

Science Spaza shines at Science Forum South Africa

Science is not only for the classroom or your club, it can take you places too! The Science Spaza team and six learners from Izixovane Science Club from Sobantu township in Pietermaritzburg, KwaZulu-Natal, took part in Science Forum South Africa 2016 (SFSFA16). It took place on 8 and 9 December at the CSIR International Convention Centre in Pretoria. The Izixovane members flew from Pietermaritzburg, and for some of the children it was their first flight. They also stayed in a five-star hotel, the Southern Sun Arcadia – what a treat!

Science Spaza was proud to be selected by the Department of Science and Technology as an exhibitor. The team had a wonderful time highlighting their passion for Science Spaza and displaying the fun activity worksheets and the newspaper, *Spaza Space*. There was even a screen playing Science Spaza videos - how cool is that?! The name, Science Spaza, is so attractive that many different people came to the stand interested in finding out about the project. This forum was a great opportunity to do lots of networking.

Pupils from Izixovane Science Club were also invited to perform as part of 'Street Science' hosted by the South African Agency for Science and Technology Advancement (SAASTA). This took place at Sammy Marks Square in central Pretoria. Izixovane did a great job performing their Hip Hop songs, written themselves, to raise awareness about the drought in South Africa and global climate



Above: Thobeka Gumede welcomes visitors to the Science Spaza stand at Science Forum South Africa.

Below: Members of Izixovane Science Club before boarding their flight (left), performing at Science in the Street (right) and being interviewed on Touch Central Radio (bottom left).



change issues. These water shortages threaten our biodiversity and wellbeing. Hip hop is very popular in youth culture today and that's why it is the perfect way to pass on important messages to the public. After the performances,

Izixovane was interviewed by Touch Central Radio Station about their science rapping. Science Spaza believes in making science fun, both in and out the classroom, and motivates learners to be more innovative in solving problems within their communities.

Read more about Izixovane's experiences in Pretoria on **Page 6**.

Water is life. Plants and animals need water to survive. Apart from water for drinking, we need water for many other things such as agriculture and hygiene purposes. So, what would happen if we ran out of water? There would be no life on earth without water!

The National Water Week campaign, running from 13th to 19th March, was initiated by the Department of Water and Sanitation to emphasize the importance of water and to raise awareness about using water efficiently. In this issue of *Spaza Space* you can read about the **water crisis** in South Africa. We also give you **tips on how you can save water.**

Climate change is real and causing more droughts and storms. We recently experienced **tropical cyclone 'Dineo'** in Southern Africa, but in fact, South Africa is currently not getting as much rain as it used to, and our sources of water are running dry.

You can read more about **tropical cyclones** and how they are formed on page 3.

On our front page you can find out more about our exciting trip with Izixovane Science Club to **Science Forum South Africa 2016**, which took place in Pretoria in December 2016.

Do you know what life is like in Antarctica? Read all about it in 'Living on Ice' on page 5.

And finally, be sure to check out SAASTA's **Southern African Science Lens Competition** on page 4. We've selected some amazing entries around the 'water' theme.

If you would like to know more about how you and your community can save water, visit <http://www.dwa.gov.za>.

The Science Spaza Team



South Africa is facing a Water Crisis

The lack of rainfall

(Source: costa-news.com)

South Africa is home to 49 million people. As well as poverty, lack of jobs and diseases like HIV/AIDS and TB, the country now faces another crisis: water shortages. There are many reasons for the growing water crisis in South Africa including climate change, poor maintenance of water supplies, pollution and deforestation.

Climate change is affecting our water supply, because rainfall that usually provides South Africa's water has been low, with dams and rivers drying out. Water restrictions (when water is cut off during certain times of the day) have already been put in place in areas such as Cape Town. Water restrictions are especially challenging for communities in rural areas who already lack access to water. Waterworks (places where water is cleaned for using again) are also not maintained properly, resulting in water wastage, and in many cases water problems experienced in communities are not reported and fixed.

As the population grows, water scarcity increases. More and more clean water is needed for drinking, cleaning, cooking and sewage. People are sometimes very careless and waste a lot of water, placing a lot of pressure on this limited resource. The number of people moving into cities (urbanisation) is

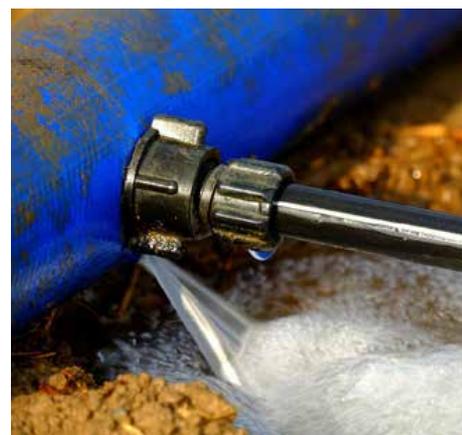
increasing, which also puts pressure on water resources.

Water, air and land pollution all contribute to the decrease of water quality. Sewage, oil and



Poor sanitation in Diepsloot in 2012

(Source: en.wikipedia.org)



Leaking water pipe

(Source: leaksmart.com)

waste from industries dumped into rivers and dams, as well as dirty water from hospitals, hotels, mines, schools and restaurants, all end up polluting our water.

Killing trees and plants (deforestation) also adds to water scarcity. Trees help prevent too much evaporation, so the destruction of forests by fire, logging and farming means that moisture in the soil is exposed to the sun's intense heat, drying it out.

All of this sounds gloomy! What can you do to help change this situation?

Here are few tips for saving water

- 1 Turn off the tap when you brush your teeth – this can save up to 6 litres of water per minute.
- 2 Fix dripping taps. A dripping tap can waste 15 litres of water a day or 5 500 litres a year.
- 3 Collect water from your roof in a tank or from the drainpipes to water your plants, clean the car and wash the windows of the house.
- 4 Water your flower or vegetable garden with a watering can rather than a hosepipe.
- 5 Fill a jug with tap water and place this in your fridge so that you don't have to leave the cold tap running for the water to get cold before you fill your glass.
- 6 Think about ways in which you can have a career that helps us look after our precious water supplies.



Hello 'Dineo'

– meeting a tropical cyclone

Flood damage from the tropical cyclone

(Source: commons.wikimedia.org)

Hurricanes or tropical cyclones are very rare in South Africa. However, due to global warming we might find an increase in cyclones closer to home. In fact, Cyclone Dineo hit Mozambique in February and caused heavy rain in South Africa.

What is a tropical cyclone?

A tropical cyclone is a circular air movement that usually occurs over warm oceans near the equator. Its diameter ranges from 200 km to 2 000 km. Cyclones create spiralling, hurricane-force winds on the earth's surface and bring heavy rain.



Damage from the tropical cyclone (Source: wusfnews.wusf.usf.edu)

The structure of a cyclone

The centre of the tropical cyclone is called the eye and is calmer because of the gently sinking cooler air within it. A huge wall of cumulonimbus clouds surrounds the edge of the eye from sea level to over 15 km into the atmosphere. This ring of cloud is called the eyewall and can be tens of kilometres thick.

Dense cirrus and altostratus clouds may also spread outward several hundred kilometres from the eyewall. The most violent winds and storms take place in the eyewall. At the top of the eyewall, air is pushed outward, making the cyclone even bigger. A tropical cyclone can take up to a week to build up over the sea when the conditions are just right. Cyclones die when they move over land or cold ocean water.

Cyclone Weather

Tropical cyclones always bring heavy rain and strong winds that cause lots of damage. The strongest winds occur before the storm hits.

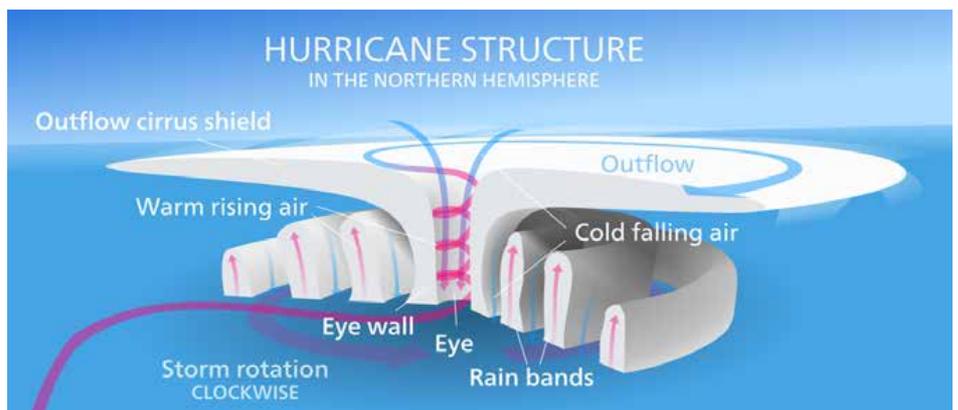
These winds whip up the sea water and create giant waves called storm surges. Storm surges cause many of the deaths that occur during tropical cyclones.

Naming tropical cyclones

There have been many methods used to name tropical cyclones. For hundreds of years in the West Indies, hurricanes were named after the day on which the hurricane occurred. Before the 19th century, an Australian meteorologist gave cyclones a woman's name. When the US military first used satellites, it is said that Air Force and Navy meteorologists who plotted the movements of storms named these storms after their wives and girlfriends. In 1953, the United States began to name tropical cyclones alphabetically. Now, names of both genders and non-gendered names are maintained by the World Meteorological Organisation (WMO) and are alphabetically cycled through over a six-year period. For example, over the Indian Ocean, Cyclone Carlos came before Cyclone Dineo.

Three conditions are necessary for cyclones to form:

- 1) Heat from warm ocean waters is needed for air to begin to rise (remember, hot air rises and cool air sinks);
- 2) Evaporation of warm surface water from the ocean to create storm clouds;
- 3) A spiralling wind pattern on the ocean surface that draws air into a rising column of thunderstorm clouds. This allows the air to warm even more and rise higher into the atmosphere.



Tropical cyclone structure

(Source: pixabay.com)

SAASTA's Southern African Science Lens Competition

Several rounds of the popular SA Science Lens science photography competition have been conducted since 2002. Both professional and amateur photographers have entered wonderful images illustrating and communicating the excitement and impact of science. Here are just a few photographs for this edition of *Spaza Space* that fit into our theme of Water Conservation...



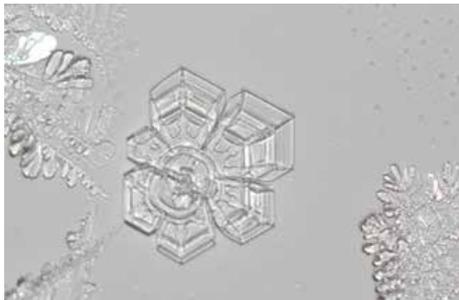
Left: Clean Water
Photographer: Morgan Trimble

This is a mountain stream in the high-altitude forests of the Rwenzori Mountains in Uganda. This photo highlights the link between a healthy, diverse ecosystem and the provision of clean water to communities for crops, sanitation, and drinking. Scientists have shown that keeping forests undamaged maintains water access downstream. But where vegetation is cleared for cultivation, water resources downstream may be cut off and even weather patterns can be changed with devastating consequences. SASL 2013



Above: Elephant Refraction
Photographer: Mike Dexter

Water drops fall from the lower lip of an African elephant as it drinks at a small waterhole in Botswana. Within the drops is a refracted image of other elephants drinking on the far side of the waterhole. When light rays move from one medium to another, in this case from air to water, their direction of movement is altered. This phenomenon is called refraction and is why the image within the water drops appears upside down. SASL 2013



Above: Icy Symmetry
(2013 Runner Up – Science Close-Up)
Photographer: Thomas Otto Whitehead

Water is the most abundant compound on the planet, and without it life couldn't exist. It's hard to see the structural details of water in its gaseous and liquid form, but when it freezes, water transforms into beautiful ice crystals. This photo of an ice crystal was taken on the sub-Antarctic Marion Island where temperatures often drop below zero. Whitehead was particularly amazed by the fact that no ice crystal is like another – each one is unique. SASL 2013



Above: Trunk Spray (2013 Highly Commended)
Photographer: Mike Dexter

Adult elephants can drink up to 200 litres of water per day when water is abundant. They are rather fussy about its quality. The female photographed here was standing next to a small waterhole that has fresh water pumped into it daily. On the surface, there was a build-up of algae and dust which she removed by sucking the surface water into her trunk and spraying it onto the bank. She did this repeatedly until she was satisfied that the water was clean enough to drink. SASL 2013

Right: Every Last Drop (2013 Runner Up)
Photographer: Kim Van Zyl

This image shows an image of a drop of water falling onto a daisy. The daisy petals are refracted through a glass of water. The idea of the image is to show the fragility of our water supply and that we need to conserve 'Every Last Drop'.

Refraction is the bending of the path of a light wave as it passes from one material to another material. The refraction occurs at the boundary and is caused by the change in speed of the light wave upon crossing the boundary. The tendency of a ray of light to bend in one direction or another depends on whether the light wave speeds up or slows down upon crossing the boundary. The extent of this 'bending' depends on the medium's index of refraction. The index of refraction for water is $4/3$, implying that light travels $3/4$ as fast in water as it does in vacuum. SASL 2013



Antarctica - Living on 'The Ice'



The night sky in Antarctica. A team member watches the Southern Lights or Aurora Australis

Antarctica is a continent often described as the coldest, windiest, driest and most remote place in the world. It is tough to work there, but as part of the South African National Antarctic Programme (SANAP), South Africa has a permanent research base there for scientists to carry out research. The South African National Space Agency (SANSA) supports engineers who live at the base throughout the year in order to transfer data back home to the SANSA facilities at Hermanus. *Article provided by SANSA.*

A challenging environment

SANSA, with support from the Department of Environmental Affairs, sends two teams to Antarctica every year. One team lives at the base for 14 months. A second team stays for three months to help the new team to take over from the one leaving. Scientists who live there for a long time must be fit and able to do hard labour in extreme weather conditions. Supplies and gear from the ship have to be hauled across 300km of snow and ice to the base.

Snowfall is low in Antarctica and most of the continent is actually a desert, even though it holds about 70 percent of the world's fresh water! It is also hard work melting snow and ice and pumping it to the base for use. Bad weather often leads to water shortages, as it becomes too dangerous to be outside to use the smelter.



Antarctica is 4500km away from South Africa. It takes three weeks to travel there on the SA Agulhas II, a research and supply vessel anchored at Cape Town Harbour.

Antarctica is an ideal location for space science research because the earth's magnetic-field lines converge at the poles and act as a funnel for space plasma to travel into the earth's atmosphere.

Measuring climate change

Antarctica is also a place where the effects of climate change can be measured. This is why many countries have bases in Antarctica and why it is vital for scientists to continue their research there.

Social Life

Activities, like playing soccer on the ice, celebrating birthdays and special holidays or visiting other stations are a good way have some fun while living on 'The Ice'. No place on earth compares to this icy wonderland which awaits those brave enough to live and work in the land of ice and snow.



The South African National Space Agency (SANSA) operates lots of specialised instruments and systems to monitor the sun and the near-earth space environment.



There are 24 hours of daylight in summer in Antarctica but winter is brutal. There is almost 24 hours of darkness and extreme cold!

Space is not as empty as you think

You might think that space is empty but that is far from true. Matter released by our sun and space weather events fills the area between our planet and surrounding bodies. This is known as space plasma. Plasma has an effect on how radio waves travel through space. It is important for scientists to understand what those effects are.

NEWS FROM THE CLUBS

This is where you, the members of the Science Spaza clubs, get to share your news and have your say about science issues.

Science Forum South Africa

Sobantu High School Learners

How cool is to be part of Science Spaza Project? Really cool!

We have done amazing activities with our science clubs. We mixing science with hip hop and come up with really cool solvents. HaHaHa! I am not going to say much. On the 8-9 December 2016 one of our science clubs (Izixovane) from Sobantu High School were invited to attend Science Forum South Africa for Science in the Street at Church Square in Pretoria. They were given an amazing opportunity to perform their own Hip Hop songs raising awareness on water related diseases. And this is what went down.

On the 7th of December, me and five other school mates went to Pretoria to perform songs that we wrote ourselves. Pretoria was fun! The coolest thing was that we flew there, I have always wanted to fly in a plane. It was really awesome. When we landed at OR Tambo airport I was so happy. We went to see the Union Buildings before we went to the hotel. That night we went for a swim in the pool. I was so tired after that so I went straight to sleep. The following day we went to perform at Church Square. The crowd went crazy after our first song that raises awareness about water-borne diseases. We performed our second song which was 'Wash Your Hands' and the crowd liked that one as well. We spent the whole day at Church Square so when we went back to the hotel I decided to relax after the long day. The next day we went to Church Square again to perform. Friday the 9th was our last night in Pretoria and we had fun. Meeting Marvellous (Marvie) and Thobeka was nice, they were really fun to hang out with, especially Marvie since I spent a lot of time with her. Sthabile was also awesome, I am really fond of her because I've known her since last year. I really appreciate what Science Spaza has done for us.

By: Nomonde Khumalo

We had a nice comfortable flight from Pietermaritzburg to Johannesburg. We arrived at OR Tambo International Airport and then drove to Pretoria where we settled into the Southern Sun Hotel. It was fun and comfortable, the Science Spaza staff who were there to mentor us made sure that we were safe. The next day we went out to educate people through Hip Hop music. Then we went to the ICC where we performed songs raising awareness on people's lives. It was fun in Pretoria.

By: Skhumbuzo Mkhize

Going to Pretoria was fun and exciting. A trip that lots of children dream of.

Being in the aeroplane for the first time was the most exciting thing for me because I had a chance to try the food, meet tourists and look at the world at a different angle. This fabulous trip has changed my peers attitude towards me because at first they said all this Science Spaza is



ABOVE: Sobantu Science Clubs looking all cool at the SFSA2016 (Source: Science Spaza Team)

bad but when they heard I was going to fly they changed their minds and were more interested.

Pretoria was fun – I enjoyed staying in a hotel for the first time, the meals, the drinks and the rooms. I felt like a V.I.P. for the first time in my life. Meeting famous people like Tall Ass Mo was wonderful because I had a chance to rap on live radio (Touch Central).

When we performed, the audience cheered and applauded and made us feel at home when they sang along. Science Spaza has changed my life in an immeasurable way, I will forever practise what I preach... Knowledge is Ncah!!!

By: Mnqobisi Majola

My experience of our trip to Pretoria was awesome. At first I got very nervous but as the time went by I ended up very comfortable with everything. The flight was something else, I really enjoyed it, it was my first one and I was a little bit scared. Thank you very much to Science Spaza for such an amazing, educational trip!

By: Sandiswa Zimu

When I first heard that I was one of the people who were selected to perform in Pretoria I was so excited because I've never been to places away from Pietermaritzburg. To top it all we were going to take a flight. When we got to OR Tambo airport, a nice driver took us to the hotel. The food, the rooms, the gym and swimming pool were amazing. I had such fun with my friends! The following days we went to Church Square to perform our songs. We were enthusiastic and optimistic about doing our best and our performances were wonderful. We went to the ICC for another performance and were interviewed by the one and only, Mr Tall Ass Mo. Going to Pretoria made me realise the importance of teamwork and I had a chance to get to know my friends better. The Science Spaza team all treated each other with respect and we all behaved well.

Thanks to the Science Spaza crew - Mr Robert Inglis, Sthabile, Marvie and Thobeka for the experience.

By: Nkanyiso Mthembu

Bokamoso scientists enjoying the first issue of 2017
 (Source: Bokamoso science club. Image by Teacher)



Senata Bridgette
 Mathipa Matyalo Secondary
 Science Club
 24 February 2017
 Grade 10

Our group has learnt to sing about sciences. Other learners ask sciences club has made a different to you guys. Tell us, what's your secret and we say no, there's no secret, but the science club taught us to create a song and practice it until. Our president they tell us no one can fight, smothering, gossiping and dozing period when is doing a science club. This are rules. In our group we discuss to do a project at school. Everything around us is all about science. When we are going to do this project our teacher will be proud of our group. We work with Mr Moganda, Mr Sebati and Mr Mafiso. These are teachers that they work with us in science club.

Masija Khatygo (KATNEWTON) Mthlango
 Grade 11

MATHIPA MATYALO HIGH (SCIENCE CLUB GROUP)

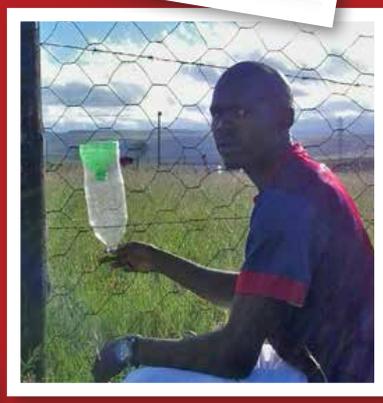
I have just joined this club since 2016 (last year) Surely this group has no negative effect. I have learnt more from Science club as science learner. To be in this group taught me how to behave as a science learner. People say to us that we do it for the beneficial for marks; but no, hard work can lead you there. This group can create your dreams and be well known in the community. Know that if you are an hard worker opportunities will come linear to you and a very good ones. Some of us are leaders of this group but are at the down level. Our teachers are our life and science club is our daily bread so if you combine this life and daily bread you will find that is equal to success. Be ultimately and complete your studies. There are certain things that are needed. like the following:

- Patiently
- Love
- Respect

if you have such things labelled above you shall become a better person. A better successful person must be a specific, friendly, playfully and know what you need in life. Run faster like GwTrain and Lumbogin

RIGHT: Hi. My name is Sanele Msomi. I am a 21-year-old boy from Msudukeni Senior Secondary School. This is my activity for MeerKAT worksheet climate change – Spaza Space 2017 first edition.

(Source: Sanele Msomi. Image by his friend)



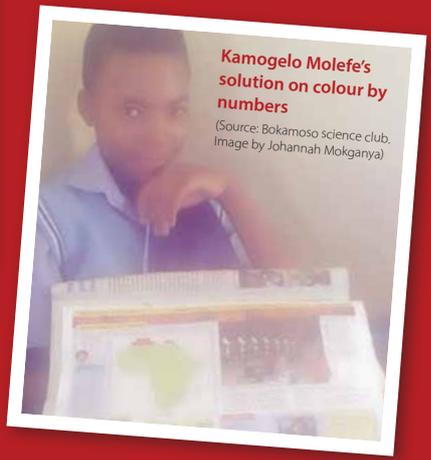
LEFT: Yael Science club have done some experiments focused on the fact that microorganisms are everywhere. In their experiments they have managed to make their own agar that supports the growth of bacteria (pictured below). They have also done a model of a water tap. This tap can be opened and closed by using the plastic bottle cap. How amazing! Science is really fun, ask the Yael Science club. (Source: Yael Science Club)



ABOVE: Hi. My name is Bradley Jagesar. I am a 15-year-old boy from Northriding Secondary school. This is my first activity with my friends. And I am enjoying it. Thank you Science Spaza. (Source: NHS)



ABOVE: I am Crystal Higinio, I am a 15-year-old girl at Northriding Secondary School. We were preparing to watch the Eclipse on Sunday 26th of February at 5:15 pm till dawn. We learnt that there are safety issues involved. We received glasses and had a chance to use a telescope to see Venus last week. Enjoying Science club to bits!! (Source: NHS)



Kamogelo Molefe's solution on colour by numbers
 (Source: Bokamoso science club. Image by Johannah Mokganya)

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SCIENCE SPAZA APPLICATION FORM

Complete the form below and send it to PO Box 22106, Mayor's Walk, 3208, email: info@sciencespaza.org or submit your application online at www.sciencespaza.org

Name of school: _____
 Municipality: _____
 Province: _____
Name of your science club:

 Name of contact person: _____
 Telephone number: _____
 Email address: _____
 Postal address: _____

To be filled in by responsible adult (parent/teacher)

Name: _____
 Surname: _____
 Position: _____
 ID Number: _____
 Signature (parent/teacher):

 Date: _____

Distribution of Science Spaza clubs in South Africa

There are more than 140 Science Spaza clubs in all provinces that receive Science Spaza products. Science Spaza prints and distributes 10 000 copies of *Spaza Space* quarterly, which includes activity worksheets, *Spaza Space* newspaper, Hip Hop Science Spaza CDs and other learning materials.

These are also sent to more than 30 Science Centres across the country. This initiative targets learners from disadvantaged backgrounds where learners do not have functional laboratories.

