AnnuAl RepoRt 2010–2011

highlights

NRF
National Research Foundation
SAIAB
South African Institute for Aquatic Biodiversity

ANNUAL REPORT
2010–2011
highlights
Contents

2 Executive Overview
3 Director’s Report
4 Developing Infrastructure
5 Research Overview
6 Research Platforms and Partnerships
  Feature: Deployment of Remotely Operated Vehicle for assessment of habitats on the Agulhas Bank — Dr Albrecht Götz
8 Towards an Integrated Collections Platform
  Feature: Post-cruise workshop at SAIAB to sort the collections made on the Southern Indian Ocean Seamounts Cruise provides surprises — from a report by Kirstin Kemp
10 Research Operations: Conservation Biology & Ecology
  Feature: New approaches in the study of estuarine fish — Dr Alistair Becker
12 Molecular Biology & Systematics
  Feature: Genetic diversity and habitat requirements of native fish in the Cape Floristic Region — Albert Chakona
  Feature: Western Indian Ocean marine fish biogeography and genetic connectivity — Dr Gavin Gouws
15 Research Associates
  Guest Feature: Joint efforts in marine taxonomy and ecology — Dr Franz Ublein
17 Human Capacity Development Initiatives
  Student Scoops
20 Communications and Science Advancement
21 Administration
22 Finance
23 Sponsors and Supporters
24 List of Acronyms

SAIAB Annual Highlights Report 2010–2011 ©
Compiled and edited by Penny Haworth
Design and layout by Jane Burnett
SAIAB’s flagship African Coelacanth Ecosystem Programme (ACEP), the extensive aquatic biodiversity collections managed and housed in the SAIAB Collection Facility and a suite of multi-disciplinary and multi-institutional projects conducted by SAIAB’s researchers offer excellent operational platforms for the training and education of students, as well as for high-quality scientific enterprise and productivity. SAIAB research staff supervise students studying towards higher degrees in universities in South Africa and other countries in Africa and supervision of postgraduate student projects has almost doubled from twenty-eight (28) in 2009 to fifty-six (56) in 2010. In addition, SAIAB’s strong engagement with international projects such as the Ocean Tracking Network and the International Barcode of Life (iBOL), provide leadership opportunities and linkages for a network of South African, African and international scientists.

National and international researchers use SAIAB through connections with research staff in projects and in drawing data from SAIAB’s databases and collections. The knowledge produced is used widely in South Africa, Africa and beyond to understand, manage and develop natural resources for the benefit of society and the planet.

SAIAB’s collections and the knowledge generated from them are also long-term elements that will benefit future generations. Water resources in particular are a vital resource for African nations and must be cared for both now and in future. Conserving biodiversity ensures that life on earth endures and forms the basis of ecosystem goods and services. By virtue of its unique position with regard to both marine and freshwater biogeographical boundaries, southern Africa is ideally placed to monitor and document climate change. From a marine perspective South Africa forms the southern apex of a major continental mass, flanked by very different marine ecosystems on the east and west coasts, and projecting southwards towards the cold southern ocean.

The biodiversity of inland waters is equally relevant to the national interest and SAIAB’s scientific leadership and expertise in freshwater aquatic biodiversity is vital when dealing with issues arising from exponentially increasing pressures of human population growth and development.

As a National Facility of the NRF, SAIAB serves as a major scientific resource for knowledge and understanding of the biodiversity and functioning of globally significant aquatic ecosystems.

While LIVE in interesting and, in many ways, turbulent times. The year under review was marked by some significant achievements for the SAIAB team and these are well exposed in this highlights report. A visit by the Minister of Science & Technology to formally open the new Margaret Smith Library was a real highlight.

Other plans we held for the year were mostly achieved with performance well beyond the target level. Probably the most outstanding result in this respect was the record increase in student supervision and of publications. Those two areas are vital indicators of the health of an institute like SAIAB – the indication is one of vibrant engagement with the science and young people being challenged to enter the field and to produce knowledge that is of benefit to society.

In the past year I have also witnessed a remarkable maturation in the operations and functionality of our major platforms – especially the systematic collections, and the marine oceanographic research platform spearheaded by the ACEP project with the Research Vessel (R/V) uKwabelana and the submersible Remotely Operated Vehicle (ROV). uKwabelana has rapidly shown its value and become operational as a real alternative for academic scientists and students to achieve cost-effective inshore marine physical and biological oceanography.

Plans for SAIAB to become a major partner in the Ocean Tracking Network (OTN) project directed from Dalhousie University in Canada are advanced and are likely to be realised in 2011-2012. The acoustic arrays to be deployed will provide South African scientists with a research platform unlike anything ever provided around this coast. The science that emerges will significantly change our understanding of South African marine ecosystems. Dr Paul Cowley has been the chief negotiator in this effort and we are extremely proud that such initiatives are emanating from individuals in SAIAB – ‘making a difference’ is fast becoming a cliché from my desk.

The curation and management of SAIAB’s systematic collections has been a difficult issue to get right for some time – for a variety of reasons including the very particular skills that it requires. We installed a state-of-the-art digital X-Ray inspection system, a -80°C freezer and were fortunate to receive funding for the development of new, improved containers for our larger specimens as the existing tanks presented a major problem in terms of preservative evaporation. The growth in the collection remains strong and visitorship figures reflect a dynamic collections platform. Planning for the expansion and renovation of the molecular laboratory was completed during the year but implementation of the project was delayed in the process of ensuring the correct tendering and contracting protocols were followed. Once this component is completed, the collections platform will be a fully integrated and modern world-class facility for systematic African aquatic science.

Planning for the final phase of renovations of the SAIAB building was completed during the year. There is no doubt that once these renovations are done the Institute will be a very different place physically from what it was just five years ago.

I have written much about the progress of physical aspects of the Institute in this report – but those factors are only one piece of the puzzle. On the human side the Institute has also achieved this year. Notably Professor Alan Whitfield received a DSc from Rhodes University for his contributions to South African estuarine ichthyology. This is a fine distinction for an outstanding scientist who has worked for many years in loyal service to the Institute.
Two younger researchers, Dr Olaf Weyl (C2) and Dr Ernst Swart (Y2), received improved or new NRF ratings, creating a situation where more than 80% of SAIAB’s researchers are rated — one of the highest proportions anywhere in South Africa.

NRF EVALUATION AND RATING SYSTEM

The NRF uses the evaluation and rating system as a mechanism to nurture scholarship and grow the country’s research capacity. The system underlines the importance of internationally competitive research and stimulates healthy competition between researchers and research institutions. It demands that researchers are accountable and efficient.

A. Researchers who are unexpectedly recognised by their peers as leading international scholars in their field.

B. Established researchers with a sustained recent record of productivity in the field.

C. Young researchers (normally under 35 years of age) who have held a doctorate or equivalent for less than five years at the time of application and who are recognised, based on their performance during their doctoral studies and/or early post-doctoral careers, as having the potential to establish themselves as researchers within a five year period.

Coupled with the extraordinary increase in student registrations, (65% increase) and that five MSc students graduated, two with distinctions, this is a fine record. SAIAB has also been awarded five Professional Development Programme (PDP) grants for candidates who will boost the research complement substantially. This is my last annual report as Managing Director and I wish all well for the Institute in the years ahead. My journey and time at the Institute, beginning in January 1994, has been a great privilege, adventure, and experience. I have had an outstanding team of executives to work with and an excellent and supportive staff over the many years. SAIAB today is a model National Facility and African research institution. Its future under the energetic Director Designate, Dr Angus Paterson, is likely to continue on its upward trajectory. I will leave this desk with deep gratitude to all who have worked to make SAIAB what it is today.

— Professor Paul Skelton, Managing Director

Visit to SAIAB and official opening of the Margaret Smith Library by the Minister of the DST

In opening the Margaret Smith Library on 13 September 2010, Minister of the Department of Science and Technology (DST), Naledi Pandor, observed that “Science and technology hold a lot of promise for the development of South Africa and we have the resources and intellectual structure to go forward.”

The new Margaret Smith Library and its companion, SAIAB’s state-of-the-art Collection Management Centre (CMC), commemorate the memory of JLB Smith and his wife, Margaret Smith and their legacy of discovery and research in Ichthyology and related fields.

Their life’s work, a team effort, established modern ichthyology in southern Africa and laid the ground work for the expansion of aquatic biology throughout the region.

The Library houses a specialised collection of journals and books covering topics such as aquaculture, fisheries science and aquatic biodiversity. Locally, SAIAB’s resources are used by students from Rhodes University’s Department of Ichthyology and Fisheries Science (DIFS) and the new library will provide bigger and better study areas for students both locally and from further afield.

The NRF invests significantly in SAIAB as one of its research institutes. Dr Albert van Jaarsveld, CEO of the NRF, who accompanied Minister Pandor, was impressed that the institute is "moving from strength to strength each year with the science potential exploding in many directions." Sharing Van Jaarsveld’s sentiments, Pandor indicated that she is confident that SAIAB is a valuable investment for the DST and that "the new library is a fitting recognition of the Institute’s research excellence.”

Directors Report (continued)
African Coelacanth Ecosystem Programme

The African Coelacanth Ecosystem Programme (ACEP) is in the final year of the current phase of funding. Progress to date has been exceptional with four dedicated ACEP Phase 2 research cruises, six ACEP mooring cruises and a further 12 cruises in the western Indian Ocean partnering with the Agulhas and Somali Current Large Marine Ecosystems (ASCLME) project having been completed. Phase 2 is a truly multidisciplinary (30 senior research scientists from various disciplines), multi-institutional (17 research institutes in South Africa) programme that is contributing to capacity building and training (49 registered post-graduate students) and is producing excellent science. During this phase ACEP has to date published 26 papers with a further nine submitted and 34 in preparation. In addition, 19 manuscripts have been accepted for a special issue of Deep Sea Research II on the recent research in the Mozambique Channel.

ACEP continues to provide research platforms such as the ROV (see p.7) and uKwabelana to the broader research community. The concept of a shared coastal research craft which is affordable to the individual grant holder has been unequivocally proven with uKwabelana being over-subscribed by researchers from a multitude of organisations such as SAIAB, Rhodes University, BayWorld, University of Fort Hare, University of the Western Cape and the University of Cape Town.

The collaboration between ASCLME, DST, DEA (Ocean & Coasts) and DAFF in the provision of research platforms and equipment has resulted in a highly successful multi-institutional and multi-disciplinary research programme. This success has been recognised and the programme will be continued with new phase from 2012 to 2015.

South African Environmental Observation Network (SAEON)

The Elwandle Node had a very active year and in collaboration with SAIAB has developed significant regional marine in situ monitoring and research capability. The Node has rapidly matured and in conjunction with its sister Node, Egoqezini, has developed Africa’s first comprehensive marine sentinel site in Algoa Bay. The sentinel site has gone from strength to strength and is rapidly reaching capacity within its present funding model. SAIAB integrates much of its marine research with SAEON’s marine programmes to ensure maximum collaboration and interdisciplinary operations. This collaboration between SAIAB and Elwandle extends further than science with the outreach and education portfolios working very closely together. In short, the hosting arrangement is working exceptionally well.

There were, however, a number of changes within SAEON with the administration of the Node leaving SAIAB and being centralised at SAEON head office in Pretoria. This was necessitated by the rapidly growing nature of SAEON that necessitated a more uniform administration and reporting system between Nodes. Elwandle also bid farewell to its founding manager, Dr Angus Paterson, who took the position of Director Designate at SAIAB. The new manager is Dr Tommy Bortman who is no stranger to Elwandle as he leads much of the primary production research within the sentinel site and was in the Elwandle office as the manager of ACEP.

Agulhas and Somali Large Marine Ecosystem Project

The UNDP supported GEF financed Agulhas and Somali Current Large Marine Ecosystems (ASCLME) project is hosted by SAIAB. This multinational project has the African Coelacanth Ecosystem Programme (ACEP) as one of its major partners. As South Africa’s co-financing of this project, ACEP has played a pivotal role in organising cruises and ships and has shouldered responsibility for ecosystem-based research in South African waters, whilst ASCLME has ventured out across the western Indian Ocean. While work north of 10°S has been prevented by pirate activity from Somalia, ASCLME and its partners have produced the first modern, near-synoptic oceanographic surveys of the western Indian Ocean. These cruises represent not only state-of-the-art physico-chemical oceanography, but also analyses of the entire ecosystem, including plankton and living marine resources. Ultimately this information will be used to manage and decision-makers in helping to plan and manage not only human impacts on the coast and living marine resources, but also in monitoring, predicting and understanding the likely impacts of climate change and environmental variability and how these will affect the people and economies of the region.

Two notable highlights of the period are the joint Seamounts Cruise (covered on pp. 8-9) and the deployment of long term oceanographic observation equipment. In partnership with the National Oceanic and Atmospheric Administration (NOAA) from the USA, ASCLME deployed the Agulhas Return Current (ARC) mooring. This buoy was set to unlock vital information on the outflowing currents and its interaction with the atmosphere (weather and climate). The multimillion Rand buoy was deployed on the 30th November, but the rigours of the southern oceans proved to be even more extreme that anticipated and it broke free from its mooring on 8 January 2011. ACEP managed to organise an international rescue that saw NOAA’s ARC mooring being chased across the sea by French research vessel Marion Dufresne, which ultimately caught up with and successfully retrieved the mooring on 8 March 2011. We hope this buoy will now be re-designed and re-deployed to fill in the vital information gaps from this region.

The ASCLME Project now enters a period which will see maintenance of the monitoring equipment and the analysis of the results to date, culminating in a Transboundary Diagnostic Analysis (TDA), a scientific assessment of the status of the ecosystems associated with offshore reefs. These reefs consist of relatively shallow (<90 meters) rocky banks and pinnacles between 20 and 150 km offshore.

The Agulhas Bank area represents the centre of the South African boat-based, commercial line fishing grounds and the bulk of the reef-associated species, many of which are severely overexploited, are caught in this area. To date, there is little information independent of fisheries on species composition, fish density and size composition, or on the invertebrate fauna from the areas around the offshore pinnacles on the Agulhas Bank which cannot be trawled. As these areas constitute potential spawning and nursery grounds for some commercially important linefish species, assessing the current status of the Agulhas ichthyofauna and its respective habitats will provide crucial milestones for the management of these threatened resources.

After the logistics of the deployment were dealt with (Figure 1), the first dives were used to assess the ability of the ROV to conduct quantitative surveys. Methods to measure invertebrates were established (Figure 2a) and using a laser-die-casting camera, sample invertebrates with a manipulator arm (both attached to the ROV; Figure 2c) and count fish around a bait-container (Figure 2d)

These initial trials clearly indicated the potential of the ROV to gather quantitative scientific data at depths inaccessible to conventional diving operations that rely on SCUBA, safely and cost effectively.

The aggregation of habitats on the Agulhas Bank Project is a collaboration between the Department of Agriculture, Forestry and Fisheries (DAFF), the Elwandle Node of the South African Environmental Observation Network (SAEON), SAIAB and the Department of Environmental Affairs (DEA).

— Dr Albrecht Götz, Contract Researcher based at SAEON

Deployment of the Remotely Operated Vehicle (ROV) for assessment of habitats on the Agulhas Bank

The assessment of habitats on the Agulhas Bank is a collaboration between the Department of Agriculture, Forestry and Fisheries (DAFF), the Elwandle Node of the South African Environmental Observation Network (SAEON), SAIAB and the Department of Environmental Affairs (DEA).

— Dr Albrecht Götz, Contract Researcher based at SAEON

BELOW RIGHT: Figure 2

BELOW LEFT: Figure 1
Workshop at SAIAB to sort the collections made on the 2009 Nansen Seamounts cruise provides some surprises

The International Union for the Conservation of Nature (IUCN), the United Nations Development Programme (UNDP) and Global Environmental Facility (GEF), the Agulhas and Somali Current Large Marine Ecosystem Project (ASCLME), the Norwegian Agency for Development Cooperation (NORAD), the Natural Environment Research Council (NERC) and the Zoological Society of London (ZSL) collaborated to develop a research programme focused on the high seas ecosystems and management of fisheries of the South West Indian Ocean, particularly the seamount ecosystems of the South West Indian Ocean Ridge, to contribute to ecosystem-based management of these fisheries.

Initially, the project aims to describe the marine communities of this region in order to understand and quantify their biodiversity, biogeography, and ultimately what is driving the energy supply and pathways within the seamount system. This information will inform an understanding of the impacts of the past and current deep-sea fishing activities in the region, how the dynamics of voluntary or enforced Marine Protected Areas may contribute to the conservation of vulnerable habitat, which seamounts should be fully protected and which can remain open and regulated.

The first of two cruises to answer these questions was undertaken in November/December 2009. Six seamounts were explored - five of these are distributed along the South West Indian Ocean ridge running from north to south, and one on the Madagascar Ridge. Sampling of pelagic fauna (those animals which live in the water column) using a combination of bongo nets, multisampling nets and trawls was undertaken. In addition, systematic acoustic surveying was undertaken with echosounders, and detailed multibeam maps and images created of each seamount. Oceanographic measurements, chlorophyll and plankton measurements, and bird and cetacean observations, were recorded for the full 40-day period.

Two intense post-cruise analysis workshops were held, the first of which was held at SAIAB. An 11-day scientific and capacity-building workshop was held from 8-15 November 2010. Twenty-one scientists, representing seven countries, participated in the workshop and succeeded in identifying and cataloguing 1,698 specimens of fish and cephalopods. The workshop concentrated on the description and documentation of the fish and cephalopod fauna. The SAIAB workshop was also a first opportunity to look closely at some of the physical oceanographic observations made during the 2009 Nansen cruise and to discuss links between physical ocean processes and the distribution patterns of zooplankton and phytoplankton.

The workshop was extremely successful both in terms of the volume of work achieved in a short time and in the establishment and strengthening of existing and new collaborations. The workshop also generated great interest in the project and the collection from scientists not directly or initially related to the project. All specimens documented and described during this workshop were prepared for accession into the permanent museum collection at SAIAB, where they greatly enhance an already extremely valuable research resource.

More than 200 species of fish were represented in the fraction of the collection that was worked through during the SAIAB workshop. The larval stages of approximately 30 fish species were identified. An estimated 2,200 tetraspecies remained to be identified after the Grahamstown workshop ended. This work is currently being undertaken by Dr. Eric Anderson, Curator Emeritus at SAIAB.

Among rare and very interesting fish identified amongst the trawl catches are:

- Oneirodes breffi (Krefft's dreamer), an anglerfish known only from about 30 specimens worldwide
- Pseudoscopelus australis (a snaketooth fish) described in 2006 and known from only about 30 specimens worldwide
- Early juvenile cardinalfish (Saccomariinae robusta). Photos of this will be used in a book currently being compiled at SAIAB detailing the fish fauna of the western Indian Ocean.
- Several mesopelagic fish which are extremely rare, including Lucinches normani (a species of wryfish known as paperbones), Scopelosaurus herwigi, (wryfish), an early juvenile Ranizia laevis (slender sunfish) and about 10 species of Myctophidae (lanternfishes) previously found only in the North Atlantic.

In addition to these rare fish finds, 74 species of squid were recorded, meaning that greater than 20% of the global squid biodiversity was represented in this survey. A new species of squid belonging to the family Chirolophidae (worm-lash squids) was identified (see above) and will be described.

The second workshop at Oxford University from 17 to 19 January 2011, concentrated solely on identifying and documenting the diverse crustacean portion of the catch. A full report generated immediately after the cruise details the initial analyses of the trawl catch plus the first results from oceanographic, ornithological, phytoplankton and zooplankton investigations undertaken onboard. Results from this work will be presented at the World Conference on Marine Biodiversity in Aberdeen, Scotland in September 2011 (http://www.marine-biodiversity.org). A minimum of 15 manuscripts are currently planned, some already ready for submission, to be included in a special issue of Deep-Sea Research II.
Long-term monitoring projects and climate change studies

In addition to the scheduled fieldtrips associated with long-term monitoring projects, which include summer and winter sampling of the East Kleinemonde Estuary and bi-monthly fish tagging trips to Woody Cape, Dr Paul Cowley undertook field trips to the De Hoop Marine Reserve and the Pondoland MPA. On these trips, Dr Cowley assisted with research activities linked to fish tagging and monitoring projects conducted by scientists from the Department of Agriculture, Forestry and Fisheries (DAFF) and the Oceanographic Research Institute (ORI). SAIAB telemetry research activities involved several field trips to upload data on the movements of Argyrosomus japonicus (dusky kob), Lithognathus lithognathus (white steenbras) and Pomadasys commersonni (spotted grunter) tagged using acoustic transmitters in Eastern Cape estuaries. In addition, Dr Cowley and two students went to Kosi Bay where studies on two additional estuarine dependent fishery species were initiated, namely Acanthopagus vago (river bream) and Lutjanus argentimaculatus (river snapper).

In August, Dr Cowley and his team once again participated in the annual Mackay Bridge Angling Club’s fishing competition on the Sundays Estuary. SAIAB’s involvement over the past three years has seen the club adopt a strict catch and release ethic, which has now become entrenched in the rules of this annual event. Sponsorship from Commercial Marine has become conditional on the sustainable recreational angling promoted by this event and with such emphasis being placed on sustainable recreational fishing, considerable media attention was focused on this particular initiative. The intention is to make this event 100% no-kill/catch and release in 2011.

Dr Nikki James continued to develop her climate change studies in collaboration with Prof Alan Whitfield, Dr Steven Lambert and Ms Student, Mr Craig Midgley, in the Mbiyane, Mbashe and Breede estuaries. Drs James, Cowley and Prof Whitfield jointly authored a chapter on climate change and estuarine fish communities for a new book produced by SAEON on environmental change in South Africa, and Drs James and Paterson jointly authored a chapter on global change and estuaries for the same book.

ILLUSTRATIONS of spotted grunter (top) and dusky kob (below) by Elaine Heenestra from Coastal Fisheries of Southern Africa by Phil and Elaine Heenestra.

Human impact on jewels of the South African coast – getting the message across

South Africa has about 250 functional estuaries comprising five major categories: estuarine lakes, estuarine bays, permanently open estuaries, temporarily open/closed estuaries (TOCEs) and river mouths. Temporarily open/closed estuaries (TOCEs) are generally small estuarine systems, located mostly on our eastern and southern coasts. Despite their abundance (more than 175 altogether) and widespread distribution around the coastline, it was only in the 1980s and 1990s that research effort in this country started to focus on issues pertaining to TOCEs. TOCEs are important as they represent nursery areas on a coastline that does not have large, sheltered bays, mangrove swamps, seagrass beds, lagoons, salt marshes and similar “traditional” nursery habitats – TOCEs fulfil the same function and are thus vital to sustained fishery productivity/survival of many species.

Despite considerable diversity in terms of shape and size, estuaries represent sheltered coastal habitats that are sought after for human activities ranging from resource exploitation (e.g. fishing) to residential and industrial development. This attraction to estuaries has meant that coastal settlements are built on or around these water bodies, which will inevitably impact on these ecosystems. Consequently, the conservation and management needs of estuaries must be addressed by municipal, provincial and national decision makers.

During 2010 there was concrete evidence of the success of SAIAB’s research focus on temporarily open/closed estuaries (TOCEs) in South Africa. Prof Alan Whitfield was a co-author of a chapter and entire book, led by Prof Renzo Perissinotto, on the ecology of TOCEs in the country. Both Prof Whitfield and Dr Cowley were also instrumental in translating research findings on TOCEs, particularly the East Kleinemonde Estuary, to create a popular full colour booklet for use by scholars and the general public. This 57-page guide, entitled “A guide to the ecology of temporarily open/closed estuaries in South Africa”, was compiled by Dr Aidan Wood, edited by Prof Alan Whitfield and Dr Paul Cowley and funded by the Water Research Commission (WRC).

A primary aim of the booklet is to educate and convey our current understanding of how TOCEs function and how human activities impact on their ecology. An informed coastal community is one that has the knowledge to manage and conserve their estuarine resources for present and future generations.

Prof Whitfield comments: “I am sure this user-friendly guide will contribute towards that goal and bring a better understanding and appreciation of these ‘jewels’ of the South African coast.”

New approaches in the study of estuarine fish

Estuaries are some of the most productive ecosystems on the planet and provide a rich source of food for fish inhabiting these areas. As such, estuaries have been recognised as important nursery grounds; however our understanding of how they function in this role is not fully understood. A closer look at almost any estuary will reveal that these systems actually comprise a variety of habitats which together form a patchwork creating the broader estuarine landscape. The aim of this research was to examine how different understudied habitats function as nursery grounds using new and innovative technology.

The first project involved using an underwater camera to record fish assemblages which are associated with rocky reefs, emergent reeds (Phragmites australis) and bare sand within the clear waters of the East Kleinemonde Estuary. This involved mounting an underwater video camera on a small tripod and positioning it in either the reef or reeds, or on the bare sand and filming for an hour. The images collected by the camera were recorded onto a shore-based video recorder connected to the camera via a cable.

Findings from these recordings are significant as they show for the first time that two habitats, which have similar fish communities within estuaries, are clearly being utilised in differing ways and scientists and resource managers should consider this when studying estuarine habitats and their potential as nursery areas. Even small isolated patches of structured habitats support fish assemblages within South African estuaries. Importantly, it appears that fish behaviour among habitats varies even when the community consists of the same species. This information will be valuable to management organisations for the implementation of plans concerning the protection of estuarine habitats and assessing the impact of development in coastal areas.

— Dr Alistair Becker, Postdoctoral Fellow

Dr Alistair Becker received his PhD in 2007 from Deakin University, Australia. He has worked as a postdoctoral fellow at SAIAB since 2009 after being awarded a Claude Leon Foundation fellowship. His research interests focus on the association of fish assemblages with habitats in coastal zones and how this fits with our current understanding of nursery grounds and habitat fragmentation. Becker is of the view that postdoctoral studies facilitate new collaborations and enable young researchers to build their scientific career with dedicated projects in new research fields. The research experience is intense and postdocs are able to work independently and deliver a large number of publications in a relatively short time.

More importantly, postdoctoral fellowships act as an essential stepping stone for young researchers to gain further valuable experience before many of them move into academic positions at universities or research institutes.
Coastal Whales and Dolphins of the Eastern Cape:

Cetacean research in the Eastern Cape was successfully started in recent years by SAIAB contract researcher Dr Stephanie Plön. Dr Plön, has a joint appointment with SAIAB, SAEON and the Port Elizabeth Museum. Two MSc students and one Honours student successfully completed their projects in 2010 under two main research programmes: a) the trophic ecology of dolphins based on specimens incidentally caught in shark nets off KwaZulu-Natal and b) a survey of the cetaceans found in Algoa Bay.

The trophic ecology of a number of dolphin species commonly caught in the shark nets off KwaZulu-Natal has not been examined since the mid-1990s and access to samples lodged in the Graham Ross Marine Mammal collection housed at the Port Elizabeth Museum now allows examination of long-term trends in the diet of these animals. Research on the diet of long-beaked common dolphins (Delphinus capensis) and the Indo-Pacific humpback dolphin (Sousa chinensis) were completed in 2010, while the Indian Ocean bottlenose dolphin (Tursiops aduncus) is still being examined. These projects are carried out in collaboration with Dr Malcolm Smale at the Port Elizabeth Museum and Prof William Fromen on the Department of Zoology & Entomology at Rhodes University.

Another collaborative effort is the examination of the spatio-temporal distribution of the cetaceans in Algoa Bay, with the SAEON, the South African National Parks Board (SANParks) and the Department of Environmental Affairs (DEA) (Branch: Oceans and Coasts) being involved. A number of developments in Algoa Bay in recent years have highlighted the need to examine the distribution (both seasonal and geographical) of these animals in the bay in an effort to identify areas important to the various species. In 2010, Dr Plön produced Coastal Whales and Dolphins of the Eastern Cape, a pocket book which provides a guide to identifying seven of the most common species of whale and dolphin found in the Eastern Cape waters. The guide includes pictures with comprehensive descriptions of each species, including information on the distribution, group sizes, weight and length of these animals. For a quick reference to recognise differences between the two mammal groups, the guide also includes whale and dolphin comparison charts. People very easily identify the different species of big cats but, as Plön explains, “People don’t so readily know how to identify whales, so this guide is far everyone with an interest in whales and dolphins, interested divers, sailors and people who walk on the beach hoping to spot a whale.”

— Dr Stephanie Plön, Contract Researcher

A revised version of this guide to the Cape Floristic Region was produced, which Dr Swartz contributed freshwater fish information. A new species of Hippopotamyrus was described from the Kunene River in collaboration with Professor Bernd Kramer and the Cypriniformes Tree of Life project published a major phylogenetic analysis of the Danioninae, to which Dr Swartz contributed.

Dr Ernst Swartz was in Christchurch (South Island, New Zealand) on a sabbatical visit to NIWA, when a 7.1 magnitude earthquake struck the city at 6:32am on 4 September 2010. Here, Ernst is standing on the Greendale fault that formed as a result of the quake. Amazingly only two residents were seriously injured and both survived, despite this earthquake being much more powerful than the February 2011 earthquake (6.3 magnitude) that tragically killed 181 people.

A new species of storebasheen called Hippopotamyrus anguliferus, was described by Bernd Kramer and Ernst Swartz. The discovery stems from a survey they did with Luis da Costa on the Kunene River in northern Namibia in 2006. Mr Ofer Gom continued his work on the Apogonid genus Sphimias, adding two more new species to the ongoing revision of this group. At the end of the year, Mr Gom and Dr Gavin Gowous collected samples for the WOOMSA project on WO biogeography and connectivity in the Republic of the Maldives, where they worked closely with staff of the local Marine Research Center. Barcoding at SAIAB received a boost with the arrival of Dr Tiulii Mäkinen (a postdoctoral fellow from Finland) as part of an IDRC project led by Prof Paul Skelton.

Mr Ofer Gom continued his work on the Apogonid genus Sphimias, adding two more new species to the ongoing revision of this group. At the end of the year, Mr Gom and Dr Gavin Gowous collected samples for the WOOMSA project on WO biogeography and connectivity in the Republic of the Maldives, where they worked closely with staff of the local Marine Research Center. Barcoding at SAIAB received a boost with the arrival of Dr Tiulii Mäkinen (a postdoctoral fellow from Finland) as part of an IDRC project led by Prof Paul Skelton.
Western Indian Ocean marine fish biogeography and genetic connectivity

Marine resources are extremely important in terms of individual livelihoods, food security, and local and national economies in the countries of the western Indian Ocean (WIO). Effective conservation or management, particularly in terms of the management of fisheries stocks or the designation of no-take Marine Protected Areas, relies on understanding the contemporary structure of stocks and the dispersal of the species concerned. Effective reserve networks need to consider scales of connectivity and dispersal so that protection within reserves can adequately sustain the use of a resource outside of that reserve. Conservation of areas that are home to unique biological diversity relies on the accurate identification of such diversity. Genetic data provide the means to address all these.

The most important contribution of this study is to provide information to support conservation and management for the sustainable use of such resources. To do this, researchers from SAIC and their collaborators are adopting a genetic approach and examining a range of predominantly reef-associated fish species, to understand patterns of differentiation and connectivity at multiple historical and contemporary scales across the WIO.

The team includes research staff and students from SAIC and collaborators from the following organisations: IFREMER, Réunion, Kenya Marine and Fisheries Research Institute, and Sokosine University of Agriculture, Tanzania. The team also draws on the expertise of renowned ichthyologists Gerry Allen (Conservation International), Daniel Golani (Hebrew University, Israel) and Jack Randall (Bishop Museum, Hawaii).

Understanding patterns of dispersal is particularly relevance for the conservation and management of marine resources, so contemporary patterns of connectivity and gene flow which influence dispersal within the WIO are important aspects of this study. DNA sequence data and microsatellite data are being generated from representative specimens of the target species, including approximately 20 species from nine families, collected from across the entire WIO and analysed. This range of taxa provides the opportunity to consider how different life history and habitat preferences interact with the physical features of the environment to produce the observed genetic structure. Interesting patterns are emerging from the preliminary data, demonstrating the "genetic isolation" of certain regions (e.g., Réunion and the Seychelles) for certain species. It is hoped that this study will begin to elicit a general understanding of the origins of WIO biodiversity and lead to a longer-term programme in which more marine taxa, beyond fish, are considered.

— Dr Gavin Gouws, Aquatic Biologist

Joint efforts in marine fish taxonomy and ecology

The taxonomy, ecology, and management of marine fishes require enhanced research efforts. This fact first struck me when, as a young student at the University of Vienna, Austria, I attended a field course on the behaviour of marine fishes in the Adriatic Sea near Rovinj, Croatia. Ever since then, and even when working in rather different research fields - such as the feeding ecology of cyprinid fishes in Austrian lakes, the predatory behaviour of cave-dwelling salamanders in the French Pyrenees; the conservation biology of salmomid fishes in alpine and pre-alpine waters; or the habitat use and predator avoidance of small freshwater crustaceans (Ostracoda) - my deep desire to plunge into the world's oceans to study marine fishes has never left me. The numerous research opportunities I have had through my scientific career culminated in my appointment as a Principal Scientist at the Institute of Marine Research (IMR), Bergen, Norway, in 2003.

My early studies on the behaviour of blennies (Blenniidae) and goatfishes (Mullidae) were done while snorkeling or diving in the Mediterranean and the Red Sea in the 1980s, but it was my appointment as a temporary Fish Curator at the Research Institute and Natural History Museum Senckenberg, Frankfurt, Germany, in 1992 that provided the first firm foundation for detailed studies of coastal and deep-sea fish taxonomy and ecology. I started collaborations with leading ichthyologists, such as Jørgen Nielsen, then Fish Curator at the Zoological Museum, University of Copenhagen, who collaborated with Phil Heemstra, at then the JLB Smith Institute of Ichthyology, through providing a chapter in Smith's "Sea Fishes: The main targets of my research interests at that time were the cuskeels (Ophidiidae) and goatfishes from the Indo-Pacific. During subsequent years while I was a Research Fellow at the Austrian Academy of Sciences, Vienna and an Associate Lecturer at the University of Salzburg, Austria, I studied the ecology and the local diversity of shelf and deep-sea fishes of the Eastern-central and Northern Atlantic, and participated in several research cruises using various fishing gears for collections and underwater vehicles for direct behavioural observations. A highlight during this period was organising the Vienna Deep-Sea Symposium in 1995 to commemorate the centenary of the first large oceanographic expedition to the Red Sea with the Research Vessel Pola, scientifically a very rewarding expedition under the Austro-Hungarian flag.

An invitation from the IMR-based Center for Developmental Cooperation in Fisheries (The Nansen Programme http://www.un.挪 or http://www.wmo.org/?) to participate in a research cruise with the Norwegian research vessel Dr Fridtjof Nansen off Mozambique in 2007, brought me back to the Indian Ocean and the African continent - and into close contact with Dr Phil Heemstra, Curator Emeritus at SAIC. During a joint meeting at SAIC immediately after our cruise, we decided to collaborate on the taxonomy of goatfishes of the genus Upeneus from the Western Indian Ocean, also in support of a planned five-volume compendium on the coastal fishes from this area, termed "Das Buch" (That Book!) by Wouter Holleman, SAIC Honorary Research Associate and Chief Editor of the Smithsonian publication series. The collaboration with Phil Heemstra has resulted in three publications with descriptions of six new species and a regional review of this genus. In addition, I reviewed the genus Mulloidichthys from this region and described a new species, M. mullae, named after a South African dive operator who has worked with SAIC over many years. In collaboration with Jack Randall, Curator Emeritus at the Bishop Museum, Honolulu, Hawaii, USA and long-standing associate of Phil and Elaine Heemstra, I completed and submitted the goatfish chapter for "Das Buch" in late 2010.

Recently I have been extending my taxonomic studies of goatfishes towards the Eastern Indian Ocean and the Pacific with the SAIC fish collection playing a central role for comparisons of western Indian Ocean material with loaned samples from fish collections in Australia, Europe and the US. Apart from planned descriptions of several new species and the preparation of regional reviews, population studies of ecologically and/or economically important goatfish species have been started in close collaboration with SAIC Aquatic Scientists, Dr Gavin Gouws, an expert in phylogeography and molecular systematics. Our comparative approach shall be based on both phenotypic and molecular characters to understand the degree of differentiation and connectivity among populations across different localities and regions within the Indo-Pacific.

During the cruise off Mozambique I also successfully collected samples of deep-water fishes from the northern Mozambique Channel and this collection may reveal several new species for science as well as new geographical records. Shortly after the cruise the material was transferred to SAIC and Eric Anderson, Curator Emeritus at SAIC, and I have started to examine it in detail. Jørgen Nielsen, now Curator Emeritus in Copenhagen, will assist me with taxonomic and systematic studies of the Ophidiidae collected during this cruise, in particular the species genus...
SAIAB has a growing number of Honorary Research Associates who contribute valuable work to the institute and are first order stakeholders in our networks and relationships. Two of these associates, Wouter Holleman and Denis Tweddle are in residence and a further two, Dr Phil Heemstra and Dr Eric Anderson, are in residence in their capacity as Curators Emeritus. Over the past five years, an increasing number of externally based aquatic biodiversity specialists, some of whom are retired, have applied for Honorary Research Associate status with SAIAB. The successful applicants are a key element in SAIAB’s ability to increase the scope and volume of our scientific outputs. For example, we now have Research Associates who are frog and squid experts, have lodged their valuable collections at this National Facility, and are publishing papers within in these disciplines under our name. We are able to fund their visits to curate these collections using publication subsidy income received from the NRF Research & Innovation Reward Programme. Other Research Associates are contributing specimens to the National Fish Collection, especially in areas where we lack the necessary expertise, e.g. Dr Allan Connell from KwaZulu-Natal, who has specialised in the study of marine larval fishes during his retirement, has donated his unique and comprehensive larval fish collection to SAIAB. All the above collections were acquired at no financial cost to SAIAB, either in terms of field collecting expenses or salaries. In addition, an indication of the magnitude of scientific contributions by Research Associates to SAIAB is provided by the fact that they were or co-authors on 25 (48% of total) of our ISI rated papers published in 2010, and that this contribution is likely to grow in future.

— Prof Alan Whitfield, Chief Scientist
Research Associates: International
Dr Tjir Naesje, Norwegian Institute for Nature Research (NIINA) Trondheim, Norway
Dr Kate Moots, Department of Biology, University of Guam, Guam, USA
Prof Berndt Kramer, Animal Behaviour and Behavioural Physiology, Institute For Zoologie, Regensburg University, Regensburg, Germany
Dr Tör Naesje, Norwegian Institute for Nature Research (NINA) Research Associates: International
Dr David Ebert, Pacific Shark Research Centre, Moss Landing Marine Laboratories, Moss Landing, California, USA
Dr Michael Elliott, Department of Biological Sciences, Institute of Estuarine & Coastal Studies (IECS), Hull, United Kingdom
Dr Steven Blairer, Retired, Queensland, Australia
Dr Johan Marius, Independent Consultant, Christchurch, New Zealand
Dr Trevor Harrison, Water Management Unit, Northern Ireland Environment Agency, Lisben, Northern Ireland
SAIAB’S HONORARY RESEARCH ASSOCIATES

A further highlight in SAIAB’s capacity building efforts was the award of five DST Professional Development Programme (PDP) placements to SAIAB for 2011.

DST NRF interns
The National Research Foundation (NRF) is responsible for the management of the DST-NRF Internship Programme in which unemployed Science, Engineering and Technology (SET) graduates and postgraduates are offered an opportunity to acquire practical work experience through mentoring and exposure to a research environment. Candidates apply for internships in various areas of specialisation or disciplines. The purpose of the NRF/DST Internship Programme is to ensure the provision of accelerated learning opportunities that enhance interns’ work place competencies and trigger their interest to pursue further studies.

Research: Khanyisile Ngomane
Research: Manqai Kraai
Information Technology: Elvis Rungqu
Science Communication: Beyhana Mohamed
On the strength of the 2010 Communications Internship SAIAB was also awarded a Graduate Internship in Science Communication from Rhodes University (RU) for 2011.

ABOVE: Dr Tuuli Makinen (back) with (from front) Sisanda Mayekiso (BSc Hons student), Precious Reddy (Senior Laboratory Assistant) and Khanyisile Ngomane (DST/NRF Intern).

Students supervised by SAIAB staff are closely monitored and encouraged to perform to the best of their ability. To establish their career paths in aquatic science early on, most students are encouraged not only to attend but to participate in conferences, symposia and workshops, as well as to turn their project research into published papers.

SAIAB Annual Highlights Report 2010–2011

SAIAB Annual Highlights Report 2010–2011
PhD students

PhD student, Amber Childs: “An assessment of estuarine dependency and habitat connectivity of the iconic sciaenid *Argyrosomus japonicus*, with implications for fisheries management.”

PhD student, Rhett Bennett: “Habitat use, movement patterns and stock delineation of an important endemic coastal fish species, *Lithognathus lithognathus* (white steenbras).” Rhett gave a presentation during that period (April 6 2011), at the 14th SAMSN/49th ECSA International Conference.

PhD student, Sisanda Mayekiso: “Systematics and biogeography of South African mormyrid fishes.”

MSc students

MSc student, Moqebela Morallana: Western Indian Ocean Marine Fish Biogeography

MSc student, Nosipho Springbok: Western Indian Ocean Marine Fish Biogeography

MSc student, Caswell Marimbuwa: achieved 2010 - Goby Genetics

MSc student, Taryn Murray: Residency, movement and migration of poonkop (*Cymatogaster nasutus*) with integrated genetic analyses

BSc Honours

BSc Honours student, SiSanda Mayekiso: achieved distinction 2010, Western Indian Ocean Marine Fish Biogeography

ACEP research projects:

An additional 48 students were registered with projects run through ACEP.

**STUDENT SCOOPS!**

The three students featured here have had conference and publication successes early in their careers:

PhD student, Amber Childs

Amber’s PhD project makes use of a suite of techniques including acoustic telemetry, otolith micro-chemistry and conventional tag-recapture techniques to investigate estuarine dependency and multiple habitat use of an iconic fish species, the dusky kob *Argyrosomus japonicus*. Otoliths (“earstones”) are calcified structures found in the head of teleost fishes, providing fish with balance and hearing. Otoliths, which consist of CaCO3 and a gelatinous protein matrix, are mainly used for age and growth studies, but in recent years have been extended to study fish migrations. Otolith micro-chemistry provides a natural tag that can be used to identify important nursery estuaries in the life history of *A. japonicus* and to quantify the degree of estuarine use. Solution-based (SB-ICPMS) and laser-ablation (LA-ICPMS) coupled plasma mass spectrometry (ICPMS) are two different techniques used to analyse the elemental composition of otoliths.

While otolith micro-chemistry is a well-established method used to study fish movements and life-history migrations, worldwide, it is a technique that has never yet been used in South Africa. To gain the necessary experience, knowledge and expertise in the field of otolith micro-chemistry, Amber visited Dr Audrey Darnaud at the CNRS laboratory at the University of Montpellier in France during April/May 2010 and January/February 2011. Prior to her departure, the otoliths were extracted and prepared (cleaned and decontaminated) in SAIAB’s newly established, Class 100 clean otolith laboratory. The CNRS Laboratory and the Geoscience Department at the University of Montpellier are host to state-of-the-art Class 100 clean laboratories, which house an ICPMS, suitable for both solution-based and laser-ablation.

The specific objectives of the trips were twofold: 1) identify key nursery habitats for *A. japonicus* by analysing (using SB-ICPMS) the otolith elemental composition of young-of-the-year juveniles collected from several estuaries and testing if the differences in elemental composition are significant to generate discriminable elemental chemical signatures (natural tags) in the otoliths of *A. japonicus* and b) map the lifetime use of estuaries by analysing (using LA-ICPMS) the Sr:Ca ratio in adult otoliths (strontium Sr is directly related to salinity - high concentrations of Sr would represent marine use, while low levels would represent estuarine use and/or freshwater). Analysis of otolith elemental compositions identified the importance of turbid estuaries to the successful recruitment of *A. japonicus*, while Sr:Ca ratios revealed dependence on estuaries during their juvenile phase, an affinity to estuarine habitats during early adulthood (50% maturity), but reduced estuarine use upon attaining 100% maturity. The experience Amber acquired during her trip abroad has enhanced her PhD studies and has provided her with the necessary training to conduct otolith micro-chemistry in South Africa.

Furthermore, it was an incredible opportunity to visit a foreign university, collaborate with an international researcher, and strengthen the relationship between SAIAB and the University of Montpellier.

PhD student, Bruce Ellender

In a paper entitled, “Invasion of a headwater stream by non-native fishes in the Swartkops River system, South Africa” published in the journal *African Zoology* (46 (1): 39-46) with supervisors, Drs Olaf Weyl and Ernst Swartz, PhD student, Bruce Ellender (right) demonstrated that the Blindekelkhoof stream, a Swartkops River tributary, was invaded by alien fish even though these fishes were eradicated by nature conservation authorities in 1989. The reinvasion of the Blindekelkhoof stream indicates that eradication of alien fishes in headwater streams is ineffective in the absence of physical barriers that would prevent reinvasion from downstream.

MSc student, James McCafferty

James McCafferty (above right) won a prize for the best student presentation at the 39th South African Society for Aquatic Science (SASSaS) Conference, the theme of which was “Aquatic biodiversity and climate change – an arid region perspective.” McCafferty, in his first year of MSc, presented a paper entitled: “Can invasive populations of barbel *Clarias gariepinus* be viably harvested in the Eastern Cape?” The paper was co-authored by fellow Honours students, Richard Peel (above left) and Reece Wartenberg, under the supervision of the SAIAB’s Senior Aquatic Biologist, Dr Olaf Weyl and Professor Tony Booth from the Rhodes University Department of Ichthyology and Fishery Science (DIFS).

MSc student, Alexis Olds

The Wilderness Lake system in the Western Cape forms a major component of the Garden Route National Park, which is managed by the South African National Parks Board (SANParks). The lakes and interconnecting channels are part of a Ramsar* site. As a result of introductions into the catchment area, four alien non-native fish species occur in the lakes system. Alexis Olds initiated an ongoing assessment of the fish fauna in the system in 2010. As the source of invasion was from upstream introductions, the research emphasises the importance of a catchment wide approach to conservation planning.

“The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Olds, who is supported by the Centre for Invasion Biology (CIB) at Stellenbosch University and supervised by Dr Olaf Weyl, has been evaluating the presence and establishment of alien fishes in the system. To date, the research has resulted in one peer reviewed paper and was presented at the South African Marine Science Symposium (SAMSS) and at the SASSaS conference where it was recognised as the best oral presentation delivered by an MSc student.

T

hree invasive fish species, the common carp *Cyprinus carpio*, Mozambique tilapia *Oreochromis mossambicus* and largemouth bass *Micropterus salmoides* are popular angling species and the fourth, the mosquitofish *Gambusia affinis* was most likely introduced for mosquito control. These alien fishes are recognised as being among the worst invasive fish species worldwide. Elsewhere, they have been linked to a variety of impacts including competition with native biota, alterations of invertebrate and vertebrate communities through predation, habitat alteration and introduction of fish diseases. Understanding the status and establishment of these fishes in the Wilderness Lakes is therefore important for the development of strategies with which to manage these invasions.

ILLUSTRATIONS FROM TOP TO BOTTOM: The common carp *Cyprinus carpio*, the Mozambique tilapia *Oreochromis mossambicus*, the largemouth bass *Micropterus salmoides* and the mosquitofish *Gambusia affinis* (cf. the comparisons made by Paul Skelton. *Freshwater Fishes of Southern Africa*).
Excellence in science — communicating who we are

A particular highlight for SAIAB was the production of a booklet by the Academy for Sciences in the developing world, ‘Excellence in Science’. The booklet was published in 2007. The focus of the booklet was to showcase the high level of scientific excellence taking place in the developing world and to illustrate how science is being put to work to address critical social needs in the South.

Conversation as catalyst for change: National Science Week

National Science Week (NSW) is an annual countrywide celebration of science. All nine provinces in the country participate in NSF and the Makana National Science Week Alliance, which comprises the Grahamstown District Department of Education (DEA), South African Environmental Observation Network (SAEON) Elwandle Node, Scifest Africa and SAIAB, was set up to organize and run NSW 2010 events in Grahamstown and environs. The objective of NSF is to promote Science, Engineering and Technology (SET) among various sections of the population, expose the public to the economic benefits of a science to economic development and alert educators and learners to science-based careers. Particular attention is given to disadvantaged sections of the population. Makana NSW Alliance members served on the planning committee for and exhibited at the national launch of NSW 2010 held at the University of Fort Hare and also offered a number of events during the week aimed at encouraging the interest of learners, parents, educators and the wider public in science.

SAIAB’s contribution was to launch science clubs at four high schools: Nathaniel Nyala High School, Nkombulelo High School and Mary Waters High School in Grahamstown and Hendrik Kanise High School in Alice. Each launch included the donation of a science kit and an interactive and educational science show presented by Rhodes University Biochemistry PhD student, Jess Goble. The science show illustrated how the learners can do experiments without a laboratory and with ordinary household items like bicarbonate of soda and dishwashing liquid. After school eatatorium for learners was also provided with a play entitled, ‘Through his eyes’, performed by a local theatre company, beneath the Skin Velocity. The play was performed by three young men, playing a number of characters. The play successfully deconstructs and makes accessible Charles Darwin’s Theory of Evolution.

Following the theme of NSF, “The role of science in economic development”, learners had the opportunity to see first-hand how science contributes to a country’s economy. The take-a-learner-to-work-day initiative was well-supported by Grahamstown businesses.

The highlight of the week was a Science Café themed Conversation as a catalyst for Change. The World Café is a structured and facilitated discussion which aims to encourage conversation, debate ideas and brainstorm solutions pertaining to a particular issue. The conversations link and build on each other as people move between groups, cross-pollinate ideas, and discover new insights into the issues at hand. Combining two themes, namely the 2010 International Year of Biodiversity and the role of science in economic development, the NSF World Café explored potential economic benefits drawn from conserving our biodiversity and how our individual actions impact on biodiversity conservation. To set the scene, SAIAB’s Managing Director, Prof Paul Scothern provided direction for the conversation with a presentation entitled “B for Biodiversity- Is or not B?”. The World Café brought together 50 learners, students, educators, lecturers, researchers and members of the general public.

A new generation of science communicators

The aim of the science communication internship is to develop the professional capabilities of suitably qualified candidates to enhance science reporting and communication in the Institute. The emphasis is to encourage dialogue between researchers and journalists and to get the journalist out into the field to experience the scientific method first hand. Communications output from SAIAB received a boost through Reyhana Mahomed’s internship. A highlight of her year was the Southern African Association of Science and Technology Centres (SAASTEC) 13th Conference at which her presentation on the use of social media to transform the way we communicate was very well received. A highly rewarding aspect of this internship for SAIAB Communications was that Ms Mahomed took full advantage of the opportunity, developed her science communication skills and established a professional profile to the point of being appointed directly from this internship into the position of Assistant Director for Media Liaison at the Department of Environmental Affairs (DEA). An agreement established with a local environmental committee, which looks at ways of reducing our carbon footprint.

Besides our Risk (Health and Safety) Committee, SAIAB has also established an Environmental Committee which looks at ways of reducing our carbon footprint. An agreement established with a local businesswoman ensures removal of our waste alcohol, which is then processed, recycled and returned as a clean product for reuse in the Collection.

— Penny Haworth, Communications Manager
SAIAB has had an active and productive year. Management restructuring and the appointment of a new Finance and Operations Manager were fundamental to effective and efficient service delivery. These interventions were necessary to ensure that cost-saving measures are introduced across the unit with minimal disruption to performance.

The second phase of renovations and refurbishment of the building has been completed and the new Margaret Smith Library was formally opened by Minister Naledi Pandor, Minister for Science and Technology. An ad-hoc infrastructure grant has allowed planning to go ahead for an upgrade to our IT networking and server infrastructure, as well as to equip the Wet Collection Facility with modern storage containers. Funding for the third and final phase of refurbishment was secured; this will complete the ground floor ablations, refurbish one of the top floor laboratories into a molecular genetics research laboratory and create a modern, dedicated state of offices for IT, Finance, HR, Administration and Governance sections on the first floor.

SAIAB set up and managed the administration and finances of the SAEON Elwandle Node for the past four years. In December 2010 all systems were successfully transferred as a “going concern” to SAEON Head Office. SAIAB continues to host the Elwandle Node in office offices close to the main campus and works closely with the Node on several research programmes.

— Wendy Sweetman, Finance Manager

SAIAB Annual Highlights Report 2010–2011

We gratefully acknowledge the following agencies for supporting the work of SAIAB through consultancies, donations, sponsorships and grants.

### INSTITUTIONAL SUPPORT

<table>
<thead>
<tr>
<th>SOURCE OF SUPPORT</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>African Parks Network</td>
<td>Bangweulu Wetlands Project</td>
</tr>
<tr>
<td>Agulhus and Somali Currents Large Marine Ecosystems Project (ASCLEP)</td>
<td>IUCN Seamounts Workshop at SAIAB</td>
</tr>
<tr>
<td>ALEXNDR</td>
<td>Alexander Bay Assessment Study</td>
</tr>
<tr>
<td>Aurecon Group</td>
<td>Swartkops Estuary Study</td>
</tr>
<tr>
<td>British Ecological Society</td>
<td>Student Support</td>
</tr>
<tr>
<td>Canadian Centre for DNA Barcoding (CCDB), University of Guelph (Canada) and their sponsors</td>
<td>Fish Barcode of Life (FBOL) and International Barcode of Life (IBOL) projects</td>
</tr>
<tr>
<td>Commercial Marine</td>
<td>Catch and Release Angle Awareness Programme</td>
</tr>
<tr>
<td>Consortium for the Barcode of Life (CBOL)</td>
<td>International Barcode of Life (IBOL) projects</td>
</tr>
<tr>
<td>Council for Scientific and Industrial Research (CSIR)</td>
<td>Conservation planning projects</td>
</tr>
<tr>
<td>Dalhousie University, Canada</td>
<td>Ocean Tracking Network, Telemetry Research</td>
</tr>
<tr>
<td>Dennis and Sally Polachski</td>
<td>Foundation sponsors: Western Indian Ocean Coastal Fishes – Book project</td>
</tr>
<tr>
<td>Deutsche Forschungsgemeinschaft</td>
<td>Kunene Myrmicid study</td>
</tr>
<tr>
<td>Institut de Recherche pour le Développement (IRD)</td>
<td>Telemetry research in Seychelles and post-grad student support</td>
</tr>
<tr>
<td>International development Research Centre (IDRC), Canada</td>
<td>IBFL Project and post-doctoral Research Fellowship</td>
</tr>
<tr>
<td>International Foundation for Science (Sweden)</td>
<td>Freshwater fish conservation project and student support</td>
</tr>
<tr>
<td>International Foundation for Science (Sweden)</td>
<td>Endemic spadefoot toad conservation assessments</td>
</tr>
<tr>
<td>International Seabed Sustainability Foundation</td>
<td>Student support in Seychelles</td>
</tr>
<tr>
<td>International Foundation for the Conservation of Nature (IUCN)</td>
<td>GEF Seamounts Cruise</td>
</tr>
<tr>
<td>International Foundation for the Conservation of Nature (IUCN)</td>
<td>Freshwater Biodiversity Studies</td>
</tr>
<tr>
<td>Esmoovu KZN Wildlife</td>
<td>Issue of collecting permits - mammal systemsatics and phylogenetics</td>
</tr>
<tr>
<td>Isimangaliso Wetland Park Authority</td>
<td>ACEP Biodiversity Project</td>
</tr>
<tr>
<td>Honda Marine (SA)</td>
<td>NIPF and Telemetry Research</td>
</tr>
<tr>
<td>Namibia National Foundation</td>
<td>ICGMA Project</td>
</tr>
<tr>
<td>National Science Foundation (BSA)</td>
<td>Nompumelelo Centre</td>
</tr>
<tr>
<td>Nelson Mandela Metropolitan University (NMMU)</td>
<td>Water Project</td>
</tr>
<tr>
<td>Petro SA</td>
<td>Telemetry Research</td>
</tr>
<tr>
<td>Research Council of Norway and National Research Foundation (NNRF-SA)</td>
<td>Freshwater fish telemetry studies on Fishery Species in SA Estuaries and Lagoons</td>
</tr>
<tr>
<td>Rhodes University</td>
<td>Library WP personnel grant</td>
</tr>
<tr>
<td>Rhodes University</td>
<td>Library WP personnel grant</td>
</tr>
<tr>
<td>Rhodes University</td>
<td>Lectures and tutorials</td>
</tr>
<tr>
<td>Rhodes University/Claude Leon Foundation</td>
<td>Freshwater fish conservation project and student support</td>
</tr>
<tr>
<td>Rufford Small Grants Foundation</td>
<td>Freshwater fish conservation project and student support</td>
</tr>
<tr>
<td>SGI Engineers and Environmental Consulting</td>
<td>Hawk-bill Estuary management</td>
</tr>
<tr>
<td>South West Indian Ocean Fisheries Project (SWIOFP)</td>
<td>Slinger project and student support</td>
</tr>
<tr>
<td>University of Dar-es-Salaam</td>
<td>NISC student support</td>
</tr>
<tr>
<td>University of Pretoria</td>
<td>Student bursaries</td>
</tr>
<tr>
<td>University of Stellenbosch, Centre for Excellence – Invasion Biology (CIB)</td>
<td>Alien Invasions Project</td>
</tr>
<tr>
<td>University of Zurich and the National Research Foundation</td>
<td>Revision of biotic diversity in South Africa’s winter rainfall region</td>
</tr>
<tr>
<td>Water Research Commission (WRC)</td>
<td>Diatom Collection</td>
</tr>
<tr>
<td>Water Research Commission (WRC)</td>
<td>Randegat Project</td>
</tr>
<tr>
<td>WWF Marine Science Association (WWFMSA)</td>
<td>Climate Change Project</td>
</tr>
<tr>
<td>WWF Marine Science Association (WWFMSA)</td>
<td>NACMA Research Fund – WWF Fish Biograpgy</td>
</tr>
<tr>
<td>WWF Prince Bernhard scholarships for Nature Conservation</td>
<td>Student support</td>
</tr>
<tr>
<td>Worldwide Fund for Nature, South Africa (WWF-SA)</td>
<td>Table Mountain Monitoring Project</td>
</tr>
<tr>
<td>WWF-SA Sustainable Seabed Initiative (SASSI)</td>
<td>Networking partners’ workshop attendance</td>
</tr>
</tbody>
</table>

### ABRIDGED FINANCIAL STATEMENTS

#### INCOME STATEMENT

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual</th>
<th>Budget</th>
<th>2009/10</th>
<th>2010/11</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R’000</td>
<td>R’000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>30201</td>
<td>24473</td>
<td>29139</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>(12999)</td>
<td>(10130)</td>
<td>(11407)</td>
<td></td>
</tr>
<tr>
<td>Salaries</td>
<td>(13700)</td>
<td>(15124)</td>
<td>(13052)</td>
<td></td>
</tr>
<tr>
<td>Fixed assets</td>
<td>(27446)</td>
<td>(26253)</td>
<td>(31192)</td>
<td></td>
</tr>
<tr>
<td>Net margin</td>
<td>2755</td>
<td>1780</td>
<td>(2053)</td>
<td></td>
</tr>
</tbody>
</table>

#### BALANCE SHEET

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual</th>
<th>2010/11</th>
<th>2009/10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R’000</td>
<td>R’000</td>
<td></td>
</tr>
<tr>
<td>Non-current assets</td>
<td>23897</td>
<td>23926</td>
<td></td>
</tr>
<tr>
<td>Current assets</td>
<td>599</td>
<td>1029</td>
<td></td>
</tr>
<tr>
<td>Total assets</td>
<td>24397</td>
<td>24955</td>
<td></td>
</tr>
<tr>
<td>Funds &amp; reserves</td>
<td>(24099)</td>
<td>(24770)</td>
<td></td>
</tr>
<tr>
<td>Current liabilities</td>
<td>(302)</td>
<td>(183)</td>
<td></td>
</tr>
<tr>
<td>Total funds &amp; liabilities</td>
<td>(24397)</td>
<td>(24955)</td>
<td></td>
</tr>
</tbody>
</table>

### ANALYSIS OF EXPENDITURE

#### 2000/2011

- Operational: 3%
- Overheads: 59%
- Salaries: 42%
- Operating: 35%
- Capital: 12%

#### 2009/2010

- Operational: 22%
- Overheads: 24%
- Salaries: 42%
- Capital: 12%
Sponsors & Supporters (continued)

GOVERNMENT DEPARTMENTS

SOURCE OF SUPPORT
Department of Agriculture, Forestry & Fisheries (DAFF) .......................... ACEP – Phase 2
Department of Environmental Affairs (DEA) ................................. ACEP – Phase 2
Department of Science & Technology (DST) / NRF ................................. ACEP – Phase 2
DST / NRF ................................. Emergency Infrastructure Grant
DST / NRF / ACEP ................................. WIO Fish Biogeography
Marine & Coastal Management Department (MCM) of DEA ................................. Collective Permits – WIO Fish Biogeography
NRF ................................. Freshwater Fish Genetics Project
NRF ................................. Student Support (Eucalyptus sp.) genetic stock assessments
DST / South African Agency for Science and Technology Advancement (SAASTA) ................................. National Science Week 2010
South African Antarctic Programme (SANAP) ................................. Research into Systematics of sub-Antarctic Nototeniid fishes
SANAP and NRF mobility grant ................................. Postgraduate student support (including travel to USA) (Research into the Systematics of sub-Antarctic Nototeniid fishes)
South African National Parks Board (SANParks) ................................. Algoa Bay mammal research
SANParks ................................. Turtles & marine research
South African National Biodiversity Institute (SANBI) ................................. Student conference support
SANBI ................................. Temperate fish diversity research and conservation planning projects
SANBio ................................. SABIF Specimen catalogue
TRANSNET National Ports Authority ................................. Coastal water quality monitoring initiatives

DETAILED

Disclaimer: This list is not comprehensive and there could be some developing support relationships that have been inadvertently omitted.

LIST OF ACRONYMS

ACEF: African Coelacanth Ecosystem Programme
ARCS: Agulhas Return Current System
ASCME: Agulhas & Somali Current Large Marine Ecosystems
BSc: Bachelor of Science
CBSL: Consortium for the Barcode of Life Initiative
CIF: Cape Floristic Region
CMB: Centre for Invasion Biology
CMC: Collection Management Centre
CMNS: Centre National de la Recherche Scientifique
CSR: Council for Scientific and Industrial Research
DFF: Department of Forestry and Fisheries
DEA: Department of Environmental Affairs
DIFS: Department of Veterinary and Fisheries Sciences
DST: Department of Science & Technology
FNB: Fish Barcode of Life project
GEF: Global Environmental Facility
HEI: Higher Education Institution
HR: Human Resources
GIS: Geographic Information System
IBOL: International Barcode of Life
ICMPS: Inductively Coupled Plasma Mass Spectrometry
IDRC: International Development Research Centre
IFSS: International Foundation for Science
IT: Information Technology
INP: Instituto Nacional de Investigação Pesquira

IUCN: International Union for the Conservation of Nature
IUCC: International Union for the Conservation of Nature – Species Survival Commission
IMO: International Maritime Organization
MFA: Marine Protected Areas
MSc: Master of Science
NEEM: National Environmental Management: Biodiversity Act
NEPR: New Partnership for Africa’s Development
NERC: National Environmental Research Council
NFEPA: National Freshwater Environment Protected Areas
NIWA: National Institute of Water & Atmospheric Research
NOMA: National Oceanic and Atmospheric Administration
NORD: Norwegian Agency for Development Cooperation
NRF: National Research Foundation
NSC: National System of Innovation
NSW: National Science Week
NZG: National Zoological Gardens
OR: Oceanographic Research Institute
OSR: Ocean Tracking Network
PD: Doctor of Philosophy
RIMS: Research Information Management System
R/OV: Remotely Operated Vehicle
R/V: Research Vessel

SABF: South African Biodiversity Information Facility
SAION: South African Environmental Observation Network
SAIAB: South African Biodiversity Institute
SANAP: South African National Parks Board
SANReN: South African National Research and Education Network
SANParks: South African National Parks Board
SANRI: South African National Research and Education Network
SCUBA: Self-Contained Underwater Breathing Apparatus
SICPs: Separately Open/Closed Ecosystems
TA: Taxonomic Analysis
TWA: Transboundary Wildlife Areas
WIO: Western Indian Ocean
WMDSA: Western Indian Ocean Marine Science Association
WRC: Water Research Commission
WMT-SA: World Wide Fund for Wildlife – South Africa
ZSL: Zoological Society of London

SAIAB’S GLOBAL COLLABORATIVE NETWORK

Developing collaborations contribute to capacity building and human resource development; collaborative research, networking, sharing of research facilities; development of aquatic biodiversity collections; exchanges between research staff and sharing of training opportunities to promote wise, community-based management of resources. We value the associations and networks that have developed over time and are still developing. The red areas of this map reflect SAIAB’s growing African and global network.

- North America and Canada: 12
- UK: 7
- Norway: 3
- Belgium: 1
- Germany: 4
- France: 2
- Netherlands: 1
- Middle East: 2
- Israel: 2
- Oman: 1
- Australia: 7
- New Zealand: 1
- Angola: 3
- Ile de la Réunion: 1
- Kenya: 1
- Malawi: 2
- Namibia: 1
- Seychelles: 1
- Tanzania: 3
- South Africa: 63