angola, Namibia and South Africa signed a Strategic Action Programme (SAP) for the BCLME. The SAP details a range of environmental problems that occur in the Benguela region, and sets out a blueprint for Angola, Namibia and South Africa to address these problems through cooperative action.

Today, five years after the implementation phase of the BCLME Programme began, the region is poised to move into a new phase of cooperative governance. As the BCLME Programme and its associated projects near completion, the three countries have started to work together through a new project: Implementation of the BCLME Strategic Action Programme for restoring depleted fisheries and reducing coastal degradation.

The aim of the new project – which has been conveniently labelled "SAP Implementation" - is to build on the successful partnerships that have been developed through the BCLME Programme and to assist Angola, Namibia and South Africa to meet the commitments that were originally laid out in the SAP and later incorporated in the Interim Agreement leading to the establishment of the Benguela Current Commission (BCC).

One of the most important objectives of the new project is to help the three countries to harmonise and realign national policies and legislation and thereby establish a basis for implementing an ecosystem approach to managing the BCLME. Another important objective is to build the institutional structure of the BCC over the next four years.

The development of the SAP Implementation project was boosted in May when stakeholders associated with the BCLME Programme met in Windhoek to map out the objectives, outcomes, outputs and deliverables of the new project.

The stakeholder workshop was organised and managed by Nico Willemse, Local Project Development Coordinator of the SAP Implementation project. Mr Willemse was assisted by Dr David Vousden, Project Development Specialist who, together with Magnus Ngoile, Director General of the National Environment Management Council of Tanzania, conducted the mid-term evaluation of the BCLME Programme.

Also assisting with the Stakeholder Workshop were Nadine Pinnell and Lydia Mlunga of Integrated Environmental Consultants Namibia (IECN); Horst Kleinschmidt of the natural resources consultancy, Feike, and Dr Neville Sweijd and Pavs Pillay, Director and Training and Capacity Building Officer of BENEFIT respectively.

Participation by stakeholders laid the groundwork for the development of a Project Document for the SAP Implementation project. This is currently being compiled by Mr Willemse and Dr Vousden and it is anticipated that the Project Document will be submitted to the Global Environment Facility Secretariat at the end of August. Final submissions will be made to the GEF Council in October.

If the Project Document is approved by the GEF, funding is likely to be released early in 2008, paving the way for the implementation phase of the SAP Implementation project to begin in March 2008.

Ellen Kuzwayo to launch in South Africa

South Africa's newest fisheries research ship, *Ellen Kuzwayo*, is to be launched in Cape Town later this year. She is currently being fitted out by local shipbuilders, Farocean Marine.

The 43.2 m fisheries and environmental research vessel will replace the inshore research vessel, *Sardinops*, which has been in service for an astonishing 49 years! Built by Globe Engineering in Cape Town in 1958, the Sardinops has conducted monthly surveys of the rock lobster fishing grounds for decades.

"The *Sardinops* was restricted to working inside the Exclusive Economic Zone," said Sharon du Plessis, Research Technician at Marine and Coastal Management.

"With *Ellen Kuzwayo* there is potential to undertake transboundary work and she is very well equipped for environmental surveys."

The *Ellen Kuzwayo* is equipped with a wet laboratory with connecting freezers. She also has a CTD lab, a dry lab and a plankton laboratory.

Her scientific equipment includes a thermosalinograph system, a remote temperature probe, a CTD and rosette system and an ADCP system which allows researchers to monitor currents while the ship is underway. She is also well equipped for acoustic surveys, carrying a Simrad EK60 scientific echo sounder, plus 38, 120 and 200 kHz echo sounders.

An observation deck and a diving platform will make it possible for researchers to observe and monitor marine mammals, seabirds and sharks and comfortably and safely deploy divers from the stern of the ship.

An interesting feature of the *Ellen Kuzwayo* is her large anti-rolling tank. This has been fitted close to the bow and will be filled with water. A series of baffles inside the tank will help to move the water from one side of the ship to the other in a sequence that is out of synch with the ship's roll.

"The anti-rolling tank will give the ship extra stability and will make working on this vessel a lot more comfortable," said Ms du Plessis.

The *Ellen Kuzwayo* has accommodation for 21 people, including crew and researchers. There are seven two-person cabins and seven single cabins. All have *en suite* ablution facilities.

Out with the old and in with the new. South Africa's inshore research vessel, Sardinops ***(top), which has been in service for 49 years, will be replaced by the modern and well equipped 43.2 m*** Ellen Kuzwayo ***(below).***

Ellen Kuzwayo was a teacher, social worker, community worker, writer and member of South Africa's first democratically elected Parliament. She was a powerful anti-apartheid campaigner and a tireless fighter for women's rights. Ellen Kuzwayo died in 2006 at the age of 91. She is among five South African heroines who have lent their names to the country's fleet of research and patrol vessels.

Training and Capacity Building

Pavs Pillay

The BCLME training programme is steaming ahead. A host of training and capacity building activities have taken place and a range of new activities is planned for the remainder of the year. Moreover, in addition to supporting three students from previous academic years, the BCLME Programme is currently supporting another three students from the region with full bursaries, 10 people on the DLIST programme and three with book and stationery grants. The table below details the student support that is being provided by the BCLME Programme.

by Pavs Pillay

Table I Students currently being supported by the BCLME Programme

STUDENT NAME	INSTITUTION	DEGREE / DIPLOMA
Current Students:		
Selma Nuuyoma	Cape Peninsula University of Technology	*B.Tech*
David Kaanandunge	Cape Peninsula University of Technology	*B.Tech*
Jackson Karupa	University of Zululand	*BSc.*
New Students:		
Selma Nasheya	University of Cape Town	Honours in Environment Studies
Afonso Estevao	University of Agostinho Neto	Master of Science
Barbara Paterson	University of Cape Town	Post-doctoral study
Book Grants:		
Liyambo Inekela	Rhodes University	Honours in Environmental Science
Nesshuku Hanna	University of Pretoria	Honours in Applied Science
Ferdinand Mwapopi	University of the Western Cape	Honours in Biological Science
DLIST Programme:		
Esthe Jordaan	Environmental Engineering Sustainable	Course work – distance learning
Matthew Hanghome	Development in Coastal Areas	
Bonnettie Nakambonde		
Calvin Sisamu		
Nelda Katjivena		
Gabriel Shekutamba		
Godfrey Sitengu		
Jefta-Moses Ampueja		
Sivanus Uunona		
Reinhold Amutenya		

The first part of a seabird ringing and rehabilitation course was run on Robben Island, near Cape Town by the company AFRING. Participants gained first hand experience of catching and ringing seabirds. This was followed by extensive training on data collection and data base management. The importance of accurate data collection, verification and curation was stressed and the participants were trained in best practices. Furthermore, the vital role of regular seabird monitoring was demonstrated; these animals provide valuable indicators of ecosystem health.

The BCLME Programme, along with the BENEFIT Secretariat, hosted and facilitated a total of six short courses between November 2006 and April 2007, training a total of 93 people from the region. These courses have ranged from hands on laboratory style workshops, to lecture-style courses and practical field work - as in the case of the seabird ringing and rehabilitation course which was hosted on Robben Island in Cape Town, South Africa. The style of the various courses has been designed to maximize the value and outcome of each course.

The BCLME Programme is planning two English courses for researchers and technicians in Angola. One course will be hosted by the *Instituto de Línguas* in Luanda and a second, three-week intensive course will be hosted by the Namibian Polytechnic in Windhoek. The latter course has been tailor-made and will accommodate 16 Angolan researchers and technicians.

Later in the year, the BCLME Programme and BENEFIT will host a week-long course on global information systems (GIS).

Table II Short courses which have been funded by the BCLME as part of training and capacity building efforts

COURSE NAME	FACILITATORS
Zooplankton workshop	Dr Janet Grieve & Dr Hans Verheye
Seabird ringing & rehabilitation course	Dr Doug Harebottle & Dr Vanessa Strauss
Fish aging	Dr Deon Durholtz
HAB workshop	Dr Jacob Larzen
Management of ballast water and invasive species	Dr Lynn Jackson, Mr. Adnan Awad & Ms Leticia Greyling
EIA in the BCLME	Dr Peter Tarr

Getting to grips with EIA

Twenty environmental managers from Angola, Namibia and South Africa met in Swakopmund recently to learn more about environmental impact assessments.

This workshop was run by the Southern African Institute for Environmental Assessment (SAIEA) and presented jointly by Peter Tarr and Zeka Alberto.

The overall theme of the course was 'decision maker's dilemma' – the challenges faced by mid-level decision makers in the BCLME Region.

Participants work for a wide range of organisations – from fisheries, petroleum and environment ministries to national projects like NACOMA. Most hold relatively senior positions in their organisations and either contribute towards the setting of terms of reference for impact assessments, or are required to comment on EIAs in the course of their work. The course was consequently designed to improve understanding of impact assessments and teach the skills required to review EIAs.

Pictured in Swakopmund at the impact assessment and decision-making workshop are (back row) Deon Louw, Domingos Neto, Theressa Frantz, Francis Santambwa, John Paterson, Aunie Gebardt, Peter Tarr, Heidi Currie, Helena André, Anja Kreiner, Alwyn Engelbrecht, Berdine Potgeiter and Petrus Shuuya.

In front are Kolette Grobler, Heidi Skrypzeck, Paloma Ellitson, Anja van der Plas, Ema Gomez, Janine Basson, Ana Yolanda Gonçalves.

Regional phytoplankton specialists learn about HABs

Among the thousands of species of microscopic algae at the base of the marine food chain are a few dozen that produce toxins. These species make their presence known in many ways, causing mass mortalities of fish and shellfish, human illness and deaths, altering marine trophic structure and leading to the death of marine mammals, seabirds, and other animals.

The impact of harmful algal blooms (HABs) on aquaculture operations can be particularly severe. Farmed fish mortalities caused by HABs have increased considerably in recent years and are now a major concern to fish farmers and their insurance companies.

Following an intensive 10-day training course, marine biologists in the Benguela region are better equipped than ever to identify toxic and harmful algae which may create adverse impacts across the entire coastal ecosystem, sometimes in subtle ways that are difficult to detect.

In all, 16 biologists from the BCLME region - including three from Angola, three from South Africa and 10 from Namibia - took part in the HAB workshop that was hosted by the Namibian Ministry of Fisheries and Marine Resources in Swakopmund in February. The workshop was funded by the BCLME Programme and organised by the BENEFIT Secretariat.

"During the workshop, participants were introduced to the concept of Harmful Algal Blooms and we concentrated mostly on likely species in the region, as well as species which are possibly toxic," says Pavs Pillay, Training and Capacity Building Officer for BENEFIT and the BCLME Programme.

Lectures on the different harmful groups were given, supported by practical examination of species under the microscopic. Cultures of toxic species were examined to show the characteristics used to identify each species.

Practical advice about working in different marine environments, sampling procedures, various counting techniques were demonstrated, and monitoring and management considerations were also taught.

Each participant was provided with a personal CD copy of the lectures, a manual on harmful marine algae (edited by Hallegraeff, Anderson and Cembella) and a certificate of attendance. A copy of Identifying Marine Phytoplankton (edited by Thomas) was presented to each country as reference material.

A follow-up workshop was proposed for February/March 2008.

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Participating in the HABs workshop were (back row): Ulrik Larzen, Philippa Wing, Trevor Bell, Paulo André da Sousa Coelho, Martin Tjipute, Erasmus Kakonya, Jan J. Gei-Khaub, Gosberth Hamutenya, Deon Louw, Pavitray (Pavs) Pillay. In front are (r-l): Charlotte-Ann Uys, Maria Filomena Almeida Oliveira Livramento, Anna-Lucia Muku-mangeni, Nelda Katjivena, Twalinohamba Akawa, Chibola Chik-wililwa, Elana Wright, Jacob Larzen, Arminda da Cunha Silva, Juliana Cristina Nascimento Muai.

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Zooplankton experts share knowledge and experience

Participants from Angola, Namibia and South Africa at the regional zooplankton taxonomy and identification training workshop. Standing (from left to right) are Hans Verheye (MCM), Anja Kreiner (NatMIRC), Dianna Gianakouras (MCM), Susan Jones (MCM), Bernado Fernandes (INIP); Janet Grieve (Facilitator, NIWA); Antonio da Silva (BENEFIT); Allie Gumbo (NatMIRC); Victor Hashoongo (NatMIRC) Catharina Rudy (INIP); Alice Martins (INIP); and Twali Akawa (NatMIRC). Seated are Jenny Huggett (MCM); Marco Worship (MCM); Nelda Katjivena (NatMIRC); Tito Milagre (INIP) and Eramus Kakonya (NatMIRC)

In the coastal upwelling region of the BCLME, data on zooplankton have been collected routinely - primarily in support of fisheries research - since the early 1950s. However, over the past two decades the region has lost a substantial number of zooplankton specialists.

The rapid dwindling of zooplankton taxonomic expertise has limited local scientists in their ability to study changes in zooplankton community structure. Such knowledge is essential for understanding and even predicting the impact that environmental change can have on fish stocks. In addition to the harvesting of marine living resources, the region is a hub of maritime activities, including oil and gas exploration and production, diamond mining and shipping. The impacts of these activities on ecosystem health require judicious management at the ecosystem level and the Benguela Current Commission (BCC) was recently established for that purpose.

Detailed zooplankton taxonomic analysis has the potential to provide the BCC with practical information which may be applied to a range of issues such as climate change, biodiversity, the introduction of alien species, pollution and eutrophication, and of course, fisheries management.

The Workshop

To address the decline in zooplankton expertise in the BCLME, a regional training course in zooplankton taxonomy and species identification was developed by Dr Hans Verheye, a specialist scientist at Marine and Coastal Management (MCM) in South Africa.

Five scientists and technicians from each of the three BCLME countries took part in the training workshop. Their participation was supported by their respective national government institutions, including the National Institute of Fisheries Research (INIP) in Angola, the National Marine Information and Research Centre, (NatMIRC) in Namibia and MCM in South Africa. Funds for the workshop were sourced from BENEFIT and the BCLME Programme, as well as from the Alfred P. Sloan Foundation (USA) through the Census of Marine Zooplankton (CMarZ), a project of the global Census of Marine Life. Dr Verheye is a member of the steering group of the CMarZ project.

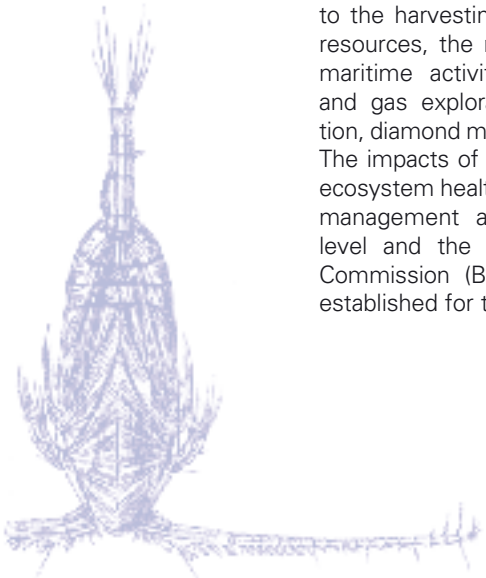
The workshop was facilitated by Dr Janet Bradford-Grieve, a world authority on copepod taxonomy from New Zealand's National Institute of Water and Atmospheric Research (NIWA) in Wellington, and a member of the CMarZ steering group.

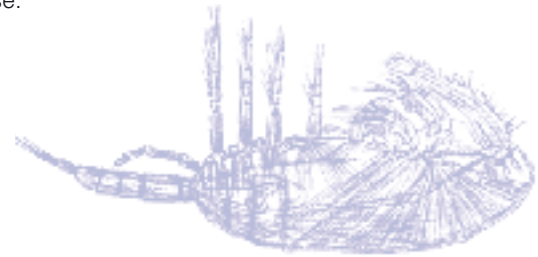
It was an intensive two week course focusing on microscopy skills and zooplankton identification. Practical sessions on taxonomy and microscope identification of different zooplankton groups were interspersed with lectures on the Benguela Current ecosystem, zooplankton ecology, sampling devices used for the collection of zooplankton, traditional and novel techniques used for sample analysis, copepod morphology, using keys, and copepod dissection and observation.

One of the outcomes of the course was the production of a guide to common copepods. This was compiled by Drs Huggett and Bradford-Grieve as an informal but useful take home tool for the participants. It is now available on the BCLME Programme website.

The copepod guide is envisioned as the first in a series of identification guides to other taxa. These taxa include euphausiids, decapod larvae, amphipods and chaetognaths, which – although often abundant in zooplankton collections in the region – were examined only to a lesser extent during the workshop.

The zooplankton workshop helped to move the region towards standardising protocol and identification verification. This can only be comprehensively achieved if there are annual zooplankton identification and verification workshops, which was one of the recommendations that emanated from this workshop. The zooplankton group has also developed a zooplankton working group for the region and will have inter-sessional discussions and interactions via email.





Report highlights by-catch problem

The global environmental conservation organisation WWF, estimates that as many as 34 000 seabirds, 4 200 sea turtles and over seven million sharks and skates are caught by longline fishing boats in the BCLME region annually.

These figures are included in a report that was released in Cape Town in April and in Namibia in June.

The report, "Towards an Ecosystem Approach to Longline Fisheries in the Benguela: An assessment of impacts on seabirds, sea turtles and sharks", was compiled and edited by Samantha Petersen of BirdLife South Africa and Deon Nel and Aaniyah Omardien of WWF South Africa. It represents the culmination of a three-year BCLME-funded project which focused on the assessment of incidental by-catch in the longline fisheries of the Benguela, including the fisheries for hake, tuna and swordfish.

Despite global concern about the impact of fisheries on seabirds, turtles and sharks, very few regional assessments such as this one exist.

The new WWF report makes specific recommendations to the three countries of the BCLME about managing incidental by-catch in longline fisheries.

In Angola, where seabirds and turtles may be deliberately caught and eaten by artisanal fishers, WWF recommends that efforts should be focused on raising awareness about threatened species and developing alternative livelihoods to fishing.

Recommendations for Namibia are focused on the need to include by-catch mitigation measures in fishing regulations and the need to collect further information about the impact of fishing on the ecosystem.

In South Africa, a critical concern is the low level of compliance with fisheries permit conditions which require skippers to use bird-scaring lines.

According to Samantha Petersen, the WWF by-catch assessment report provides a platform from which informed decisions can be made that will reduce the impact of fishing on threatened species in the region.

"These impacts need to be taken seriously by the governments of South Africa, Namibia, and Angola, as well as relevant intergovernmental regional fisheries organisations, as part of their commitment to implement a new ecosystem approach to fisheries" she says.

The governments of the three countries have committed to implementing an ecosystem approach to fisheries by 2010.

The report also provides practical recommendations and guidelines for reducing these impacts. Among the guidelines is the recommended use of bird-scaring lines that deter seabirds, including the endangered albatross, from diving onto the thousands of baited hooks set by longline vessels in the BCLME region annually.

"The project has also been active in raising the level of awareness about this issue within the fishing industry and developed mechanisms for the industry to be part of the solution," says Ms Petersen.

Workshops, training programmes and face-to-face interaction with fishers, fisheries inspectors and observers, have all been undertaken in an effort to change the mindsets of skippers and fishers and encourage them to use by-catch mitigation measures.

Petersen emphasises that, by consistently implementing a few simple measures, it is possible for fishers to avoid catching seabirds and turtles when fishing with longline gear.

The unnecessary killing of seabirds like this shy albatross can be avoided by following a few simple strategies, including setting lines at night and consistently using a tori line, or bird scaring device.

Pictured at the Cape Town launch of the WWF report are Johann Augustyn, Chief Director of Research and Development at Marine and Coastal Management and Maria de Lourdes Sardinha, Director of the BCLME Programme's Activity Centre for Biodiversity, Ecosystem Health and Pollution in Luanda, Angola.

Namibia's Minister of Fisheries and Marine Resources, Dr Abraham Iyambo, delivers a speech at the launch of the WWF report which was held in Walvis Bay in June.

By-catch report released in Namibia

The report, *"Towards an Ecosystem Approach to Longline Fisheries in the Benguela: An assessment of impacts on seabirds, turtles and sharks"*, was presented to the Namibian Minister of Fisheries and Marine Resources, Dr Abraham Iyambo, in June.

Speaking at the presentation, Dr Mick O'Toole, Chief Technical Advisor to the BCLME Programme, drew attention to the importance of regional collaboration in reducing the numbers of seabirds, turtles and sharks that are killed annually in the BCLME.

"By working together, through the BCC, to address the impact that longline fishing has on these predators, Angola, Namibia and South Africa have a unique opportunity to contribute to global conservation efforts," said Dr O'Toole.

Samantha Petersen, Manager of the BirdLife and WWF Responsible Fisheries Programme and Aaniyah Omardien, Manager of the WWF Sanlam Marine Programme.

African nations are working together to improve ocean governance

Chika Ukwe, Project Manager of the Guinea Current Large Marine Ecosystem Programme, addresses the second Pan-African LME Forum.

Justin Ahahanzo, Global Environment Fisheries Project Manager at the Intergovernmental Oceanographic Commission; Professor Gotthilf Hempel, scientific advisor to the government of Bremen, Germany and George Wiafe of the University of Ghana.

The progress made with introducing an ecosystem approach to managing Africa's ocean resources was the subject of discussion at the second Pan African Large Marine Ecosystem Forum which took place in Cape Town.

The meeting was attended by oceanographers, fisheries scientists and senior managers from all over Africa. They discussed the progress of four Large Marine Ecosystem (LME) projects that are at various stages of development around the continent of Africa. These are the BCLME Programme, the Canary Current LME Programme, which unites the countries of North Africa, the Agulhas Somali Currents LME Programme, which brings together nine African nations to better manage the marine resources of East Africa, and the Guinea Current LME Programme in West Africa.

At the Forum the African participants released a brief declaration which endorses the Large Marine Ecosystem concept as a means for managing the oceans around Africa and for implementing an ecosystem approach. The declaration also recommends building partnerships between the Pan African LME programmes and the Global Ocean Observing System (GOOS) of the Intergovernmental Oceanographic Commission.

Other recommendations of the Pan African LME Forum were to:

- Strengthen strategic partnerships among African coastal states, regional and international organisations and agencies, aimed at the recovery of the degraded African LMEs;
- Adopt best practices and examples of approaches to the recovery and sustainability of LME transboundary goods and services;
- Initiate a co-ordinated assessment of African LMEs in relation to adaptation mechanisms for mitigating the effects of climate change;
- Develop and strengthen cooperation between African LME programmes to advance recovery of depleted fisheries resources and recover and sustain marine ecosystems;
- Mobilise financial resources to support the mitigation of ecological and socio-economic disruptions of the LMEs caused by climate change;
- Develop a harmonised approach to support NEPAD policies on fisheries and environment, and cooperation with existing regional governance mechanisms including the Abidjan and Nairobi conventions, regional fisheries bodies and river basin authorities;
- Promote implementation of the WSSD and UN Millennium Goals through integrated management and sustainable development of the African LMEs;
- Strengthen efforts to enhance capture fisheries through improved regulation of access, MCS, combating IUU and other measures.

The African LME programmes and their international sponsors are attempting to develop affordable and sustainable ocean observing systems to service the needs of African countries and the continent as a whole. To this end, in the week before the LME Forum took place, a number of young African oceanographers participated in a leadership workshop aimed at building physical ocean observing capacity in Africa.

Delegates from all over Africa attended the Pan-African LME forum in Cape Town. In front are Ken Sherman, a pioneer of the LME approach to ocean governance, Edward David Singhatey, Minister of Forestry and Environment in the Gambia, and Simon Nhongo, UNDP Resident Representative in Namibia.

Tombwa set for environmental monitoring

The repair and upgrade of the Angolan environmental research ship, *Tombwa*, was completed in Cape Town recently. The upgrade has equipped the 46m research ship to carry out routine environmental monitoring similar to that which is conducted in Namibia and South Africa.

"She has been rigged to do the standardised oceanographic sampling that we do at two sites in South Africa and two sites in Namibia," says Dr Larry Hutchings, Senior Specialist Scientist at Marine and Coastal Management.

South Africa has been monitoring environmental parameters, such as sea surface temperature, wind speed and currents off St Helena Bay (on the west coast) for approximately 60 years. Another sampling station at Kommetjie on the Cape Peninsula has been operational for about 13 years. Similar stations were set up at Walvis Bay in 2000 and at 20° South in 2005.

Now that the *Tombwa* is equipped to carry out oceanographic measurements, two environmental monitoring lines are to be established off the Angolan coast at Namibe and Luanda. There is a possibility that a third monitoring line will be established in the far north of Angola, off Cabinda Province.

"We want to derive oceanographic indicators that are relevant to the management of the most important marine resources in the region," explains Dr Hutchings, "in Angola that would be horse mackerel and sardinella."

With improved environmental information, oceanographers will be better equipped to monitor and even predict trends in these key commercial fisheries.

The $450 000 (R3.1 million) repair and upgrade of the *Tombwa* was jointly funded by the BCLME Programme, BENEFIT and the Angolan fisheries research institute, INIP. It was managed by Alan Robertson of Arcon Management Services who played a key role in the procurement, design and delivery of South Africa's four environmental protection vessels and the newly built research ship, *Ellen Kuzwayo*.

Mr Robertson explains that the *Tombwa* spent two weeks on the synchrolift in Cape Town harbour where her hull was inspected, scraped and painted. The ship's main engine and two auxiliary engines were serviced and overhauled, while the refrigeration, ventilation and air conditioning systems were repaired. Lifesaving equipment, including life rafts, EPIRBS, SARTS and life jackets were serviced and updated.

"Although the ship had not been to sea since November 2005, the key systems have been kept running," explains Mr Robertson, "but the systems for environmental research were very limited."

With the upgrade of the *Tombwa*, the oceanographic systems have been vastly improved. A new wet laboratory has been constructed on the port side, replacing a disused freezer compartment. The new laboratory will be used to process water and plankton samples.

A new davit, which will be used for deploying a CTD array has been installed on the port side fo'castle deck. The CTD winch has been re-sited in line with the new davit and fitted with a new conductor cable.

A second winch and davit have been installed on the port side, main deck to facilitate the towing of small plankton nets. The winch has a cable capacity of 1 000 m to allow for towing to depths of 300 m. It has a hauling power of 1 000 kg, making it feasible to launch and recover Bongo nets, grabs and dredges.

All the scientific systems on board the *Tombwa*, including the thermosalinograph, Seacat profiler system and Sealogger CTD system have been checked, repaired and calibrated. The ship's highly sophisticated Simrad scientific echosounder system, which has never lived up to expectations, has been checked out and will be thoroughly tested to determine whether it can play a meaningful role in Angolan fisheries research. As Mr Robertson explains, interference with the acoustic signal has plagued the Simrad system since INIP took delivery of the *Tombwa*. The cause of the interference may be the location of the main scientific system blister, which is fitted very far forward, close to the ship's bow. The blister, which houses the ADCP, Simrad 38 Khz and 120 Khz transducers, was also very encrusted. A new fairing cover was fitted to the ADCP transducer in an attempt to reduce flow induced noise.

The Angolan fisheries research vessel, Tombwa*, is pictured on the synchrolift in Cape Town harbour*

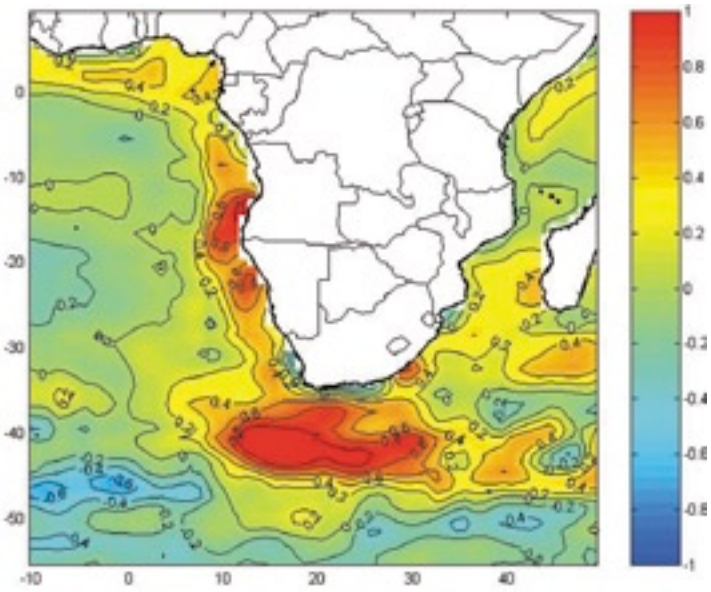
A new winch and davit were installed on the Tombwa's *port side to facilitate the towing of small plankton nets*

"We engaged a specialist to sort out the problems with the acoustic system and we are hoping to reinstate it and calibrate it," explained Mr Robertson, "we think we might have solved the problems, but there is a chance that the ship might ultimately prove to be unsuitable for acoustic work."

A full range of sea trials will be conducted before the *Tombwa* sets sail for Luanda and begins her new life as an environmental research vessel.

Is the BCLME feeling the effects of global climate change?

In May, 40 oceanographers and regional experts gathered in Cape Town to discuss the changing state of the Benguela ecosystem. At an intensive three-day workshop, the participants analysed the patterns in long term data sets, identified the possible drivers of climate change and the prospects for adapting to the social and economic consequences of climate change in the Benguela region.



This image, provided by Dr Pedro Monteiro of the Council for Scientific and Industrial Research in South Africa, illustrates the warming that took place near the northern and southern boundaries of the BCLME between 1982 and 2006.

Following the workshop, a number of specialists - including Dr Pedro Monteiro, Principle Scientist with the CSIR's Coast Programme, Professor George Philander, a climate specialist from Princeton University in the US, Dr Mick O'Toole, head of the BCLME Programme, Dr Larry Hutchings, Chief Specialist Scientist at Marine and Coastal Management and Professor Vere Shannon, Honourary Professor in the oceanography department at UCT – summarised the key findings of the workshop.

They noted that the BCLME is a highly productive, complex and variable ecosystem. In such a system, it is extremely difficult to separate the climate change "signal" from "noise". Other large ocean basins, such as the North Atlantic and the North Pacific, have well defined inter-decadal changes. In contrast, the Benguela has a higher degree of variability than its counterparts in other parts of the world such as the Humboldt, Canary and California Current systems. This has to be taken account of when managing the ecosystem and its response to climate change. The Benguela Current LME is at the confluence of three major ocean systems, (the Atlantic, Indian and Southern oceans) and is subject to influence from the tropical Atlantic, the mid-latitude pressure systems in the Atlantic and the Southern oceans and the subtropical pressure systems in the Indian and South Atlantic oceans.

Working with comprehensive data sets stretching back about 50 years, long-term trends and cycles are beginning to emerge from data and models. During the workshop, it became clear that conditions in the large ocean basins surrounding southern Africa play an important role in regulating and influencing not only the marine resources in the coastal regions, but also terrestrial rainfall and weather patterns over the entire region.

Major findings were:

- One of the strongest trends in the data has been a warming at the northern and southern boundaries of the Benguela system. In the north the warming has occurred across the boundary, while in the south, warming has occurred just south of the Agulhas Bank. In the inshore areas of the Agulhas Bank and southern Benguela it has cooled slightly, increasing the gradients across the southern boundary region.
- There has been an increased frequency of "warm events" off southern Angola and northern Namibia in the past decade or so. There has been a persistent change in the onset of seasonal warming in the north, which has potential consequences for increased hypoxia de-oxygenation of water on the Namibian shelf. In this respect, it is thought that a major low oxygen event off Namibia in the 1990's had a severe and long-lasting impact on the hake stocks, which have not recovered despite conservative management actions.

Dr Larry Hutchings, Chief Specialist Scientist at Marine and Coastal Management; Professor George Philander, Professor of Geosciences at Princeton University, and Professor Bruce Hewitson, Professor of Climatology at UCT were keynote speakers at the BCLME Programme's Climate Change Workshop.

The canary in the mine

The BCLME could be the "canary in the mine" that alerts the world to the effects of global climate change.

Drawing an analogy between the yellow canaries that helped 20th Century coal miners in the UK to identify poisonous and potentially dangerous gases in coal mines, Professor George Philander – Professor of Geosciences at Princeton and a world renowned expert on the *El Nino* phenomenon - suggested that the BCLME could be a very important region for monitoring global climate change. This is because the Benguela Current is an upwelling zone that is characterised by very cold water at relatively low latitudes.

Professor Philander was one of 40 oceanographers and regional experts who participated in the Climate Change Workshop which was hosted in Cape Town by the BCLME Programme.

He advocated the expansion of the BCLME Programme's sphere of interest and suggested that future research and monitoring efforts

- There has been a long-term increase in southerly winds which induce upwelling in the southern Benguela with modulation over decadal time scales. In the northern Benguela, winds also follow a decadal cycle and are currently in a low wind phase.
- Sea level has risen at approximately the same rate as the rest of the world but is not regarded as a serious problem in the BCLME region with relatively few low-lying developments.
- There has been a 10-fold increase in zooplankton over the past five decades in the Benguela region, caused by changes in productivity and the upwelling-favourable wind field, but moderated by the pelagic fish boom in the southern Benguela between 2000 and 2003.
- Pelagic fish trends in the northern and southern Benguela have been dominated by heavy fishing pressure, resulting in the collapse of sardine stocks in the 1960's. Despite a steep decrease in fishing pressure in Namibia in the 1990's, the sardine have failed to recover to their former levels. This could be attributed to the warming trend, competition with increased horse-mackerel stocks, or heavy predation. By contrast, pelagic stocks in the southern Benguela have increased and this has been accompanied by an eastward shift in sardine and anchovy. These eastward and westward shifts appear to be cyclical, but are currently causing economic problems and foraging problems for penguins. The 40 to 60 year cycles are characteristic of sardine and anchovy and have been occurring since before industrial fishing began, judging by scale deposits.
- Horse-mackerel stocks in Namibia increased after the collapse of sardines but have now recently begun to decline. Stocks of another horse- mackerel species found off southern Angola have also declined sharply in recent years, resulting in a ban on catching horse-mackerel and a need to import fish for local consumption in that country.
- There is no evidence for changes in hake distribution in the southern Benguela, but deepwater hake appear to have expanded northwards in Namibia in response to improved oxygen levels on the Namibian shelf in the late 1990's.
- Rock lobsters have declined in the central Benguela and shifted southwards and eastwards in the southern region. This could be a result of heavy sustained fishing pressure, which has been exacerbated by the increase in low oxygen waters in the inshore waters of the southern region that led to mass walkouts in the 1990's and a depleted population on the west coast. As a result, employment has dropped on the west coast and increased in the Walker Bay area.
- Top predators have responded to the changes in fish availability in different parts of the ecosystem. Seals, which are generalized feeders, have expanded northwards into southern and central Angola and stabilized in the central Benguela region. Seabirds, however, have declined considerably in the northern Benguela. The eastward shift in pelagic fish in the southern Benguela has led to recent steep declines in penguin and gannet populations on the west coast. Several other seabirds, which do not depend on fish as food have also expanded their range eastwards in recent decades. Along with these findings, there have also been increased outbreaks of avian flu and cholera, symptomatic of stressed populations.

Viewing the system as a whole, where there has been persistent decadal variability in the BCLME, it is not clear that these changes are linked exclusively to climate change, or to inherent natural long term cycles. There appears to be a shift to the northern and eastern extremes of the Benguela region from the central parts along the west coast, creating economic hardships for communities in the core of the Benguela Current region. The inherent high decadal (five to 15 year) variability in driving forces in the BCLME and the South Atlantic suggest that management of marine resources need to adapt over similar time scales.

will need to focus on a much broader approach in space and time, including global changes and palaeo-oceanographic time scales. Not only is this important for integrated marine ecosystem management, but it is also likely to underpin the accuracy of forecasting seasonal and longer term weather and climate change in the region.

Professor Philander suggested that the subject of climate change needed to be incorporated into the intellectual nature of the BCLME Programme.

"There's more to south western Africa than fish!" Professor Philander told the workshop.

He said that an oceanographic programme could be justified for the Benguela region, irrespective of the economic importance of commercial fisheries.

The workshop concluded that the newly established Benguela Current Commission can play an important role in climate change research by encouraging collaboration between the oceanic and atmospheric institutions in southern Africa and the development of a strong global perspective.

Angolan participants in the workshop included Maria de Lourdes Sardinha and Quilanda Fidel

Oceanographers, Jennifer Veitch and Carl Palmer.

O Seminário sobre a Fronteira Norte

Luisa Morais, Professora de Engenharia Química na Universidade Agostinho Neto (UAN) e Cirílo da Conceição Cauxeuro, Professor de Geologia na UAN, tomando parte nas discussões. Sentado atrás encontra-se Manuel Xavier, Chefe de Departamento no Ministério dos Petróleos.

Graca de Almeida, Chief Biologist at NatMIRC, participates in the discussions.

Bjoern Serigstad, do Instituto Norueguês de Investigação Marinha (IMR) e Francisca Delgado, Directora Geral do Instituto Angolano de Investigação Pesqueira (INIP).

Membros da comunidade BCLME – incluindo representantes de instituições científicas, governo e das indústrias pesqueira e petrolífera – reuniram-se em Luanda para participar no Seminário sobre a Fronteira Norte.

por Nkosi Luyeye

O objectivo do seminário foi analisar a parte mais a Norte do BCLME e registar o conhecimento existente sobre a oceanografia, ecossistemas e recursos marinhos vivos e não vivos da região.

A região da fronteira Norte é uma área tropical alimentada pela Corrente de Angola e influenciada pelas correntes equatorial e equatorial-sul. Constitui o centro da próspera indústria de produção de petróleo e gás de Angola e é um local onde existe uma importante pesca transfronteiriça de Sardinella.

Segue-se um sumário dos resultados do seminário sobre a Fronteira Norte.

Oceanografia

O grupo oceanográfico apresentou as características principais da circulação do oceano na região da fronteira Norte, concentrando-se na importância das correntes Equatorial e Equatorial-Sul e na topografia da região costeira. Foram apresentados dados oceanográficos físicos recolhidos durante os levantamentos a bordo do navio de investigação Dr Fridtjof Nansen entre 1985 e 2006.

O grupo oceanográfico explicou que a região é caracterizada por baixa salinidade e uma elevada concentração de nutrientes numa área de fraco vento. O grupo concluíu que os dados oceanográficos biológicos são escassos para toda a costa angolana, mas especialmente para a região da Frente de Angola. O grupo recomendou o estabelecimento de três linhas de monitorização oceanográfica, incluindo uma para a área da Frente de Angola, o que ajudaria os oceanógrafos a entender melhor a dinâmica da área da fronteira Norte.

Recursos marinhos vivos

Este grupo de especialistas concentrou-se nos problemas que afectam os pescadores na região da fronteira Norte. Uma das suas maiores preocupações é o conflito entre os grupos de utilizadores dos recursos pesqueiros (pescadores artesanais e comerciais) e os produtores de petróleo e gás. Outro problema é a falta de conhecimento sobre as espécies marinhas que existem na área do estuário do Congo. O grupo listou as lacunas no conhecimento nesta área e recomedou que sejam realizados mais estudos na área da fronteira Norte. Os dados disponíveis precisam igualmente de ser sistematicamente compilados.

Espécies marinhas

As discussões deste grupo concentraram-se nos recursos protegidos, incluindo mamíferos, tartarugas, aves marinhas e tubarões. O grupo reviu a informação disponível sobre a diversidade, distribuição e comportamento dos recursos protegidos na área da fronteira Norte. Eles listaram igualmente o conhecimento existente, incluindo os padrões de migração,

The Northern Boundary Workshop

by Nkosi Luyeye

Members of the BCLME community, including representatives of scientific institutions, government and the fishing and oil industries, met in Luanda to participate in the Northern Boundary Workshop.

The goal of the workshop was to analyse the northern-most part of the BCLME and to record what is known about the region's oceanography, ecosystems, living and non-living resources.

The northern boundary region is a tropical area that is washed by the Angola Current and influenced by the Equatorial and South Equatorial currents. It is the centre of Angola's thriving offshore oil and gas production industry and the location of an important transboundary fishery for Sardinella.

The following is a summary of the findings from the Northern Boundary workshop.

Oceanography

The oceanographic group presented the main characteristics of the ocean circulation in the northern boundary region, focusing on the importance of the Equatorial and South Equatorial currents and the topography of the coastal region. They presented physical oceanographic data collected during the surveys on board the research vessel, *Dr Fridtjof Nansen* between 1985 and 2006.

The oceanographic group determined that the region is characterised by low salinity and a high concentration of nutrients in an area of low winds. The group concluded that biological oceanographic data is scarce for the entire Angolan coast, but especially in the region of the Angola Front. It recommended the establishment of three oceanographic monitoring lines, including one for the Angola Front area, which will help oceanographers to better understand the dynamics of the northern boundary area.

Living marine resources

This group of specialists concentrated on the problems affecting fishers in the northern boundary region. One of their main concerns is conflict between fisheries user groups (artisanal and commercial fishers) and oil and gas producers.

os efeitos do Rio Congo nas espécies marinhas e as ameaças para a conservação.

As principais recomendações cobriram a necessidade de implementação dos projectos de estudo e identificação dos recursos existentes e da influência das correntes na área da Frente de Angola.

Recursos marinhos não vivos

Os representantes deste grupo descreveram vários produtos do petróleo e gás, alguns dos quais têm um período de vida até 35 anos. Eles descreveram ainda as actividades relacionadas com petróleo e gás dos países vizinhos tais como a RDC, Congo e Gabão. Foram identifcadas uma série de prioridades, incluindo o mapeamento de áreas sensíveis, a formulação de planos nacionais de contingência para derrames de petróleo e o estabelecimento de um programa nacional de monitorização. Como um projecto a longo prazo, o grupo propôs a criação de uma base de dados nacional para a região da fronteira Norte.

Dr Emmanuel Adegboyega Ajao of the Nigerian Institute of Oceanography and Marine Research, Dr Mick O'Toole, Chief Technical Advisor to the BCLME Programme, Francisca Delgado, Director General of INIP, Victória de Barros Neto, Deputy Minister of Fisheries in Angola, Graciano Domingos, Deputy Minister of Urban Affairs and Environment in Angola and Dr Neville Sweijd, Director of BENEFIT.

Grupo de Ecossistemas e Conservação

Este grupo de especialistas analisou as fontes de informação sobre biodiversidade marinha na área da Frente de Angola. O grupo descreveu as potenciais ameaças para a biodiversidade, incluindo a pesca, corte de mangais, erosão costeira e produção de petróleo e gás. O grupo recomendou uma série de estudos específicos, tais como estudos integrados da área da Frente de Angola, mapeamento de mangais e impactes da poluição.

Another problem is a lack of knowledge about the marine species that occur in the vicinity of the Congo estuary. The group listed the gaps in knowledge about this area and recommended that more studies be undertaken in the northern boundary area. Available data also needs to be systematically compiled.

Marine species

The focus of this group's discussions was protected resources, including mammals, turtles, seabirds and sharks. They revised the available information on the diversity, distribution and behaviour of protected resources in the northern boundary area. They also listed what is unknown, including migration patterns, the effects of the Congo River on marine species and threats to conservation.

The main recommendations were to implement studies of the existing resources and the influence of currents in the area of the Angola Front.

Non living marine resources

Representatives of this group described several oil and gas projects, some of which have a lifespan of up to 35 years. They also described the oil and gas-related activities of neighbouring countries such as DRC, Congo and Gabon. A number of priorities were identified, including mapping sensitive areas, formulating national contingency plans for oil spills and establishing a national monitoring programme. As a long-term project, the group proposed the creation of a national database for the northern boundary region.

Ecosystems and conservation group

This group of specialists analysed the sources of information on marine biodiversity in the area of the Angola Front. The group outlined the potential threats to biodiversity, including fishing, cutting of mangrove forests, coastal erosion and oil and gas production. The group recommended a number of specific studies, such as integrated studies of the Angola Front area, the mapping of the mangrove forests and the impacts of pollution.

Nkosi Luyeye, Vice-Director do INIP e Maria Esperança Pires Santos, Chefe da Secção Demersal no INIP, partilhando um momento mais descontraído.

Projects supported by the BCLME Programme

The BCLME Programme has allocated more than $10 million (R70 million) in support of 98 projects. The projects are being implemented by a wide variety of clients, including government institutes, universities, private consultancy companies and the regional scientific programme, BENEFIT. Each project has been designed to address transboundary environmental problems and contribute to the integrated and sustainable management of the Benguela Current Large Marine Ecosystem.

Completed Projects

Final reports for the following projects have been submitted and approved and posted to the BCLME Programme's website: www.bclme.org.

BCLME/BOUNDARY/05/01a
Angola/Benguela Front Workshop: assessment of the structure and functioning of the Angola-Benguela Frontal System and its implications for sustainable resource management in the BCLME. Phase I – initial study
Project value: US$45 000
Contracted to: BENEFIT
Completion date: July 2006

BCLME/BOUNDARY/06/01
Southern Boundary Workshop
Project value: US$46 000
Contracted to: Not contracted out
Completion date: December 2006

BCLME/SEIS/05/01
Development of and making operational a viable and integrative State of the Ecosystem Information System for the BCLME
Project value: US$87 242
Contracted to: BENEFIT and Feike
Completion date: December 2006

PCU/AVM/03/01
Publicising the BCLME Programme through audio visual media
Project value: US$16 000
Contracted to: Francois Odendaal Productions
Completion date: September 2004

PCU/BCC/04/01
Institutional review and analysis for Benguela Current Commission (BCC)
Project value: US$63 425
Contracted to: EnAct International
Completion date: December 2004

PCU/BCC/04/02
Economic study and cost benefit analysis of cooperative research and management of the BCLME
Project value: US$30 100
Contracted to: Fisheries Economics Research Unit, UBC
Completion date: October 2004

BCLME/PCU/07/05
Report on the status of Marpol in the BCLME region
Project value: US$7 000
Contracted to: FEIKE
Completion date: May 2007

PCU/POLYTECH/05/01
Assessing potential for producing final ocean colour maps for Namibia's marine environment
Project value: US$2 625
Contracted to: Polytechnic of Namibia
Completion date: September 2006

PCU/TCB/03/01
Training and capacity building needs assessment for the BCLME region
Project value: US$26 230
Contracted to: Anchor Environmental Consultants
Completion date: September 2003

PCU/TCB/06/01
Integration and review of training and capacity building in the BCLME Programme
Project value: US$8 500
Contracted to: Anchor Environmental Consultants
Completion date: March 2006

BEHP/BAC/03/01
Classification of coastline for aquaculture development
Project value: US$50 000
Contracted to: BENEFIT
Completion date: Project incorporated into BEHP/BAC/03/01

BEHP/BAC/WORKSHOP/04/01
Ecosystem Mapping and Biodioversity Consultative Workshop
Project value: US$47 095
Contracted to: BENEFIT
Completion date: May 2004

BEHP/BW/TRAINING COURSE/03/01
Project value: US$7 600
Completion date: December 2006

BEHP/IA/03/03
Harmonisation of national environmental policies and legislation for marine mining, dredging and offshore petroleum exploration and production activities in the BCLME region
Project value: US$39 697
Contracted to: SAIEA
Completion date: July 2004

BEHP/CEA/03/03
Assessment of the cumulative effects of sediment discharge from on shore and near shore diamond mining activities on the BCLME
Project value: US$140 000
Contracted to: CSIR
Completion date: June 2006

BEHP/CEA/03/04
Assessment of the cumulative impacts of scouring of sub-tidal areas and kelp cutting by diamond divers in near-shore areas of the BCLME
Project value: US$62 117
Contracted to: PISCES Environmental Consultants
Completion date: January 2007

BEHP/EEF/03/01/02
By-catch of threatened seabirds, sharks and turtles in long-line fisheries in the Benguela Current Large Marine Ecosystem (BCLME): An integrated approach
Project value: US$113 299
Contracted to: WWF-South Africa
Completion date: April 2007

BEHP/LBMP/03/01
Baseline assessment of sources and management of land-based marine pollution in the BCLME
Project value: US$85 000
Contracted to: CSIR
Completion date: January 2006

BEHP/LBMP/03/04
The development of a common set of water and sediment quality guidelines for the coastal zone in the BCLME region
Project value: US$80 000
Contracted to: CSIR
Completion date: January 2006

BEHP/ML/03/01
Marine litter
Project value: US$36 693
Contracted to: EcoAfrica Environmental Consultants
Completion date: November 2006

EV/ANGOLA/03/01
Compilation of inventory and acquisition of oceanographic environmental data in the Angola sector of the BCLME. Phase one (inventory)
Project value: US$20 000
Contracted to: INIP
Completion date: July 2005

EV/ANGOLA/03/02
Comprehensive review and re-interpretation of oceanographic information on the Angola sector of the BCLME
Project value: US$20 000
Contracted to: INIP
Completion date: July 2005

EV/ANGOLA/03/03
Assessment of the present state of oceanographic environmental monitoring in the Angolan sector of the BCLME region
Project value: US$10 000
Contracted to: INIP
Completion date: July 2005

EV/ANGOLA/03/05
Build capacity for Angola
Project value: US$7 000
Contracted to: INIP
Completion date: July 2005

EV/ANGOLA/03/06
Upgrade communication systems for Angolan BCLME core partner institutions
Project value: US$8 000
Contracted to: INIP
Completion date: July 2005

EV/ANGOLA/05/01
Provision of basic English courses to Angolan institutions participating in the BCLME Programme
Project value: US$17 840
Contracted to: INIP
Completion date: April 2006

EV/FORECAST/04/01
International Workshop on Forecasting and Data Assimilation in the Benguela and Comparable Systems
Project value: US$80 000
Completion date: November 2004

EV/HAB/02/01
Harmonisation of regulations for microalgal toxins for application in countries bordering the BCLME
Project value: US$69 323
Contracted to: MFMR
Completion date: April 2005

EV/HAB/02/02a
Development of an operational capacity for monitoring of Harmful Algal Blooms (HABs) in countries bordering the northern part of the BCLME: Phase 1-Design
Project value: US$36 260
Contracted to: MFMR
Completion date: April 2005

EV/HAB/02/03
Investigation into the diversity and distribution of cysts of Harmful Algal Blooms (HABs) within the BCLME Region
Project value: US$25 420
Contracted to: UCT
Completion date: January 2005

EV/HAB/02/05
Development of an operational capacity for real-time observation and forecasting of Harmful Algal Blooms (HABs) in the BCLME: Detection of HABs through the deployment of bio-optical moorings. Phase 1: Demonstration project in Namibia and South Africa
Project value: US$135 035
Contracted to: UCT
Completion date: July 2005

EV/HAB/02/06
Development of an operational capacity for real-time observation and forecasting of Harmful Algal Blooms (HABs) in BCLME: utility of models in forecasting HABs events
Project value: US$30 700
Contracted to: UCT and CSIR
Completion date: April 2006

EV/HAB/04/Shellsan
Development of a shellfish sanitation programme model for application in consort with the microalgal toxins component
Project value: US$27 925
Contracted to: MFMR
Completion date: April 2005
Shellsan project included in EV/HAB/02/01 & EV/HB/02/02a

EV/HAB/05/01
Investigation into the diversity and distribution of cysts of Harmful Algal Blooms within Luanda Bay (Angola) and Lüderitz Bay and Walvis Bay (Namibia)
Project value: US$29 994
Contracted to: UCT
Completion date: November 2005

EV/HAB/05/02
Development of an operational capacity for monitoring of Harmful Algal Blooms in countries bordering the northern part of the BCLME: Phase 1 – Design: component pilot monitoring in the Lüderitz area
Project value: US$4 015
Contracted to: MFMR
Completion date: March 2006

EV/HAB/07/01
Harmful Algal Blooms workshop and distance learning course.
Project value: US$29 900
Contracted to: BENEFIT
Completion date: April 2007

EV/HABSCON/04/01
Sponsorship of the 11th International Conference on Harmful Algal Blooms
Project value: US$8 000
Donated to: Conference organisers

EV/HUMBOLDT/04/01
Ichthyoplankton distribution, monitoring and training, northern Namibia/southern Angola (AHAB Leg 8); Oceanographic, hydrological and benthos monitoring in Angolan waters (AHAB Leg 9)
Project value: US$130 000
Contracted to: Baltic Sea Research Institute
Completion date: January 2005

EV/LOW/02/01
Low oxygen variability in the Benguela Ecosystem: a review and new understanding
Project value: US$46 250
Contracted to: UCT and CSIR
Completion date: August 2006

EV/LS/02/02
Feasibility study of the south-east extension of PIRATA (Pilot Moored Array in the Tropical Atlantic)
Project value: US$29 900
Contracted to: UCT
Completion date: November 2003

EV/LS/02/04
Participation in the Climate Variability Programme (CLIVAR/OOPC) Workshop on South Atlantic Climate Observing System in Angra dos Reis, Brazil
Project value: US$3 160
Completion date: March 2003

EV/SADCO/03/01
SADCO holdings of Namibian data: Assessment of historical oceanographic data available from SADCO
Project value: US$2 400
Contracted to: Ms Fiona Duncan, contracted through UNDP-SA
Completion date: October 2003

EV/Provare/02/01
Feasibility assessment for the use of a towed undulating oceanographic recorder (TUOR) in the BCLME
Project value: US$5 850
Contracted to: Dr Chris Reid, Foundation for Ocean Science
Completion date: November 2003

EV/PROVARE/02/02(a)1
The Lüderitz Upwelling Cell/Orange River Cone (LUCORC) Workshop
Project value: US$31 000
Contracted to: BENEFIT
Completion date: April 2006

EV/LOW/02/03
Assessment of key transboundary processes and measurement scales in respect of low oxygen water (LOW) variability: preliminary implementation and examination of the role of large scale and transboundary hydro-

Abbreviations

CSIR:	The Council for Scientific and Industrial Research (South Africa)
FAO:	Food and Agriculture Organisation of the United Nations
GISP:	Global Invasive Species Programme
IMR:	Institute of Marine Research (Norway)
INIP:	*Instituo Nacional de Investigação Pesqueira* (Angola)
IRD:	*Institut de reserche pour le développement* (France)
UCT:	University of Cape Town
MCM:	Marine and Coastal Management (South Africa)
MFMR:	Ministry of Fisheries and Marine Resources (Namibia)
NOAA:	National Oceanic and Atmospheric Administration (USA)
SAIEA:	Southern African Institute for Environmental Assessment
UBC:	University of British Columbia (Canada)
WWF:	Worldwide Fund for Nature

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dynamic control of LOW variability
Project value: US$62 750
Contracted to: UCT and CSIR
Completion date November 2006

EV/LOW/02/04
Assessment of key transboundary processes and measurement scales in respect of low oxygen water variability: implementation of the LOW generation areas simulation that provide inputs to transboundary models in LOW project EV/LOW/02/03
Project value: US$122 500
Contracted to: UCT and CSIR
Completion date: June 2006

EV/LS/02/02b
PIRATA SE Extension – purchase, deployment and retrieval of a moored buoy off the coast of Angola
Project value: US$100 000
Contracted to: PMEL NOAA, IRD and Dr Mathieu Rouault
Completion date: June 2007

EV/LS/02/03
Analysis of Benguela dynamical variability and assessment of predictability of warm and cold events in the BCLME
Project value: US$150 000
Contracted to: UCT
Completion date: September 2006

EV/LS/02/06
Diagnosis of large scale South Atlantic modes that impact on the transboundary BCLME: investigating the potential for improved predictability and sustainable management
Project value: US$87 959
Contracted to: UCT
Completion date: January 2007

EV/PROVARE/02/05
Retrospective analysis of plankton community structure in the BCLME to provide an index of long-term change in the ecosystem
Project value: US$105 849
Contracted to: BENEFIT
Completion date: March 2007

EV/PROVARE/04/01
Characterising the spawning habitat (temporal, spatial and in terms of physical and biological attributes) of harvested pelagic species *(Sardinops sagax, Trachurus sp., Engraulis capensis)* using Continuous Underwater Fish Egg Sampler (CUFES) and net sampling
Project value: US$93 003
Contracted to: BENEFIT
Completion date: May 2007

BCLME/LMR/CF/03/06
Potential shared hake stocks – research planning meeting (Namibia and South Africa)
Project value: US$53 048
Contracted to: BENEFIT
Completion date: May 2006

LMR/AFSE/03/01
Review of institutional arrangements and provision of baseline information in respect of artisanal fisheries, including socio-economic surveys of coastal communities
Project value: US$194 120
Contracted to: Environmental Evaluation Unit, UCT
Completion date: The project has three components: a) January 2005 b) March 2006 c) March 2005

LMR/CF/03/01
Feasibility study into the establishment of a permanent regional fish ageing centre in one of the BCLME countries
Project value: US$11 520
Contracted to: BENEFIT
Completion date: November 2003

LMR/CF/03/02
An assessment of the state of commercial fisheries catch data in the BCLME region
Project value: US$11 240
Contracted to: BENEFIT
Completion date: May 2004

LMR/CF/03/04
Feasibility study into the application of genetic techniques for determining fish stock identity of transboundary populations in the BCLME region
Project value: US$6 906
Contracted to: BENEFIT
Completion date: November 2003

LMR/CF/03/07
Determination of optimal harvesting strategies for the hake trawl and long-line fisheries in Namibia and South Africa
Project value: US$98 100
Contracted to: Fisheries Economics Research Unit, UBC
Completion date: October 2005

LMR/CF/03/08
Assessment of the ecological importance of pelagic fish and pelagic gobies in the functioning of the BCLME region - a desktop review
Project value: US$30 000
Contracted to: BENEFIT
Completion date: September 2005

LMR/CF/03/11 b
Retrospective analysis of sardinella fisheries in Angola
Project value: US$23 780
Contracted to: INIP
Completion date: February 2005

LMR/CF/03/12
A review of the impacts of seismic surveying and toxicity of oil products on the early history stages of pelagic fish, the benthos and the pelagic ecosystem with potential application to the sardinella fishery
Project value: US$22 666
Contracted to: INIP
Completion date: May 2005

LMR/COM/02/01
Henties Bay Community project
Project value: US$ 4 051
Contracted to: Henties Bay Community
Completion date: Project terminated

LMR/COM/03/01
An assessment of means of involving coastal communities in the BCLME Programme
Project value: US$ 30 000
Contracted to: Eco-Africa Environmental Consultants
Completion date: March 2004

LMR/COM/03/02
Introducing the BCLME Programme to the wider audience within the coastal communities
Project value: US$16 000
Contracted to: Eco-Africa Environmental Consultants
Completion date: June 2004

LMR/COM/04/01
Development of a demonstration website for the Artisanal Fisheries Institute, Angola
Project value: US$5 000
Contracted to: EcoAfrica Environmental Consultants
Completion date: December 2005

LMR/MC/03/01
Development of a responsible aquaculture policy for the BCLME region
Project value: US$92 734
Contracted to: Enviro-Fish Africa
Completion date: May 2005

LMR/NANSEN/04/01
Survey of transboundary demersal fish stocks in southern Namibia with special reference to hake
Project value: US$110 500
Contracted to: IMR
Completion date: May 2004

LMR/NANSEN/04/02
Assessment of variability of transboundary pelagic fish stocks particularly sardinella from Gabon to central Angola
Project value: US$110 500
Contracted to: IMR
Completion date: October 2004

LMR/NANSEN/04/04
Transboundary study with emphasis on deep water hake in the Lüderitz – Orange River Cone area
Project value: US$102 000

Contracted to: IMR
Completion date: November 2004

LMR/NANSEN/05/01
Transboundary survey between Namibia and South Africa with focus on shared stocks of hake
Project value: US$174 000
Contracted to: IMR
Completion date: November 2004

LMR/NANSEN/05/02
Transboundary survey of pelagic fish particularly horse mackerel and pilchard in southern Angola and northern Namibia
Project value: US$76 500
Contracted to: IMR
Completion date: October 2005

LMR/NANSEN/05/03
Transboundary survey of hake and hake ichthyoplankton in the transboundary area between the Orange River and Lüderitz
Project value: US$59 500
Contracted to: IMR
Completion date: January 2006

LMR/SE/03/02
An economic and legal study to assess the policy prospects for formulating a balanced development of trade in fish and fish products from the BCLME region
Project value: US$133 260
Contracted to: Enviro-Fish Africa
Completion date: December 2006

LMR/SE/03/03
An analysis of right-based micro-economic systems and governance of the important commercial fisheries in the BCLME countries
Project value: US$229 914
Contracted to: Enviro-Fish Africa
Completion date: December 2006

LMR/SE/03/05
An analysis of revenue raising instruments of the important commercial fisheries in the BCLME countries
Project value: US$ 91 228
Contracted to: Enviro-Fish Africa
Completion date: December 2005

LMR/SKI/04/01
Support services for inshore water quality monitoring program in Namibia
Project value: US$43 700
Contracted to: Z-Craft, South Africa
Completion date: September 2005

LMR/SKI/04/02
Support services for inshore water quality monitoring program in Angola
Project value: US$43 700
Contracted to: Z-Craft, South Africa
Completion date: September 2005






Biodiversity, Ecosystem Health & Pollution Projects

BEHP/BAC/03/01
Marine biodiversity status assessment and conservation planning for the BCLME
Project value: US$134 905
Contracted to: BENEFIT
Completion date: April 2007

BEHP/BAC/03/02
Mapping of the shoreline, shallow water, estuarine and offshore habitats of the BCLME region
Project value: US$95 185
Contracted to: BENEFIT
Completion date: October 2006

BEHP/BAC/03/03
Identification of communities, biotopes and species along the BCLME shoreline and shallow sub-tidal zone, and assessment of offshore biodiversity
Project value: US$216 761
Contracted to: BENEFIT
Completion date: April 2007

BEHP/BAC/03/04
Baseline surveying of species and biodiversity in estuarine habitats
Project value: US$99 929
Contracted to: BENEFIT
Completion date: December 2006

BEHP/BTA/04/01
Analysis of threats and challenges to marine biodiversity and marine habitats in Namibia and Angola
Project value: US$36 308
Contracted to: BENEFIT
Completion date: November 2006

BEHP/BW/03/01
Ballast Water Programme
Project value: US$35 000
Contracted to: GISP
Completion date: December 2006

BEHP/CD/03/01
Development of institutional capacity for biodiversity research in the countries of the BCLME
Project value: US$100 000
Contracted to: BENEFIT
Completion date: April 2007

BEHP/CEA/03/01
Data gathering and gap analysis for modeling the cumulative effects of offshore petroleum exploration and production activities on the marine environment of the BCLME region
Project value: US$95 000
Contracted to: CSIR
Completion date: May 2006

BEHP/CEA/03/02
Data gathering and gap analysis for assessment of the cumulative effects of marine diamond mining activities on the BCLME
Project value: US$76 000
Contracted to: PISCES Environmental Consultants
Completion date: September 2006

BEHP/LBE/04/01
Luanda Bay Ecosystem Project
Project value: US$80 000
Contracted to: INIP
Completion date: September 2007

BEHP/MC/03/02
Classification of coastline for aquaculture development
Project value: US$50 000
Contracted to: BENEFIT (incorporated into BEHP/BAC/03/01)
Completion date: April 2007

BEHP/OSCP/03/01
Regional Oil Spill Contingency Planning in the BCLME region
Project value: US$142 000
Contracted to: CSIR
Completion date: July 2007

BEHP/Survey/06/01
Transboundary Pollution Monitoring
Project value: US$100 000
Contracted to: IMR
Completion date: January 2007

BEHP/WRF/04/01
Assessment of the need for waste reception facilities in ports across the BCLME region
Project value: US$10 000
Contracted to: To be identified
Completion date: October 2007

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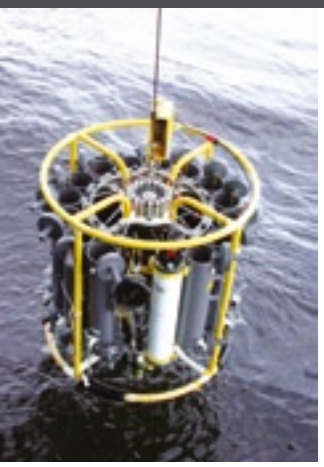
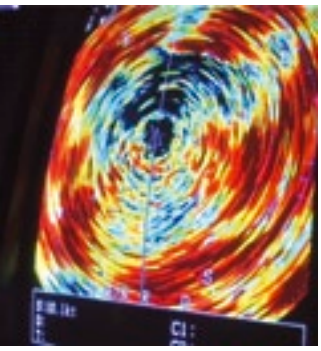




Living Marine Resources Projects

LMR/CF/03/10
Review of research and management on transboundary small pelagic and midwater stocks between Angola and Namibia – Northern Benguela transboundary small pelagic and midwater resources research planning workshop
Project value: US$50 000
Contracted to: BENEFIT
Completion date: August 2007

LMR/CF/03/16
Development of a management plan for bronze whaler shark resources in the BCLME region
Project value: US$90 385
Contracted to: BENEFIT
Completion date: July 2007

LMR/EAF/03/01
Ecosystem approaches for fisheries (EAF) management in the BCLME
Project value: US$257 270
Contracted to: MCM and FAO
Completion date: December 2006

LMR/EAF/03/02
A regional ecosystem monitoring programme: top predators as biological indicators of ecosystem change in the BCLME
Project value: US$217 994
Contracted to: MCM
Completion date: December 2006

LMR/SE/03/04
Harmonisation of socio-economic policies and legal provisions for effective implementation of the BCLME Programme
Project value: US$135 000
Contracted to: Enviro-Fish Africa
Completion date: March 2007

Environmental Variability Projects

BCLME/EEWS/05/01
Development of and making operational a viable and integrative Environmental Early Warning System (EEWS) for the BCLME
Project value: US$116 770
Contracted to: UCT
Completion date: November 2007

EV/HAB/06/01
Development of an operational capacity for a shellfish sanitation monitoring program in countries bordering the northern part of the BCLME: phase II - implementation
Project value: US$90 743
Contracted to: MFMR
Completion date: extended to August 2007

EV/MODEL/03/01
A cross-cutting simulation-modelling capability for the BCLME
Project value: this project - US$126 935 plus additional US$36 000 (2004); US$35 000 (2005) – hardware expenditure
Contracted to: UCT
Completion date: March 2007

EV/PROVARE/06/01
Development of satellite remote sensing products for operational application.
Project value: US$112 152
Contracted to: BENEFIT
Completion date: September 2007

EWS/TG/02/02
Purchase and installing tide gauges in the BCLME region
Project value: US$100 000
Contracted to: To be identified
Completion date: October 2007

Projects administered by Programme Co-ordination Unit

PCU/EAI/07/01
Training course - Impact assessment and decision making in the BCLME region
Project value: US$22 260
Contracted to: Southern African Institute for Environmental Assessment
Completion date: May 2007

PCU/POLGOV/07/01
National and regional policy and governance review related to the management of living marine resources and the marine environment as a whole
Project value: US$34 250
Contracted to: FEIKE Management Consultants
Completion date: July 2007

PCU/SSR/07/02
State of the stocks report for the BCLME region
Project value: US$12 500
Contracted to: Capricorn Fisheries Monitoring
Completion date: August 2007

PCU/STKPT/07/01
Preparation of a stakeholders' participation plan for the SAP Implementation project
Project value: US$25 000
Contracted to: Integrated Environmental Consultants Namibia (IECN)
Completion date: July 2007

PCU/TCBPLN/07/01
Training and capacity building strategic plan for SAP implementation in BCLME region
Project value: US$5 000
Contracted to: BENEFIT
Completion date: July 2007

PCU/TOMBWA/06/01
Modification and refitting of Angolan research vessel *R.V. Tombwa* for oceaongraphic and environmental survey work
Project value: US$100 000
Contracted to: Arcon Management Services and Hesper Engineering
Completion date: June 2007

Biodiversity projects nearing completion

The six biodiversity projects that were contracted to BENEFIT in 2005 have provided a number of researchers with a unique and often exhilarating opportunity to paint a big, vibrant picture of the Benguela Region. By dipping into a paint box that comprises centuries old data collected by Portuguese explorers, seabed maps compiled in geological surveys, and the records of fishing companies and marine research agencies, the biodiversity specialists have been required to go the extra mile to access previously unattainable information. Using the marine component of South Africa's National Spatial Biodiversity Assessment as a model, the BCLME programme has effectively extended this study into Namibia and Angola.

by Neville Sweijd

Two mapping projects form a major constituent of the biodiversity suite. Vera De Cauwer and her team from Polytechnic Namibia have worked tirelessly to compile data on the physical features of the BCLME. Despite severe data limitations, the physical mapping exercise has set an important precedent by accessing data that provides new insights on the physical features of the Benguela region, especially Namibia and Angola.

The biological mapping project has also provided fresh data. Three joint field expeditions have been undertaken, two of which were intertidal surveys of the Angolan coastline. This was the first intertidal survey to be undertaken in Angola in 30 years and provided a rare opportunity for a number of regional specialists to comb the rocky shores and sandy beaches of Angola and document what they found. Data gathered on the field expeditions has been supplemented by retrospective studies on coastal biodiversity. Researchers like Pedro Alfonso of the Artisanal Fisheries Institute in Luanda and Janine Basson of NatMIRC have contributed to the mapping projects by collating unpublished data and extracting information from historical documents.

Khara Shine, a Masters student at the University of Cape Town, has led the offshore biodiversity project. Khara, in collaboration with Silvi Nsianganago (INIP) and Paul Kainge (NatMIRC), have been responsible for scrutinising data gathered from the decks of fisheries research ships in the Benguela region over many years. They have been specifically concerned with compiling information about demersal species (fish that live on, or close to, the seabed).

The offshore component of the biodiversity suite will eventually combine four separate data sets, and use them to paint a picture of the offshore biodiversity of the entire BCLME region.

An estuarine system analysis is also underway. This is a significant component of the biodiversity suite, but once complete, it will offer a holistic analysis of the physical and biological nature of the large transboundary estuaries in the region (the Kunene and the Orange river mouths). As part of this analysis, two important estuaries in Angola – the Kwanza and Catumbela river estuaries – have been thoroughly surveyed. Other rivers in the region have been analysed in desktop surveys using satellite data, aerial photographs, detailed maps (and Google Earth!).

A further component of the biodiversity suite is a small project that aims to map the biological and oceanographic processes that occur in the region. These include, for example, the movement of the Angola Benguela Frontal Zone and the migration of whales and other marine species across the boundaries of Angola, Namibia and South Africa.

The sixth component of the biodiversity suite is an analysis of the status and magnitude of threats to biodiversity in the Benguela. This information has been obtained from documents and expert consultations for Namibia and Angola and has quantified these in broad categories for specific bio zones within the EEZ.

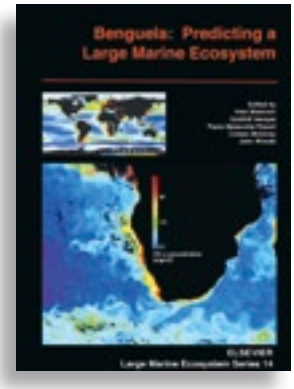
The five different projects that have been outlined above are all nearing completion and in the coming months their findings will be systematically integrated into a final product. This will be done by the sixth component, the MOM team, which will integrate the data generated by the components using a method called Systematic Conservation Planning. Leading the MOM team will be Dr Mandy Lombard, a conservation planning specialist.

The BENEFIT team: Antonio Da Silva (Research Officer), Petro Rabe (Manager), Leesa Jephthah (Secretary), Pavs Pillay (Training Officer BENEFIT / BCLME), and Neville Sweijd (Director).

The MOM team will integrate the findings of the five biodiversity projects into a strategic planning tool that is capable of providing advice on the protection of sensitive areas and vulnerable species, as well as recommendations for marine protected areas and aquaculture installations. Information will be packaged in such a way that it is accessible to planners and conservation officials in Angola, Namibia and South Africa.

So, the finished canvas will undoubtedly be a work of art, but it will be a useful work of art. Indeed, it has the potential to become a vitally important tool for planning and implementing an ecosystems approach to managing the BCLME.

Public Relations



Benguela book is launched

Government ministers from Angola, Namibia and South Africa were the first to receive a copy of the scientific volume *Benguela: Forecasting a Large Marine Ecosystem* which rolled off the presses shortly before last year's GEF Assembly.

The ministers were presented with a copy of the book which is regarded as the definitive work on the variability and predictability of the Benguela Current Large Marine Ecosystem.

Benguela: Forecasting a Large Marine Ecosystem is a product of the International Workshop on Forecasting and Data Assimilation in the Benguela and Comparable Systems which was held in Cape Town in November 2004. The workshop was sponsored by the BCLME Programme, in partnership with nine other international and regional agencies.

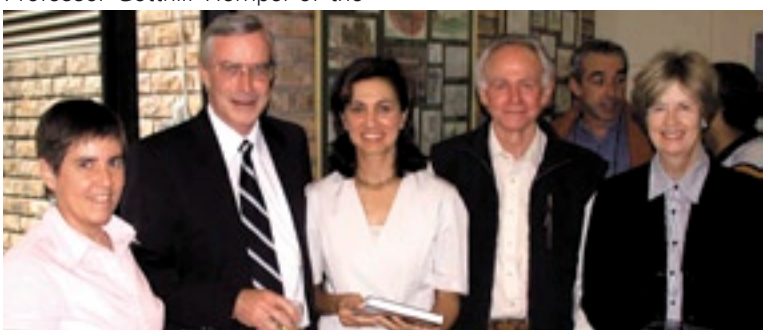
The book was edited by Professor Vere Shannon, Honourary Professor of oceanography at the University of Cape Town (UCT), Professor Gotthilf Hempel of the Centre for Marine Tropical Ecology in Bremen, Germany, Dr Coleen Moloney of UCT, Dr Paola Rizzoli of the Massachusetts Institute of Technology and Professor John Woods of Imperial College, London.

Sally Adams of the National Oceanic and Atmospheric Administration in the USA is the technical editor.

Benguela: Forecasting a Large Marine Ecosystem is available from the publishers at www.elsevier.com.

Dr Abraham Iyambo, Minister of Fisheries and Marine Resources in Namibia, accepts a copy of the book, Benguela: Forecasting a Large Marine Ecosystem, from Simon Nhongo, UNDP Resident Representative in Namibia.

South Africa's Minister of Environmental Affairs and Tourism, Marthinus van Schalkwyk, accepts a copy of the book from Simon Nhongo. Mr Pedro João, Deputy Minister of Fisheries in Angola, looks on.



Pictured at the UCT launch of the book are Dr Coleen Moloney, Professor Vere Shannon, Professor Cheryl de la Rey, Deputy Vice Chancellor of Research at UCT, Professor Frank Shillington of the Department of Oceanography at UCT, and Kathy Driver, Dean of Science at UCT.

…and presented at UCT

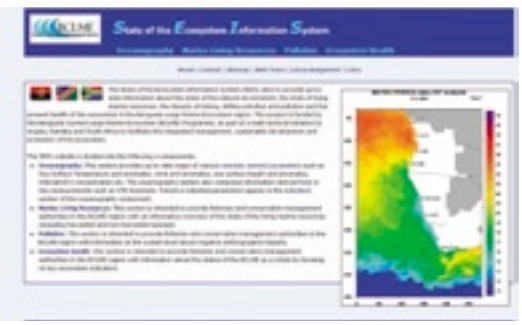
University of Cape Town academics who played a leading role in publishing the book, Benguela: Predicting a Large Marine Ecosystem, celebrated the book's launch at UCT recently.

Students from the University of the Western Cape examine a display on the BCLME Programme that was erected at the university on World Oceans Day.

BCLME display is well received

The 10 panel display on the BCLME, which was launched at the Two Oceans Aquarium last year, has gained wide exposure since then. The display has been erected at Kirstenbosch Gardens, the Two-Oceans Aquarium, the BMW Pavilion and the University of the Western Cape, and has been well received by a number of local and international delegates who have attended meetings at these venues.

The BCLME display is to be erected again at the International Waters conference, which is scheduled to take place at the Cape Town International Convention Centre in July and August.



BCLME website expands

The BCLME Programme's website has been expanded to include information about the "state of the ecosystem". A link has been created from the BCLME website to the State of the Ecosystem Information System (SEIS) website.

The SEIS website provides up-to-date oceanographic information as well as information about commercially harvested resources and the present health of the Benguela Current Large Marine Ecosystem.

Oceanographic information includes maps of various remotely sensed parameters such as sea surface temperature, wind direction and speed, sea surface height and chlorophyll concentration. Trends in selected parameters are also provided.

Agulhas Somali Currents LME Programme set to begin

The Global Environment Facility (GEF) has recently approved funding for a new Large Marine Ecosystem project for the Western Indian Ocean. The Agulhas-Somali Current LME project will be an initial five-year project with the primary objectives of developing a Transboundary Diagnositic Analysis (TDA), leading to a formally-adopted Strategic Action Programme (SAP) for both LMEs.

The United Nations Development Programme (UNDP) will implement the project on behalf of GEF and will provide support to eight governments in the region to help them achieve the project's objectives. These include the governments of Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, South Africa and Tanzania.

Somalia will also be a partner in the project.

The LME project will form part of an overall ASCLME Programme which includes the WIO-LaB project - currently being implemented by the United Nations Environment Programme (UNEP) and focusing on land-based sources of pollution and coastal degradation - and SWIOFP (the South Western Indian Ocean Project) implemented by the World Bank to address offshore commercial fisheries.

Dr David Vousden was recently appointed by the GEF to manage the ASCLME project for UNDP and the eight countries. He will also act as the coordinator of the three projects that make up the ASCLME Programme.

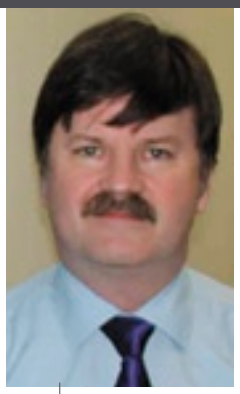
Dr. Vousden has had a wide and detailed career in coastal and offshore resource management and in GEF project implementation.

As a marine scientist, he specialised in coastal and offshore surveys and data collection. He has worked on long-term projects in the Middle East, the Caribbean and Central America, as well as at the United Nations headquarters in New York. Over the past 12 years, through his work with the GEF, he has travelled the globe, gaining first hand experience of the many projects that make up the International Waters Portfolio.

Dr Vousden is well known in southern Africa, having been responsible for evaluating the BCLME Programme at its mid-term stage and helping to develop the SAP Implementation project which will enhance regional cooperation in the Benguela region and support the development of the Benguela Current Commission.

He has also played a key role in the design and final submission of the ASCLME project to the GEF and made various inputs into the Guinea Current LME Programme and other sub-Saharan International Waters projects.

Dr. Vousden is expected to take up his new position, based at the South African Institute for Aquatic Biodiversity in Grahamstown, South Africa, in August.



Dr David Vousden

Reporting back on the progress of the BCLME Programme

A meeting at which the key achievements and outputs of the BCLME Programme will be presented to regional managers from Angola, Namibia and South Africa will be held in Cape Town on July 24.

The meeting will be opened by Dr Monde Mayekiso, Deputy Director General in the Department of Environmental Affairs and Tourism and the head of Marine and Coastal Management. An introductory talk will be given by Dr Mick O'Toole, Chief Technical Advisor to the BCLME Programme.

The report-back sessions will be chaired by the Directors of the BCLME Activity Centres, Maria de Lourdes Sardinha (Angola), Frikkie Botes (Namibia), and Lesley Staegemann (South Africa).

Approximately 20 presentations will be given by project managers from the institutions, universities and consultancy companies that were contracted by the BCLME Programme to undertake a diverse range of studies. The presentations will outline the results of the projects and will make recommendations on policy actions and ways to improve sustainable management of living marine resources, forecasting of environmental variability, conservation of marine biodiversity and protection of the environment in the Benguela Current Large Marine Ecosystem.

The outputs of the BCLME Programme will also be on display at the meeting. These will include hard copies of the final reports of most of the projects; a compilation containing the executive summaries of all projects to date; CDs of the promotional film *Current of Plenty*, the Highlights Symposium (2005), International Forecasting Workshop (2005) and Climate Change Workshop (2007), all five editions of the BCLME newsletter and copies of the original Strategic Action Programme, Transboundary Diagnostic Analysis and a number of brochures that have been produced since the Programme began in 2002.

A list of the final reports referenced under key topics and cited according to authors and institutions or companies contracted will be distributed at the meeting.

The BCLME website, with its large amount of information, will be demonstrated along with the State of the Ecosystem Information System (SEIS) which has recently been developed as a management and information tool.

Forthcoming events

Fourth Biennial International Waters Conference


Photo: Barrie Rose

Ecosystem approaches to fisheries management will come under the spotlight at the International Waters conference, which will be hosted by South Africa.

The fourth Biennial International Waters Conference will take place in Cape Town, South Africa, from 31 July to 3 August.

The purpose of the conference is to share experiences and innovative practices between projects that are funded by the GEF and included in its International Waters portfolio. Other goals of the conference are to promote learning and capacity building, develop strategies to enhance stakeholder collaboration, and encourage GEF International Waters projects to apply evolving GEF policies and procedures during implementation.

It is anticipated that approximately 350 participants from more than 100 countries will attend.

The BCLME Programme will erect a display, which details its progress and achievements over the past five years.

Key participants in the BCLME Programme will also join hands with their colleagues in the South African Department of Environmental Affairs and Tourism to host two side events. These will consist of presentations and panel discussions on a wide range of topics, including ecosystems approaches to fisheries management, top predators' management and the management of transboundary fish stocks. Marine protected areas and the socio-economic impacts of climate change on marine ecosystems will also be discussed.

Fish Africa rolls around again

The bi-annual Fish Africa exhibition will take place at the Cape Town International Convention Centre from October 24 to 26. The expo attracts those in the fishing industry, fish farmers and marine equipment manufacturers and suppliers.

For this year's Fish Africa expo, the BCLME Programme will participate in the South African Department of Environmental Affairs and Tourism's display.

FISH AFRICA 2007

Global LMEs to be showcased in China

A second international conference on Large Marine Ecosystems (LMEs) will take place in the Chinese port city of Qingdao from 11 to 13 September 2007.

The Conference will provide review lectures on the results of the GEF supported LME projects underway in Africa, Asia, Latin America, and Eastern Europe. Invited lectures will deal with the theoretical background of the LME approach and its role in present day marine science. Conference linked papers are invited. For more information visit: **www.iwlearn.net**



Celebrating a decade of collaboration

Recognising that the BCLME and BENEFIT programmes are reaching their conclusion, and noting the inauguration of the Benguela Current Commission (BCC), a concluding event will be held in November to focus on the scientific achievements made in the Benguela region in the past decade.

The goal of the event is to present the key outputs of the BCLME and BENEFIT programmes, and consolidate plans for the future integrated management, sustainable development and protection of the Benguela Current ecosystem.

Themes will range from marine scientific research, transboundary management of shared fish stocks, links between fisheries and the environment, monitoring the state of the ecosystem, data management, forecasting and global climate variability, ecosystem health and pollution, impacts of seabed mining and oil and gas exploration and production, socio-economics and governance.

Attention will also be given to the philosophy and history leading to the development of regional cooperation and lessons learned in establishing and implementing the two programmes. It is hoped that the occasion will also see the launch of a book on the history of scientific co-operation in the Benguela entitled *The Current of Plenty.*

The meeting will take place from 19 to 21 November in Swakopmund.

Sediment monitoring advised

South Africa, Namibia and Angola need to consider additional environmental management and monitoring actions to better understand and mitigate the effects of discharged sediments resulting from near-shore and coastal diamond mining.

This advice is contained in a report, compiled under the leadership of South Africa's Council for Scientific and Industrial Research (CSIR), on the cumulative effect of discharges resulting from mining activities in a defined area of the BCLME.

The project area covered a section of the Namibian coastline, from the Olifants River (in the south), to Spencer Bay (in the north), and from the high-water mark extending to 40m in depth.

It is estimated that 400 to 800 million tons of sediment from the Orange River was discharged between 1968 and April 2005 in this area. In comparison, it is likely that about 400 million tons of sediment resulted from near-shore and coastal diamond mining during the same period.

Leader of the CSIR research project, Geoff Smith, says that in recent years, some mining operations have resulted in the discharge of up to several million tons of tailings at a single site annually.

"Several future mining operations are planned to be of a similar scale. This study was rooted in a concern that cumulative effects, over time and space, may be severe," Smith explains.

Other findings included:

- Natural sediment, i.e. from the Orange River and windblown sediment tend to be fine. Most of the sediment discharged from mining, however, is medium to coarse sand. The fine sediment is mobilised by wave action and is transported rapidly, generally northward, by wind-driven and wave-driven currents. This is not the case with coarse mine sediment, which generally results in accretion. Of a total of 361 million tons of sediment (primarily sand) estimated to have been discharged from 1970 onwards, about 294 million tons or 81 percent are accounted for by measured accretion of the shore and near-beach region.
- The discharge of large volumes of sand can result in long-term (years to decades) deposition on reefs, which overshadows natural trends. By 2013, an estimated total of about three kilometres of rocky inter-tidal and near-shore sub-tidal smothering of reef in the demonstration areas will occur. This estimate is based on measured accretion to date and future accretion based on planned mining rates, on known reef areas. The smothered area comprises only one to two percent of the rocky shore in the Namibian part of the project area. Nevertheless, it is important to verify that the impacted shore does not constitute a unique and important habitat.

The CSIR recommends that detailed logs should be kept of the hourly or daily rates of all sediment discharges, as well as accurate directional wave measurements and wind data in mining areas.

Consideration should also be given to discharging at wave-exposed sites that will result in more rapid dispersion of sediment, as opposed to wave-sheltered sites; while discharge of selective mine tailings into mined-out areas should also be considered. (In Namibia the policy is to discharge tailings into the marine environment, unlike South Africa, where tailings are discharged into slimes dams).

The environmental impacts of coastal and nearshore diamond mining should be better monitored say scientists from South Africa's Council for Scientific and Industrial Research.

Marine Research Institute is launched

The University of Cape Town launched the Marine Research (MA-RE) Institute recently.

The Institute is an umbrella body for some 40 full-time researchers, in several different departments, who are involved in marine research at UCT. As such, it coordinates and fosters cross disciplinary and inter-faculty research projects and develops marine curricula.

Areas of development and capacity building will include marine law and policy, integrated coastal management, marine biotechnology, operational oceanography, Southern Ocean research, satellite oceanography and numerical modelling, marine engineering, an ecosystem approach to fisheries, seabird research and marine biodiversity studies.

Pictured at the launch of MA-RE are Dr Keith Alverson, Director of the Global Ocean Observing System (GOOS) office at UNESCO in Paris; Dr Therina Theron, from the Department of Research and Development at UCT; Professor John Field, Director of the MA-RE Institute; Professor Cheryl de la Rey, Deputy Vice-Chancellor of Research at UCT, who launched the Institute as one of UCT's new signature themes; Dr Justin Ahanhanzo, Technical Director of GOOS-Africa; and Emlyn Balarin, Manager of the MA-RE Institute.

Products of the BCLME Programme

Over the past five years, the BCLME Programme has funded and supported a wide range of activities, including workshops, research projects, exhibitions and even the production of a documentary film. The list below details the products of the BCLME Programme to date (June 2007.)

Books

Shannon V, Hempel G, Malanotte-Rizoli P, Moloney C, Woods J (eds) (2006) Benguela: Predicting a Large Marine Ecosystem. Elsevier Large Marine Ecosystem Series 14. Oxford UK.

Compact Discs

Attwood CS (compiler) (2005) Highlights Symposium 9-10 May 2005. A compilation of PowerPoint presentations

Staegemann L (compiler) (2007) Climate Change Workshop 15-18 May 2007. A compilation of PowerPoint presentations

Velasquez Rojas C (filmmaker) (2004) Current of Plenty. A documentary on the Benguela Current (also produced in Portuguese as *Corrente de Abundâcia*)

Whittle C (compiler) (2004) Benguela: Predicting a Large Marine Ecosystem, CD supplement

Newsletters

Attwood CS (ed) (October 2003) Benguela Current News. The Newsletter of the Benguela Current Large Marine Ecosystem Programme

Attwood CS (ed) (July 2004) Benguela Current News. The Newsletter of the Benguela Current Large Marine Ecosystem Programme

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Brochures

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Attwood CS, O'Toole M (compilers) (2006) The Benguela Current Large Marine Ecosystem Programme. Twelve-page profile on the BCLME Programme (also produced in Portuguese as *Programa do Grande Ecossistema Marinho da Corrente de Benguela*)

Matthews S (compiler) (2002) The Benguela Current Large Marine Ecosystem. Eight panel fold-out brochure on the BCLME Programme (also produced in Portuguese as *Programa do Grande Ecossistema Marinho da Corrente de Benguela*)

Websites

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Attwood CS, Cocks M, Collins J, Maneveldt G (2003-2007) www.bclme.org: official website of the BCLME Programme

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Coastal Communities

Anon (2004) An assessment of how coastal communities can become involved and benefit from the BCLME programme. Report on the Angolan visit. An Assessment of Means of Involving Coastal Communities in the BCLME Programme. BCLME Project Report **LMR/COM/03/01** (Contracted to EcoAfrica Environmental Consultants, Cape Town, South Africa)

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Odendaal F, Phillips T, Garcia R (2005) An assessment of how coastal communities can become involved and benefit from the BCLME programme. An Assessment of Means of Involving Coastal Communities in the BCLME Programme. BCLME Project Report **MR/COM/03/01** (Contracted to EcoAfrica Environmental Consultants, Cape Town, South Africa)

Ecosystem health and pollution

Odendaal F, Philips T, Nghiulikwa R, Garcia R, Huongo A (2006) Marine litter programme. Marine Litter. BCLME Project Report **BEHP/ML/03/01** (Contracted to EcoAfrica Environmental Consultants, Cape Town, South Africa)

Pulfrich A (2007) Assessment of Cumulative Impacts of Scouring of Sub-Tidal Areas and Kelp Cutting by Diamond Divers in Near-Shore Areas of the BCLME Region. BCLME Project Report **BEHP/CEA/03/04** (Contracted to PISCES Environmental Services, Tokai, South Africa)

Smith G (compiler) (2006) Assessment of the Cumulative Effects of Sediment Discharges from On-Shore and Near-Shore Diamond Mining Activities on the BCLME. BCLME Project Report **BEHP/CEA/03/03** (Contracted to CSIR, Stellenbosch, South Africa)

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De Cauwer V (2006) Assessing Potential to Produce Final Ocean Colour Maps of Namibia's Marine Environment. BCLME Project Report **PCU/POLYTECH/05/01** (Contracted to Polytechnic of Namibia, Windhoek, Namibia)

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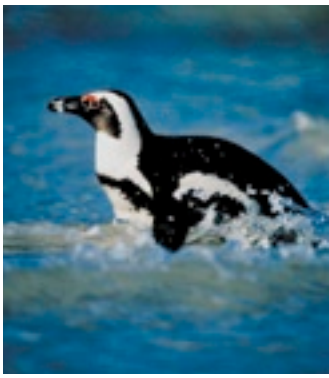

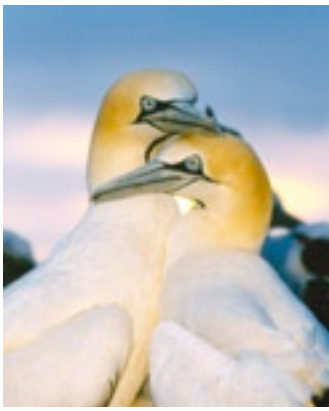

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The BCLME Programme

The Benguela Current Large Marine Ecosystem stretches up the west coast of South Africa and Namibia to Cabinda, the northern-most province of Angola. It is one of the richest ecosystems on earth.

The BCLME Programme is a joint initiative by the governments of Angola, Namibia and South Africa to manage and utilise the resources of the Benguela region in a sustainable and integrated way. The Programme is supported by the Global Environment Facility through the United Nations Development Programme.

Over the past five years, the BCLME Programme has been extremely successful in capturing vital knowledge and information necessary for the development of an integrated, ecosystem-based and cooperative management approach. The Programme has made significant advances in capacity building and training. Most importantly, the BCLME Programme has created an environment of trust and partnership between Angola, Namibia and South Africa.

In 2007, the BCLME Programme was extended for a further 12 months and a second project, entitled "Implementation of the Benguela Current LME Strategic Action Programme for restoring depleted fisheries and reducing coastal degradation" was initiated.

This project will support the institutional strengthening of the Benguela Current Commission over the next four years.

The Benguela Current Commission or BCC is a formal institutional structure that will help Angola, Namibia and South Africa to implement an "ecosystem approach" to managing the BCLME. This means that, instead of managing living and non-living marine resources at the national level, the three countries will work together to tackle transboundary environmental issues such as pollution, the management of shared fish stocks and the coordination of regional efforts to mitigate the impacts of marine mining and oil and gas production on the environment.

The BCC will ultimately make recommendations to the three countries on research and management issues relating to the sustainable utilisation, conservation and protection of the BCLME. It will be informed by an Ecosystem Advisory Committee which will supply countries with the best available information concerning the implementation of the ecosystem approach to management

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