

MARINE SCIENCE: WORKING TO KEEP OCEANS HEALTHY

PHYTOPLANKTON? HABs? WHAT DOES THIS MEAN?

In a balanced ecosystem, phytoplankton (also known as microalgae) provides food for a wide range of sea creatures including shrimp, snails, and jellyfish. When too many nutrients are available, phytoplankton may grow out of control and form harmful algal blooms (HABs) or red tides as they are commonly known. The problem with HABs is that they produce extremely toxic compounds that have harmful effects on fish, shellfish, mammals, birds, and even people.

Meet Dr Ross-Lynne Gibb from the South African Institute for Aquatic Biodiversity. Her particular area of interest and expertise, and also the subject matter for her PhD, is phytoplankton ecology and more specifically harmful algal blooms (HABs) and their effects on other organisms.

NRF-SAATA took time out to chat to Dr Gibb about her choice of career and why she is so interested in Phytoplankton and HABs.

South Africa's coastline stretches more than 3000 kilometres from the border with Namibia on the Atlantic west coast around the tip of the continent up the east coast to Mozambique on the Indian Ocean. This expansive coastline houses marine biodiversity comprising more than 10 000 marine species within 150 diverse ecosystems.

When one considers that the country's coastline contributes substantially to the South African economy and provides a livelihood for many thousands of South Africans, it is of critical importance that the health of the marine environment and associated biodiversity are protected.

It is here that various national, provincial and local organisations, as well as individuals who make it their life's work to protect the oceans, play a vitally important role. Numerous career options are available to someone who is passionate about the world's oceans and one such career is that of a marine scientist.

Marine scientists are involved in research and analysis of the sea and its interaction with the land and atmosphere. They study sea floors, animal life and plants to gather information that is used to predict changes in the earth's infrastructure, to guide legislation and, very importantly, to encourage environmental protection.

One might find a marine scientist in an office, a laboratory, a coastal research site or a combination of these. During the course of their work, they engage with climate change scientists, marine engineers, other natural science professional and coastal communities.

WHY IS THE WORK YOU DO IMPORTANT?

We rely on marine systems for food and other services and at the foundation of these ecosystems are phytoplankton or microalgae

that are microscopic single-celled organisms that photosynthesise. Along with bacteria, phytoplankton support aquatic organisms. They are food for zooplankton which are in turn food for fish and so forth. Changes in the phytoplankton and bacterial communities can affect our food security and health. If a toxic or disruptive species becomes dominant (harmful algal bloom), this will affect the quality of our water sources and can cause fish kills which affects not only our food supply but the food supply for many organisms.

TELL US A BIT ABOUT WHAT YOU ARE DOING CURRENTLY

It is important to understand what causes harmful algal blooms because they are becoming more prevalent with environmental changes and human population growth. I am currently studying the harmful algal blooms in the Swartkops estuary in the Eastern Cape because we want to find out how its presence affects the Swartkops water quality and how it affects other organisms (specifically bacteria) in this ecosystem.

WHAT ATTRACTED YOU TO A CAREER AS A MARINE SCIENTIST?

I was fortunate in that I knew what I wanted to do from a young age. My family recalls me saying that I wanted to work at the fish shop with the fish. I didn't yet understand that the fish don't live at the fish shop. As I grew up, I wanted to pursue a career in marine biology. It is only after studying and learning about the variety of organisms and systems that one can study, that I discovered my passion for microalgae research.

WHAT DOES YOUR WORK INVOLVE ON A DAY-TO-DAY BASIS?

My work involves collecting water samples in the field, extracting DNA from the samples for sequencing and analysing phytoplankton under the microscope. We use the data from these analyses and combine it with environmental data to figure out what makes these communities tick. Other than field work, most of my time is either spent in the lab or at the computer. I am also passionate about exposing young learners to this kind of research and try to participate in educational opportunities when I can.

WHAT STUDIES DID YOU UNDERTAKE?

I completed my undergraduate studies (BSc), honours (BSc Hons) and masters (MSc) degrees at Nelson Mandela University. My PhD was completed at Rhodes University and using various techniques I assessed the relationship between phytoplankton communities and environmental fluctuations.

Majors like Zoology and Botany with subjects like chemistry, microbiology, biochemistry and geology can be mix and matched based on what you ultimately want to study. For example, I would

have benefited from more microbiology or geology rather than zoology and chemistry or physics.

WHICH HIGH SCHOOL SUBJECTS ARE REQUIRED TO STUDY FOR THIS QUALIFICATION AT A UNIVERSITY?

The most important subjects for this field are science and core maths. However, biology and computer subjects such as IT and CAT definitely helped me in my undergraduate studies. Matric marks have to be at least be 65% and above to be able to study science subjects.

BESIDES THIS CAREER PATH, WHICH OTHER OPPORTUNITIES DOES YOUR QUALIFICATION OPEN UP OR OFFER?

Interestingly, with my qualifications I could pursue a career in forensics due to the lab experience and the application of microalgae such as diatoms in forensics. Biotechnology involving phytoplankton is also a hot topic and there is a lot of scope for industrial applications of your research, but microbiology, biochemistry and botany is strongly recommended for a career in biotechnology.

WHAT SKILLS/PERSONALITY TRAITS DOES ONE NEED TO EXCEL IN THIS FIELD?

Determination, as it's not always easy but everything is temporary and if you keep going it's worth it in the end. You need to be hard-working, passionate and always willing to work with other people. The skills needed can be learned as you go along. ●

Work hard at pursuing your passions and it's okay to not know what you want to do at first, you will figure it out as you go along. University fees are expensive but there are funding opportunities and small jobs out there that can help you to pursue your career so don't be discouraged. I worked as a waitress and did odd lab jobs for people to put myself through my studies so dream big and then make it happen! It won't always be easy but it will be worthwhile



Dr Ross-Lynne Gibb looking at a cell of *Noctiluca scintillans* using a microscope. *N. scintillans* is a red tide species found in Algoa Bay. Phytoplankton cells within Algoa Bay were counted in this way for her PhD thesis.



Dr Ross-Lynne Gibb packing stromatolite water samples into a cooler box. These samples were incubated to measure nutrient uptake rates. She was assisting a colleague collect these samples.

