

Water is the essence of life

Nelani Mbokazi
edited by Matthew Del Grande

National Water Week, 14-22 March, and World Water Day, 22 March, are arguably the most important dates not only in South Africa, but globally. These days are dedicated to increasing awareness of the importance of water. Water is essential for life on our planet. There isn't a life form on Earth that is not dependent on water at some level. It acts as the medium in which different organic compounds mix with one another.



The fact that about 65% of our bodies are made of water, and that it is involved in all body functions, signifies the importance of this substance! Besides water being essential for our health and well-being, we also use water for various functions that improve life such as cooking, growing crops, cleaning, transporting waste and washing ourselves! About 70% of our planet is covered with water, where it exists in three phases: liquid, solid and gas. Only about

2.5% of that water is fresh and usable, the rest is in oceans and is too salty to use for most of the life-sustaining purposes that we need fresh water for. Furthermore, of that 2.5% of fresh water, only 1% is accessible to us in its liquid form. The rest is trapped as ice in glaciers and in the ice caps around the North and South Poles.

But today, this precious resource is under a lot of stress. Water is being polluted by toxins and other impurities. Freshwater

sources are now drying up at an increasing rate. Population growth, climatic change and heavy industrialisation are also putting a lot of pressure on the availability of water. Scientists are suggesting that the rate at which we use water is higher than the rate at which the supply of fresh water is replenished! This has great implications for millions of people, especially those who are less privileged. A report from the World Health Organisation of the United Nations revealed that every day around the world thousands of young children die from diseases associated with a shortage of clean water!

So it is up to us to take full responsibility for saving and conserving water. By doing so we will not only serve those who are less privileged, but we will contribute to a more sustainable environment and help to ensure that this precious resource will still be accessible to future generations.

Science Spaza Hip Hop Health Initiative

Nelani Mbokazi, edited by Matthew Del Grande

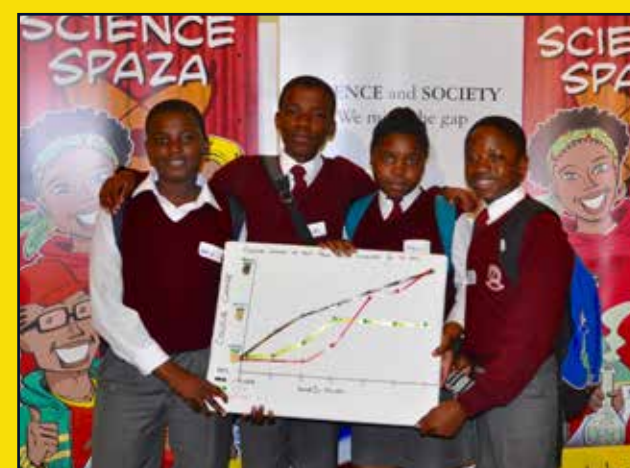
In 2015, three Science Spaza Clubs from KwaZulu-Natal took part in a pilot research project. This year the project will be entering another phase and will integrate all of the Science Spaza clubs around the country.

The Science Spaza Hip Hop Health Research Project seeks to empower young people to take the initiative and help solve critical water and health issues affecting their communities! The project is funded by the Wellcome Trust foundation and it is focused at increasing awareness about water and water related illnesses, so that we can find ways of solving these problems.

The clubs who participated in the pilot project were from three schools, namely Sobantu High School, Mehlokazulu Senior Secondary and Emzameni High School. They were the first schools in South Africa

ever to have participated. Learners applied approved fundamental principles of conducting research in science. These include observing the problem, learning more about it and finding ways of solving it. A fun twist was added to the programme: The learners used Hip Hop to communicate their findings to the local community and other interested people.

Science and Hip Hop have a lot in common. As you go through this newspaper you will learn more about the similarities between the two. The rap songs which were created by learners, with the purpose of educating



Mehlokazulu Senior Secondary School learners presenting their findings from their research

their communities about water and water related illness, were professionally recorded on to CD! These will be distributed to all registered Science Spaza clubs across the country. The actual research which was conducted by learners, including the Hip Hop part, will also be broadcast on SABC 2 Hectic Nine-9 during the National Water Week.

Fighting unemployment through protecting water availability

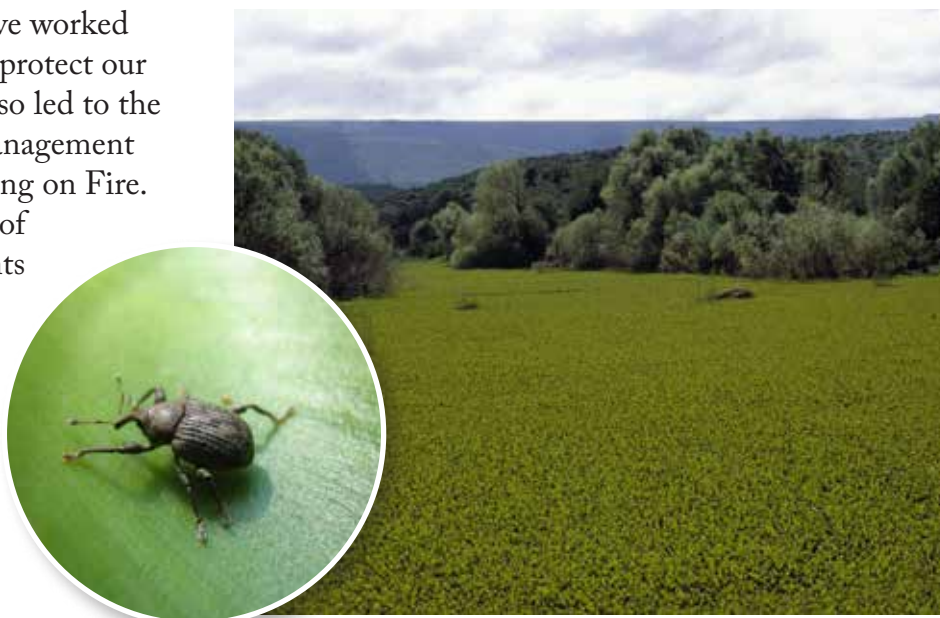
In 2015, the Department of Environmental Affairs celebrated its 20th anniversary of the inception of the Working for Water (WfW) and the Working for Wetlands (WfWet) Programmes. For 20 years the Department of Environmental Affairs has combined social initiatives with environmental projects to uplift South Africans and ensure that our beautiful natural landscapes remain pristine for future generations.

For two decades these programmes have worked to help keep our wetlands healthy and protect our water sources nationwide. They have also led to the forming of other Natural Resource Management (NRM) Programmes, including Working on Fire. WfW focuses on reducing the density of invasive alien plants (IAPs). These plants are not originally from South Africa and have grown too widespread since they were introduced. There are currently 198 species of plants that are classified as IAPs and they are destructive to the environment because they not only begin to replace the indigenous species but also reduce water availability for more productive uses in agriculture, fisheries, transport, recreation and general water supply.

How is the DEA fighting this threat? There are four major methods by which WfW fights to control the spread of IAPs: 1.) Mechanical – manual labour and use of machinery to remove the plants; 2.) Chemical – the use of herbicides and other chemical agents to reduce the population of invasive species; 3.) Biological control – through the introduction of host specific parasites like insects to halt the spread of IAPs; and finally 4.) an integrated method that combines the above.

The WfW programme works in partnership with local communities as the use of these control methods creates job opportunities for local communities. Since the inception of the WfW programme in 1995, more than 20 000 people have been employed in WfW jobs and more than 18 463 in WfWet jobs.

The WfWet projects, a sub-programme under the DEA NRM Programmes focuses on stopping the destruction of South Africa's wetlands and the rehabilitation of already damaged areas. Studies have indicated that over 40% of South Africa's wetlands have been degraded and so the DEA continues to fight for their preservation. Wetlands are home to thousands of species and are major sources of water for every living thing in these areas. Wetlands function as sponges and protect against flooding and store carbon dioxide to regulate climate change. Livelihoods from fishing, travel, tourism and water provision all depend on healthy wetlands. More than 1 billion people around the world depend directly on wetlands to earn an income. WfWet advocates for the wise use of these areas, striving to find a balance between agricultural practices and ecological stability. Through this, WfWet seeks to combine conservation with job creation.



Above: A wetland before the removal of invasive alien plants (IAPs)

Inset: Wetlands are home to a huge variety of organisms both big and small



Above: A wetland after the removal of IAPs

Clearing invasive plants along rivers typically results in stream flow increase of 800 to 12 000 litres per hectare per day in the winter rainfall region, and up to 34 000 litres per hectare per day in the summer rainfall region.

Are you interested in the great work that the Department of Environmental Affairs does? Visit their website, www.environment.gov.za, to find out more on the WfWet and WFW programmes and the many other initiatives that the DEA have developed to protect our water resources and keep our land beautiful.

Call centre number: 086 111 2468



environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



WATER!!!

You need it. We need it. The world needs it!

This issue of *Spaza Space* is all about water. With Water Week here, we decided it was the perfect opportunity to dive into what makes water such a hot commodity and why you should care about it!

Come and learn about how precious water is on page 1 by reading an article that's just flowing with exciting facts. Find out when **National Water Week** and **World Water Day** are and just how much we truly rely on water in our day-to-day lives.

Go to page 5 for what went down at the **2015 Hip Hop Health Science Spaza!** The learners worked hard to put on amazing performances and they even got to learn something along the way. See what they got up to and get a glimpse of the fun – we have some great pictures for you to see! Also, if you feel like you want to take part in 2016 visit our website at www.sciencespaza.org.

If you want to know who won the Hip Hop Competition then swing past to page 9 where we have announced the talented **winner**, as well as a piece on another group who made some serious waves!

Check out page 11 for some news from our **Science Spaza clubs** from around the country. It's always fun to hear what you guys have been up to!

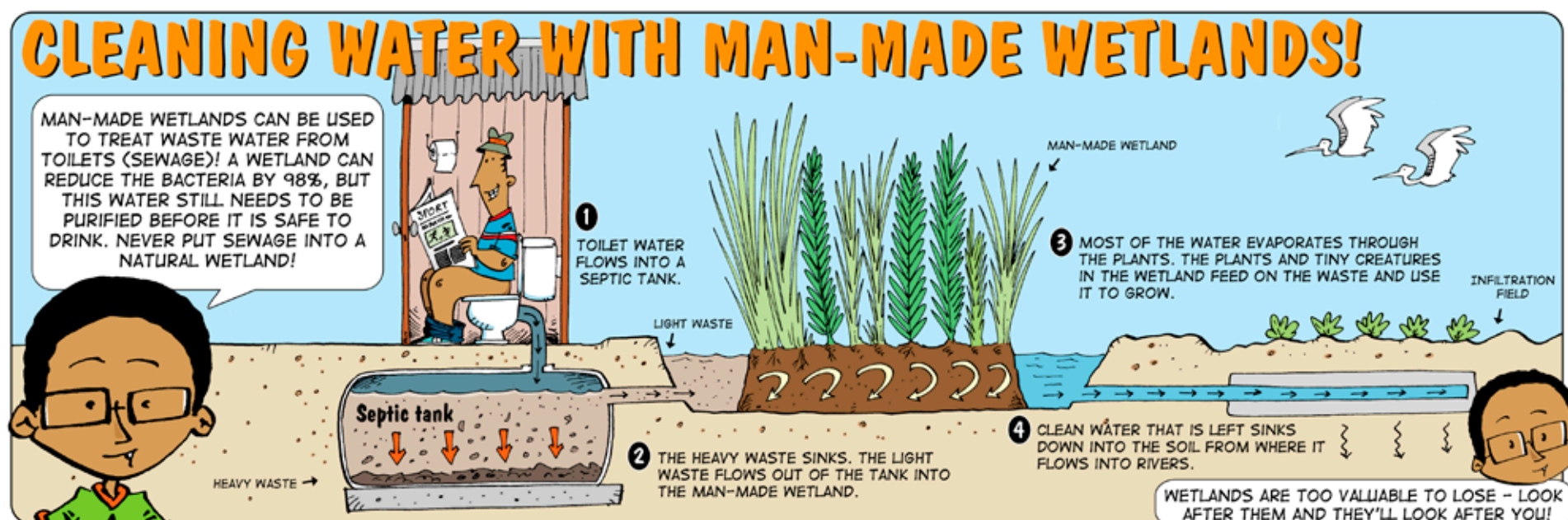
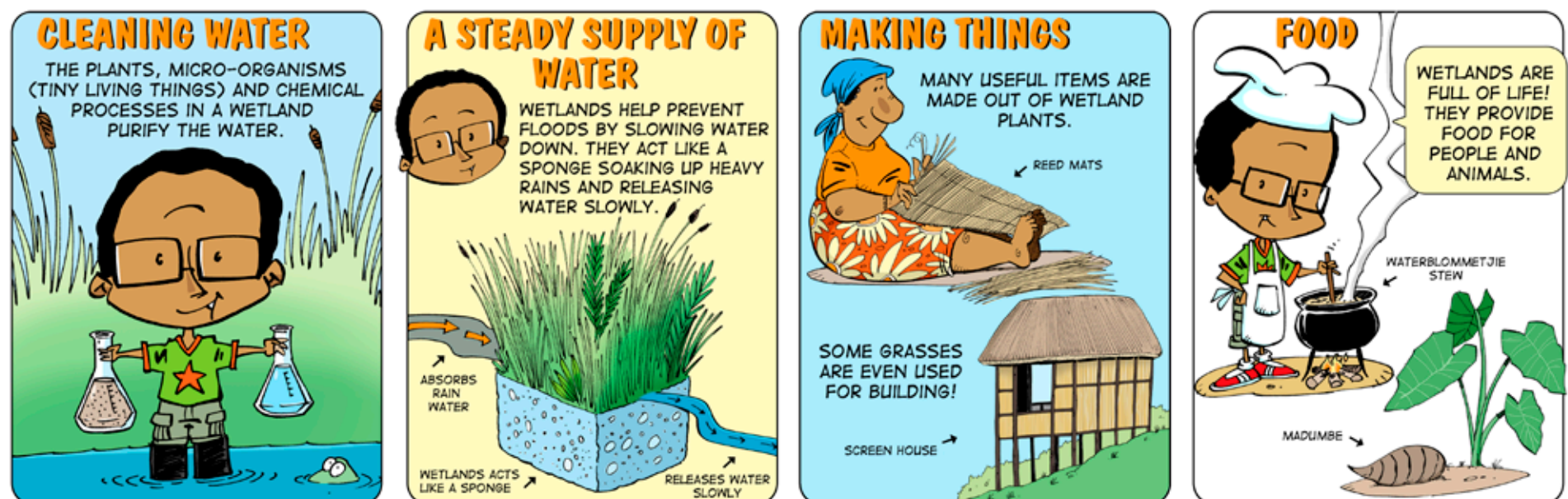
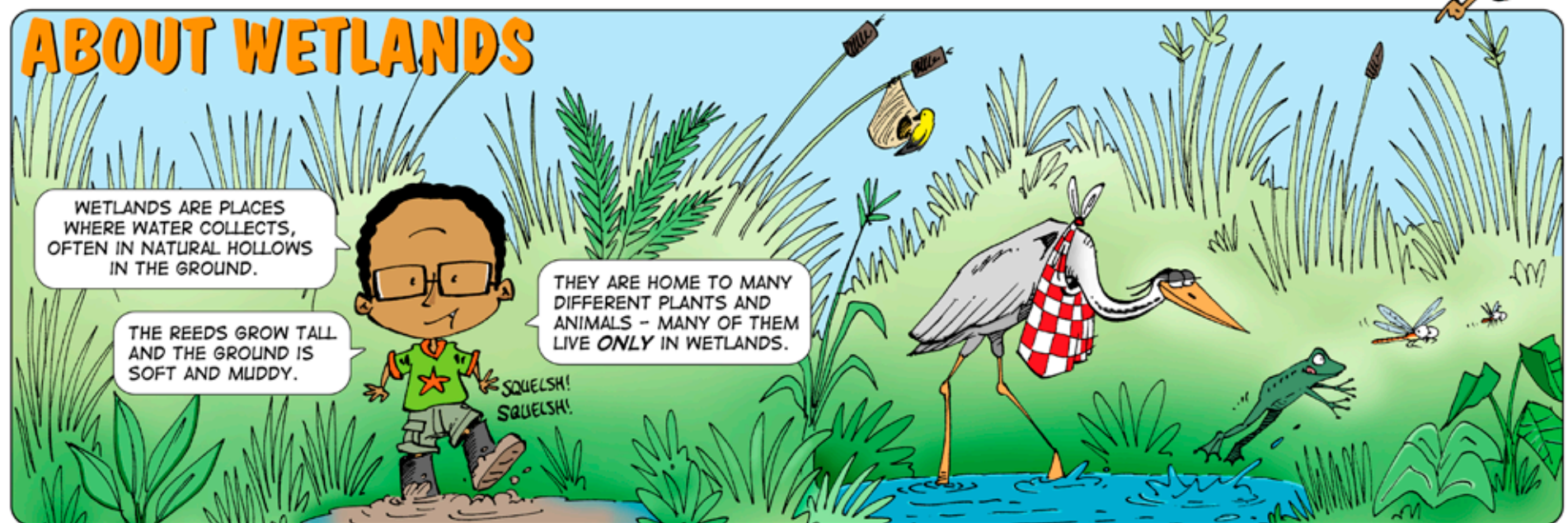
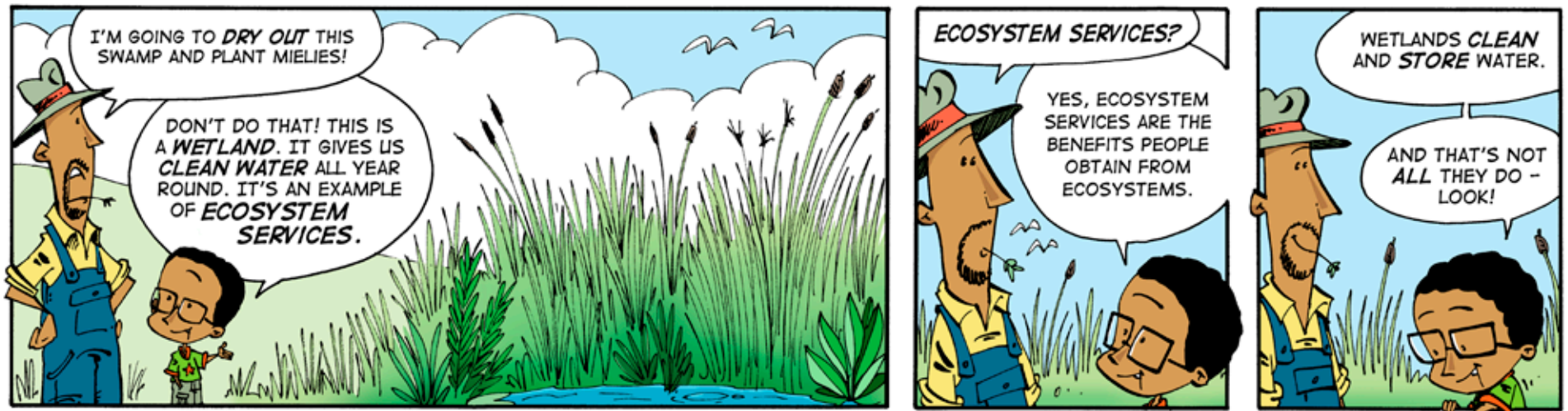
Don't forget to like our Facebook page (Facebook. com/sciencespaza) and remember that water is essential for life, we must protect it. Enjoy!

The Science Spaza Team



ECOSYSTEM SERVICES

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SOUTHERN AFRICAN SCIENCE LENS COMPETITION

A Photographic Competition To Celebrate And Communicate Science

Congratulations to the 2015/2016 winners



Science Close-up

Inside Out by Dr Dorit Hockman

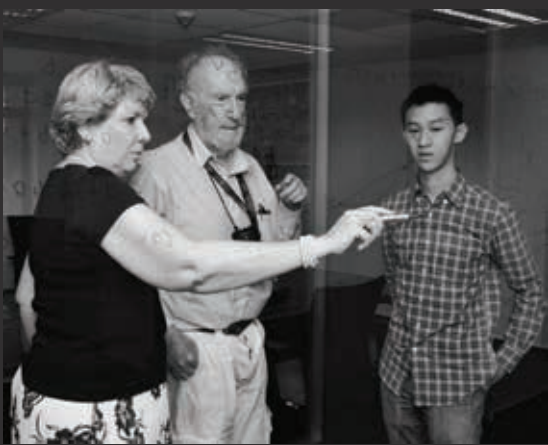
When is a bone not a bone? This photo might look like an X-ray, but actually is a photograph of dyed bones and cartilage from a late-stage embryo of the veiled chameleon, called *Chamaeleo calyptrotus*. As the skeleton forms in the embryo, cartilage is gradually replaced by bone. By comparing the rate of skeleton growth and other processes of embryonic development across different animals, scientists such as Dr Hockman learn how evolution acts on these processes to allow the diversity of form in the animal kingdom.



Science As Art

Pearl Essence by Dr Camilla Floros

This beautiful photo may look like an artistic painting, but it is really a close-up photo of the scales of a blue emperor fish, called *Lethrinus nebulosus*. You may be surprised to learn that the beauty of fish scales has literally been under our noses for decades. Pearl essence, as it is called, is derived from fish scales and it has been used in lipsticks and nail polish to give them that shimmery look. Crystals within the fish scales reflect light from many different angles and levels, giving lips and nails a pearly appearance.



Science in Action

Research is Attainable by Michelle Low

The writing's on the wall. Three extraordinary chemical engineering academics brainstorm ideas by writing on a window pane. Prof Diane Hildebrandt (left) and Prof David Glasser (middle) are directors of the MaPS (Material and Process Synthesis), a research unit at UNISA. Dr David Ming (right) is a lecturer at the University of the Witwatersrand. He is one of the 2014 Mail and Guardian Top 200 Young South Africans and is one of the directors of Engineers Without Borders South Africa. The image shows that scientists need to work together and share their ideas.



International Year of Light and Light-Based Technologies

Light at night – natural and man-made by Morgan Trimble

The stars in the sky and the city lights of Cape Town in this photo show us both natural and man-made lights. Did you know that our desire to study the stars and galaxies has driven the development of amazing light-based technologies such as telescopes, light collecting sensors and advanced engineering to study the faintest light signals from far-away galaxies.



Research, Rhythm & Rhyme for healthy communities

The Hip Hop Health Science Spaza programme, developed and run by Jive Media Africa and supported by Wellcome Trust, seeks to get South African students involved in the sciences by combining the fun and infectious rhythm of Hip Hop with interesting and educational activities.

The theme for this project focused on issues surrounding water and water related diseases, calling on students from three Science Spaza clubs to identify problems in their communities, research and collect information and then finally present their findings in a way that was entertaining and informative, through the power of music!



Learners gathered at the Olwazini Discovery Centre to learn how to identify the issue of water-borne diseases in their communities and how to create research questions around these problems. They also learned about research ethics and how to conduct research in a

respectful manner. The workshops were led by expert consultants, who worked with the learners to build up their research skills. Take a look at some of the experienced and dedicated scientists that supported the students through this learning period.



From left to right: Adwoa Awuah (BSc Environmental Science), Nombuso Radebe (Bcom law and finance & Postgraduate Diploma in Finance, Banking and Investment Management), Ntswaki Dithale (National Diploma in Nature Conservation, Certificate in Water Quality management & Accredited SASS5 practitioner), Blessing Silaigwana (Microbiologist currently studying for his PhD in research Ethics)



Their next step was for these enthusiastic students to participate in workshops where they mapped water sources in their communities and then identified the possible problems that these water sources could be facing. There were three major types of water related issues that the learners were taught to identify: water-borne diseases, water-washed diseases and water quality.



Naleni, a student from Mzamweni High School, did her research on water-borne diseases. She said that she had never done this kind of research before and that the programme's workshops taught her about research methods and presenting her findings. A group from Emzamweni High School, who were focusing on water-washed diseases, said that they learned that using different research methods helps make your findings more reliable, and from their results they could see that proper hygiene is very important in preventing water-washed diseases from spreading. Another group, from Sobantu High School,

focused their attention on the effects of water pollution in their communities. They were fascinated with the way water quality affected the number and types of organisms that live in water sources!

Students chose many ways to show their results. Some chose to use 3D models made from Lego to explain their findings while others preferred to design detailed info-graphs. Everyone put so much effort into their research because they wanted to be sure that their results would be as clear as possible so that others could learn from them. Their chance at creativity was just beginning, though!



Once the students had gathered their data and organised their results it was time for the exciting task of turning their findings into catchy hip hop songs! The students were supported in this by working closely with experts and professional musicians who helped them create songs that were both entertaining and informative. These songs were to be presented to the learners' families, their communities and Hip Hop artist iFani!

All the songs were recorded live and an album was made. Then came the final and most fun part of the programme. The students performed their songs at the Hexagon Theatre on 29 August, spreading awareness of the issues surrounding water and water related diseases in this country and showing off their musical talent!



When asked how they felt about having to create music from their research projects, the learners said that they were excited that they got to perform, especially after all the support from their musical workshop leaders. The learners also said that they were happy with the fact that the genre of music was Hip Hop because it was something that was familiar and fun. Many felt that they now see that Hip Hop doesn't



have to be about crime or partying, but it can be informative and a tool to send a message.

"I was very comfortable because we were not using vulgar language but we were passing on the right message," said one member of a group from Emzawweni High School.



All the learners who participated received the album with the music they created. The album will also become available on Soundcloud, and on the ‘ScienceSpaza’ web page so that anyone can listen in and learn. The event was a great success and all the learners had fun, while both educating themselves and being a part of a new movement of young, enthusiastic scientists!



Listen to *Hip Hop Science Spaza* on these community radio stations...

 Phalaborwa community www.phalaborwafm.co.za	 Radio today www.1485.org.za	 Wild Coast FM www.wildcoastfm.co.za	 Emalahleni fm www.emalahlenifm.org.za	 Aganang FM www.aganangfm.org.za
 Mogale FM www.mogalefm.com	 Vaalart FM vaaltarfm.co.za	 Siyathuthuka siyathuthukafm976.co.za	 Whale coast fm whalecoastfm.co.za	

The **Hip Hop Science Spaza Project** is a national collaboration between popular music artists and learners in science clubs around South Africa to make science accessible to the general public. See www.sciencespaza.org. Science Spaza is an initiative of Jive Media Africa. National Science Week is an initiative of the Department of Science and Technology managed through the South African Agency for Science and Technology Advancement (SAASTA). Find out more at www.saasta.ac.za

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Hip Hop Science Spaza 2015 Winner Announcement!!!

Congratulations to the 2015 Hip Hop Science Spaza winners! They are the BOOM Science Kids, from Lungisa Senior Secondary School, Eastern Cape. Their song 'The Universe' was selected by the Science Spaza team and will be professionally recorded in 2016!

The theme for 2015's Hip Hop Science Spaza was "The international year of light and light based technologies". The contestants had to create a hip hop song using four scientific facts on this topic. The BOOM Science Kids delivered a fun and funky song which captures the essence of what the universe is and how it flows like the rhythm of hip hop.

"The universe, the galaxy, the solar system with all the lower systems, they all happen in time and they all have rhyme ..."

To listen to the full song and to sing along, keep an eye on our Facebook page for the announcement of when The BOOM Science Kids have finished recording and you'll find it on the Science Spaza Soundcloud page (www.Soundcloud.com/ScienceSpaza). Also, if you and your club are interested in being a part of the 2016 Hip Hop Science Spaza Competition, keep reading Spaza Space for details!



Sobantu Science Club

As Science Spaza, we would like to congratulate one of our science clubs from Sobantu High School for being selected as finalist at the DUCT (Duzi uMngeni Conservation Trust) competition!



The club won a voucher worth R1500 for their school, which will be used to improve its infrastructure. They also won lots of cool prizes for themselves, including t-shirts and bags from DUCT. The club is made up of four members, Sizwe Majola, Sikhumbuzo Mkhize, Nkanyiso and Kwandile Manqe, who are all Grade 11 science learners. Sobantu Science Club was also part of the Hip Hop Health Research project organised by Science Spaza. They conducted their research in water and water related illnesses and at the end they created a rap song as a way of communicating their findings to their local community.

The DUCT competition took place in Pietermaritzburg at Plessislaer Lay Centre, under the banner of uBuntu Earth Festival. The competition rules were set to make the learners focus on creating a song or poem using any environmental concept and then present it in front of the audience. The purpose of the whole competition was to increase environmental awareness, aiming to educate people about the importance of the environment. The group from Sobantu used the same rap song to enter the competition that they created during the Science Spaza Hip Hop research project. This actually shows the richness of the song they created: using this song they were able to snatch 3rd place in the overall results.

If you are interested in listening to their song visit www.sciencespaza.org and click on the link: **Our Soundcloud!**



SCIENCE SPAZA



Knowledge is Ncah!



About Science Spaza

Science Spaza is an initiative of Jive Media Africa that aims to improve the teaching and learning of Science, Mathematics and Technology in schools.

The project brings fun, interactive and exciting curriculum-linked hands-on activities to schools, more especially to disadvantaged schools around the country. The Science Spaza activities can be conducted using materials that are easily accessible, materials that learners and educators have at their homes. Part of the goal is to reveal to young people the power of science and technology in transforming their world. The project has established a network of science clubs that are learner-

driven so that they can be supported with resources. It also aims at increasing the number of learners who are interested in various science disciplines and turning that interest into science careers.

To keep this project exciting and fun to be part of, Science Spaza has a rousing component called Hip Hop Science Spaza where learners who are members of science clubs write rap songs which can be used to present science facts to the audience in a creative way, and they send them in using WhatsApp or email. A winner has their song professionally recorded and shared with all the other science clubs around the country. This happens each year. The number of

science clubs has grown rapidly over the past two years, and learners from all the nine provinces are now registered as part of this network.

To sign up your club visit our website:

www.sciencespaza.org

You can also LIKE us on Facebook:

www.facebook.com/ScienceSpaza

Follow us on Twitter:

@ScienceSpaza

WhatsApp Contact:

076 173 7130

START YOUR OWN SCIENCE SPAZA!

Name of school: _____

Municipality: _____

Province: _____

Name of your science club:

Name of contact person: _____

Telephone number: _____

Email address: _____

Postal address: _____

Complete the form below and send it to PO Box 22106, Mayor's Walk, 3208, Fax to 086 610 5453, email: info@sciencespaza.org, WhatsApp it to 076 173 7130 or submit your application online at www.sciencespaza.org

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

Name: _____

Surname: _____

Position: _____

ID Number: _____

Signature (parent/teacher):

Date: _____

Get in touch – we'd love to hear from you!

Like us on Facebook:  ScienceSpaza Whatsapp us:  076 173 7130



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

Hanyani Young Products

We are the Hanyani Young Products from the **Hanyani Nkuzana High School**. We have been involved with Science Spaza doing the activities and that has encouraged us to conduct some research on electricity from cow dung. This was once done in India.

We used cow dung, tamarind, sodium chloride (table salt), water, a container, aluminium cans and carbon rods. We put the cow dung inside the container and added sodium chloride, then mixed it with water until it became creamy. Then we added tamarind and mixed it in. We put the mixture inside the aluminium can, then inserted a carbon rod into the mixture in the can, making sure that the carbon rod did not touch the can. In this way electricity was generated.

Currently, we're planning to light up a light bulb by using a potato, a copper sheet, a zinc sheet, clip leads and a knife. We will cut the potato into two halves,



then insert the copper sheet into the potato. We will also insert the zinc sheet into the potato. We will make sure it doesn't touch the copper sheet. Then we will close the potato, insert the clip leads on top of the potato, then connect it with a voltmeter. In this way we will find out if there's electric power in a potato, and this is how we want to set up this electrical circuit.

THE BOOM Science Kids Science Club

We are the Boom Science Kids Science Club from **Lungisa Senior Secondary School** in Port Elizabeth and we are very passionate about science and helping people understand science better. We have done some really fun and interesting practicals about wind energy!! We have built a mini model of a wind turbine to make the topic more interesting, and we discussed the advantages and disadvantages of relying on wind power for electricity. We

found that wind turbines are not reliable because the wind is not always there, and again we found out that using wind power to generate electricity does not cause air pollution like burning fossil fuels (like coal) to generate electricity!!

We took a mini trip to a local wind turbine farm to see real turbines generating megawatts of electricity. We did a project on human evolution to learn about

our origin and our ancestors, even though our parents did not approve of this project!! We learned that our living relative ancestors are chimpanzees and bonobos!!* Shocking huh!! We also learned that our early ancestors used both hands and legs to walk, but later they learned to walk upright using their two legs, and they also learned to use tools and make fire.

Since it was National Space Week we decided to learn and teach people about how the universe was created even though some of the facts about the universe sounded like a science fiction movie. We visited our nearby science and technology centre to learn more about the creation of the universe, the galaxies and our solar system. That is when the idea of creating a song about the universe came about.

** Editor's note: Humans are not descended from chimpanzees, but humans and chimpanzees are both descended from a common ancestor.*



Taxonomists Science Club

We are the Taxonomists Science Club from **Mpandeli Secondary School** and we are really passionate about science!

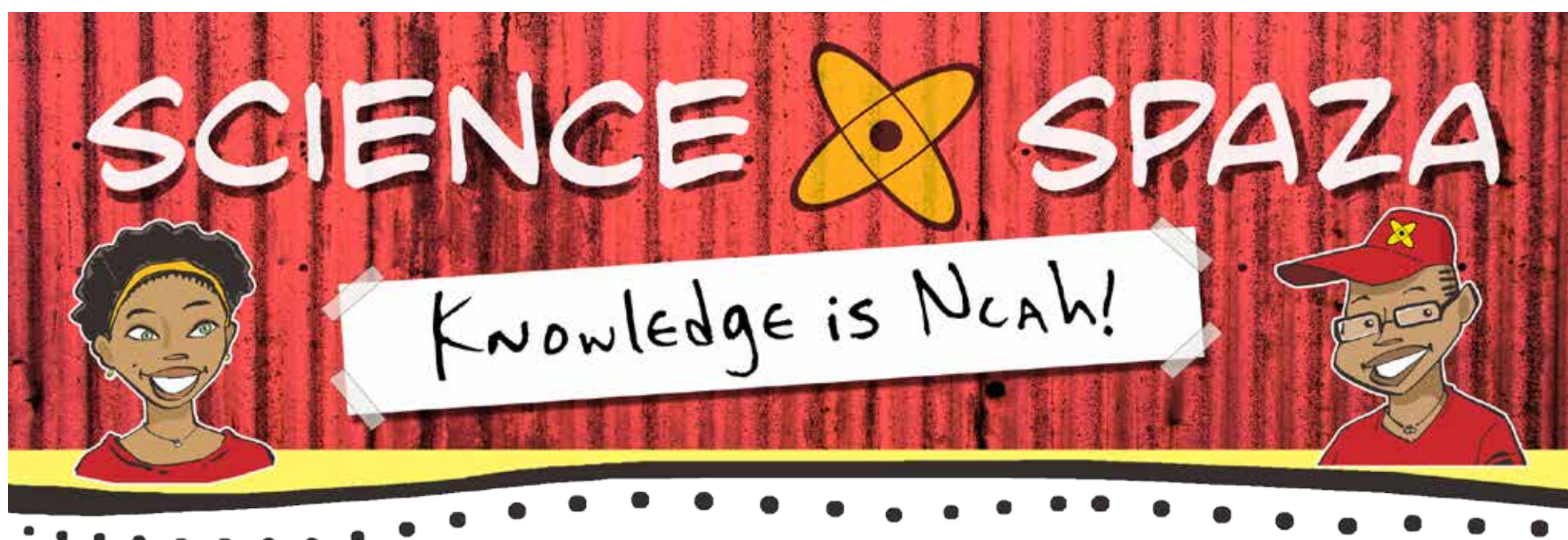
We've done some interesting research and a little project about Global Warming as it is a huge problem faced by the world now. And basically it is caused by us humans.

We've looked for several causes such as pollution emissions and the burning of forests for no reason. This results in increasing the temperature that results in too much heat all over. That also ends up causing veld fires, which have a bad impact on the habitat and destroy the animals living in the bush. Too much heat, as we all know, can cause drought and our country is water scarce. Many areas are suffering from drought and land is becoming desert. Heat and water shortage are really not good for survival.

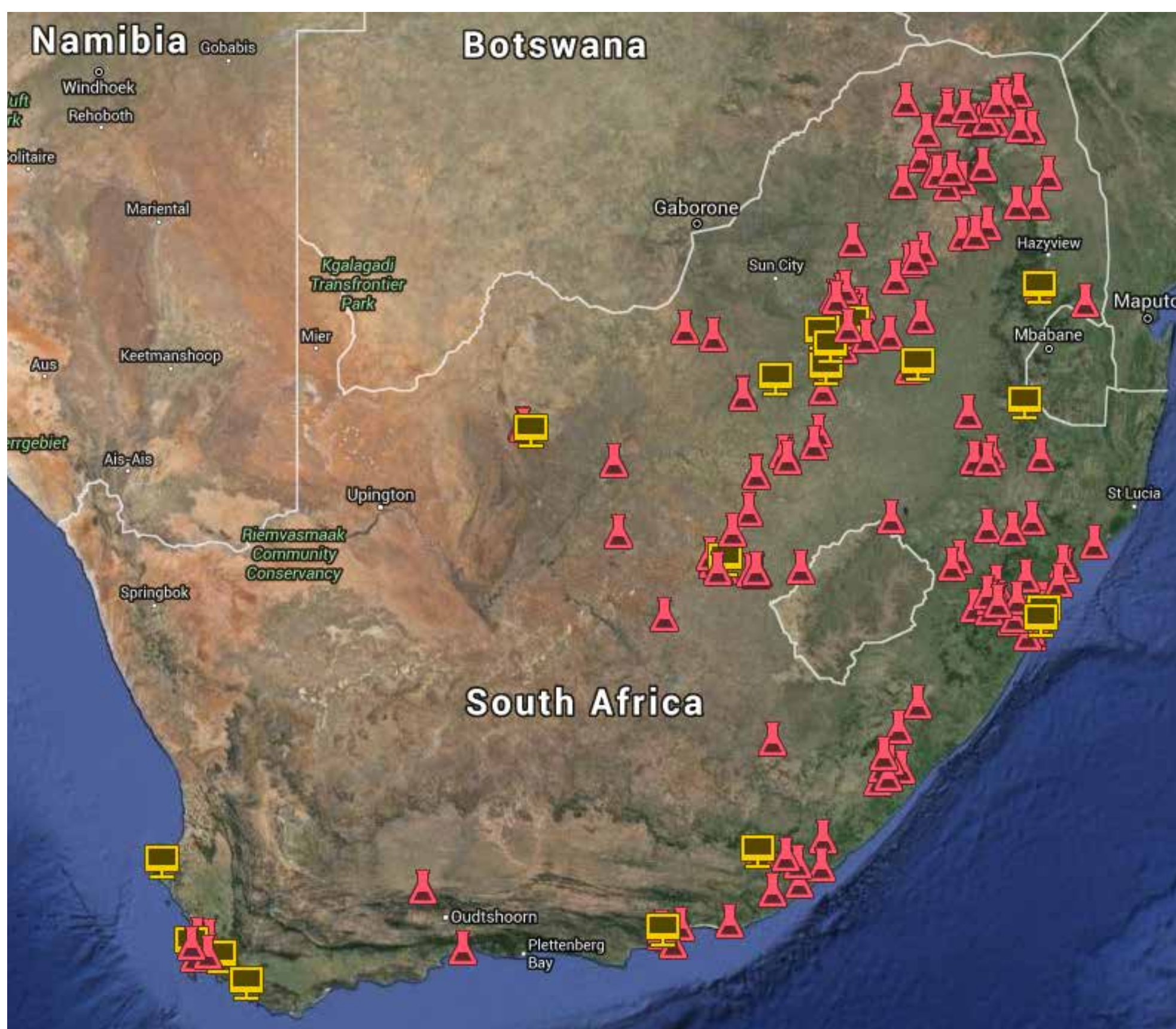
The Taxonomists Science Club really want to bring change together with science. Our main goal is to get people of all ages to engage in reducing global warming, which impacts greatly on our ecosystems and on us.

We gathered our community and school pupils and sent a shout out about protecting Mother Earth. Sharing our thoughts and ideas with them was the greatest thing ever! We spread science all over and we have their support! Remember, Knowledge is NcaH!





Distribution of Science Spaza clubs in South Africa



There are more than 130 Science Spaza clubs in all provinces that receive Science Spaza products. Science Spaza prints and distributes 8 500-10 000 copies of worksheets 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 the disadvantaged backgrounds where learners do not have functional laboratories.