SCIENCE SPAZA SPACE

Knowledge is Ncah!

NATIONAL SCIENCE WEEK EDITION – 2024

WIN
A VR TRIP FOR YOUR SCHOOL

National Science Week

LIVING IN A HIGH-TECH WORLD: SHOULD WE BE CONCERNED?

Wild Wisdom: *Learning from nature*

Designers studied the way kingfishers dive for their prey to design the super-fast bullet train. *Pic: Motihada, Pixabay*

YAZI CENTRE FOR SCIENCE & SOCIETY IN AFRICA

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Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

NRF National Research Foundation 25 SAASTA South African Agency for Science and Technology Advancement

National Science Week

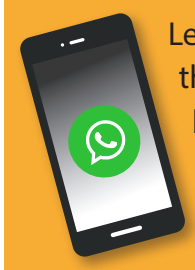
Jive Media Africa

In this edition ...

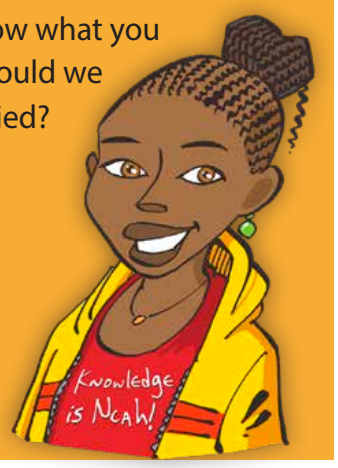
Hey Science Spaza!

It's that time of year again! **National Science Week 2024** is happening all over South Africa from 30 September to 5 October. This year's theme is: **Living in a high-tech world: Should we be concerned?** As our world is becoming more high-tech, people are starting to wonder if this is a good or bad thing. What do you think?

In this edition, we take a look at how nature, science and technology can help each other. Even the smartest technologies often take inspiration from nature – like how scientists create **cool new inventions by copying the way nature does it (page 3)**, or use their knowledge of nature to develop **new medicines and ways to treat disease (page 5)**. We can also use technology to **protect and support our natural environment (pages 4-5)**. All human activity has an environmental impact – it's up to us to make sure that our technologies enhance and support nature, rather than destroy it.



Let us know what you think. Should we be worried?



The Science Spaza Team

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We are talking to our future leaders. Are you?

Eskom EXPO FOR YOUNG SCIENTISTS Est. 1980

DISCOVER YOUR FUTURE

A week of science fun!

Get ready for an incredible week of science, technology, engineering, maths and innovation (STEMI) with Eskom Expo for Young Scientists during NSW.

From 30 September to 5 October 2024, events will be happening all across South Africa. There will be science shows, fun workshops for both students and teachers, and cool robotics and coding workshops. You can also check out science exhibitions, join competitions, and listen to public talks and panel discussions.

Parthy Chetty, Eskom Expo's Executive Director, says, "NSW is the biggest science event in South Africa. We want more students to take up STEMI subjects to help grow our economy and make South Africa competitive globally."

To find out what's happening in your area, visit the Eskom Expo website at **www.exposcience.co.za**. Click on "Get Involved" and choose your province from the map. Don't miss out on these awesome events!

Did you know? Leading up to NSW, we hosted our 44th Eskom Expo International Science Fair. Young scientists from 35 regions across South Africa, plus students from India, Russia and Mexico, presented their amazing research and engineering projects. There were even young researchers from Lesotho, Turkey, Ghana, Mozambique and Ireland taking part virtually! Visit **www.exposcience.co.za** to see how you can take part in 2025!

Scan this code to find out what's happening and get inspired to be part of Eskom Expo in 2025!

Biomimicry:
Nature knows best

Nature has had millions of years to solve problems in smart and efficient ways. We can use this knowledge to develop clever new products or better ways to do things to help people. This is called **biomimicry**. By copying these natural solutions, we can create products and technologies that work better, are sustainable, don't harm the earth and can last a long time.

Engineers, scientists, designers and architects use biomimicry to design buildings, **prosthetics**, farming methods, navigation tools and even running shoes. Nature teaches us how to recycle and reuse everything, which helps us create products that don't harm the environment.

Biomimicry has led to many amazing inventions.

WORDS TO KNOW:

biomimicry – copying nature. "Bio" means life and "mimic"means to copy.

prosthetics – man-made replacements for body parts.

Velcro was created after a Swiss engineer noticed how little prickly seeds, called burrs, stuck to his dog's fur.

Coffee filters are inspired by the way cell membranes let some things pass through while blocking others.

Inventors created a material strong enough to stick a TV to a wall without nails by copying geckos' feet.

Airplanes and **cars** copy the shapes and movements of animals like birds and fish to help them move faster.

Solar panels are designed like leaves to collect energy from the sun.

Radar and **sonar technology**, used for navigation and medical imaging, are based on bats' echolocation.

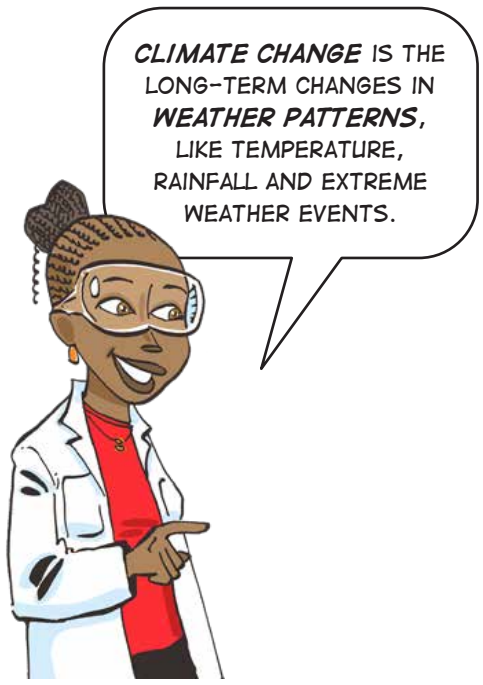
Your turn to think like a scientist!

What would nature do?

With a partner, or in small groups, think of a common problem in your community. It could be how to collect clean water, stay cool in the heat or reduce litter. Ask: How does nature deal with this problem? Can you think of an animal or plant that solves this problem? Draw a design or create a simple model using natural materials like sticks, leaves or stones to show your idea for a nature-inspired solution.

Rising seas: The impact on South Africa

By: Kogie Govender (Science Engagement Coordinator, NRF-SAEON) and Caitlin Ransom (Science Engagement and Communications Officer, NRF-SAEON)



The Thwaites Glacier. *Adapted from NASA/OIB/Jeremy Harbeck. Rasmussen 2019*

These changes across the globe are caused mainly by human activities. One of these is burning fossil fuels. These activities release carbon dioxide and other greenhouse gases into the atmosphere, which causes the Earth's surface temperatures to rise, resulting in more extreme weather. The rise in temperature also affects our oceans. Sea levels rise when the ice in glaciers and in the Arctic and Antarctic ice caps melts, adding more water to the oceans. The warmer temperatures also cause the water in the oceans to expand.

Scientists use satellites and other instruments in the air to closely monitor and measure melting glaciers. Researchers at NASA discovered a very big hole in the Thwaites Glacier in Antarctica. The melted ice from this one glacier increased the total amount of water in all the oceans around the world by 4%!

Why are rising sea levels a problem?

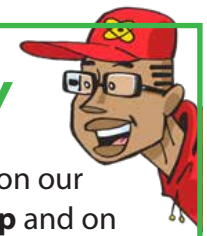
In South Africa, higher sea levels could lead to severe floods happening more often. These floods would have a big impact on people's lives and destroy ecosystems. Understanding the risks of rising sea levels and finding ways to adapt is very important. The graphic below shows the risks of rising sea levels.

By learning about climate change and its effects, we can take steps to protect our planet and our future.

For more fun activities, check out the NRF-SAEON website: **www.education.saeon.ac.za**

National Research Foundation | South African Environmental Observation Network

Activity



Keep an eye out on our **WhatsApp group** and on our **social media** for a great activity about rising sea levels. You can also scan this **QR code** to download it.

Some of the risks of rising sea levels and what we can do about it *Adapted from the IPCC*

Key risks	Adaptation issues and prospects	Climatic drivers	Time frames, risk and adaptation potential
 Movement of fish and invertebrates	• Fish and invertebrates change their movement to areas where the temperature is suitable for them, and they are unlikely to adapt. • Fishing industries are having to relocate, and this has already had an impact on coastal people and their livelihoods.	• Warming trend • Extreme temperatures	Present: Low risk Near-term (2030-2040): Medium risk Long-term (2080-2100): Medium risk
 Ocean acidification, coral reef bleaching, reduced biodiversity	• There is a decrease in the expansion of saleable shellfish and calcifiers. • Stress from fishing and tourism should be restricted.	• Warming trend • Extreme temperatures • Damaging cyclones • Ocean acidification	Present: Medium risk Near-term (2030-2040): High risk Long-term (2080-2100): High risk
 Rise in sea levels	• Coastal flooding can lead to erosion, which is more prominent at sandy beaches and leads to loss of intertidal habitats in some instances (Fernandino et al., 2018).	• Warming trend • Extreme temperatures • Damaging cyclones • Ocean acidification • Extreme precipitation • Sea level rise	Present: Low risk Near-term (2030-2040): Medium risk Long-term (2080-2100): High risk

UNDERWATER SAFARIS:
Marine Protected Areas

by Lucky Dlamini, NRF-SAIAB Communications and Stakeholder Relations Manager

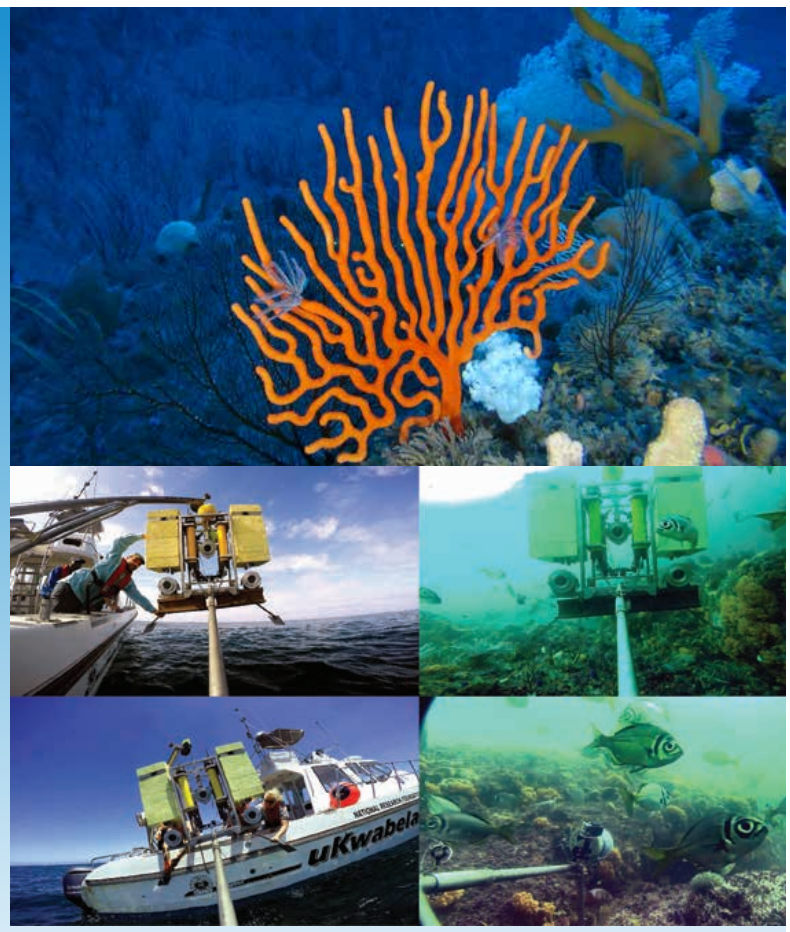
Our oceans, marine life and beaches give us many amazing benefits! They create jobs, connect us with the world, provide food for many families and are great places for fun, relaxation and spiritual connection.

The ocean and its creatures face many dangers, like overfishing, litter, water pollution and climate change. These threats have caused many fish and marine animals to become endangered.

In the same way that nature reserves protect land animals like lions, elephants and rhinos, our national Marine Protected Areas (MPAs) are special places in the ocean that protect marine life.

MPAs are also important because they are safe places where migratory fish can rest, feed and reproduce without any humans disturbing them.

Scientists at the South African Institute for Aquatic Biodiversity (NRF-SAIAB) work on projects to identify the fish living in MPAs. They do this by laying underwater video cameras and bait bags on the ocean floor. The bait in the bags attracts sea animals, which are recorded by the cameras. These recordings have helped scientists identify amazing life in MPAs, including various species of fish, sharks, stingrays, octopuses and cuttlefish.



NRF-SAIAB scientists using underwater cameras and bait bags to capture images of different species

The information from these studies helps governments create better fishery management plans and policies to protect marine life around Africa. MPAs can help reduce poverty, improve food security and make sure we have sustainable fisheries.

How can I help protect the ocean?

Don't litter! Avoid using single-use plastics like straws and water bottles. These end up in the ocean and harm marine life. You can learn more about the work that NRF-SAIAB is doing at: **www.saiab.ac.za**.

National Research Foundation | SAIAB South African Institute for Aquatic Biodiversity

Nature's medicine chest

Have you ever wondered where medicines come from?

by Professor Rosemary Dorrington, DSI/NRF SARChI Professor: Marine Natural Products Research, Rhodes University

Some medicines come from plants in our gardens or the veld. Many are made by tiny microbes, which are tiny bugs you can't see without a microscope. These microbes help make medicines like penicillin, an antibiotic that fights germs. Sometimes these germs fight back and become resistant to antibiotics, which means the medicine stops working. Scientists are now searching the ocean for new medicines.

Scientists at Stellenbosch University are researching medicines from the ocean

Our oceans are home to special animals called sponges that live on the sea floor in beautiful underwater gardens. Inside these sponges are friendly bugs called symbionts. These symbionts give sponges food, vitamins and medicines to keep them healthy and fight off germs in the seawater. The sponges give the symbionts a safe home and act like a garden for good bugs to grow in. This is just like we grow vegetables and herbs in the soil in our gardens, or farmers grow crops on farms.

At Rhodes University, scientists are learning the secrets of sponges and symbionts to help them find new medicines that can be used to fight the germs that make us sick.

So, next time you go to the beach and dip your toes into the seawater, remember that our oceans can provide us with more than just food, but also medicines to keep us healthy.

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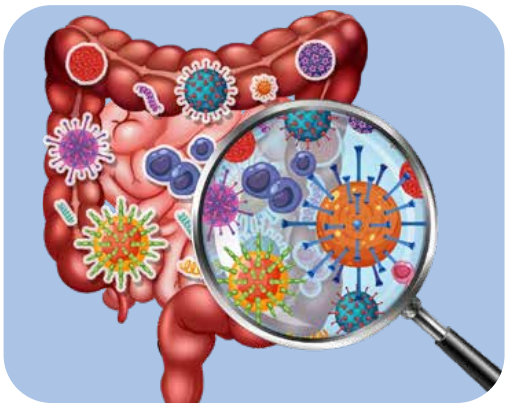
Guess what?

- Our planet is mostly ocean. Over 71% of Earth is covered by ocean water.
- We know more about the moon than our own oceans, even though the moon is over 384 000 km away (which would take 10 years if we could go by bus)!
- Our oceans are medicine chests! The ocean provides us with more than just food. It also offers new medicines to keep us healthy.

Speak to scientists

Did you know that millions of tiny bacteria and microbes live in and on our bodies? This community of organisms is called a microbiome. Scientists are discovering just how important the microbiome is. It plays a role in everything, from how we feel to how well we digest food and fight off diseases. Other animals and plants also have their own microbiomes!

The Science Spaza gang chatted to Dr Charissa Camille Naidoo, Dr Rachiel Gumbo and Lauren Martin from Stellenbosch University's Division of Molecular Biology and Human Genetics and Department of Psychiatry within the Biomedical Research Institute (BMRI) about their exciting research into the microbiome.



The microbiome is a community of millions of tiny organisms living in and on our bodies

Dr Charissa Camille Naidoo

Tuberculosis (TB) is South Africa's biggest cause of death. My research helps find out if the treatment for TB impacts certain bacteria in the microbiome and how these changes to the microbiome influence our health. We also want to know if a special diet helps the microbes in the gut microbiome return to normal faster after TB treatment.

I've loved science since school, especially maths and life science. My dad was a big inspiration for me. He worked very hard and never gave up, even when things were tough. He encouraged me to use what I learned to help people in South Africa. I studied biomedical sciences at the University of KwaZulu-Natal in Durban, because I wanted to find new ways to diagnose and treat diseases.

One of my biggest challenges was not having enough money for further studies. But I worked really hard during my honours degree and graduated with high marks. This led to my getting a bursary for more studies, which was a big help!

Dr Rachiel Gumbo

Tuberculosis (TB) affects both humans and animals! I study TB in wildlife. The main part of my research is developing new tests that tell us if an animal has TB or not. Knowing if an animal has TB is really important. It means we can stop the spread of TB to other wildlife populations.

An exciting part of my work is studying the microbiome of African Lions. We want to know how TB impacts their health. We do this by looking at any changes in the bacteria of lions' faeces (yes, poop!) when they have TB. This tells us how TB affects their health and also how the disease spreads. By understanding how TB impacts lions, we can help protect both the animals and the environment.

I have always dreamed of being in a lab coat, doing experiments and discovering new things. I grew up in an underprivileged environment, but I was determined to get the best education. I worked hard to get good grades and managed to get funding for my studies.

Lauren Martin

With my research, I want to find out if drinking alcohol when a woman is pregnant has an impact on the microbes in a pregnant woman's gut. These microbes are passed from a mother to her baby during pregnancy and birth. They play an important role in the growth and development of the baby. We believe that the alcohol damages the microbes that help the baby's brain to develop. Now we want to understand how drinking alcohol during pregnancy changes the gut microbiome and plays a part in the development of foetal alcohol spectrum disorders (FASDs), leading to physical, mental and attitude disabilities. South Africa has one of the highest rates of FASD in the world. Even though there's no cure for FASD, my research aims to find ways to reduce the symptoms and improve the quality of life for the child and their family.

I've always been interested in science, especially life science. When I was growing up, my dad took me on nature walks, taught me about animals and plants, and even gave me little quizzes to see what I had learnt. At first, I wanted to be a medical doctor, but after I did not get into medicine, I decided to study human life sciences at Stellenbosch University. There, I discovered my passion for genetics!

Scientists' advice for you

"Don't be afraid to try new things. Finding a mentor can really help guide you. Also, volunteering at a local lab can give you a taste of what being a scientist is like and help you learn more about it." ***Charissa***

"Don't let your background or anyone's doubts stop you. You'll face challenges, but keep pushing forward and believe in yourself." ***Rachiel***

"Even if things don't go as planned, take every chance to learn and follow what interests you. Your path might have twists and turns, but each step will bring you closer to finding what you're meant to do." ***Lauren***

Scan here to watch a video about these researchers and their exciting work.

Stellenbosch UNIVERSITY IYUNIVESITHI UNIVERSITEIT

saMRC advancinglife

NEWS FROM THE CLUBS

Growing bacteria from the grossest places

by Luc Louw, Pretoria Boys High Science Club

Scientists all around the world grow bacteria in labs so that they can use them to make medicines, vaccines and certain pesticides. Our science club wanted to learn more about different bacteria, how they live and how they multiply. We decided to do an experiment where we collected and grew our own samples of bacteria and then viewed them under a microscope.

The process of growing bacteria is as simple as using a swab to collect a sample and placing it onto a growth medium like **agar**. We were each given a sterile swab and a petri dish full of agar. We were then sent to explore our school to find the dirtiest locations possible to collect samples. We then left them to **incubate** in a dark drawer in our school lab. One week later, we removed them from the drawer and inspected them under a microscope.

It was a great success. The bacteria grew incredibly well, and we all had a great time trying to swab the dirtiest parts of our school. "It was really fun going around the school looking for the grossest and dirtiest things to swab – we swabbed the stair rail, a computer's keyboard keys and mouse, the pond and even the bathroom taps and urinals!"

We hope to repeat this experiment in future as it is easy to replicate, but this time we will change certain variables, such as the incubation time and the growth medium selected.

WORDS TO KNOW:

agar – substance made of seaweed used to grow bacteria

incubate – grow

Top: Pretoria Boys High Science Club in the lab

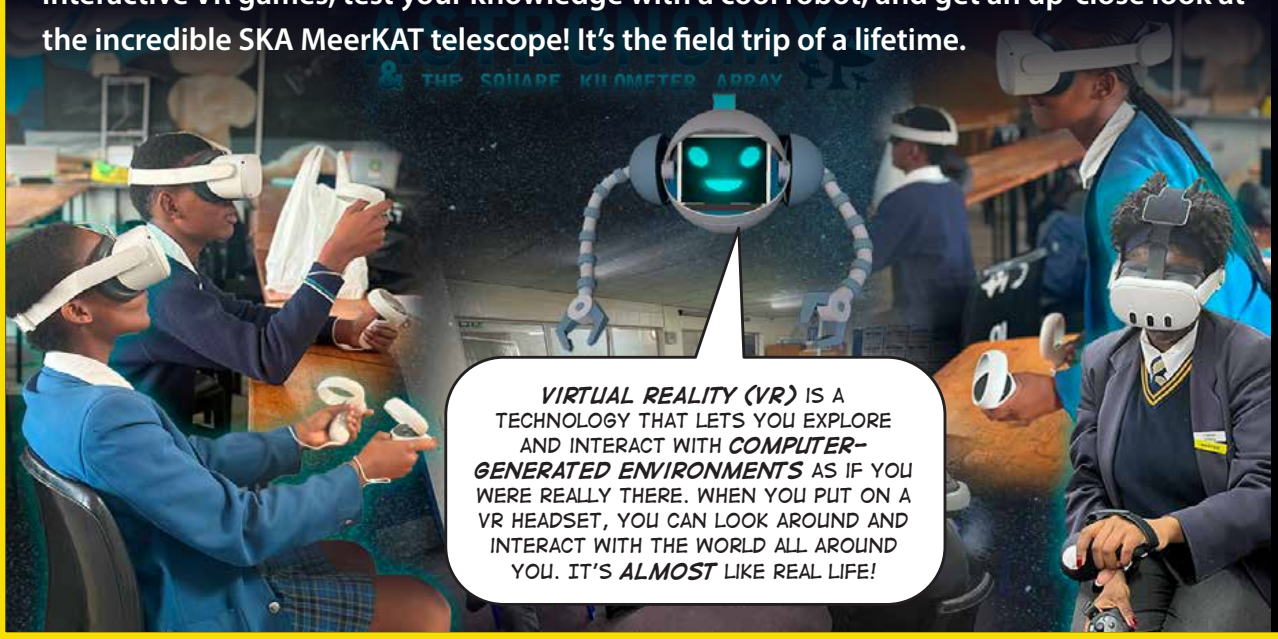
Bottom: Some of the boys collected bacteria samples from the drain!

Win! a fantastic space adventure

Calling all schools in the Western Cape!

Here's a chance to win a virtual reality (VR) field trip for your club, that is out of this world!

Would you like to explore the Square Kilometre Array (SKA) MeerKAT telescope in the Northern Cape? Well, Sozo Labs will bring it right to your classroom! This amazing VR field trip is just like being at the telescope yourself. You will be able to meet Galileo, play interactive VR games, test your knowledge with a cool robot, and get an up-close look at the incredible SKA MeerKAT telescope! It's the field trip of a lifetime.



What is the SKA MeerKAT telescope?

Scan this code to download our special **SKA edition** of *Spaza Space*.

How to enter

Tell us why you think your school should win this cool space adventure!
Email a 250-word letter of motivation to info@sciencespaza.org or send a short video or voicenote to us at 076 173 7130.
Get creative and have fun!

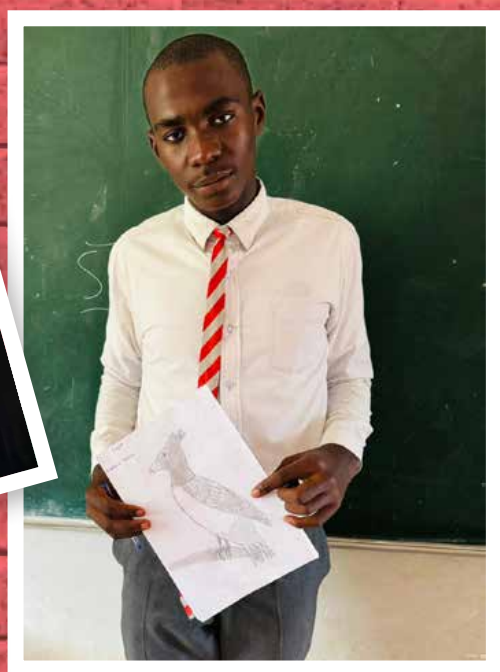
The competition is only open to schools in the Western Cape. All entries must be received by 15 November 2024.

Enter now and let the adventure begin!

SOZO LABS

More News from the Clubs

Our clubs across South Africa have been very busy! Here is just some of what they have been up to: collecting plastic, researching migratory birds, doing Science Spaza activities and exploring how science and nature can work together. Keep it up and remember to send us your photos and videos!



PARTNER WITH US ...

Help us reach every school in South Africa. We can't do it alone, and need your help.

To find out how you can partner with us, contact Robert on 084 357 7333, email: **info@sciencespaza.org** or **www.sciencespaza.org**.

We are talking to future leaders. Are you?

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