

50 YEARS

The Directors' Cut

JLB SMITH INSTITUTE OF ICHTHYOLOGY 1969 - 1999

SOUTH AFRICAN INSTITUTE FOR AQUATIC BIODIVERSITY 1999 - 2019

SALAB 50 years – The Directors' Cut
Perspectives 1969-2019

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Edited by Penny Haworth



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November 2019

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*The most exciting phrase to hear in science is not,
'Eureka, I found it!' but 'That's funny'!*
Isaac Asimov, popular science writer.



FOREWORD



Dr Clifford Nxomani

I take personal delight in writing the foreword for a book that chronicles the history of my Institutional *alma mater*. My very first job was at the South African Institute for Aquatic Biodiversity (SAIAB) which culminated in my receiving a PhD in fish molecular genetics in 2002. Thus I have first-hand experience of at least half of its life. Along with the coelacanth, the J.L.B Smith Institute of Ichthyology and subsequently SAIAB hold a special place in the science landscape in South Africa. The 50th anniversary of the founding of the Institute is a major milestone and has been achieved through multiple generations of dedicated staff, students and support staff. As you read through this publication you will notice a few themes which I believe have resulted in SAIAB being the superb National Facility it is today. The Institute's key attributes are its ability to adapt, excellence and a dedicated, cohesive staff.

Any research institution in South African which is 50 years old has had to navigate significant changes in the science landscape and SAIAB is no exception. The leadership within the organisation has managed these changes well and positioned SAIAB to take up new mandates and flourish where other Institutions have faltered. Doing excellent science is paramount in terms of long term survivability as a science organisation, and research at SAIAB has always been cutting edge and relevant. Another measure of success is to see where its students go. The graduates and staff stemming from SAIAB have filled important positions in science and industry around the globe.

Apart from the peer reviewed literature, the Institute is famous for its seminal books on fish taxonomy and I look forward to the soon to be completed *Fishes of the Western Indian Ocean* which globally will be one of the largest fish taxonomy books ever produced. SAIAB's primary research platform, the National Fish Collection, is one of the most important in the world and SAIAB's marine research infrastructure—vessels, equipment and technical expertise—has developed to a point where the Institute hosts a number of significant national platforms.

The Institute's ability to adapt to the fundamental political changes in South Africa after the end of apartheid, meant that SAIAB has fully recognised and purposefully embedded the transformation imperative that the country requires. The *Phuhlisa* development programme is a paradigm shifting transformation programme which has left a clear mark on the marine research landscape in South Africa.

Presented through the lenses of the Institute's directors, this book clearly articulates the challenges, opportunities, political forces and decisions made during their tenures that have resulted in SAIAB reaching its 50th birthday in fine fettle and focused on future growth and development. The authors write in their own styles, which in many ways reflect their differing perspectives, approaches and personalities, give insights into the challenges and successes of the Institute through time and provide a snapshot of the changing landscape of science in South Africa over the last 50 years.

As the Deputy CEO of the NRF I am very proud to have been part and parcel of this ongoing adventure.

Dr Clifford Nxomani
Deputy Chief Executive Officer
National Research Foundation
November 2019

ACKNOWLEDGEMENTS

Since its establishment, the JLB Smith Institute of Ichthyology, now SAIAB, has been a seminal influence in the lives of many people throughout the world. It is impossible in a work such as this to acknowledge all of the numerous contributions that have gone into making the Institute what it is today. To single out one person in an acknowledgement would require singling out all.

The 50 years covered have seen a relatively small, intensely focused research institution open wide its doors to embrace new administrative and financial systems, grow new infrastructure that has extended its relevance as a leader in Africa, and mould its operations into a recognised centre of influence.

Under the committed and passionate guidance of each of its four directors, the Institute has remained systematically progressive, providing an integrated package that combines modern science with the parallel development of the infrastructure required to meet the changing needs of society.

In their respective chapters, the authors have provided a snap-shot of a half-century of research that will not fade over time. Their ongoing belief in and loyalty to this Institute has been supported throughout by family, friends and colleagues without whom it could not have made the impact it has.

Here's to everyone – one and all – who have been and continue to be committed to

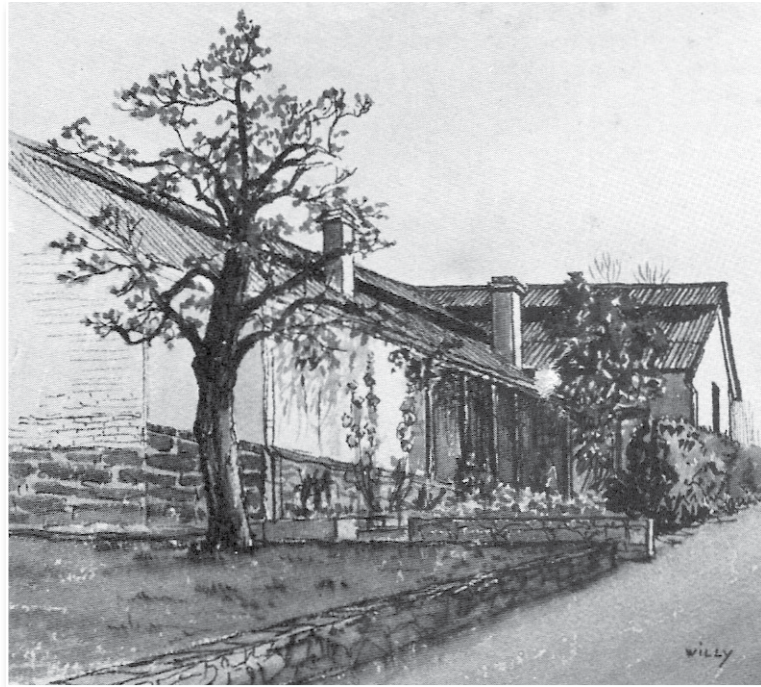
**ADVANCING KNOWLEDGE
TRANSFORMING LIVES
INSPIRING A NATION**

Penny Haworth

Editor

SAIAB

November 2019



Where it all began... the first Department of Ichthyology 1946-1968.

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Margaret Smith.

CHAPTER ONE

Margaret Smith's directorship

Prof Mike Bruton



“An inspiring woman, a role model and world renowned ichthyologist. Her human touch made the interaction with students her special strength. She was loved by all”.

Inscription on a plaque in Margaret Smith House, a women's residence at Rhodes University.

Extending JLB's legacy

1968 WAS a traumatic but also a triumphant year for Margaret Mary Smith. When her ailing husband, Professor JLB Smith, committed suicide on 8th January 1968 it was a shock to her, but also a relief, as she knew that he had been suffering both physically and mentally. We do not know the extent to which the Smiths discussed the future of ichthyology in Grahamstown before he died but Margaret's determination to build on JLB Smith's legacy soon became apparent to all. Later that same year her dream to establish a research institute in JLB's name became a reality.

JLB Smith had been the only marine fish researcher of note in Grahamstown since 1946 when Rhodes University College established the research Department of Ichthyology. During this period, Margaret had played a subservient (but increasingly assertive) role as wife, research assistant, artist and general factotum. After JLB's death the CSIR had reservations about supporting ichthyology in Grahamstown without a scientist of high standing at the helm, and the university was not prepared to take on the full responsibility of funding a new research institute. There was therefore no guarantee that ichthyology would continue to be funded and developed in Grahamstown after Smith had died. After all, Grahamstown was hardly the ideal location for a marine and freshwater fish research facility, and major developments had already taken place in this regard in Cape Town and Durban.

But this common sense approach did not take into account Margaret's steely determination to honour the legacy of her late husband and ensure that 'ichthyology in Grahamstown' would become a permanent feature of the scientific landscape. Furthermore, she informed those in authority that the contents of the ichthyology library, a key ingredient in the success of ichthyology in Grahamstown, belonged to her and that she would not give permission for it to be moved elsewhere! She also made it clear that she would not be prepared to continue working in the unsafe and unhealthy ex-Anglo-Boer War building in which JLB Smith had laboured throughout his stellar ichthyology career.

Margaret set out to convince the authorities that Grahamstown was the logical place, not only for the continuance but also for the future development of ichthyology in South Africa, and also that she should step into the shoes of her husband. Many doubted that she would be successful but they



did not factor in the charm and formidable persuasive powers of the newly liberated crusader. Soon Margaret had the support of key CSIR personnel, including the President, Dr Chris van der Merwe Brink, Dr Chris Garbers, Dr Rein Arndt and her close friend, Willie Weideman, as well as Dr James Hyslop, Vice-Chancellor of Rhodes University. It was obvious to all that she would leave no stone unturned in her determination to ensure that ichthyology remained firmly rooted in Grahamstown!

Within a year Margaret had persuaded the CSIR and the university to continue to invest in fish research in Grahamstown and also to fund a brand-new customised building for this purpose! Within 11 months, on 13th December 1968, the CSIR and the university jointly resolved to establish the JLB Smith Institute of Ichthyology in a new building in Somerset Street, and appointed Margaret as the first director.

High Tide:

Prof. J. L. B. Smith

This outstanding collection of selected articles is by the South African scientist and author—the coelacanth man—who in his life-time brought to light many secrets of our southern seas. His adventurous sorties in small craft through often badly charted seas off northern Moçambique with his wife; his discoveries and observations on sharks, whales, barracudas, toxic fish and sea snakes, as well as fabulous smaller creatures such as sea-horses and mud-hoppers (fish that climb trees), are among those dealt with in this fascinating book and are fully illustrated.

Each chapter tells its own vivid story and reflects another aspect of this unique pioneer in his own field of ichthyology—a man, incidentally, who when he needed a plane urgently, rang up the Prime Minister and got it. This book will appeal not only to fishermen but to everyone interested in the exciting and little-known marine life off the shores of Southern Africa.

Margaret M. Smith

To commemorate the first Boardmeeting
of
The J.L.B. Smith Institute of Ichthyology
on the 14 April 1969

Those present:

Chris Smith (Vice President of C.S.I.R.)

J.M. Hyslop (Chairman)

Allan Heydorn (Director of O.R.I.)
J.P. Castle (Chairman of R.U. Council)

J.P. Quinan (Professor of Zoology + Entomology)
R.U.

P. Merdun (Financial advisor)

Pete (Sr.) +
Margaret M. Smith (Dir)

The first meeting of the Board of Control of the new institute was held on 14th April 1969 under the chairmanship of Dr Hyslop, with representation from the CSIR (Dr C van der Merwe Brink, Dr AEF Heydorn and Dr B van D de Jager) and Rhodes University (Mr Justice JD Cloete and Professor BR Allanson). Later, at the suggestion of the second chairman of the board, Dr Derek Henderson, a steering committee was appointed comprising the chairman, the Dean of Science and the Head of Zoology, to monitor and contribute to the development of the institute. This committee met three times a year, with the first meeting in July 1977.

Building with purpose

With this victory under her belt, Margaret set off on a seven-month world tour, from May to November 1969, to study fish research institutes, public aquaria and museums in Europe, the USA (including Hawai'i), Japan, New Caledonia, New Zealand, Australia and Mauritius. She investigated trends in fish research, techniques for cataloguing and

Opposite: The new customised building housing the JLB Smith Institute of Ichthyology.

Above left: From the cover comment on the book *High Tide*.

Above right: Signatories to the first Board Meeting.

preserving fish collections, and the design of preparation rooms, collection rooms, libraries and specialised research facilities with the objective of making informed recommendations to the architects who designed the new institute building. With the help of Dr Peter Castle, a visiting Research Fellow, she submitted a detailed set of specifications to the architects (Vos, Lane & Vincent of East London) for the design of a specialized fish research building.

Margaret's plan, from the outset, was to design the building around the Fish Collection Room and the library, as she rightly regarded the fish collection and library holdings as the institute's most valuable physical assets. To the astonishment of the architects, she stipulated that the Collection

Room should have an area of 9 000 m²; this made everyone sit up and take notice! In fact, Margaret had underestimated the size that the Collection Room needed to be. Today SAIAB has a two-storey, state-of-the-art Collection Facility with a floor area about the same size as the original building, as well as a Collections Management Centre in the main building.

Work on the new building started in 1973 and was completed in July 1975. The end product was a magnificent research facility that was widely proclaimed as one of the best of its kind in the world. The new building was officially opened by Dr Basil Hersov, Chairman of Anglo-Vaal and President of



The door commissioned by Margaret Smith and created by Maureen Quin, 1976.

the South Africa Foundation, on 26th September 1977, the 80th anniversary of JLB Smith's birth (and the 61st anniversary of Margaret's), in front of a crowd of over 400 people. At the opening ceremony displays of dangerous marine animals, live fishes, photographs illustrating the life and work of JLB Smith, colour plates from the *Sea Fishes* book and the Institute's new skiboat, *Marlin*, were mounted. Margaret was particularly proud of the Institute's beautiful wooden door, designed and carved in imbuia by the Eastern Cape sculptor, Maureen Quin. Margaret later told Paul Skelton that she had paid for the door privately as the building was "too masculine and needed a feminine touch".

Breaking new ground and investing in the future

Initially the new institute had five staff members – the all-women crew of Margaret Smith (director), Doris Cave (librarian), Jean Pote (secretary), Rose Spannenburg (clerical assistant) and Liz Tarr (artist). The next five years were probably the happiest of Margaret's life – arranging the fish collection in the vast new Collection Room, establishing and expanding the library, making new staff appointments, and increasing collaboration with ichthyologists worldwide. In later years her tours of the Ichthyology building became legendary, although time-consuming, as she went to great pains to explain the *raison d'être* for every nook and cranny.

Having established the physical institute, Margaret's next task was to develop the fish research and postgraduate ichthyology teaching programmes. During his ichthyology career JLB Smith had done virtually no teaching and had had no postgraduate students. Margaret knew that she could not match her late husband's research output, and was astute enough to realize that the introduction of postgraduate teaching programmes into the institute's repertoire would strengthen its case in its negotiations for funds with Rhodes University and the CSIR. She also realised that there would be nobody to replace her if she did not develop the research school and train students in ichthyology, and readily accepted advice from others on how to expand the institute's range of scientific services. At the same time Margaret set about consolidating partnerships with the Albany Museum, East London Museum and Port Elizabeth Museum and recognising the contributions of her collaborators. They included Dr EJ Morris from New York, Dr Humphry Greenwood from the British Museum (Natural History) in London, Dr Rex Jubb from the Albany Museum and, through long association, Dr Marjorie Courtenay-Latimer from the East London Museum.

Dr Tom Fraser was appointed by Rhodes University as Senior Lecturer in Ichthyology in March 1970, and soon MSc and PhD courses in Ichthyology were offered to students with an Honours degree in Zoology. In March 1971 Peter Jackson, a Rhodes graduate who had gained extensive experience in freshwater fish research and management in East Africa, was appointed as a Senior Research Fellow. He contributed substantially to the teaching of applied fields, such as fisheries management and aquaculture, and was also responsible for implementing research programmes on eel culture (further developed by Martin Davies), Lake Le Roux, fishes of the Transkei, and Lake Malawi. The Lake le Roux programme was developed by Tumi Tómasson, a PhD student from Iceland, and by Jim Cambay. They documented the transition from a riverine to a lacustrine fish fauna, with three large

cyprinid species eventually gaining dominance and showing commercial potential. Jackson's work also included studies on the fishes of the Zambezi system with special reference to the colonising patterns of riverine fishes in manmade lakes, which had important implications for the management of the fisheries of the manmade lakes at Kariba and Cahora Bassa.

Broadening the reach of Ichthyology into sub-Saharan Africa

From 1978 Tony Ribbink led a seven-year programme on the cichlid fishes of Lake Malawi. This programme assessed the aquarium potential of the rock-dwelling *mbuna*, helped to establish the Lake Malawi National Park, and provided research opportunities for students. The programme also offered technical training to Malawian officials, which has contributed significantly to the proper management of the lake's fishes and established firm links between the Malawian authorities and the Ichthyology Institute. The Lake Malawi programme later extended its reach to the cichlids of Lake Tanganyika in collaboration with Roger Bills, who now manages the SAIAB Collections Platform.



Margaret (shown) with staff of the JLBSII – 1981.

Fraser was replaced by Dr Rick Winterbottom in 1974, who attracted many enthusiastic young ichthyology students and carried out extensive field research in South Africa and Madagascar, where he was the first to use rotenone and scuba diving for collecting fishes. Winterbottom introduced an extremely good course in ichthyology and laid the foundation for the future. Many students, including Paul Skelton, Wouter Holleman, Graham Butler and Mike Christensen, benefitted from his teaching. Winterbottom left at the end of 1976 and was replaced in 1978 by Dr Mike Bruton, who had just completed his postdoctoral year at the British Museum (Natural History) after carrying out field research on freshwater fishes in northern Zululand. Bruton continued to maintain an interest in Zululand and his 1980 book, *Studies on the Ecology of Maputaland*, stimulated further research in the region.

In the early 1980s Mike Bruton, Peter Jackson and Paul Skelton initiated a project to revise and update Rex Jubb's 1967 book on the freshwater fishes of southern Africa. The first phase of this project was to update the checklist of fishes, examine the type specimens, and produce colour illustrations of all species. This preliminary work proceeded well and a *Pocket Guide to the Freshwater Fishes of Southern Africa* was published in 1982, but plans to produce a field guide, or the overall revision, did not reach fruition due to a lack of funds.

The Margaret 'Touch'

In those early days the small staff of the institute was an effective team as well as a happy family. Margaret's administrative style was unorthodox as she would not hesitate to interrupt a meeting to cuddle the baby of a visitor or discuss the great-grandchildren of a long-lost friend. Equally, she was a formidable foe to any academic or government official who questioned her management style. To her, happiness and harmony – life's journey – were more important than bureaucratic procedures, although she also kept her mind fixed firmly on her goals. Her office was always crowded with people and cluttered with donkey harnesses and stamps for the Red Cross. Morning tea was a joyous occasion during which she regaled the staff with hilarious, and sometimes exaggerated, accounts of her early expeditions with JLB Smith. She also had the invaluable ability to make true contact with people and to dignify them by showing a genuine interest in what they were doing.

Breaking from academia as a Declared Cultural Institution

In 1980, towards the end of her directorship, Margaret Smith worked closely with the Vice-Chancellor of Rhodes University, Dr Henderson, to facilitate the establishment of the JLB Smith Institute of Ichthyology as a Declared Cultural Institution under the Department of National Education (DNE). This move was necessitated by the need to make the Ichthyology Institute financially independent of Rhodes University. Although this development, which was realized on 1st April 1980, resulted in the institute becoming an autonomous 'national museum', close links were retained with the university. Margaret served on the Faculty of Science and Senate of the university from 1968 until 1982 and was

appointed an Associate Professor in 1980 and a Full Professor in 1981.

The transition to a Declared Cultural Institution did not go smoothly as the DNE only provided a token amount of funding during the first financial year (1st April 1980 to 31st March 1981) on the understanding that the university would 'carry' the institute until they could provide adequate funding in the following financial year. Unfortunately this did not happen as the department only provided enough funds in 1981/82 for filled posts, with a paltry amount of R1 000 for running costs. As electricity and water costs alone amounted to R13 000 pa, this meant that no funds were available for telephones, transport, postage, chemicals, equipment maintenance, stationery, books and other operational expenses. The financial situation improved steadily in later years with in-creased grants from the DNE which were carefully

managed by Margaret and the Accountant, Joe Hart, a retired bank manager.

The new arrangement relieved Rhodes University of the full burden of funding the institute but also meant that the institute could no longer

The Sea Fishes revision resulted in the discovery of over 1 400 new species of fishes and the addition of more than 75 000 specimens to the National Fish Collection.

offer postgraduate training to students. A new Department of Ichthyology and Fisheries Science was therefore established at the university to develop teaching in these fields and, in 1981, Dr Mike Bruton was appointed as the founding head, a position he held until he was hired as the second director of the JLB Smith Institute of Ichthyology in 1982.

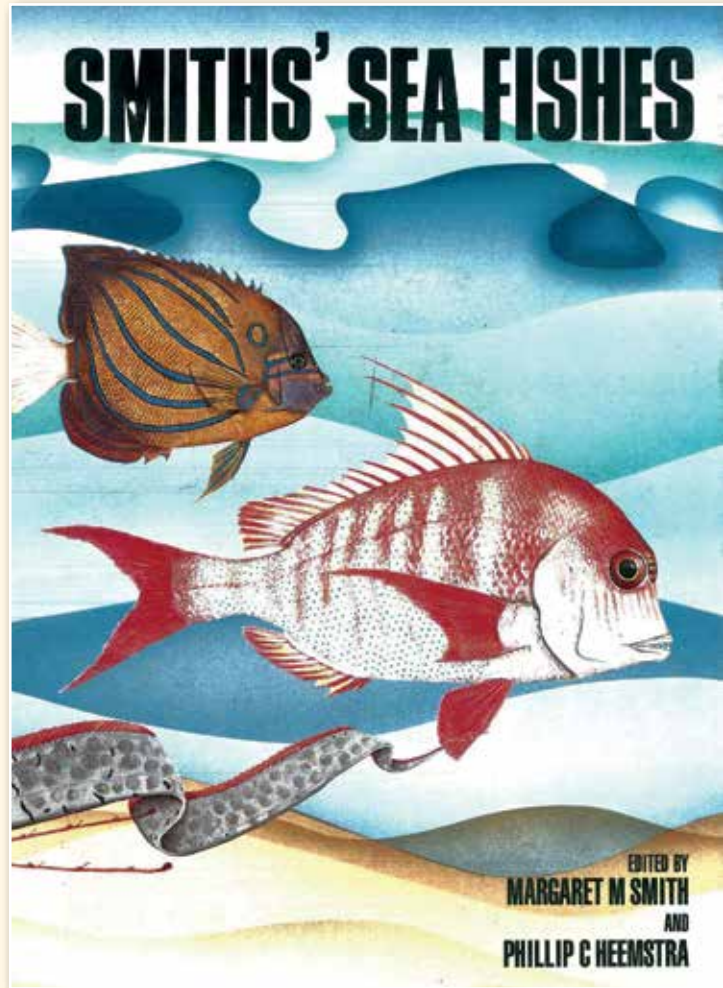
International clout

Although Margaret Smith was 50 years old when JLB Smith died, she was determined to continue her field and laboratory research on fishes, building on the expertise that she had gained while working with him. In 1969 she republished all his *Ichthyology Papers* and *Ichthyology Bulletins* in four bound volumes and, in September that year, arranged for a revised edition of the *Fishes of the Seychelles* to be published. Between 1969 and 1977 she also published JLB Smith's unfinished work on the kingfishes and described a new species of kob from KwaZulu-Natal. In 1975 she published *Sea and Shore Dangers: their Recognition, Avoidance and Treatment*, and, in the same year, a catalogue of the *Common and Scientific Names of the Fishes of Southern Africa* with Peter Jackson. This checklist highlighted the need for a revision of JLB's famous *Sea Fishes of Southern Africa* book.

In 1978 Margaret initiated a complete revision of the *Sea Fishes* book. She contemplated carrying out this task herself, with a research assistant, but soon changed her mind when she realized the enormity of the task. The South African National Committee for Oceanographic Research (SANCOR) agreed to fund the revision on condition that an Editorial Board was formed to help the editor-in-chief. This board comprised Margaret Smith (chair), Professor Brian Allanson, Dr Butch Hulley (South African Museum) and Dr John Wallace (Port Elizabeth Museum), with the first meeting taking place on 10th

April 1978. A few weeks previously, on 12th March 1978, Dr Phil Heemstra from the University of Miami had joined the institute as Curator of Marine Fishes, on the recommendation of Jack Randall, to assist Margaret with the *Sea Fishes* revision. Phil served as an *ex officio* member of the Editorial Board and soon busied himself drawing up templates for family and species accounts. Heemstra's appointment turned out to be a master stroke as he assumed, within a few years, JLB Smith's mantle as the leading marine fish taxonomist in South Africa and developed a very productive working relationship with Margaret. Over the next nine years they co-edited the massive revision of the *Sea Fishes* book, published numerous scientific papers and chapters in books together, and described three new fish species.

Margaret and Phil realized that they could not compile the revision alone and eventually enlisted the assistance of 77 specialists from 15 countries. The new revision was one of the most ambitious internationally collaborative biological research programmes ever undertaken in South Africa and re-affirmed the institute's role as one of the leading fish research institutes in the world. The tome was published by Macmillan SA in September 1986, four years after Margaret had retired and one year before she died. The book covered over 2200 species of fish, a 57% increase over the 1400 species described in JLB's original book, and was richly illustrated with new colour paintings by Margaret Smith, Liz Tarr, Dave Voorvelt and other artists. Margaret authored or co-authored 41 family accounts in the new book, a remarkable achievement for someone with no formal training in ichthyology or taxonomy, and also played a vital role by co-ordinating the whole project and encouraging the collaborators to complete their tasks on time. Phil



Heemstra authored or co-authored an impressive 74 family accounts in the book.

The *Sea Fishes* revision resulted in the discovery of over 1 400 new species of fishes and the addition of more than 75 000 specimens to the National Fish Collection. The end product, called *Smiths' Sea Fishes* to recognise the contributions of both Smiths, is widely regarded as the best regional fish book in the world and won the 'Bill Venter Book Award' in 1989 for 'the most outstanding publication by full-time members of staff of a South African university'. The first printing of 5 000 copies was sold out within six months and the book was republished in 1988 and 1991.



Margaret with her gold medal received for 'exceptionally meritorious service in the public interest', 1986.

Margaret also encouraged her staff to be productive. In March 1971 Tom Fraser carried out marine fish collecting trips to Inhaca, Mauritius and Brandon Shoal and, in September and October 1973, Margaret herself embarked on a five-week fish collecting expedition to the Quirimbas islands in northern Mozambique. After that expedition she joined Dr Jack Randall from Hawai'i on a fish-collecting trip to Reunion and Mauritius! During these trips she insisted on sharing even the most arduous tasks and it was not unusual to see her helping to launch the boat or working late into the night on fish identifications or paintings. In June 1977 she organised another fish-collecting expedition to northern Zululand and, in April 1979, at the age of 63 years, she led her final expedition to Sodwana Bay, accompanied by Dr Gerry Allen from Australia, Jack Randall, Dr Malcolm Smale from the Port Elizabeth Museum, Robin Stobbs and Dr Mike Bruton.

A legacy of her own

During Margaret's tenure as director, the research staff of the institute produced 70 scientific papers, 25 books or chapters in books (excluding those in the *Sea Fishes* revision) and attended 55 conferences. Six major expeditions were organised, and

eleven exhibitions were mounted on the life and work of JLB Smith. Margaret also knew the value of effective science communication: she wrote 57 popular articles, presented 170 public lectures and gave 95 TV and radio interviews.

Margaret Smith retired on 30th April 1982, and was made a Professor Emeritus of Rhodes University, having engineered the transition of the institute from a classical taxonomic research unit into a world-class marine and freshwater fish and fisheries research facility in fourteen short years. She had also served on numerous scientific and resource management committees and was an honorary member or patroness of numerous angling and diving societies. Margaret co-authored three books, edited three books (including the monumental *Smiths' Sea Fishes*) and authored or co-authored 38 scientific papers and many popular articles. She also produced over 2 000 monochrome and colour illustrations of the fishes of southern and eastern Africa.

In February 1986 Margaret received the Order for Meritorious Service Class 1: Gold from the State President 'for rendering exceptionally meritorious service in the general public interest', and, in April 1986, she was awarded the degree of Doctor of Laws (*honoris causa*) by Rhodes University in recognition of her contributions to science and the well-being of her community.

To Margaret Smith, the establishment of a fish research institute in Grahamstown in her husband's name was the culmination of her life, but she did not rest on her laurels. She was a hard-working administrator and researcher as well as an important ambassador for science. She was also an exceptional networker, not only with the international ichthyology community but also with anglers, divers and aquatic resource managers, which ensured that the institute became a mecca for everyone interested in fishes. During her directorship she kept an empathetic hand on the tiller and laid a solid foundation on which the next director could build. From mid-1986 she was confined to a wheelchair but did not allow this inconvenience to slow her down. She continued to busy herself with her charitable work and her ambassadorial and networking roles in science. When she died on 8th September 1987 at her home in Grahamstown, the Smiths' great scientific partnership ended, but many continue to benefit from the fruits of their endeavour.

Margaret successfully developed the institute from its formative stages through thirteen years of rapid growth as both a research and a teaching institution. She formed excellent partnerships with Rhodes University, the CSIR and the national government, and laid a solid foundation on which future directors could build.

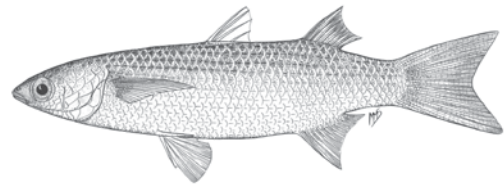


Illustration of *Chelon dumerili* by Margaret Smith.

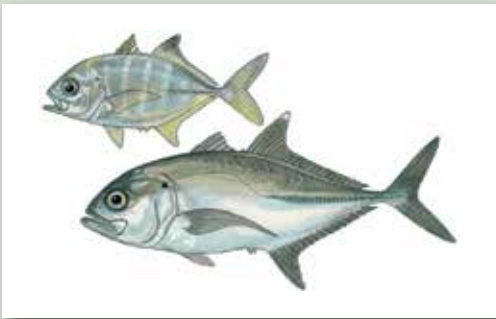
Coastal Fishes of the Western Indian Ocean: 25 years – a long-standing vision realised.

Not long after the publication of the first edition of the Sea Fishes of Southern Africa in 1949, JLB Smith had in mind a major work on the fishes of the entire Western Indian Ocean that would be “... at least four times the size of my current volume and would probably occupy 6 - 10 years”.

It was left to Margaret Smith, who drove the establishment of the JLB Smith Institute in 1969, and Phillip Heemstra, Senior Curator of Marine Fishes, to re-ignite this vision after the publication of Smith Sea Fishes in 1986. Preliminary discussions in 1987 eventually led to the project gathering momentum from 2004 onward.

This ‘project’ has evolved into a work of some 3000 pages, in five volumes, with information on more than 3200 species of coastal fishes in the Western Indian Ocean. About 100 specialists from around the world have voluntarily contributed the accounts, and several hundred individuals and publishers have provided the thousands of illustrations of the species. Furthermore, the area covered by this work, from the Gulf of Aqaba, to Cape Point and east to the southernmost point of India, is the largest stretch of ocean a work like this has ever been compiled for.

The Coastal Fishes of the Western Indian Ocean will be printed in the second half of 2020, and an online version will be made freely available shortly afterwards.



Wouter Holleman

CHAPTER TWO

Casting the net wider

Prof Mike Bruton

*“Science is not a heartless pursuit of objective information;
it is a creative human activity”.*

Stephen J. Gould, palaeontologist and science writer.



IN EARLY 1982 I was happily ensconced in the Department of Ichthyology & Fisheries Science at Rhodes developing new teaching programmes when I was approached about applying for the directorship of the Ichthyology Institute, which would soon become vacant. At the age of 34, brash and self-assured, I decided, ‘Why not?’, and, to my surprise, I was offered the job. If they wanted youthful enthusiasm and a strong work ethic, I had it in abundance. The rest I would have to learn on the job.

Margaret Smith and I had always worked well together and she was the perfect ex-director – always available and supportive, but never interfering. It was inevitable that our directorships would be different, as I made no attempt to emulate her style, and she accepted that I would take her beloved institute in new directions.

In terms of bare statistics, the development of the institute proceeded well over the next 12 years – the staff establishment grew by 70 percent (from 17 in 1982 to 29 in 1994) and its operating budget increased nearly 12-fold (from about R201 000 to R2 596 000 in 1980/90s terms).

Along the way there were many highlights, and some lowlights, but I decided that my directorship would be characterised by building on past strengths while also developing new avenues of service. There was nothing revolutionary in this train of thought, but the ways in which we went about achieving it were novel. The staff was encouraged to visualise where we wanted to go as a team and how best to get there. I created an environment with the minimum of bureaucracy in which our researchers could be productive, emphasized the importance of creativity, and pointed out that being a ‘faithful formalist’ would not lead to novel insights or important discoveries. I also encouraged our researchers to be risk takers, to dream big and to break the rules.

A strong emphasis was also placed on producing substantive publications of the highest standard. The revisions of the ‘Sea Fishes’ book, and the book on the *Fishes of the Southern Ocean*, are good exemplars of this trend. We concurred that we were not ‘stamp collectors’ who accumulated data and regurgitated it in descriptive publications, but that we should strive to produce meaningful, problem-solving, strategic publications that tested hypotheses and had a major impact across disciplines. The books on *Alternative Life-History Styles of Animals* and *Alternative Life-History Styles of Fishes* are examples of this policy.



J.L.B. Smith Institute of Ichthyology staff in 1987-88.

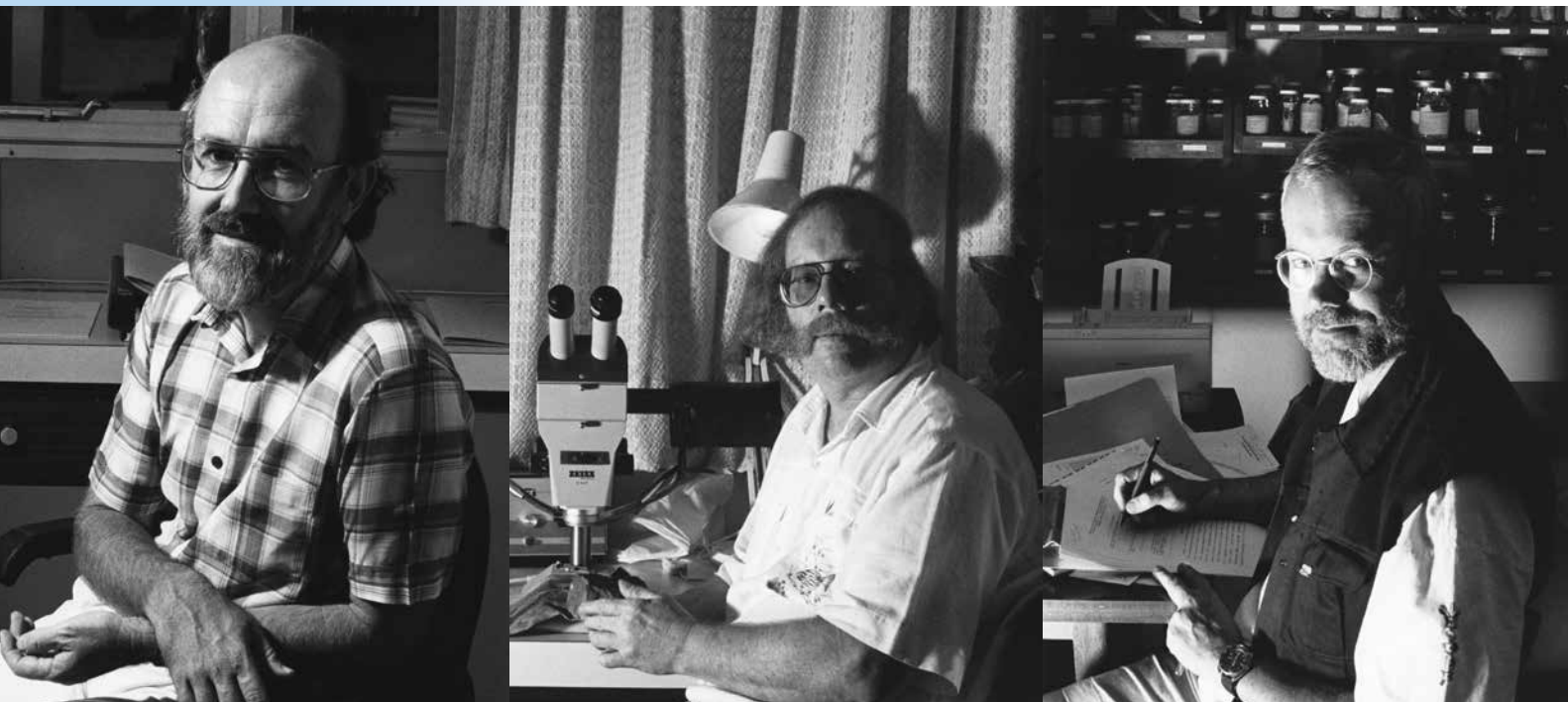
In 1986-87 the main Department of National Education (DNE) grant increased by 27 percent. This was a substantial amount, but in reality was only enough to cover basic salaries and fringe benefits, with a very small component (0.5%) being available for operating costs, building maintenance and renovations, and library and fish collection accessions. The amount available to cover curatorial, educational and research costs, the main functions of a museum, was therefore completely inadequate and funds had to be acquired from outside sources. This fund-raising campaign was successful but time-consuming and resulted in staff being diverted away from their main functions.

In 1987 inadequacies in the system created constraints on the Institute's development which were recognised and, as far as possible, addressed. Lack of appreciation by the funding authorities of the fundamentally important role of systematics in biological research resulted in insufficient allocation of funds from the main DNE grant to cover staff salaries and fringe benefits, or to develop the full curatorial potential of the Institute and maintain and develop the National Fish Collection. At the same time, we experienced difficulties with fund-raising because donations to Declared Cultural Institutions were not eligible for tax relief. These challenges were exacerbated through the inability of the Foundation for Research Development (FRD), the main research funding agency at the time, to effectively implement the partial research grants to senior scientists.

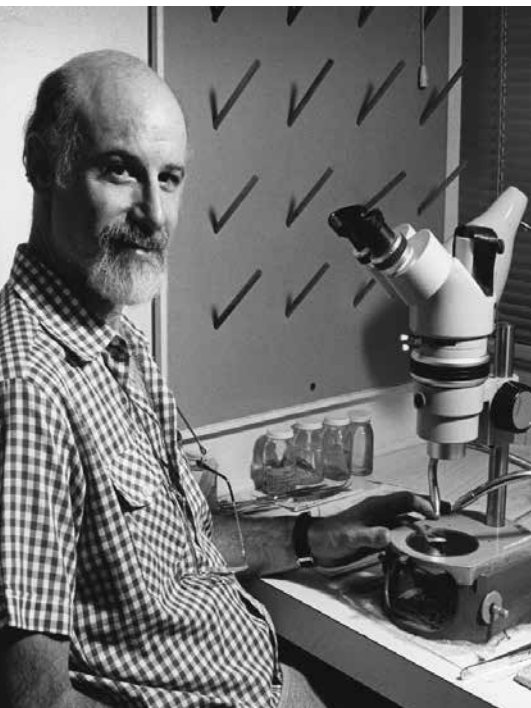
By 1994 the Institute was still heavily dependent on its DNE grant, which provided 93 percent of its official income for that financial year. In order to cover financial shortfalls, an amount of R628 000 (substantial in 1994 terms) had to be raised to cover research costs and attendance at conferences. In addition, R164 000 was raised for the establishment of the Knysna Angling Museum and R50 000 for our first computers. This pattern of an inadequate DNE grant for core expenses, and the need to spend considerable effort on fund raising in order to carry out essential functions, persisted throughout my directorship.

One of my most aggressive moves was to appoint new staff at the highest level. In 1983 Glenn Merron, a wetland fish specialist, joined us from Karl Lagler's famed fisheries school in Michigan, and he was followed, in 1984, by freshwater specialist, Dr Paul Skelton from the Albany Museum, who soon excelled in the role of Curator of Freshwater Fishes. In 1982 Ofer Gon from the Hebrew University of Jerusalem joined the team as a tropical fish expert but soon transformed into an Antarctic fish fundi! Ofer made numerous and substantial contributions to the Institute's work.

The internationally renowned shark expert, Dr Len Compagno, visited the Institute from California for a one-year FRD fellowship in 1983 and then joined the permanent staff in 1984. Len was one of my best appointments – his was a towering intellect and he had a phenomenal work ethic. The estuarine fish expert, Dr Alan Whitfield, joined us in 1987 and soon established a very productive research programme in this previously neglected field; he would eventually achieve an NRF A-rating and become SAIAB's Chief Scientist. Also in 1987, Dr Humphry Greenwood retired as Head of the Freshwater Fish Section at the British Museum (Natural History) and settled in Grahamstown, where he became an *ex officio* member of our staff. 'Humph' made a very strong contribution to the development of our research and received an honorary doctorate from Rhodes University in 1992.



Top: left to right: Alan Whitfield, Eric Anderson, Phil Heemstra and Ofer Gon.
Below: Leonard Compagno with his beloved sharks.



When Compagno left for the South African Museum in 1989 he was replaced by a deep-water fish expert, Dr Eric Anderson, who filled a vacant niche in our ecological repertoire and also developed the field of fish palaeontology. Important temporary staff appointments included Irene de Moor (impact of invasive aquatic animals), Dave Ebert (shark biology), Nick James (fish culture), Kathy Holden and Lil Haigh (fish embryology) and Vanessa Rouhani (evolutionary biology).

Two outstanding librarians, Eve Cambray and Margaret Crampton, were appointed and took the library to new heights, and we also built on the legacy of fine fish illustrators, started by Margaret Smith, by appointing Liz Tarr, Jean-Michel Vinson, Dave Voorvelt and Elaine Heemstra. Our technical team was led by the very capable Robin Stobbs, with Billy Ranchod as Collection Manager, and we also had outstanding administrative staff, including Huibre Tomlinson, Jean Pote, Joe Hart and Wendy Sweetman. I doubt that any ichthyology institute in the world has had an administrative assistant as knowledgeable on fishes as Jean Pote. She served three directors, JLB and Margaret Smith and myself, and published on matters ichthyological.

During this period the Institute's research programmes diversified from an initial focus on marine fish taxonomy and distribution to include studies of fish ecology, ethology, embryology, genetics, functional morphology, life-history styles, captive propagation, the impact of invasive aquatic animals and freshwater fish taxonomy and distribution. In addition, applied contracts in the fields of fisheries management, aquaculture, aquariology (the study of plants and animals in aquaria), environmental impact assessment and integrated environmental management were carried out.

A consultancy agency, FISHTEK, was established in 1991 to facilitate the efficient execution of contracts for clients in the public and private sectors. Examples of contracts that were completed included assessing the impact of the *Katina-P* oil spill on the marine life of Delagoa Bay, Mozambique, identifying fishes caught illegally by foreign trawlers in South African waters, managing the fishery on the Phongolo floodplain in northern Zululand, monitoring the recovery of fishes in the Elands River in Mpumalanga following a pulp mill effluent spill, ameliorating the impact on fishes of insecticide spraying to kill tsetse flies in the Okavango Delta, Botswana, training Malawian fisheries officers, assessing the impact of afforestation on rivers in the north-eastern Cape, and artificially propagating endangered freshwater fishes. An unusual contract was fulfilled when the artificial waterways in the Sun City complex in North-West province were stocked with over 700 locally caught and cultured freshwater fishes.

In late 1986, a research expedition was launched to the Islamic Republic of the Comoros by Phil

Heemstra and Malcolm Smale (Port Elizabeth Museum) during which fish diversity and the impact of humans were studied. Further expeditions to the Comoros were carried out under the leadership of the director in 1987, 1989, 1991 and 1992, after which recommendations were made on the conservation of the coelacanth and its habitat. In May 1989, President Said Johar of the Comoros presented the Institute with a coelacanth specimen in recognition of its contributions to marine conservation in the Comoros.

During the 1987 Comoros expedition we established the Coelacanth Conservation Council (CCC) which would later play a vital role in coordinating and promoting coelacanth research and documenting coelacanth catches. In 1991 a comprehensive book, *The Biology of Latimeria chalumnae and Evolution of Coelacanths*, was published, edited by Jack Musick (USA), Mike Bruton and Eugene Balon (Canada) with 44 contributors from six countries. Important coelacanth discoveries at this time included the first description of its chromosomes by John Wourms (USA), Eugene Balon and Mike Bruton (1986) and the examination of coelacanth pups from a pregnant female caught off Mozambique in 1991 that had been donated to the Institute by Dr Augusto Cabral, Director of the Natural History Museum in



Staff and international guests on the October 1984 Okavango expedition.

Maputo, Mozambique.

In September 1986 in my capacity as Director I participated in an aquaculture conference and toured aquaculture facilities in the Republic of China, and was subsequently appointed as Chair of a South Africa-Taiwan Working Group on the Problems of Invasive Aquatic Animals. I also served on the Scientific and Technical Review Panel (STRP) of the Ramsar Convention on Wetlands of International Importance and attended STRP meetings in Hungary, Japan, Switzerland and Australia. I was subsequently charged with developing criteria for declaring wetlands of international importance based on their fish and fisheries; these recommendations were subsequently adopted by the Ramsar Convention.

In April 1991 an important Devonian-age fish fossil site was discovered by Eric Anderson and Robert Gess (Albany Museum) near Grahamstown. Gess has subsequently found the fossils of juvenile estuarine coelacanths at this and other local sites. In May and June 1991 a new phase of marine research was initiated in South Africa using the German research submersible, *Jago*. Twenty-three dives were performed off the eastern and southern Cape coasts to a maximum depth of 370 metres, six times deeper than previous research dives there. Whilst no coelacanths were discovered along this section of coast, these dives showed that a manned submersible could safely be deployed off our



The Pongolo fonya drive – a seasonal community fishing effort in 1993.

treacherous coast.

The wetland research programme, initiated in 1979, was further developed during several expeditions to the Okavango Delta between 1982 and 1992, with Glenn Merron taking the lead. The most comprehensive survey of the fishes of this World Heritage Site was completed which led later to the publication of the first book on Okavango fishes. Between 1983 and 1992 six expeditions were also organised to the Phongolo floodplain, and one to the Mkuze Swamp, in northern Zululand, and recommendations were made on the management of their fish stocks.

During the period there was an increased awareness that we needed to provide fish- and aquatic ecosystem-related services to the community that were relevant to the needs of the Reconstruction and Development Programme (RDP) so that the Institute would be well positioned to contribute meaningfully to the development of the new South Africa. We also realized that a balance needed to be achieved between fundamental science, contributions to community needs, and integrated environmental management, in such a way that all the resources of the Institute were utilized in an optimal way.

By 1994 our research was trending increasingly towards meeting basic needs such as feeding people, aquatic conservation, water quality and health care. In addition, environmental education was introduced into projects so that riparian and coastal communities could become involved in making and implementing their own management decisions. This transition represented an important change in our research priorities.

From 1982 to 1994 the Institute staff and students published 327 peer-reviewed scientific papers



Jean Pote demonstrates the first computer in the library in 1986.

in journals and chapters in books and 13 books. Significant publications included a *Pocket Guide to the Freshwater Fishes of Southern Africa* (1982) by Mike Bruton, Peter Jackson and Paul Skelton, *Sharks of the World Part 1. Hexanchiformes and Lamniformes* (1984) by Phil Heemstra, the authoritative *Complete Guide to the Freshwater Fishes of Southern Africa* (1993, in English and Afrikaans) by Paul Skelton, and *Sharks of the Order Carcharhiniformes* (1987) by Len Compagno. Compagno also developed the SHARKLIT bibliographic data-

base on sharks for the library and, in 1989, published the authoritative *FAO Catalogue of World Sharks*.

In 1984 Phil Heemstra published 16 family accounts in the *FAO Species Identification Sheets for Fishery Purposes: Western Indian Ocean*, and, in 1991, he and Jack Randall produced a *Revision of the Indo-Pacific Groupers*. In 1986 Paul Skelton produced the important *South African Red Data Book: Fishes*, and, in 1993, Randall and Heemstra combined again to produce the *World Catalogue of Groupers* through the FAO in Rome. The publication of the new edition of *Smiths' Sea Fishes* in September 1986 (see previous chapter) was threatened when the director discovered that the Trustees of the Sea Fishes Book Fund had not raised any funds to cover the printing costs. A new Board of Trustees was quickly formed and the necessary funds were raised.

In 1988 Mike Bruton and Fred Gess (Albany Museum) edited a conference proceedings, *Towards an Environmental Plan for the Eastern Cape*, and, in the same year, Roy Lubke (Rhodes University), Fred Gess and Mike Bruton published *A Field Guide to the Eastern Cape Coast*. Also in 1988, Mike Bruton co-edited, with Christian Lévêque (France) and George Ssentongo (Italy), a multi-authored book, *Biologie et Ecologie des Poissons d'Eau douce Africains/Biology and Ecology of African Freshwater Fishes*, with contributions by 28 authors from 10 countries.

The South African Scientific Committee for Antarctic Research (SASCAR) was aghast when, in 1984, I proposed that they should fund research leading to the publication of a new book on Antarctic fishes, based on the *Sea Fishes* model, even though we had little expertise and no collection in this field. Nevertheless, funding was granted and, after an intensive period of international collaboration, *Fishes of the Southern Ocean* (1990), edited by Ofer Gon and Phil Heemstra with contributions by 32 scientists from 11 countries, was published to international acclaim. In June 1992 the State President, FW de Klerk, presented a deluxe edition of this book to Emperor Akihito of Japan, who is an ichthyologist.

Institute staff were also very active at exhibitions and conferences during the period. In October 1984, Tony Ribbink and I organised a conference on evolutionary biology, attended by 60 leading evolutionists, and, in April 1985, a colloquium on 'Trout in South Africa' was organised by Paul Skelton and Martin Davies. In September 1985 Tony Ribbink arranged a colloquium on 'The unique qualities and threats facing the African Great lakes', which resulted in a publication that generated valuable international debate.

In June 1987 Institute staff organised a conference, *Alternative Life History Styles of Fishes and Other Organisms*, which was attended by 239 delegates, including 18 international guests from 10 countries. This was the first conference to bring together scientists who had studied the life-history strategies of all major animal groups and resulted in the publication of two proceedings, *Alternative Life-History Styles of Fishes* (1990) and *Alternative Life-History Styles of Animals* (1991), both edited by Mike Bruton. Another book produced at that time was *Women in Ichthyology: an Anthology in Honour of ET, Ro and Genie* (1994), edited by Eugene Balon, Mike Bruton and David Noakes, on the contributions by three famous women ichthyologists, Ethelwynn Trewavas, Rosemary Lowe-McConnell and Eugenie Clarke.

In September 1988 a symposium was held on 'The management of invasive aquatic animals' which

led to the publication of the *Atlas of Alien and Translocated Indigenous Aquatic Animals in Southern Africa* by Mike Bruton and Irene de Moor (1988). In late 1988 we mounted an exhibition to celebrate the 50th anniversary of the discovery of the first living coelacanth and, in 1989, the South African Post Office issued a set of four postage stamps to commemorate this epochal event.

Throughout my directorship we recognised that one of our primary responsibilities was to develop, curate and make available for study the National Collection of Fishes. In 1986 a computer was acquired to create a computerised catalogue of the fish collection, called FISHNET, which grew faster than ever before (1987 annual report) and, by 1992, had increased by a further 55 074 specimens from 12 countries and as many oceans.

A strong priority was also placed on increasing and computerising the library holdings. In July 1985 Margaret Crampton initiated FISHLIT, a computerised bibliographic information system on fish and fisheries that went online on in-house computers in 1991, thanks to a grant from

ICHTHOS

NEWSLETTER OF SOCIETY OF FRIENDS
OF THE J.L.B. SMITH INSTITUTE OF ICHTHOLOGY



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To promote an interest in fishes

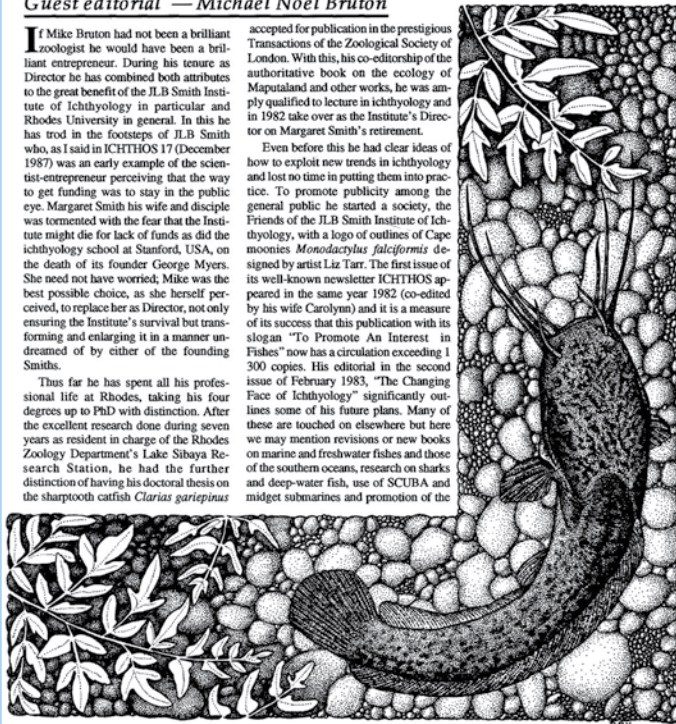
Guest editorial — Michael Noel Bruton

If Mike Bruton had not been a brilliant zoologist he would have been a brilliant entrepreneur. During his tenure as Director he has combined both attributes to the great benefit of the J.L.B. Smith Institute of Ichthyology in particular and Rhodes University in general. In this he has trod in the footsteps of J.L.B. Smith who, as I said in ICHTHOS 17 (December 1987) was an early example of the scientist-entrepreneur perceiving that the way to get funding was to stay in the public eye. Margaret Smith his wife and disciple was tormented with the fear that the Institute might die for lack of funds as did the ichthyology school at Stanford, USA, on the death of its founder George Myers. She need not have worried, Mike was the best possible choice, as she herself perceived, to replace her as Director, not only ensuring the Institute's survival but transforming and enlarging it in a manner undreamed of by either of the founding Smiths.

Thus far he has spent all his professional life at Rhodes, taking his four degrees up to PhD with distinction. After the excellent research done during seven years as resident in charge of the Rhodes Zoology Department's Lake Sibaya Research Station, he had the further distinction of having his doctoral thesis on the sharp-toothed catfish *Clarias gariepinus*

accepted for publication in the prestigious *Transactions of the Zoological Society of London*. With this, his co-editorship of the authoritative book on the ecology of Mafuputland and other works, he was amply qualified to lecture in ichthyology and in 1982 take over as the Institute's Director on Margaret Smith's retirement.

Even before this he had clear ideas of how to exploit new trends in ichthyology and lost no time in putting them into practice. To promote publicity among the general public he started a society, the Friends of the J.L.B. Smith Institute of Ichthyology, with a logo of outlines of Cape moories, *Monodactylus falciformis* designed by artist Liz Tarr. The first issue of its well-known newsletter ICHTHOS appeared in the same year 1982 (co-edited by his wife Carolyn) and it is a measure of its success that this publication with its slogan "To Promote An Interest in Fishes" now has a circulation exceeding 1 300 copies. His editorial in the second issue of February 1983, "The Changing Face of Ichthyology" significantly outlines some of his future plans. Many of these are touched on elsewhere but here we may mention revisions or new books on marine and freshwater fishes and those of the southern oceans, research on sharks and deep-water fish, use of SCUBA and midge submarines and promotion of the



Stamps commemorating the discovery of the first living coelacanth.

the Anglo American and De Beers Chairman's Fund. In 1992 further generous grants were received from the FRD and Rhodes University for the installation of a local area network that linked FISHLIT with users on campus and, in 1992, the service was made available to scientists throughout South Africa through the CSIR's computer network. In 1993 FISHLIT was published on a compact disk by the National Information Services Corporation (NISC) in the USA and marketed internationally as 'Fish and Fisheries Worldwide'. The FISHLIT NISC disks were received with enthusiasm by the international ichthyology community, and, by March 1994, included over 39,000 records.

Margaret Smith had created good rapport with the general public and we knew it was important to build on this foundation as the Institute was funded by public money. In September 1982 a Society of Friends of the Institute, ICHTHOS, was launched to provide a vehicle for communication between researchers and the general public. The society published a quarterly newsletter that included informally-written articles on new developments in research, fisheries management, aquarium science and aquaculture. The newsletter also acted as a forum for debate on contentious issues, such as whether fish feel pain, humane angling methods, the threat posed by angling competitions and by invasive fishes, and the importance of tag-and-release conservation measures. According to Peter Jackson, the newsletter 'developed into a journal of quite remarkable literary merit, with a readership of well over one thousand'.

In 1992 the Knysna Angling Museum project was initiated with the aim of promoting awareness of our angling heritage and the importance of using fishes sustainably. The displays, collected by Mike Bruton and Jean Pote and designed by Dave Voorvelt, were installed from early 1993 and, in June 1994, the Nestle Children's Underwater



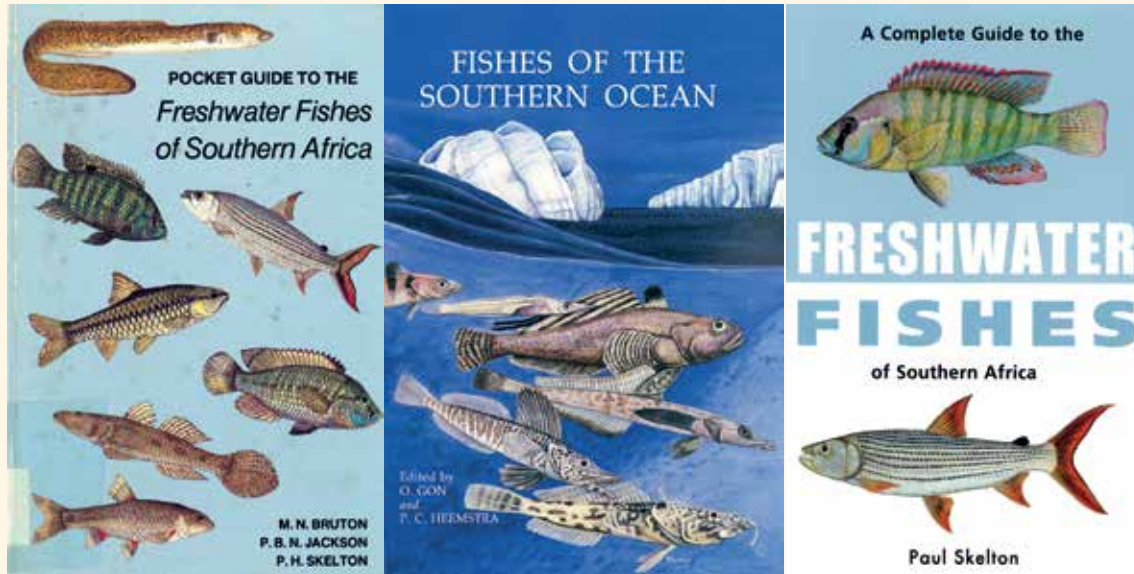
A portion of the display in the Knysna Angling Museum.

Discovery Centre, the museum's educational arm, was opened by Professor John Hanks of the Southern African Nature Foundation. The main museum was opened in July 1994 by Brian Wilmot, then the Chief Director of Cape Museums.

The public outreach programme also included art exhibitions held in July during the National Arts Festival and, in 1994, the Dakawa Art Project, funded by a Stockholm-based NGO, 'Artists against Apartheid', was launched that encouraged local artists to use fish, and especially coelacanths, in their designs and artworks. Another outreach initiative was the hosting of annual Traditional Fish Suppers at the Institute. An extraordinary range of shellfish and fish dishes, cooked by staff, students and invited guests, was offered at these informal dinners, which soon became a social highlight in the Eastern Cape. Although this event may seem trivial, it created very positive vibes with our stakeholders.

The JLB Smith Institute staff were not without their accolades. In 1985 Tony Ribbink received the silver medal of the Limnological Society of South Africa and, together with Paul Skelton, the Special Museum Merit Award from the FRD in 1992. In 1993 the latter award was also made to Eric Anderson and Phil Heemstra. In 1986, Mike Bruton was awarded the British Association Medal and, in 1992, he was elected as a Fellow of the Royal Society of South Africa.

After 12 years at the helm I resigned from the directorship, at an age younger than Margaret Smith when she first took over the reins. I had no regrets as I knew that, as a team, we had mounted



a muscular and fearless campaign to further enhance the international status of the Institute and had succeeded despite financial constraints and bureaucratic obstructions. I decided to take up a new challenge as Head of Education at the fledgling Two Oceans Aquarium in Cape Town and trekked westwards with my family in December 1994, with my daughter Tracey's horse and 35 boxes of books in tow. On leaving, I expressed my gratitude to those who had supported me and also thanked my detractors, who had kept me on my toes. Science, like Nature, is red in tooth and claw!



Professor Mike Bruton with a farewell gift.



The first issue of Ichthos was published in October 1982, but ICHTHOS was more than just a newsletter – it was a club with membership and purpose. As a membership newsletter, Ichthos survived for almost 23 years and over 70 issues were produced. The newsletter was historically established for the Friends of the JLB Institute of Ichthyology to promote an interest in fishes. One of its aims was to emphasize the variety of ways in which fishes impinge on our lives.

*The ICHTHOS logo was designed by Elizabeth Tarr, then senior artist at the JLB Smith Institute of Ichthyology, and consists of superimposed profiles of the Cape moony *Monodactylus falciformis*. The moony is a familiar fish which lives in the sea, estuary and freshwater and was chosen as representative of a variety of ichthyological interests.*

When the Institute became a business unit of the National Research Foundation (NRF), Ichthos became the mouthpiece of the Friends of the South African Institute for Aquatic Biodiversity (SAIAB). Unfortunately membership numbers began to dwindle and, although sponsorship from I & J Pty Ltd had made a valuable contribution to the production of the newsletter and its development, the final issue of Ichthos was published in 2005. It remains an avenue of communication missed by many.

CHAPTER THREE

A new beginning

Prof Paul Skelton

*"Inch by inch, life's a cinch.
Yard by yard, life's hard."*

John Bytheway



The End of an Era

THE YEAR 1994 was a watershed for the Institute. Not only had South Africa entered a radically new political dispensation that augured change in government institutions and administration but, in addition, the Director unexpectedly left at the end of December. All so-called Declared Cultural Institutions, including the JLB Smith Institute of Ichthyology, were transferred from the former Department of National Education to the newly established Department of Arts, Culture Science and Technology. In November 1994 the Minister, Dr Ben Ngubane, commissioned an enquiry into Declared Cultural Institutions in order to establish their status, viability and placement in Government. The Institute's Deputy Director, Dr Tony Ribbink, was appointed as interim Acting Director in January 1995 until the Board could appoint a new Director.

Brokering change

I was appointed as the new Director from 1st April 1995 and was challenged with the immediate task of engaging with the Commission of Enquiry and securing a future for the JLBSII. My former position on staff was as Freshwater Ichthyologist, so the new tasks of institutional management, financial bureaucracy and political negotiation were fundamentally different to all my previous experience. However, having been thrown into the 'deep end' of national negotiations and local political dynamics I soon honed the skills needed for defending the Institute in the new society. Uncertainty around the future of the Institute took its toll on staff morale and several members left, including scientific and support staff. Dr Tony Ribbink was granted extended leave in order to manage a major GEF project on Lake Malawi for at least five years and stood down as Deputy Director.

There were other pressing needs to be dealt with, financial constraint being the most demanding. Restructuring the operations of the Institute and a new management and administrative structure were quickly established. The traditional core business clusters of marine and freshwater ichthyology were reviewed and a more appropriate categorization of systematic and ecological sciences were identified. The need to communicate science and



serve society, especially the broader previously disadvantaged components of society under the new political dispensation, was also elevated as a priority to be addressed. Staff and financial limitations meant that some streamlining was required and the Knysna Angling Museum was accordingly phased out and transferred to local interests over the next three years. The Knysna Municipality offered to provide a permanent display area in the Knysna Museum for this precious collection. Ownership of the angling collection was transferred to the Knysna Municipality at the end of 2007 by SAIAB. The care of the artefacts, many of which had been donated by keen anglers from all over South Africa, was handed over to the Knysna Museum with the support of Provincial Museum expertise and the Angling Collection was reopened on 24th April 2008.

Perhaps the most fundamental change to the Institute initiated during this phase was embracing the new South African paradigm of equality, transparency and accountability. In place of isolation and independence in the landscape of our relationships with other institutions, it was necessary to open the doors of co-operation and collaboration, and to ensure our resources, human, capital and financial, were used to greatest benefit of the society that we served. These imperatives became even more accentuated and relevant as the new identity of the Institute emerged. Discussions and negotiations on the future of Declared Cultural Institutions were actively in progress through 1995-1997. It was clear that the Government was determined to change the old paradigm of what South African art and culture represented and to make it reflect the new order.

It was also clear that the Institute, technically speaking, was not strictly a 'cultural' institution in the typical 'museum' mould but, more correctly, its culture and operations rested firmly in a scientific sphere. This was acknowledged as such by the Director General of the Department of Arts, Culture Science and Technology at a formative conference held by the Department on Robben Island in 1997.



Delegates to the Pan-African PARADI/FISA conference in 1998.

Events moved rapidly and in 1998 several significant key events occurred and changes were made to the placement of the Institute in Government. In September the Institute hosted the second Pan-African Fish and Fisheries (PARADI/FISA) Conference. This Conference signaled both the new role in Africa for South African fish and fisheries science and the relevance of the Institute as a vital communications node for aquatic science in Africa. The conference was opened by Dr Rob Adam, a Deputy Director General of the Department of Arts, Culture Science and Technology, another clear signal from the Department that the Institute was relevant and ready to play a new role in the science landscape. In his opening address Dr Adam pointed out that the South African Cabinet had declared 1998 as the year of Science and Technology, and significantly, that government was 'looking at a way to bring the JLB Smith Institute much closer as an institution to the rest of the scientific establishment in South Africa'. The Department acted promptly on Dr Adam's pronouncement and, in January 1999, de-proclaimed the Institute as a 'Declared Cultural Institution' and transferred it from 'Arts and Culture' to 'Science and Technology'.

Joining the NRF: Envisioning change and transformation

At the time, the South African 'Science and Technology' landscape was in the transformative grip of the new Science and Technology Policy of National System of Innovation, and in April 1999, as of the beginning of the 1999 - 2000 financial year, the Department shifted the Institute to the new National Research Foundation (NRF) as a 'National Facility'. This was a double challenge, firstly to embrace what a 'biological' national facility actually represented, and secondly, to play a meaningful role in the establishment of the NRF as a vital science agency of government. The latter challenge, although indirect, was critical because the NRF was the future administrative and governing home for the Institute. Until that stage, and throughout its history, the Institute's own Council had played that particular role, and the connection between management and governing body was tight, direct and focused. Abruptly the connection was broken and governance was a broad-based issue within the framework of a new system of innovation and a cluster of other institutions starkly different from the Institute in size, as well as the science and operational requirements they embraced (radio-astronomy, astronomy, magnetic space science and nuclear science).

For the Institute the advantages of being part of the NRF were considerable. As soon as the Institute became a National Facility the financial system and policy, as well as human resource management, were no longer in-house responsibilities but were determined and executed from head office. In addition, the rapidly developing IT services required of modern scientific institutions were developed at a higher and more effective level than would have been locally possible by an independent institute. For most of the first two years my attention was focused on ensuring the close integration of the Institute with its new parent body. The scientific operations were allowed to proceed unhindered within the directions and framework of the individual drivers themselves. However, once the NRF had its foundations and systems in place, the focus on developing the Institute as a true National Facility assumed a priority of its own. The first task in this process was to establish the new scope and

strategic focus of the Institute. The dynamic President of the NRF, Dr Khotso Mokhele provided strong guidance and support for this vital transformative process.

There were two fundamental problems with the Institute in terms of it serving as a National Facility. The first was its scope as an ichthyological research institute. This taxon-specific focus was clearly too restrictive and the focus was therefore broadened to include ‘aquatic biodiversity’. The second and related issue concerned developing a wider relevance for South African aquatic biodiversity research and researchers across the landscape – in this context the close association that the Institute held with Rhodes University was seen by the majority of stakeholders as an inhibiting factor as far as functioning in the National System of Innovation was concerned. Whilst the positive values of an association with a hosting body was necessary, a National Facility had to be open for and embrace all interested institutions and researchers in the country. A certain space had to be created in the established relationship, in order to allow this to take place. That need naturally created a local tension between traditional stakeholders and the Institute, but it had to take place, and did.

The primary way in which to create such a space was to rename the Institute – a rebranding process that naturally raised public emotions and tensions at the time because of the deep attachments locally and abroad to the founding personalities of JLB and Margaret Smith. At the same time, the renaming also signaled and reframed the ‘new’ institute as a National Facility in the eyes of the public at large. Most importantly, the renaming of the Institute was mandated by the NRF as a symbolic action of transformation in science under the new dispensation.

Establishing a new strategic plan for the Institute through the active engagement of a wide range of both the established and a new set of stakeholders was an exciting process. The scope of the Institute, its mission was defined to include research, education and the public understanding of science. It is always easier to identify a task than to carry it out, especially transformation that requires existing personnel to change their midstream career directions. The change envisioned for SAIAB was always going to be a slow and difficult process because, although the financial dispensation had improved, the salary component was never enough to allow for the creation of sufficient new posts to make the changes required. In addition, inertia within the science educational landscape in South Africa was initially ineffective in bringing sufficient black South African graduates to bear. None-the-less, changes and sacrifices were made and the Institute quickly fashioned a special place for itself in the innovation landscape.

The Institute has always been a smaller unit than most of the other National Facilities. It could therefore adapt and adopt the revised conditions of service, market related salaries, pensions and retirement changes quicker than the others. In addition, it led the field in developing a ‘Business Management’ approach and the introduction of performance management for all staff, including the scientists. The positive impact of this move was quickly revealed in terms of a steady upward trend in scientific outputs, student training and publications, and other key performance areas such as training and education. From being a “Cinderella” collections facility in South Africa, the Institute soon became the benchmark to which other national museums aspired.

The collections grew at a pace that began to stretch the physical facilities available and it was necessary to adopt a martial approach to physical space in order to accommodate the growing facility. Soon we were forced to lease a property across the road in order to house the new *Elwandle* Node of the South African Environmental Observation Network (SAEON). Unexpectedly, another major challenge arose to force the infrastructural future of SAIAB. During a meeting of the NRF Board at SAIAB, arranged precisely to familiarise board members with the challenges and opportunities of the facility, the housing of the extensive wet collection in the Institute building was identified as an unacceptable occupational health and safety risk that required immediate attention.

Occupational Health & Safety and the Wet Collection: Core changes to established Infrastructure

All over the world the major museums with wet collections have been upgrading their facilities to meet modern standards of curation and, more importantly, of occupational health and safety standards. The risk of fire and workplace health are serious issues for wet collections. The view that wet collections are biological in nature is misleading when considered from a technical perspective – most specifically in terms of the nature of the preservatives! The main chemicals used for the fixation (10% formalin) and preservation (70% Ethyl Alcohol) of biological samples are respectively carcinogenic in nature or highly volatile and inflammable, and require special conditions for handling and storage. The situation for SAIAB at the time was in fact that the entire building was ‘illegal’, because it was a volatile chemical store, in which it was both hazardous and illegal to work! Indeed, leading up to the NRF Board decision, staff were complaining of ‘sick building syndrome’.

The situation was sufficiently serious for the NRF Board to allocate the necessary funding to build a new collections facility. However, two problems had to be overcome before the building could be properly designed and constructed. The first was that the Institute was housed in a Rhodes University

building on Rhodes University property. The second was that there were no recently constructed, modern wet collection buildings in South Africa on which to model designs. The first problem was overcome when Rhodes University allocated land adjacent to the Institute for a new wet collection store, and a 99 year lease agreement was negotiated. The second problem required exposing the design engineers to modern wet collection facilities in Europe through a fact-finding tour. The tour on which we embarked included visits to the Darwin Centre (The Natural History Museum, London), the National Museum in Stockholm (an underground facility), the Naturalis Museum in Leiden (a high-

“
Collections from several expeditions provide probably the most comprehensive set of preserved specimens from the system in museums worldwide.
”

rise facility), the Royal Museum for Central Africa in Tervuren (a converted underground parking lot), and the National Museum of Natural History in Paris (formerly a nuclear-bomb-proof underground facility). In addition, I visited the Natural Museum, Smithsonian Institution in Washington, the American Museum of Natural History in New York, and the Royal Ontario Museum in Toronto, to draw experience from their modern off-site facilities.



The Collections building taking shape, and the completed facility in 2007.

The new state-of-the-art double story wet collection building was opened by Deputy Minister Derek Hanekom in 2007. At that time, funding restrictions meant that only the ground floor was fully completed. Besides the air-conditioned, fire-protected collection store, the facility contained an isolated bulk chemical store, a formalin preservation room, an alcohol transfer room, a glass store and a skeletal preparation room. The second floor was left largely vacant apart from a biobank freezer



Top left: Preparation and curation.
Above: Mr Vuyani Hanisi tending to the collection.
Left: Re-housing the collection.

facility. The transfer of the specimen collection from the old building was soon achieved and attention turned to the refurbishing of that building, an extremely important task to ensure that the Institute could function as a National Facility should. It took several years of careful planning and spatial change before the task was achieved, all the while ensuring that operations were not unduly affected by the reconstruction process. Out of this emerged a modern research institute with several innovative laboratories and work-centres, including a Collection Management Centre, a Library geared for digital documentation and an integrated Administration Division and IT Service Facility. A Molecular Preparation Laboratory was also commissioned, thus enabling modern systematic research to take place.

The physical restructuring of SAIAB was a key development in positioning the Institute to function as an innovative leader in aquatic biodiversity research in South Africa. Strategic planning had focused on the need for the facility to provide the academic research community with high-level platforms generally beyond the reach of single institutions to conduct certain kinds of research. An early start had been made following the 1998 PARADI Conference where the absence of specialist information systems expertise was exposed. Information systems expertise was added as a recruitment priority and this enabled work on developing the collection database to be initiated. In time, this essential development extended through leadership and collaboration to the entire biological collections community in South Africa and beyond. In the systematics field, the provision of wet-facilities is an extremely costly outlay, so the consolidation of some aquatic biodiversity collections was initiated. A digital X-Ray Unit and Biobank were incorporated with the Collections and Molecular Laboratory to create a unique systematics platform for the nation.



Dr Phil Heemstra and the *Jago* submersible. The first exploratory expedition took place in March-April 2002. A total of 11 coelacanths were located by the South African-German team using the manned submersible.

Expansion of Marine Ecosystems Research and the beginnings of Platform Thinking

The Coelacanth Programme, initiated in 2001, exposed the gap of significant South African based marine research in the Indian Ocean, and the lack of small-craft oceanographic capabilities to undertake this work. From the beginning, marine research in the JLB Smith Institute of Ichthyology focused mainly on fish taxonomy. In the 1980s, under Professor Mike Bruton, marine research was expanded to include underwater exploration into coelacanth biology. However, the unexpected discovery by deep-diving Trimix divers of a population of coelacanths off Sodwana in KwaZulu-Natal in 2000, was a catalyst that changed the focus. The discovery called for a response from the marine community that resulted in the establishment of a project that was eventually named the African Coelacanth Ecosystems Project (ACEP). The initial focus of the project was to explore the canyon environs where the coelacanths had been discovered and to ensure the conservation of the population. Dr Tony Ribbink was appointed as Project Leader and, with excellent funding, the multidisciplinary project soon produced remarkable results including sightings of coelacanths in collaboration with Professor Hans Fricke from the Max Plank Institute and a German manned-submersible named *Jago* off Sodwana. In addition, with funding secured from the Anglo-American Chairman's Fund, the development of a highly successful marine education programme was initiated and ran from 2001-2006.

More significantly the ACEP project itself was a catalyst for, and formed the South African contribution to, a larger international GEF funded project exploring the Western Indian Ocean, the Agulhas and Somali Currents Large Marine Ecosystems (ASCLME) Project. Furthermore, the ASCLME management and administration selected SAIAB in Grahamstown as its host institution. The Institute leased a house in Somerset Street to accommodate the ASCLME team. These projects and the cohort of scientists and high-level managers that assembled in SAIAB, in turn encouraged the new SAEON initiative of the NRF to house the marine inshore *Elwandle*



Dr Tony Ribbink and Dr Ben Ngubane, Minister of DACST, at the launch of the Coelacanth Programme in April 2002. On February 14, 2002, Dr Ngubane had announced at Parliament that his department would commit R10 million to the Coelacanth Initiative.

Passing it on: education and outreach at SAIAB

“... the renaming of the Institute was mandated by the NRF as a symbolic action of transformation in science under the new dispensation.”

Throughout the first three directorships until 2010, SAIAB had a very active education and outreach component, with a passionate team undertaking educational activities and events. This outreach initiative was extended beyond the limits of

Grahamstown to rural areas in the Eastern Cape when the Institute was gifted an old bus by the Methodist Education Initiative in 2002 - the bus was custom-fitted as a mobile classroom ideally suited to bringing science to under-resourced schools in remote areas and was aptly named the Fantastic Fish Tank. The brightly hand-painted bus turned heads and toured to the Western Cape and all the way to Sasolburg to participate in the SASOL TechnoX science festival. The Fantastic Fish Tank was replaced with a new more reliable EduBus sponsored by Market Square Volkswagen in 2004. The EduBus was also highly visible and a purpose-fitted educational resource on wheels which travelled all over the Eastern Cape from 2005-2009.

Long term projects such as the Inkwenkwezi Sustainable Fishing Project, the Bloukrans River Monitoring Project and the Bright Sparks Project, had incredible impact on young learners. The highly successful Bright Sparks Project selected Grade 10 science students from schools around the Eastern Cape to be part of a three year programme encouraging and supporting the learners through workshops, tours and tutoring until they left school at the end of Grade 12.

In 2008-2009, with sponsorship from Murray and Roberts, SAIAB teamed up with SAEON Elwandle Node in many of its outreach activities. Activities with local and rural schools included workshops and presentations, beach clean-ups and science days. National events such as National Marine Week, National Science Week, National Clean up South Africa Week, and Take a Girl Child to Work Day were annual focus events.

SAIAB also initiated a Work shadowing programme for Grade 11 learners to give them experience in marine, freshwater and estuarine research as well as in the Collections. The SAIAB Winter School targeted second and third year undergraduate students from historically disadvantaged universities in order to help them make informed choices regarding postgraduate study. Ten to 12 second year students were selected annually on the strength of their motivations to attend two weeks at SAIAB doing fish identification courses, gaining field experience, learning molecular techniques and even getting to grips with geographic information systems (GIS).

These innovative long-term projects have borne fruit. Several of the ‘Bright Sparks’ progressed to attend universities and have since graduated. Workshadowing students have continued in science (Marine Biology, Ichthyology) at tertiary level and Winter School students have returned to SAIAB as interns or to do their degrees!

Opposite top left: Nomtha Myoli introduces rural school children to sea creatures. Above right: Prof Paul Skelton with the 2007 Bright Sparks during their visit to the National Zoological Gardens in Pretoria. For most, this was their first trip outside the Eastern Cape province. Below left: Work shadowing; Below right: The Fantastic Fish Tank won hearts and minds of rural children throughout the Eastern Cape.





The RV *Dr Fridtjof Nansen* on the coast of Madagascar,

Node at SAIAB. In effect, within a few years SAIAB had quickly emerged as a major centre for marine research in southern Africa, focused largely on the Indian Ocean seaboard.

In 2007, a second phase of ACEP was initiated and management of the project was handed to Dr Angus Paterson and seated within the SAEON *Elwandle* Node. The funding model was changed from a block-grant to grant funding from the Department of Science and Technology. The programme expanded to develop marine platform infrastructure and an open call for research by South African researchers in the Agulhas Current region. The education and training of a new generation of marine scientists became one of the key objectives of the programme. The project initially arranged research cruises that used large research ships such as the RV *Algoa* and the RV *Fridtjof Nansen* for its operations. However, for the first time, in 2010 SAIAB designed, built and equipped its own research vessel, the 20 metre RV *uKwabelana*. In addition, it acquired a Sea-eye Remote Underwater Vehicle (ROV) that allowed the marine science community for the first time to visually explore the coastal inshore waters.

There was a further initiative undertaken that has led, in time, to significant marine research developments in South Africa. Through the efforts and initiatives of Dr Paul Cowley, the Institute engaged with the international marine project called the Ocean Tracking Network to provide global ocean tracking facilities around the southern African coastline. These now major platforms have changed the nature of marine research in southern Africa by opening it up to a broader section of the global community and formed integrated and collaborative networks of researchers.

Research Highlights 1994-2011

In 1996 the Institute celebrated 50 years of Ichthyology in South Africa. The occasion was marked with a review of its history and research in a dedicated volume of the Transactions of the Royal Society of South Africa. Ofer Gon summarised the systematic and taxonomic research accomplishments for that half century for which four books, *The Sea Fishes of Southern Africa*, *Smith's Sea Fishes*, *Fishes of the*

International collaboration: studying behavioural ecology of fishes in the Seychelles.



JLBSI Ichthyological Bulletins and Smithiana Bulletins, Monographs and Special Publications

The publication of Sea fishes of Southern Africa (1949) marked the culmination of two decades work by JLB and Margaret Smith. They next focused on the marine fishes of the East African coast. Extensive fieldwork was undertaken between 1950 and 1956 along the coast of Mozambique, Tanganyika, Zanzibar, Pemba and Kenya, as well as around numerous islands in the Seychelles archipelago and the Aldabras. They also visited Angola.

It was decided to work up the material family by family, starting with the more difficult groups. Assisted by grants from the Council for Scientific and Industrial Research (CSIR) for publication and colour reproduction, the first Ichthyological Bulletin, The revision of the Parrotfishes, was published in 1956 by the then Department of Ichthyology, Rhodes University. From 1980 the Ichthyological Bulletin was published by the newly created JLB Smith Institute of Ichthyology.

After the Institute joined the NRF, the publication series (Monographs, Bulletins & Special Publications) honoured JLB Smith and Margaret Smith with the name Smithiana, in recognition of their many years of devoted service to African aquatic biology. Their life's work, a team effort, established modern ichthyology in southern Africa and laid the groundwork for the expansion of aquatic biology throughout the region.

In the Smithiana Bulletin SAIAB published original scientific articles in the fields of taxonomy, systematics, ethology, ecology, biogeography, and conservation of the fishes of Africa and surrounding oceans. The Bulletin ran from 2003 to 2011.

Smithiana Special Publications were originally published for relatively short research papers in place of JLB Smith Institute Special Publications. The 'Special Publications' series was resurrected in 2002 and ran to three issues, the most recent (and last) being 2011. Its purpose was to make available reports, surveys and similar work that fall outside the ambit of a research paper, but which contain valuable information that should be made accessible.

The Bulletin and Special Publications were discontinued when there was no longer a justification to publish them. At the time a publication subsidy was coming into effect and the Smithiana series would not be subsidised under the scheme. There were also good new journals such as Zootaxa emerging which were catering for taxonomy and it was important to avoid a conflict of interest developing between 'in house' publications, which were effectively being subsidised by the NRF, and external journals.

The Monograph Series has remained active on an ad hoc basis. The most recent in the series, Volume 4, Fishes of Southern African Estuaries: from species to systems by Alan Whitfield, the culmination of forty years of dedicated research by the author and more than a century of work by fish scientists in the many and varied estuaries of southern Africa, was published to wide acclaim in 2019.

DEPARTMENT OF ICHTHYOLOGY
Rhodes University, Grahamstown

ICHTHYOLOGICAL BULLETIN No. 1
ISSUED JANUARY, 1956

THE PARROT FISHES
OF THE
FAMILY CALLYDONTIDAE
OF THE
WESTERN INDIAN OCEAN

By
Professor J. L. B. Smith

S.A. Council for Scientific and Industrial Research Fellow in Ichthyology

Illustrations by Margaret M. Smith

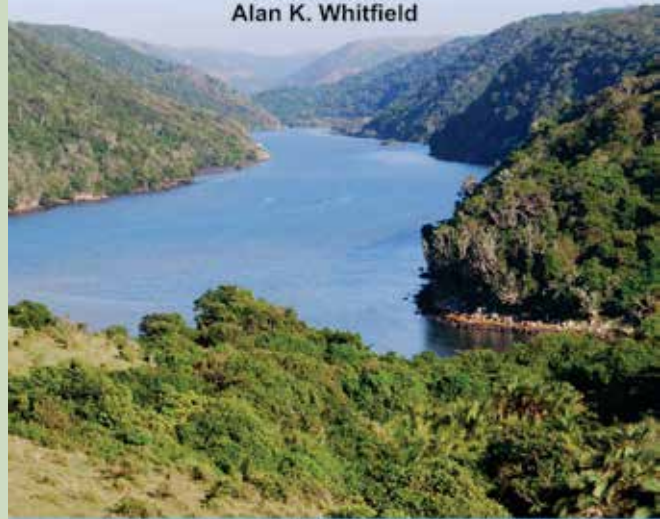
(Published by the Department of Ichthyology, Rhodes University, Grahamstown,
South Africa)

Published in 1956.

SMITHIANA MONOGRAPH NUMBER 4

**FISHES OF
SOUTHERN AFRICAN ESTUARIES:
from species to systems**

Alan K. Whitfield



Published in 2018.



Paul Skelton and collaborators at the source of Zambezi river in Zambia as part of the 4-corners Initiative.

Southern Ocean and A Complete Guide to the Freshwater Fishes of Southern Africa effectively stamped the authority of institute scientists on the discipline for the region. In the subsequent period, Dr Alan Whitfield likewise produced a comprehensive synthesis on the *Biology and Ecology of Fishes in Southern African Estuaries*. Systematic ichthyology continued as a strong theme after 1995 but, increasingly, contributions to conservation and ecological and applied aspects initiated since 1982 assumed even more significance.

One of the factors that encouraged a continual stream of marine systematic publications was a new project to compile a book on fishes of the Western Indian Ocean under the lead of Dr Phil Heemstra. This ambitious undertaking involved over 50 authors and was still in progress at the end of the period. It was a vehicle to bring a number of senior researchers to the Institute for extended visits in order to revise their particular groups. In addition to his many contributions to deep sea fishes, there was a flourish of publications on fossil fishes in southern Africa by Dr Eric Anderson.

The opening up of African borders to South African researchers after 1994 created major opportunities for SAIAB's biological scientists over the years. This was particularly relevant in facilitating exploration of systems arising further north in Angola, Zambia and Mozambique, as well as other African states like Tanzania, Lesotho, Swaziland, Namibia, Zimbabwe and Botswana. A Fisheries Development Project in Lesotho on the newly formed Katse impoundment was the first of several such projects. During 2002-2004 a team from SAIAB explored the Upper Zambezi in Zambia as part of the **4-Corners Initiative**. In 2005, SAIAB was invited to assist the Fisheries Institute in Luanda, Angola, broaden their scope into inland waters and a joint survey of the Cuanza River was undertaken from 2006-2009. These initiatives allowed SAIAB to take a lead for the southern African region in a Pan-African assessment of the conservation status and distribution of freshwater biodiversity coordinated by Dr William Darwall. Collections from several expeditions provide probably the most comprehensive set of preserved specimens from the system in museums worldwide.



Top left: An early trip to the Okavango.
Top right: A fish merchant in de Morne, Mauritius.
Above: Dave Voorvelt illustrating at Cape Maclear, Malawi.
Right: The Collection represents SAIAB's local and international reach.

Conclusions: The benefits of Succession Planning!

If the only constant is change, then for SAIAB, in order to survive in the science landscape and transform into a whole new entity as a National Facility serving the nation, the period 1995-2011 was one of constant change. Its major achievement was to demonstrate clearly that the concept of a biological national facility was both innovative and essential for the development of the sciences in a new South African order. The period saw a relatively small, intensely focused research institution, open wide its doors to embrace new administrative and financial systems, develop new physical and capital infrastructure that extended its relevance as a leader in Africa, and to mould its operations into a centre of influence beyond the established elements on the subcontinent. Training and education, previously a marginal matter, assumed a core value and young leadership, willing to step boldly into uncharted spaces, was needed to take the voyage further.

Fortunately such leadership, in the person of Dr Angus Paterson, was waiting in the wings and ready to take the ship forward on its voyage.



Paul's farewell.

CHAPTER FOUR

2011-2020 #Transformation

Dr Angus Paterson

*“Take your science seriously,
yourself not as much”*
Humphry Greenwood



I ANTICIPATED that the start of my directorship would be smooth: it had been part of a succession plan and after all, I thought, I would have an overlap period of six months with a well-seasoned director who would show me the ropes. Little did I know that this hand over period would actually be limited to a meeting during which Paul would say, “I am going to my lab to get to back to my fishes. If you have any problems, just shout!” The long and short of it is that Paul had been an excellent director for 17 years, but his DNA was that of a freshwater fish taxonomist and at the first chance he got he was back working on his beloved freshwater fishes. As it turned out, Paul’s belief in the systems he was leaving behind was warranted, as he left a well-functioning Institute and the handover was indeed very smooth.

I started out as an undergraduate student at the JLB Smith Institute of Ichthyology in the early 1990s, so I am the first Director who did not personally know either of the Smiths. One could say that a full generational change was beginning when I took over the reins in 2011. The natural passage of time since the inception of the Institute had resulted in a number of key scientific appointments made by Prof Mike Bruton in the 1980s now coming to the end of their careers at SAIAB. Some of these staff members had been in service for over 25 years. These included Dr Eric Anderson, a renowned marine deep-sea ichthyologist, Mr Ofer Gon, a marine ichthyologist whose key legacy was a major contribution to the understanding of Apogonid taxonomy, as well as the seminal publication *Fishes of the Southern Ocean*, and Prof Alan Whitfield who retired in 2018 after 30 years’ service, having dedicated his life to the ecological understanding of South African estuaries, for which he received the Gilchrist medal as well as an A-rating from the National Research Foundation (NRF).

Prof Paul Skelton’s retirement as Managing Director also officially ended his tenured career as the Institute’s freshwater fish taxonomist. Paul’s academic career at SAIAB resulted in key publications such as the *Complete Guide to the Freshwater Fishes of Southern Africa* as well as a considerable collection of freshwater fish. Long-standing administrative staff, such as Wendy Sweetman and Jane Stockwell also retired leaving a big hole to fill in terms of administrative functionality. Sadly, some of the key retired staff who made SAIAB what it is today have passed on. Most recently, the passing

of Dr Phil Heemstra is of particular significance as it was he who maintained the momentum of, and continued to drive, the Smith's legacy of marine fish taxonomy. His seminal contribution in working with Margaret Smith on the legendary *Smiths' Sea Fishes*, as well as the upcoming *Coastal Fishes of the Western Indian Ocean*, the compilation of which he initiated some 25 years ago and which has involved taxonomists from around the globe, will not be easily matched. So, for a small institute which, historically, has had a very low staff turnover, SAIAB has changed significantly over the last decade with a younger generation eagerly hoping to make their mark on this incredible Institution. And the younger generation has not failed, as will be outlined later!

Directors usually retire when they believe they have made their contribution and it is time for fresh ideas in an operational environment that is always changing and evolving. Professor Paul Skelton had indeed left his mark and the landscape was indeed changing. Two shifts were occurring at the national level: firstly the system was frustrated, and rightly so, with the pace of transformation in the country's scientific workforce, at the levels of both the student and the researcher. Secondly, the way in which science was managed was undergoing a paradigm shift towards compliance, redress through BBB-EE based procurement, detailed performance management and comprehensive reporting. Lastly, at the level of the NRF, the growth of the National Facilities and, in particular, the advent of the Square Kilometre Array, a global scientific investment in radio astronomy infrastructure, gave the NRF added impetus in the development of its National Facilities' infrastructure. These three forces needed to be carefully navigated if the Institute were to reach 2020 in a fit-for-purpose state and position itself strategically within NRF Vision 2030.

Transformation and change

In the first decade of the new century, the Institute made good progress in changing the equity profile of the technical and administrative staff, but change in the student cohort and scientific staff was slow. Progress had been made in the addressing the gender balance of the research staff, but slow staff turnover and lack of additional posts made recruitment and retention of young black scientists illusive.

The recognition of the need for more equitable access to academia was not limited to SAIAB, but was being felt through the whole system and it finally boiled over on a national scale in 2015 with the #feesmustfall and #Rhodesmustfall movements which brought universities in the country to a standstill. SAIAB recognised this frustration early and, since 2011, the equity agenda has been at the core of all our activities. While there is still a long way to go, certain key actions have resulted in a fundamental change in the gender and race balance of students both within the Institute as well as more broadly within the system.

Internally, SAIAB has driven change in the following ways: performance agreements of scientists are heavily weighted towards the transformation endeavour; transformation targets in some bursary programmes were scrapped in favour of a 100% redress approach which put equity at the centre of the Institute; also, strong emphasis is placed on addressing the articulation and life skills gaps that many students at the postgraduate level still experience due to the long-term effects of enforced



SAIAB staff, interns, students and NRF visitors, July 2019.



Top left: Skipping.
Bottom left: Data analysis.

Top right: Instrument deployment.
Bottom right: Field data collection.

privations associated with the repressive governance systems of apartheid and colonialism. Essential competencies like driving, swimming, skipping, public speaking, first aid are now all part and parcel of a SAIAB postgraduate’s training.

In 2018, SAIAB managed to secure two additional scientist positions along with an additional post for a marine curator. All of these posts will be filled in late 2019 by black South African candidates who entered the SAIAB student pipeline in the period 2012–2014. Through natural attrition and staff turnover the Institute will continue to move towards establishing a representative research staff compliment that reflects the demography of the country.

Externally, SAIAB has played a major role in driving change in the science system. In 2008, SAIAB’s flagship African Coelacanth Ecosystem Programme’s Open Call required applicants to actively address race and gender equity imperatives. After a poor response by the traditional marine science universities to adequately address this imperative, the ACEP Phuhlisa programme was developed to expressly provide support for other South African universities, not traditionally involved in marine research, to develop their marine science curricula. The Phuhlisa programme pulls together all the best that the NRF offers in terms of bursaries, travel grants, life skill courses, infrastructure (e.g. coastal vessels) and technical support, and offers this as a holistic, integrated package. The programme had immediate traction and, by 2018, more than 100 students were undertaking postgraduate degrees in a variety of marine fields at the University of Fort Hare, Walter Sisulu University, the University of Zululand and University of the Western Cape.



Managerialism in science

The paradigm by which science is managed within the NRF was fundamentally changed after 2010 as a result of the imperative to provide detailed quantitative reporting, third-party verification and economically transformative procurement systems. This shift from a primarily science-driven management focus to managing science within a highly regulated, paperwork-heavy and often inflexible compliance framework, required two changes – one functional and the other psychological. The functional change in terms of reporting systems, committees and systems of governance has been achieved, but not without challenges. No additional resources were forthcoming to meet these new demands and existing staff had to be coached to work with the new systems. The old management emphasis on maintaining as lean an administrative staff as possible, with focus directed entirely on the science operation, is now a distant past paradigm.

For an Institute that has always been well managed, the additional administrative burden that staff and, in particular, scientists had to bear was initially resisted and deeply resented; particularly since researchers at universities were not subject to the same operational strictures. While the deep integration SAIAB has with the Higher Education system has always been very positive, the differences in operational environment between a university and a research institute which is subject to the National Treasury's Public Finance Management Act, resulted in our scientists questioning the efficiency, need and efficacy of the new administrative systems. Some very frank discussions were held as the governance requirements were not optional and ultimately SAIAB would have to fall in line. True to form, the dedicated scientists at SAIAB weighed up the benefits of being at a National Facility versus the additional reporting requirements and have all taken up the challenge to meet compliance requirements while maintaining a very high science output.

In my overview of SAIAB's development over the past 10 years, the inclusion of a discussion around the way science is currently managed may seem uninteresting, dull and dreary to some. However, it is significant in that managerialism, compliance and oversight changes during the last decade have resulted in many research institutions suffocating and failing. The fact that SAIAB has not failed but grown is testament to the foresight of its scientists in recognising early on that the rules had changed and there was a new way of doing business.

Research Infrastructure Platform expansion

When the NRF was formed, SAIAB was the smallest National Facility and, initially, the only biodiversity-based platform within the National Facilities suite. Some may have regarded SAIAB as an outlier in relation to the other National Facilities which were predominantly very large, single-site, physics infrastructure platforms providing, for example, telescopes and cyclotrons. In the late 1990s, the then Director General of the Department of Science & Technology, Dr Rob Adam, saw early on that an international centre of Ichthyological research with a well-managed national collection could be developed into an aquatic biodiversity National Facility undertaking not only excellent research,

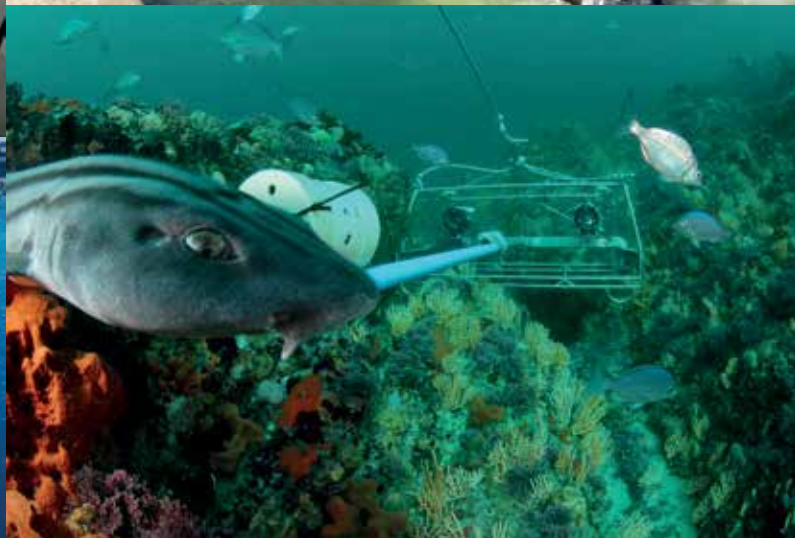
but also providing well-managed, cutting-edge research infrastructure to the National System of Innovation (NSI).

Over the 20 years since SAIAB became a National Facility, its role as a multi-faceted infrastructure provider for biodiversity research in marine, estuarine and freshwater systems has fully materialised. Prior to 2010, SAIAB was predominantly known for its world class specimen collection facilities and curation. Over the decade that has followed, not only have the Collection facility's storage capacity and capabilities been significantly increased through the completion of the second floor, but SAIAB has also developed and now provides cutting-edge, unique coastal marine infrastructure. This expansion of SAIAB's ability to provide research platforms beyond collections was made possible through funds provided by the Department of Science and Innovation (DSI) to the NRF with which to upgrade the National Facilities, as well as tenacity of purpose and belief in the Institute's ability to meet its mandate.

In addition, the combination of government and industry recognising the need to grow the Blue Economy through the government's Operation Phakisa, as well as the knowledge that there was a dearth of information available on east coast marine systems, represented an opportunity for SAIAB. Ship-based research in the deep marine environment is very costly and was already being undertaken by the Department of Environmental Affairs through the division called Marine and Coastal Management (MCM). So SAIAB decided to target predominantly the continental shelf edge and develop platforms designed to work up to 40 nautical miles offshore and down to 300 m depth. Given SAIAB's National Facility status, platforms offered in these new research areas needed to be unique within the NSI, be cutting-edge internationally, require significant technical skills and generally be at a scale beyond the scope of any single university in the country. With these criteria in mind, a number of innovative marine infrastructure platforms were developed.

First of these was the **National Coastal Craft Fleet**. SAIAB pioneered the use of smaller vessels (below 25 tonnes) for use in coastal waters. These were designed to have an operational speed above 15 knots, a range of 200 nautical miles, the capacity to undertake cruises of up to 48 hours, be able to deploy oceanographic equipment, have excellent manoeuvrability and a permanent technical crew of two highly trained individuals with berth space for up to six scientists. This model has proved to be highly cost effective, has allowed unprecedented access to the coastal environment and complements the fleet of large ships managed by the Department of Environment, Forestry and Fisheries. The programme has developed a fleet of specialist coastal research vessels: RV *uKwabelana* (2009 Port Elizabeth) which comprises a 13 m fiberglass hull with two outboard motors; RV *Phakisa* (2016 Durban) is a 15 m aluminium catamaran with jets; RV *Smithi* (2018 Grahamstown/Makhanda) which is an 8.5 m rigid inflatable vessel, and RV *Observer* (Port Elizabeth), a 15 m aluminium catamaran with jets due to be launched in December 2019.

Key coastal research techniques are now available to researchers through the deployment of specialist coastal marine research instrumentation from these coastal vessels, which negates dependence on the traditional large ships. These instruments include CTDs, Niskin Rosettes, ADCPs, ROVs, SBRUVs, grabs, sleds, pumps and nets. The value of this type of platform was recognised by



Top left: CTD rosette.
Bottom left: A retrieved ATAP receiver
and acoustic release.

Top right: Marine research vessel.
Bottom right: Stereo-BRUVs on a high
profile reef in the Tsitsikamma MPA.

the DSI's Shallow Marine and Coastal Infrastructure Research programme which has funded the RV *Observer*.

The **National Acoustic Tracking Array Platform (ATAP)** is a dispersed array of acoustic receivers developed by SAIAB's Principal Scientist, Professor Paul Cowley. The array capitalises on South Africa's geographical advantage with regard to tracking fish migration and movement. ATAP comprises over 100 sub-surface acoustic stations located from Langebaan to Sodwana Bay which are serviced by SAIAB and ATAP's partners, and which have to-date tracked in excess of 1 000 individually tagged fish. ATAP is a key partner in the Global Ocean Tracking Network programme and epitomises the role of a National Facility in deploying and managing a dispersed array for researchers within the entire NSI. The platform has provided insights into the movement patterns of key commercial and non-commercial fish species which have fed directly into developing sound management of these fish stocks.

The advent of digital cameras and remote operating systems has wholly transformed scientists' ability to access deeper water and explore well beyond the depths that are safe for SCUBA divers. Through the **Marine Remote Imagery Platform (Mar-RIP)** Dr Anthony Bernard and Mr Ryan Palmer have pioneered the use of a remotely operated vehicle (ROV) and stereo baited remote underwater video (SBRUV) platforms for use in the epipelagic zone (0 - 100 m) and shallow mesopelagic zone (100 - 300m). SAIAB provides the only research ROV capability in the NSI and the most developed SBRUV platform. Mar-RIP is also playing a major role in developing the understanding of reef ecosystems throughout the Western Indian Ocean with its systems having been deployed in Mozambique, Madagascar, Kenya, Comoros and Seychelles. Dr Bernard has also developed an untethered lander system capable of working to 1000m, which has significantly extended the research reach and potential of this unique platform.

South Africa has more territory under the ocean than above it, yet our detailed understanding of the geology and benthic ecosystems of even our shallow waters is poor. SAIAB launched a new **Geophysics mapping platform** in 2018 which will be fully integrated into the ACEP programme in 2021. The platform is equipped with a state-of-the-art inertial navigation system and a multi beam echo sounder which allows for detailed mapping of the seafloor down to 250 m. The new system will be deployed off RV *Phakisa* and RV *Observer* and will enable researchers to map uncharted underwater geographical features of the South African east coast continental shelf.

SAIAB has also developed two **Specialist Research Laboratories** which are aligned to the investments in the coastal research infrastructure. The **Aquatic Genomics Research Platform** was formed in conjunction with the South African Research Chair in Marine Natural Products held by Professor Rosemary Dorrington of Rhodes University. In 2015 SAIAB built a new laboratory to house a Next Generation sequencer to complement an existing Sanger sequencer which meant that this platform provides an unprecedented technical pipeline from source to analysis, all within one Institution. This production chain includes the collection of organisms at depth using the ROV and one of the coastal craft, storage of tissue material in a biobank, barcoding of tissues, storage of the whole organism in a collection facility, undertaking genomics applications and finally storage of any assays in a safe biobank.



Above: BRUV data provides new insights into the ocean.

Above right: Marine Remote Imagery deployment.

Right: Bongo-net sampling.



In 2014, SAIAB and the Department of Ichthyology and Fisheries Sciences at Rhodes University joined together to build the **Aquatic Ecophysiology Research Platform (AERP)**, a small but highly functional laboratory. The lab concentrates on understanding the effects of temperature, salinity and pH on aquatic organisms. Significant results have already been forthcoming with Dr Murray Duncan, one of the first PhD graduates to use the lab, contributing his findings for a paper entitled 'Exploitation may influence the climate resilience of fish populations through removing high performance metabolic phenotypes' (Duncan, M.I., Bates, A.E., James, N.C. & Potts, W.M. 2019. Scientific Reports 9(1), art. no. 11437).

In the last decade, the **African Coelacanth Ecosystem Programme** has gone from strength to strength and remains a flagship programme of the DSI and NRF. ACEP has always aimed to produce world class, multi-disciplinary, multi-institutional east coast marine research. The Programme has been the vehicle through which researchers within the NSI have gained funded access to key research infrastructure on a competitive basis. The support provided is an integrated package of research running costs, technical support and research platform access, as well as student bursaries. The access to infrastructure that has been made available to South African researchers through the various ACEP open calls has included:

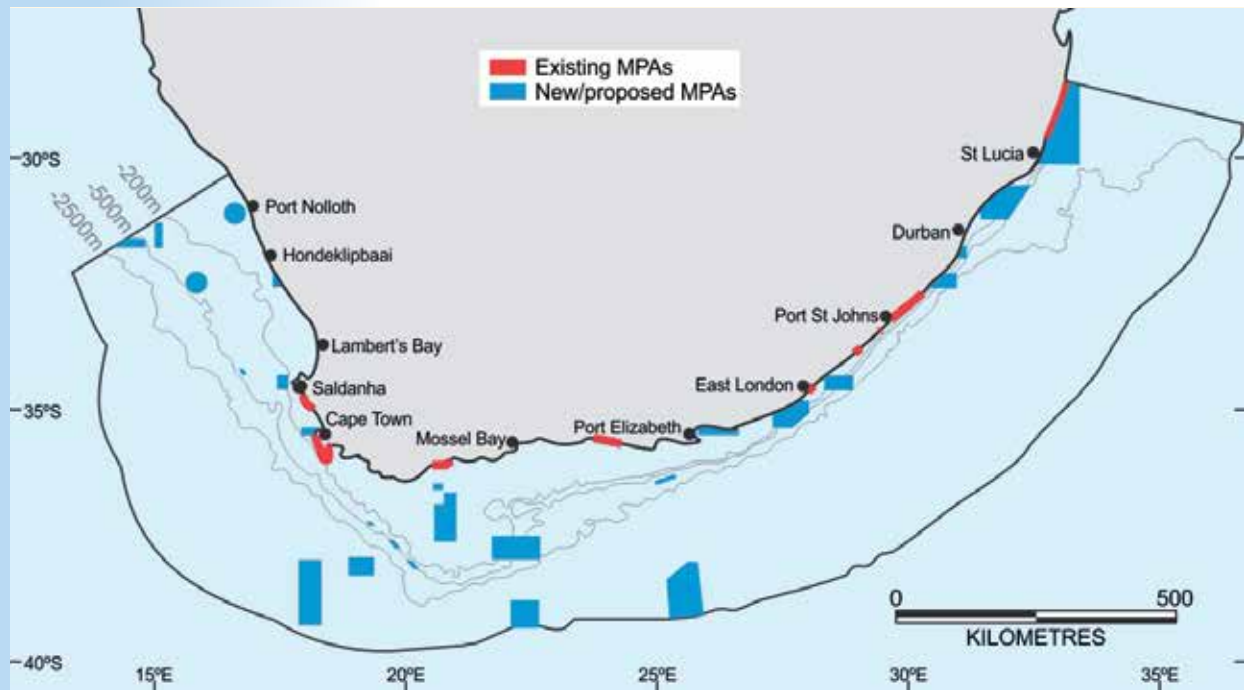
- RV *Algoa* cruises (DEFF)
- Sentinel sites (SAEON)
- Agulhas Somali Current Array (SAEON)
- Coastal Craft Fleet (SAIAB)
- Acoustic Tracking Array Platform (SAIAB)
- Marine Remote Imagery Platform (SAIAB)
- Geomap (SAIAB)

A total of 21 open call projects have been funded, all of which have been aligned to the country's mandated research priority areas. A key highlight has been the role that ACEP and resulting ACEP data played in the promulgation of the 20 new Marine Protected Areas (MPAs) off South Africa. ACEP's graduate and training output has grown systematically.

Broadening the Research Focus in Service of Society

Although marine and coastal research at SAIAB during the past decade has continued to focus on fishes, the Institute has made a successful transition from a primarily marine fish taxonomy focus, to concentrating on broader biological and ecological areas of study. Much of this work has focused on habitat utilisation by fishes within estuaries and the coastal zone using the latest technologies, including acoustic telemetry, dual-frequency identification sonar (DIDSON), stable isotope and genetic studies. In addition, *in situ* field studies, together with environmental laboratory studies, have provided insights into the physiology of both invertebrates and the early life stages of fishes in relation to potential climate change impacts on these organisms.

The sustainability of coastal fisheries has come under the spotlight in recent times and the stocks



A map of existing and new MPA's in South African waters.

of some exploited species are considered to be collapsed. SAIAB scientists have not only focused on the biology and ecology of these taxa, they are also linking changing environmental pressures such as reduced river flows into estuaries and increased water temperatures on estuarine and coastal fish species. A number of these and other studies within the field of southern African estuarine and marine research have been synthesized over the past decade and published as major reviews, monographs and book chapters.

In the freshwater realm, SAIAB's taxonomic and genetic work, which includes the recent revision of several groups of endemic fishes from the Cape Fold Region, provided the basis for the 2018 reassessment of the conservation status and extinction risk for all freshwater fishes of South Africa. This assessment, using the IUCN Red List Categories and Criteria, highlights conservation priorities and threat levels.

The impact of introduced alien fishes is high on the list of threats to South African freshwater fish biodiversity. Alien fishes provide a management dilemma because their introductions have resulted in severe impacts on native fish communities but, at the same time, they also provide economic benefits



Top left: The invasive mirror carp *Cyprinus carpio* has escaped from catchment farm dams and now occupies the oligohaline headwaters of certain southern African estuaries,
Top right: SAIAB publication *Coastal fishes of Southern Africa* in use in Maputo.
Left: Breede River Redfins at Bainskloof.

through fisheries and aquaculture. Thus, research on alien fishes has been a major thrust of SAIAB's research strategy. Through focused work on invasion pathways, drivers and impacts of introduced aquatic biota, SAIAB research has directly contributed to the national legislation and strategy on Alien and Invasive species.

Understanding human and environmental impacts on fish populations is a fundamental requirement to ensuring their conservation and sustaining their contributions to food security and



Estuaries that fall within marine or estuarine protected areas need to have the support of local communities in order to be successful as fish sanctuaries.
Mr Martin Fakudze and Ms Nokuthula Khumalo at Ngonini conducting an electrofishing survey.

livelihoods on the African continent. In the last decade SAIAB's research has developed much of the ecological knowledge required for developing safe, sustainable harvesting strategies for subsistence and recreational inland fisheries in South Africa. Further, SAIAB's research continues to support inland fisheries' decision making in the SADC region with an emphasis on the African Great Lakes as well as the Orange, Okavango and Zambezi River basins.

In line with global norms, the core measures of SAIAB's research performance are publications and students. SAIAB scientists are highly regarded and, since the Institute's inception, have been extremely successful at winning competitive research grants. It is these grants which fund all of the Institute's research activities. All of SAIAB's scientists are NRF-rated (currently three at the B level), most serve on the editorial boards of international scientific journals, and some represent South Africa's science sector by serving on international committees and working groups. Among these



are: FutureEarth BioDiscovery, IUCN-Freshwater Fish Specialist Group, FAO Inland Fisheries and the Global Ocean Tracking Network Project. Through the implementation of clear performance contracts, engagement with research associates, and support from excellent Postdoctoral Fellows, SAIAB's research output and impact has followed a positive trajectory.

Over the last ten years (2011-2019) more than 650 ISI-rated papers have been published. Although there has been no increase in the number of permanently employed research staff at the Institute, the publication rate has increased from less than 50 papers per year prior to 2011 to 100 per year from 2018. Research outputs include applied, analytical and conceptual contributions in leading journals, e.g. taxonomic descriptions of fishes such as the Giant redfin minnow *Pseudobarbus skeltoni* (Zootaxa 3686), genetic insights into evolutionary processes (Proceedings of the Royal Society B: Biological Sciences 279), developing new metrics to understand and predict the ecological impacts of invasive species (Journal of Applied Ecology 54), information for the conservation and management of highly threatened fish species (Biological Conservation 212), developing the technology, science and application in animal tracking (BioScience 67), and contributions to global assessments on the impact of fishing (Nature 572), which continue to build a strong foundation to conservation planning and sustainable development in South Africa's aquatic ecosystems.

Significant advances have also been made with regard to capacity development with the student cohort doubling from fewer than 30 supervised postgraduate students prior to 2010, to over 50 post graduates supervised annually thereafter. This resulted in the graduation of 32 BSc Hons, 66 MSc/MTech and 29 PhD students over the last decade. A graduation rate of 13 postgraduate students per year is exemplary given the relatively small group of permanent researchers at SAIAB. There has been an increasing trajectory towards transformation. SAIAB's Postgraduate School comprises 56 students from South Africa and other countries. Of these 45 are South African students – 53% are black South Africans and 56% are South African women. The impact of this is seen by the significant contributions of these students to the knowledge economy. Examples of SAIAB graduates in key research positions are Dr Henning Winker (DEFF); Dr Albert Chakona (SAIAB); Dr Pholoshi Maake (SANBI); Thethela Bokhutlo (Botswana International University of Technology - BIUST); Dr Ryan Wassermann (BIUST); Dr Amber Childs (Rhodes University); Nkosinathi Mazungula (SAIAB), Dr Bruce Ellender (WWF-Zambia) and Dr Rhett Bennett (Wildlife Conservation Society). SAIAB has expanded its research footprint through the ongoing support of key associates who include experts on the taxonomy of sharks, frogs and diatoms, as well as highly productive early career researchers.

Service to society is inherent in many of SAIAB's research programmes, with major contributions to national biodiversity assessments, red-list assessments and support to the development of national policy and legislation. Through active engagement with international research partners, SAIAB is increasingly contributing to international research efforts with marine programmes addressing issues in the western Indian Ocean and freshwater programmes on the African subcontinent. Active research partnerships include researchers in Mozambique, Zimbabwe, Botswana, Namibia, Zambia and the Democratic Republic of the Congo. Beyond Africa, collaborations include researchers from



Guided by Mr Mzwandile Dwani, school children and their teacher enjoy a “hands-on” experience at the Collections display at the ACEP-funded Water World walk-through exhibition during Scifest Africa 2019.

Opposite: It’s never too late to enjoy the wonders of science – pensioners at Water World 2019.

all continents except Antarctica. Collaborations involve the joint supervision of students, research exchanges and the use of research platforms such as ATAP, the Collections platforms and Mar-RIP.

Science Engagement

In 2010, the Institute experienced some very challenging financial constraints and with the resignation of two education officers, the Education division was temporarily closed and the two education outreach posts were frozen. At that stage I do not think anyone would have thought it would take

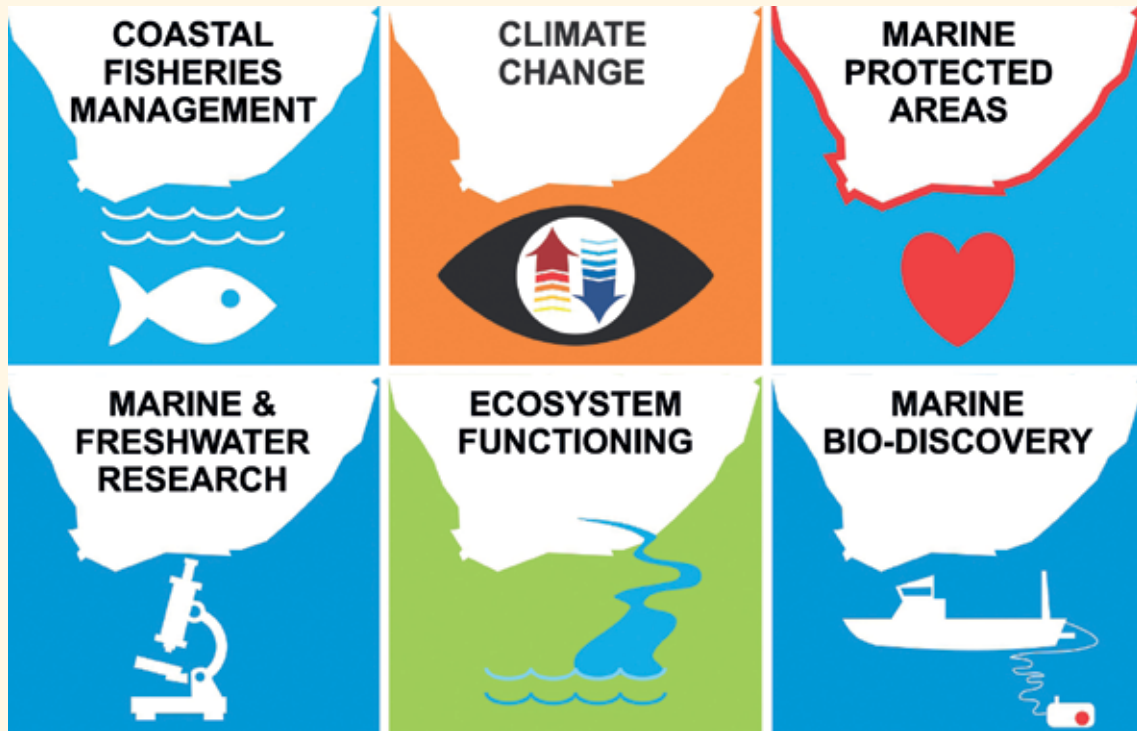
a full nine years to find funding for these posts to be refilled. Despite concerted efforts to remedy the situation, the last decade was a massive opportunity lost, as SAIAB had previously established a rich legacy in outreach with the roll out of many highly successful programmes. Fortunately, SAIAB did manage to partly fulfil this part of its mandate through the ACEP programme and in particular ACEP Water World at Scifest Africa, the national science festival held annually in Makhanda. The scientists also rallied and many of our activities were instigated, managed and implemented by our in-house scientists – some would say that this constitutes outreach or, rather, engaged research, at its best. Penny Haworth and Vanessa Rouhani did a sterling job in managing this portfolio with less than optimal support. While Water World and our other lesser activities were well received, this does not negate the fact that SAIAB as a National Facility should have been doing more. Fortunately, SAIAB secured additional funds in 2019 for a single permanent post in Science Communication. This will enable the Institute to move into the next decade with at least some dedicated science engagement capability in a more modern, relevant and purpose-driven format that is in line with the country’s Science Engagement Strategy.



SAIAB made a significant and recognised contribution on behalf of SAASTA and the NRF as a test case for the implementation of Responsible Research and Innovation in a scientific research institute on the European Union funded Horizon 2020 NUCLEUS Project from 2017-2019. Through involvement in this project, the Institute has been able to position itself to ensure that it interrogates not only “what” we do, but also “why”, “by whom” and “for whom”. Going forward, beyond the NUCLEUS project, RRI will continue to be driven by a specific directorate within the Institute.

SAIAB will also continue to ramp up its existing efforts to transform the research system through ensuring balanced representation. Programmes that drive change within the system, such as ACEP *Phuhlisa*, will be continued.

SAIAB’s research programme will be directly aligned to both the National Development Plan 2030 and the global Sustainable Development Goals. Additional effort will be placed on ensuring that



research results are clearly articulated to all stakeholders. Further, as a National Facility, it is incumbent on SAIAB to make every effort to ensure that its research, research platforms and databases are as open and accessible as practically possible.

Future Forward – Meeting the Challenge

Rigorous science is required so that the best possible decisions can be made to ensure the sustainable use of the country's marine resources. SAIAB will continue to undertake important research in the following areas:

- Coastal Fisheries Management
- Climate Change
- Marine Protected Areas
- Taxonomy and Foundational Marine Research
- Ecosystem Functioning
- Marine Natural Bio-discovery

In establishing its research agenda going forward, SAIAB has established an excellent cohort of researchers, postdoctoral fellows and students to answer key research questions of the 2020s. SAIAB aims to grow its scientific complement to 25 researchers (full-time staff and postdoctoral fellows). With the scope of aquatic biodiversity being so broad, SAIAB will continue to run and support an associate network of scientists who work on taxa and systems not covered by the full-time staff. SAIAB will continue to drive transformation until the student body reflects the demography of the country. In addition, SAIAB will continue to invest in a programme that results in well-rounded graduates who have all the necessary academic, practical and social skills to be successful in the workplace.

A key component of National Facilities is the open provision of Research Platforms. SAIAB has developed a number of cutting-edge and unique (for South Africa) research platforms. Over the next 10 years these platforms will be kept up to date and their capabilities expanded.

The Collections and Associated Specialist Laboratories platform will be expanded and new techniques such as 3D scanning will be introduced. The biobank, in particular, will be expanded and SAIAB aims to become the National Aquatic Science Biobank Facility. The genomics platform will be expanded to include bio-mining of whole genomes from a variety of environmental sources, for biosynthetic pathways responsible for the synthesis of natural products with potential for pharmaceutical or industrial applications.



Rhodes SAEON and ACEP students on RV *Algoa*.

Over the next decade, SAIAB's Marine Platform will continue to concentrate on the coastal and epipelagic zone (200 m), while developing the capability to reach deeper into the upper mesopelagic zone (500 m) in conjunction with the DSI's Shallow Marine and Coastal Research Infrastructure Programme. To this end, the Institute will retain and upgrade its existing fleet of research vessels, expand the Acoustic Tracking Array Platform up the East Coast of Africa, develop the capability of the Marine Remote Imagery Platform to operate to 500 m, and develop marine mapping capability to 500 m. It is anticipated that the marine platforms will continue to be made available on the basis of open competitive calls through the African Coelacanth Ecosystem Programme.

The future of the institute as outlined above is planned through a system of gradual and sustainable growth. That said, there are also possibilities of a step change in activities which will result in the Institute operating at a significantly higher level. One of these step changes would be the development of a SAIAB Aquatic Science Campus. SAIAB engages with a range of universities and research agencies nationally, regionally and globally. The opportunity exists to develop an Aquatic Science Campus that can host students and researchers from around the globe. This would be achieved through the development of living quarters, a lecture hall and additional visitor offices to complement expansions in the research platforms. A key component would be to house visiting students from South African universities other than Rhodes University, particularly students from under-resourced institutions. The opportunity also exists for SAIAB to develop short courses in taxonomy, curation and technical courses which can be offered nationally and regionally. Through the Aquatic Science Campus, SAIAB would aim to further embed itself within the Higher Education System by offering joint activities at the campus with all of the major Eastern Cape universities - Rhodes University, Nelson Mandela University, the University of Fort Hare and Walter Sisulu University.

Maintaining a Relevant and Significant Role

Freshwater resources in South Africa are already in a serious predicament and, while government's focus is currently on the energy sector, South Africa's water crisis will be far more difficult to solve. Water is essential for the country's well-being, yet our water resources are over-allocated; as treatment works continue to fail, poor water quality is developing into a national disaster; municipal reticulation systems are under-managed and often in disrepair; there is an increasing reliance by the rural poor on the food security associated with water bodies; invasive organisms are having a significant impact on ecosystem goods and services; aquatic biodiversity is in a critical state, and ecosystem functioning is failing in many areas. In addition, climate change will continue to amplify many of these issues.

This is compounded by the latest research review that indicates that research in the water sector is grossly underfunded. Indications are that key agencies and advisory boards such as the National Advisory Council on Innovation, Department of Science and Innovation (DSI), Water Research Council and NRF, have recognised these key challenges and water research will be a key priority in the DSI Decadal Plan and the NRF's Vision 2030.

Within South Africa's marine, and coastal environments there are urgent research questions

associated with understanding and managing key socio-economic sectors, as well as mitigating key global and climate change stressors. South Africa is waking up to the possibilities of expanding the Blue Economy and, through the Presidency, Operation Phakisa is aiming to develop a range of sectors such as oil and gas, shipping and aquaculture, in addition to the more traditional and established sectors of fishing, mining and tourism.

SAIAB is well positioned to contribute significantly to these new initiatives through its existing and growing research expertise in Marine and Estuarine ecology, Acoustic Tracking and movement studies of important commercial linefish species, Freshwater Ecosystem Health, Taxonomy, Rural Fisheries management, Inland Fisheries management, Invasion Biology and Climate Change.



In terms of national need, SAIAB is well placed to continue playing an important and increasing role within the aquatic sector.



Dr Angus Paterson, current Director of SAIAB.

