



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

Aquatic Bioscience Careers



Introduction

Bioscience is the science around living things (plants and animals). Aquatic Bioscience is the science of plants and animals that occur in or are associated with water. Scientific research would focus on freshwater systems, estuaries and the marine environment. As an example, someone who studies the marine biological sciences would be called a Marine Bioscientist or Marine Biologist. Sometimes the term, biological oceanographer, is also used.

Biologists study organisms (plants and animals), their behaviours and their interaction with the environment. To be able to do this biologists need to have a basic understanding of other scientific fields such as, physics, chemistry and geosciences (geology and geography). This helps them see a bigger picture and understand ecosystems.

There is a wide variety of topics that a biologist could select or specialise in. Specialisation could focus study on a particular species, organism, behaviour, technique or ecosystem. For example, a biologist could study a single species of shellfish or all the shellfish found in an area.

An emerging field is that of Marine Biotechnology. A marine biotechnologist focusses on biochemical aspects and the development of drugs that originate in marine organisms. They could also assist in the development of coatings that stop organisms from growing on structures in the sea.

Molecular biology, is another area of specialisation. In this field researchers apply molecular approaches and techniques to many environments from a pond to the deep sea.

Other popular fields of biology are environmental biology and toxicology. Both have direct implications and applications for our society.

There are many other areas of specialisation or related fields. To be an aquatic biologist you should have an interest in the natural environment and an aptitude for science. School subjects required include mathematics, physical science and preferably biology. You could then start off with a Bachelor of Science (BSc) degree or do a technical degree or diploma in oceanography.

Let's meet some Bioscientists who work in the aquatic environment...

Professor Janine Adams

Research Supervisor and Lecturer at the Nelson Mandela Metropolitan University, Botany Department

Highest Qualification: PhD (Botany)

Her areas of specialisation are:

- Estuarine ecology
- Freshwater requirements of estuaries
- Sustainable utilization of mangroves

Why she chose science as a career:

"Challenging and rewarding, no two days are similar. As a lecturer you spend time with students and as a researcher you spend time outside studying and enjoying the natural environment."

Advice to you:

"Follow your heart and a job that makes a difference... do what you love."



Professor Dan Baird

Head of Department, researcher and lecturer at the Nelson Mandela Metropolitan University, Department of Zoology

Highest Qualification: PhD (Fishery Science)

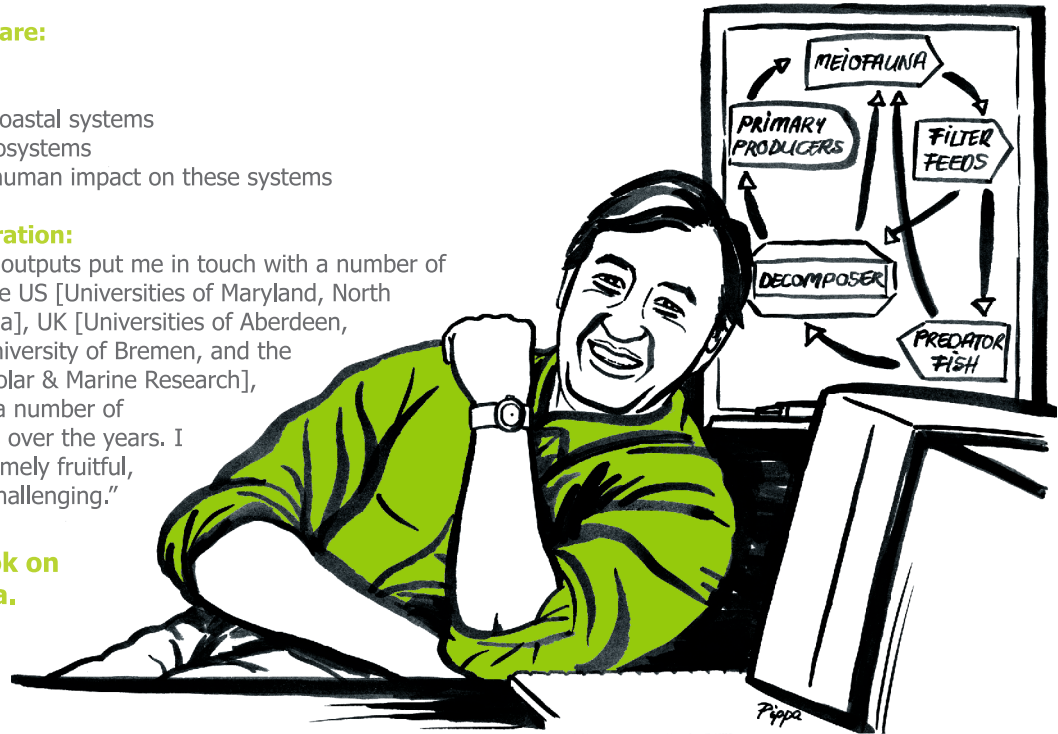
His areas of specialisation are:

- Fishery science
- Estuarine ecology
- Structure and function of coastal systems
- Management of coastal ecosystems
- Ecosystem Modelling and human impact on these systems

Achievements and collaboration:

"These interests and research outputs put me in touch with a number of colleagues at universities in the US [Universities of Maryland, North Carolina, Georgia, East Carolina], UK [Universities of Aberdeen, Cambridge], and Germany [University of Bremen, and the Alfred Wegener Institute for Polar & Marine Research], with whom I have conducted a number of collaborative research projects over the years. I found these associations extremely fruitful, interesting and intellectually challenging."

Dan has co-edited a book on estuaries of South Africa.



Phumelele Gama

Researcher, PhD Candidate and lecturer at the Nelson Mandela Metropolitan University, Botany Department

Highest Qualification: MSc (Botany)

His areas of specialisation are:

- Water quality
- Ecosystem health of freshwater ecosystems
- Primary productivity (algae)
- Estuaries

He says: "An understanding of phytoplankton is important in understanding the food chain in estuaries. They provide food for zooplankton (small animals) which fish feed on. Birds then feed on the fish in this cyclic process. The importance of estuaries should never be underestimated."

His message to you:

"What this country needs is the involvement of more young people in such crucial issues which uphold the principles of sustainability."



Professor Charles Griffiths

Researcher and Director of the Marine Biology Research Institute
at the University of Cape Town

Highest Qualification: PhD (Zoology)

His areas of specialisation are:

- Taxonomy
- Physiology
- Ecology

Why he chose science as a career:

He grew up in rural Kenya, where he was surrounded by nature. He thus developed early interests in fishing, snorkeling, shell collecting, photography and other nature based activities and he has always retained this passion for animals.

Greatest achievements:

Described 100 animal species new to science
Written two best selling photographic field guides to marine life and insects



Dr Sebastian Jaquemet

Associate Researcher Rhodes University, Department of Zoology and Entomology



Highest Qualification: PhD (Zoology)

His areas of specialisation are:

- Top marine predators
- Sea Birds

Why he chose science as a career:

"My interest in sea and marine animals began when I first watched the oceanographic cruises of the French "Commandant Cousteau" on TV, through which I discovered how fascinating and enjoyable nature is. I also got a sense of the freedom which being in contact with wildlife brings. Hence, since young I dreamed of a job that would allow me to travel the world and be in contact with nature. This dream became a project when I started University. I did a PhD on tropical seabirds, specialising in the ecology of marine top predators as a scientist. Top predators are wonderful to study, as they are advanced animals, very similar to humans: observing them teaches you a lot about human nature. Studying seabirds also allows privileged access to remote islands, where they breed."

Advice to you:

"...being a scientist provides a chance to actively participate in promoting the well being of the natural environment."



Dr Gavin Maneveldt

Researcher and Lecturer at the University of the Western Cape,
Department of Biodiversity and Conservation Biology

Highest Qualification obtained: PhD (Botany)

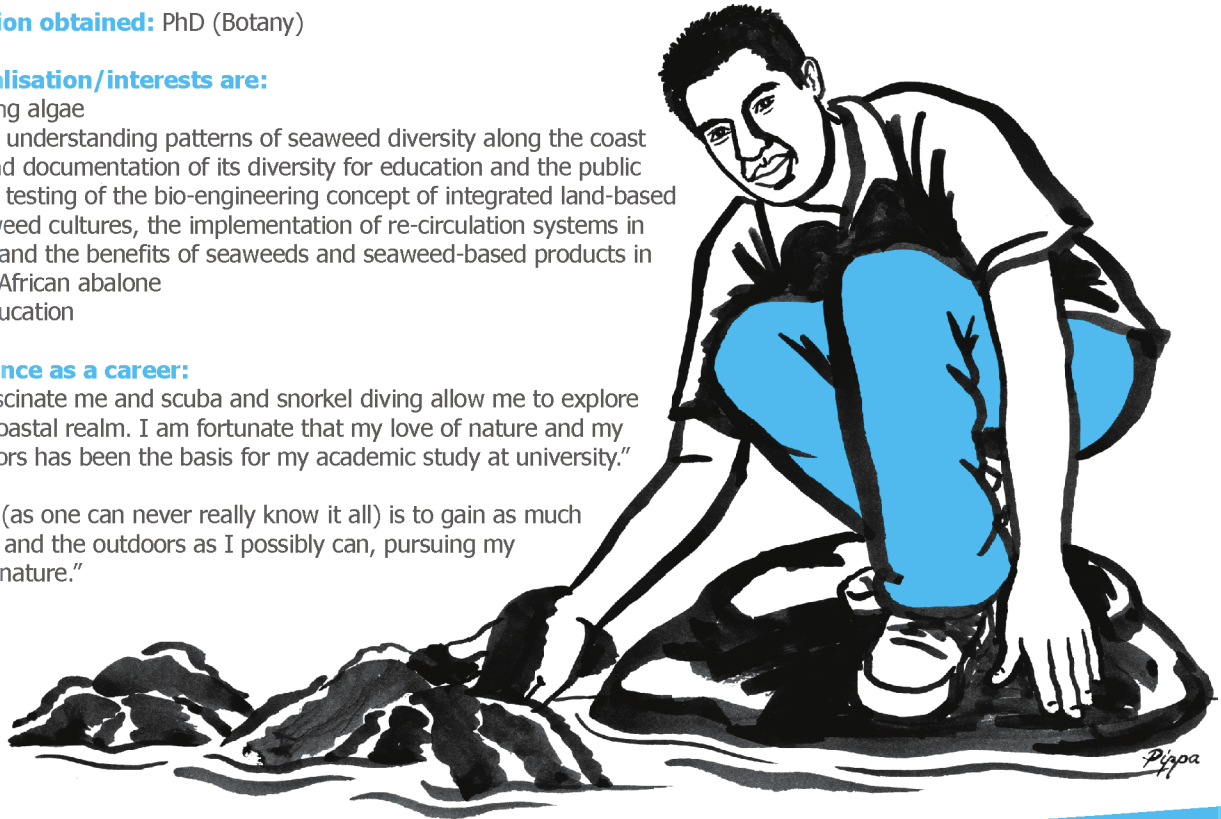
His areas of specialisation/interests are:

- Coralline encrusting algae
- Documenting and understanding patterns of seaweed diversity along the coast of South Africa and documentation of its diversity for education and the public
- Development and testing of the bio-engineering concept of integrated land-based abalone and seaweed cultures, the implementation of re-circulation systems in abalone farming, and the benefits of seaweeds and seaweed-based products in the diet of South African abalone
- Environmental Education

Why he chose science as a career:

"All things marine fascinate me and scuba and snorkel diving allow me to explore my interests in the coastal realm. I am fortunate that my love of nature and my interest in the outdoors has been the basis for my academic study at university."

"My continuous goal (as one can never really know it all) is to gain as much knowledge of nature and the outdoors as I possibly can, pursuing my interests in practical nature."



Monica Mwale

Researcher at the South African Institute for Aquatic Biodiversity

Highest Qualification: MSc (Zoology)

Her areas of specialisation/interests are:

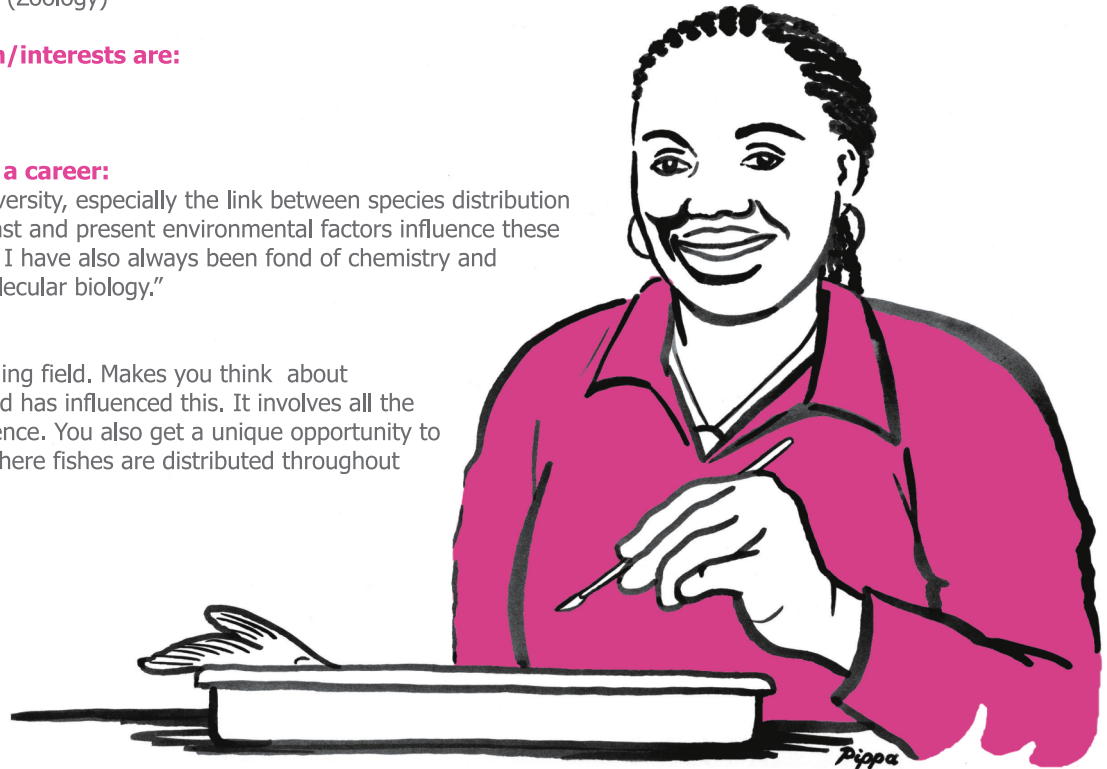
- Ichthyology
- Fish systematics

Why she chose science as a career:

"I enjoy studying about biodiversity, especially the link between species distribution and identities and how the past and present environmental factors influence these relationships (biogeography). I have also always been fond of chemistry and therefore enjoy doing the molecular biology."

Advice for you:

"It is an exciting and challenging field. Makes you think about biodiversity and how the world has influenced this. It involves all the fundamental principles of science. You also get a unique opportunity to see various places/habitats where fishes are distributed throughout the world."



Professor Renzo Perissinotto

Researcher and Lecturer at the University of KwaZulu Natal,
Department of Biological Sciences

Highest Qualification: PhD (Biological Oceanography)

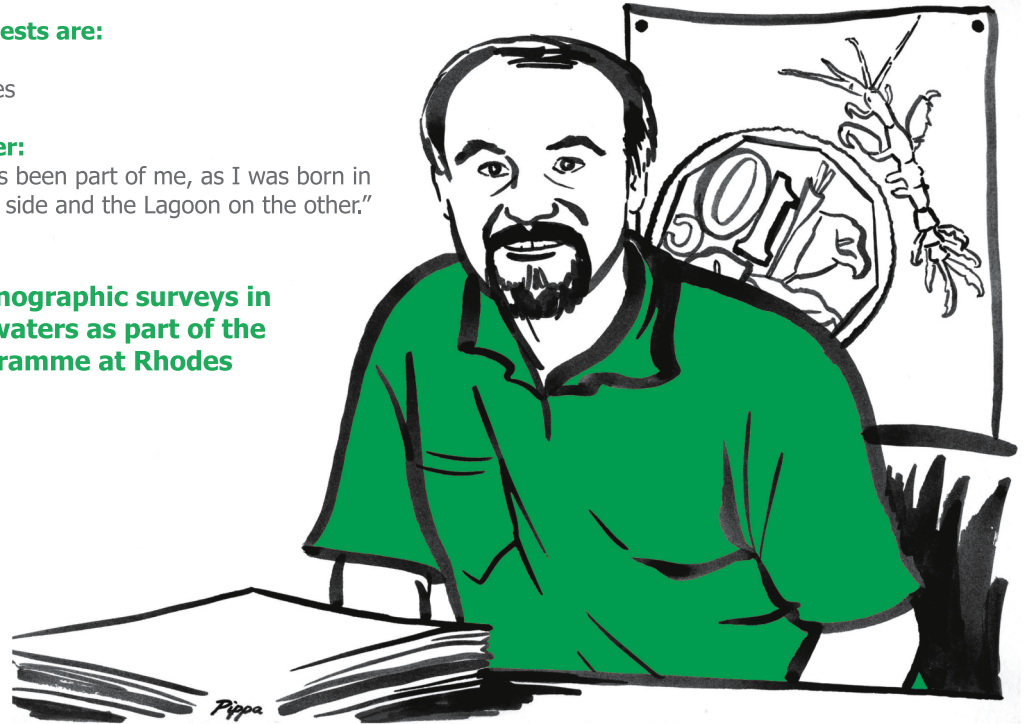
His areas of specialisation/interests are:

- Zooplankton dynamics
- Global change effects on estuaries

Why he chose science as a career:

"The marine environment has always been part of me, as I was born in Venice, with the Adriatic Sea on one side and the Lagoon on the other."

Renzo has been part of oceanographic surveys in sub Antarctic and Antarctic waters as part of the South African Antarctic Programme at Rhodes University, Grahamstown



Anusha Raj Karan

PhD Candidate and intern lecturer at the Nelson Mandela Metropolitan University, Botany Department

Highest Qualification: MSc (Botany)

Her areas of specialisation are:

- Estuarine ecology
- Mangrove and forest ecology
- Population dynamics

Why she chose science as a career:

"I remember spending many hours on the beach playing "Treasure Island" among the rocks. I believe this inspired me to want to discover more about the marine and coastal environments and from a young age I wanted to be a marine biologist. While my field of interest has changed somewhat, that was the starting point for my career in science. I admit I did not know what I was getting myself into at the time but I think it was the right career choice as it is gratifying to see how our research could make a small difference in the conservation and management of mangroves in our country in the future. Ultimately to make a difference (regardless of the magnitude) in our plight to conserve what is left of the natural world is the best part about being a scientist."

Advice to you:

"Know your strengths, weaknesses, and most importantly your passion in life; these are the things that will keep you striving to become the best scientist that you can be. The ability to work hard is a pre-requisite to becoming a scientist."



James Stapley

Science Communicator and Coordinator at the South African Institute for Aquatic Biodiversity, African Coelacanth Ecosystem Programme

Highest Qualification obtained: BSc (Hon)

His interests/specialisations are:

- Fish taxonomy
- Photojournalism
- Ichthyology

Why he chose science as a career:

"I've wanted to be a scientist for as long as I can remember. I guess I decided to become an Ichthyologist when I was about 10 or so. I couldn't do Ichthyology at undergraduate level in the UK (where I'm from), but as a postgraduate MSc student (what I'm doing now) I chose to do Ichthyology. I've always been fascinated by fish, probably (according to my parents!) since I was 4 or 5."

Advice to you:

"Learn more about the world around you, and fish in particular! There's a real shortage of people who are willing to sit down and do "boring" and low paid science - fish taxonomy kind of falls in there; there's a lot of scope for people in this discipline too, as there is still lots of work to be done. OK, so counting gill rakers and measuring dead fish all day isn't exactly fun; you get worthwhile data at the end of it that lets you answer really interesting questions about the fish around you. I think the most exciting thing you could possibly do is find a new species and give it a name, but creating order out of chaos and fixing the mistakes that other people have made is also quite interesting. And meeting 3.5m tiger sharks certainly isn't boring! People always ask me why I don't go and work with computers and earn lots of money - computers are actually quite boring, and I could see myself being rapidly more bored in a computer job than playing with fish! Money isn't everything in life - it's more important that you really enjoy what you do, and gain a lot from it personally."



Dr Nadine Strydom

Senior Aquatic Scientist at the South African institute for Aquatic Biodiversity

Highest Qualification: PhD (Zoology)

Her interests and areas of specialization are:

- Larval Fishes

Why she chose science as a career:

"My questioning mind and my passion for the ocean and ocean life were the main drivers in helping me select a career as a marine biologist"

Advice to you:

"If you have a passion for the ocean, a questioning mind and are practical, hardworking, a team player and enjoy outdoors then marine biology is the career for you. In the case of larval fishes, scientists working on larval fishes also require a keen sense of humour to spend many hours of hard work catching things they cannot see without a microscope, and then a large amount of patience to sort through samples picking out the baby fishes, followed by hours of counting, measuring and identifying which larva belongs to which adult fish species."

"The aspect of my research that I find most enjoyable and inspirational is that it is a challenge to study larval fishes. My work tests my brain on a daily basis and this keeps my interest in my subject. I also have the opportunity to make a meaningful scientific contribution to South Africa because there is so little information on the larvae of our common fishes and by understanding larval fishes we can tell a lot about the survival of fish populations. "



Dr Ernst Swartz

Molecular Biologist at the South African Institute for Aquatic Biodiversity

Highest Qualification: PhD (Zoology) Stellenbosch University

His interests and areas of specialization are:

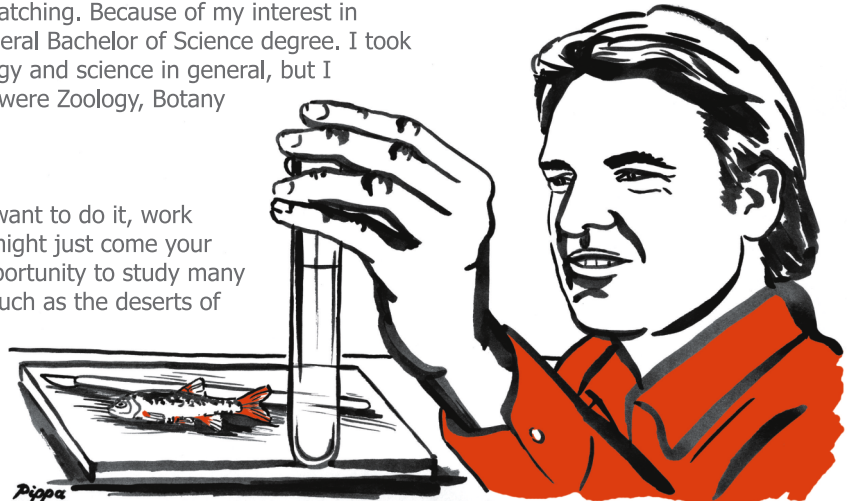
- Molecular Biology
- Fish

Why he chose science as a career:

"I was always interested in biology and conservation issues, but did not know how to pursue my dream of becoming a researcher or conservationist. I also knew that I was interested in fishes and went fishing whenever I had the opportunity. It never mattered to me how big the fish was, but I always identified which species I was catching. Because of my interest in research I decided to go to University and to do a general Bachelor of Science degree. I took subjects that gave me a very wide knowledge of biology and science in general, but I also allowed myself to follow my real interests, which were Zoology, Botany and Geology."

Advice to you:

"Getting a job in science is not easy, but if you really want to do it, work independently and are very dedicated, opportunities might just come your way. My research career has already given me the opportunity to study many interesting fish species and to travel to exotic places such as the deserts of Namibia, the highlands of Lesotho and even to Europe for conferences and meetings. Biology is definitely a career worth following if you are prepared to eat, sleep and dream fish or any other organism of your choice."



Dr Nile Vine

Researcher at Rhodes University, Ichthyology and Fisheries Science

Highest Qualification: PhD (Zoology/Microbiology)

His area of specialisation:

- Probiotics in Aquaculture

Why he chose science as a career:

"As a young boy growing up in East London, I was fortunate to spend much of my spare time on the beaches, rivers and in the rock pools. I grew to love the rivers and sea and became curious about all the creatures that lived in them and as a result, spent my time fishing, diving and keeping fish tanks.

At school I never thought of pursuing my love of the sea as a career and in fact wanted to become an engineer. However, after school I visited a friend at university who was doing a BSc in Zoology and after seeing what he was studying I realised that this was my passion and what I wanted to do. I then went on to do my BSc in zoology and microbiology and followed through to my doctorate in which I worked on clownfish. I couldn't have dreamed of a better job when I was at school. My curiosity for the creatures of the sea now helps drive me in my work as a scientist where I am now able to better assist in contributing to the field of bioscience."

Advice to you:

"...if you love the outdoors and have a passion for nature, maybe think about a career in the biosciences. The job is a pleasure to get out of bed for and I wouldn't trade it for the world. Remember though, there are many people who are passionate about pursuing bioscience as a career so you need to be willing to work hard during your studies so you separate yourself from the rest thereby providing yourself with the best job opportunities."



Lukhanyiso Vumazonke

Researcher at the South African Institute for Aquatic Biodiversity

Highest Qualification: MSc (Zoology)

His area of specialisation:

- Coastal and Marine invertebrates

Why he chose science as a career:

He likes to work outdoors, travel to exotic places and does not have to wear a suit.

Other achievements:

He was selected to join a group of scientists from Rhodes University on board the research vessel mv SA Agulhas to the sub-Antarctic Prince Edward Islands. Lukhanyiso soon found himself drawn to the ocean, completing an MSc through Rhodes University on the biology of the shrimp found around the Southern Ocean Islands.

Lukhanyiso has participated in several sub-Antarctic cruises and has published several academic papers and popular articles on Antarctic research. Because of his involvement with the South African National Antarctic Programme (SANAP), he was invited to participate on the first-ever international, multi-disciplinary expedition dubbed ICEFISH. The ICEFISH 2004 cruise started in Punta Arenas, Chile, and sailed for the Falklands, South Georgia, the South Sandwich and Bouvet Islands, Tristan da Cunha and finally to Cape Town.

He feels that as a young black scientist he can inspire other black students into joining the field of aquatic science. To do this he delivers popular talks at various public and school events



Where can you study?

Name of Institution	Postal Address	Telephone / Fax	Website
Eastern Cape			
Rhodes University	The Registrar PO Box 94 Grahamstown 6140	Tel: 046 603 8111 Fax: 046 622 5049	www.ru.ac.za
University of Fort Hare	The Faculty Manager Faculty of Science and Agriculture Private Bag X1314 Alice 5700	Tel: 040 602 2323 Fax: 040 653 1554	www.ufh.ac.za
Nelson Mandela Metropolitan University	The Registrar PO Box 1600 Port Elizabeth 6000	Tel: 041 5042 111 Fax: 041 504 2574	www.nmmu.ac.za
Walter Sisulu University	The Registrar PO Box 1421 East London 5200	Tel: 043 708 5200 Fax: 043 708 5331	www.wsu.ac.za
Free State			
University of the Free State	Faculty of Natural and Agricultural Sciences PO Box 339 Bloemfontein 9300	Tel: 051 401 9111 Fax: 051 401 2117	www.uovs.ac.za
Gauteng			
University of Johannesburg	Faculty of Science PO Box 524 Auckland Park 2006	Tel: 011 489 3247 Fax: 011 489 3207	www.uj.ac.za
University of Pretoria	The Registrar University of Pretoria Hillcrest Pretoria 0002	Tel: 012 420 3111 Fax: 012 420 4555	www.up.ac.za
University of South Africa	School of Environmental Sciences PO Box 392 UNISA 0003	Tel: General 012 429 3111 or Environmental Sciences: 012 352 4271 or Nature Conservation: 011 471 2355 Fax: 012 429 3221	www.unisa.ac.za

Name of Institution	Postal Address	Telephone / Fax	Website
University of the Witwatersrand	Dept of animal, plant and environmental science Private Bag X3 Wits 2050	Tel: General 011 717 1000 or 011 717 6404 Fax: 011 717 1065 or 011 403 1429	www.wits.ac.za
Kwazulu Natal			
University of Kwazulu Natal	Faculty of Science, University of Kwazulu Natal Durban 4041	Tel: General 031 260 1092 or 031 260 2212 Fax: 031 260 2967	www.ukzn.ac.za
Limpopo			
University of Limpopo	The Registrar Private Bag X1106 Sovenga Limpopo 0727	Tel: 015 268 9111 Fax: 015 287 0152	www.ul.ac.za
North West			
North West University	Faculty of Natural Sciences Private Bag X6001 Potchefstroom 2520	Tel: 018 299 2304 Fax: 018 299 2421	www.nwu.ac.za
Western Cape			
University of Cape Town	Department of Science Private Bag X3 Rondebosch 7701	Tel: 021 650 2712/3023 Fax: 021 650 2710	www.uct.ac.za
Cape Peninsula University of Technology	Faculty of Applied Science Fisheries Resource Management PO Box 652 Cape Town 8000	Tel: 021 959 6121 Fax: 021 460 3698	www.cput.ac.za
University of the Western Cape	Department of Biodiversity & Conservation Biology Private Bag X17 Belville 7535	Tel: 021 959 2301 Fax: 021 959 2312 Email:lvheerden@uwc.ac.za	www.uwc.ac.za
University of Stellenbosch	The Registrar Private bag X1 Matieland Stellenbosch 7602	Tel: 021 808 9111 Fax: 021 808 4499	www.sun.ac.za

References and Websites Consulted

The South African Career Guide 2006 by 30 East Communications
Water Research Commission, 2004, Water@work, A Career Guide, pg 29-30

Department of Water Affairs and Forestry - www.dwaf.gov.za

Department of Science and Technology - www.dst.gov.za

National Research Foundation - www.nrf.ac.za

Public Understanding of Biotechnology - www.pub.ac.za

Sea Grant Careers - www.marinecareers.net

Scidev Net - www.scidev.net

South African Agency for the Advancement of Science and Technology - www.saasta.ac.za

South African Institute for Aquatic Biodiversity - www.saiab.ru.ac.za

South African Careers - www.careers.co.za

Water Research Commission - www.wrc.org.za

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Disclaimer

In preparing this publication, the African Coelacanth Ecosystem (SAIAB) has consulted various experts, all of whom contributed to the topics covered.

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