

SCIENCE SPAZA SPACE



Knowledge is Ncah!



EDITION 3 - NATIONAL SCIENCE WEEK 2019

Can you keep it cool? The rise of global warming



Learners at
Fridays4Future protests
in Pietermaritzburg,
KwaZulu-Natal

Pic: Jive Media Africa

It's that time again – yes, that's right, it's **Spaza Space** time!

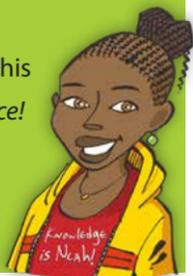
We hope that everyone had a great third term and that you're ready to take on the end of year exams!

The second half of the year has brought **National Science Week** with it, and this year's theme was "facing the harsh realities of climate change". **Climate change** is here, and it's time to take action! Find out more about climate change on this page, read the articles by climate change researchers and make your very own climate change booklet that comes with this edition (see the instructions for making your booklet on page 3).

Then find out what we did for National Science Week (Hint: It's **AWESOME**). Check out our interviews with **women in science** who we celebrated for Women's Month. Lastly, check out news from our awesome clubs on page 8.

We hope you enjoy this edition of *Spaza Space*!

The Science Spaza Team



Here's the 411...

OKAY, GUYS, HERE ARE A FEW TERMS THAT YOU NEED TO UNDERSTAND BEFORE YOU CAN GET A GRASP OF CLIMATE CHANGE ...



WEATHER: day-to-day conditions in our atmosphere



CLIMATE: the average of weather conditions over a long period of time



THE GREENHOUSE EFFECT:

A natural process that takes place when gases in the earth's atmosphere trap the sun's heat. This makes the earth a warm and comfortable place to live.



So, what's global warming got to do with it?

"Global warming" refers to the trend of average global temperatures rising over a long period of time. BUT, over the past 50 years, the average global temperature has increased at the fastest rate ever recorded!

This rapid increase in the average global temperature is happening because of the increase in carbon dioxide (CO₂), other pollutants and greenhouse gases which collect in the atmosphere and absorb sunlight and solar radiation that has bounced off the earth's surface. Normally, the heat from sunlight and solar radiation would escape through the earth's atmosphere, but

these gases and pollutants trap the heat, which intensifies the greenhouse effect and causes our planet to get hotter!

According to the Intergovernmental Panel on Climate Change (IPCC), the earth's temperature has risen 0,74°C. Now, this may not sound like a lot, but its effect is HUGE. One of the most visible impacts of the earth's warming is on glaciers and ice sheets, which are melting at a rapid pace, causing ocean levels to rise, and causing a loss of habitat for many species that live in places like Antarctica.

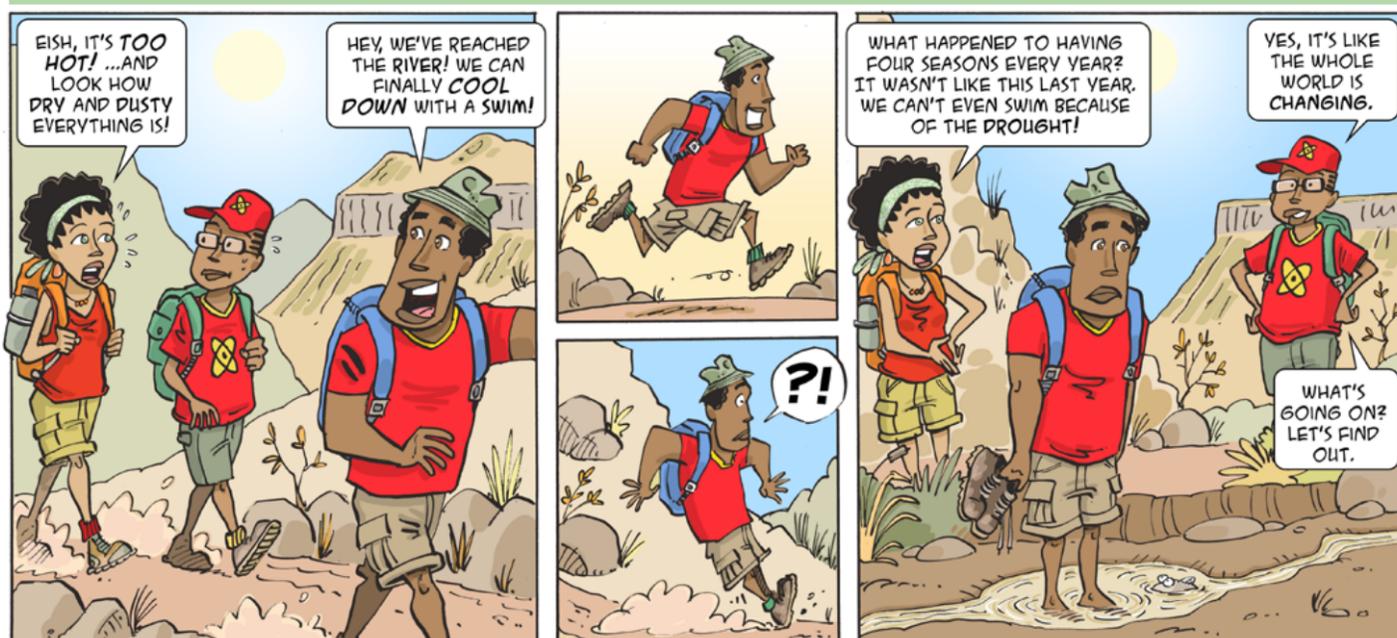
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We are talking to our future leaders. Are you?



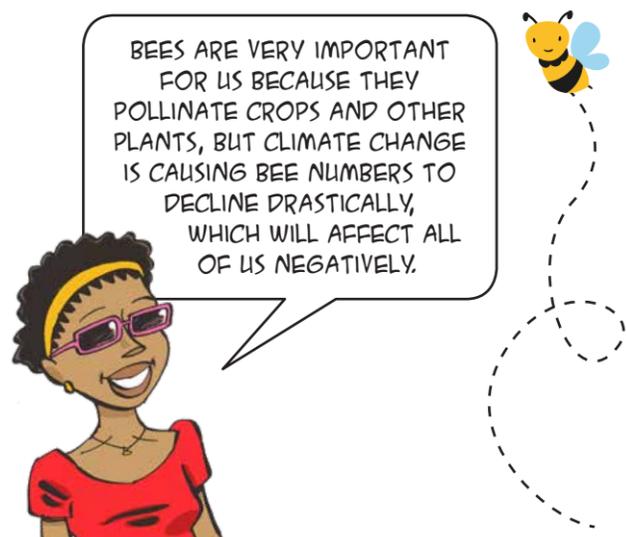
Be sure to keep an eye out for the air quality booklet in our next edition!

Climate change – it's here!

The increase in the earth's temperatures through global warming and the changes that it brings to our climate mean that our weather will become more unpredictable and extreme. In some cases, humans and animals may not be able to adapt to changes in the weather.

Rising global temperatures put human health at risk, increase the occurrence of extreme weather and cause damage to ecosystems. Here are some of the impacts of climate change:

- Heatwaves
- Heavy rain
- Drought
- Wild fires
- Sea level rise
- Threats to animals and their habitats
- Ocean acidification



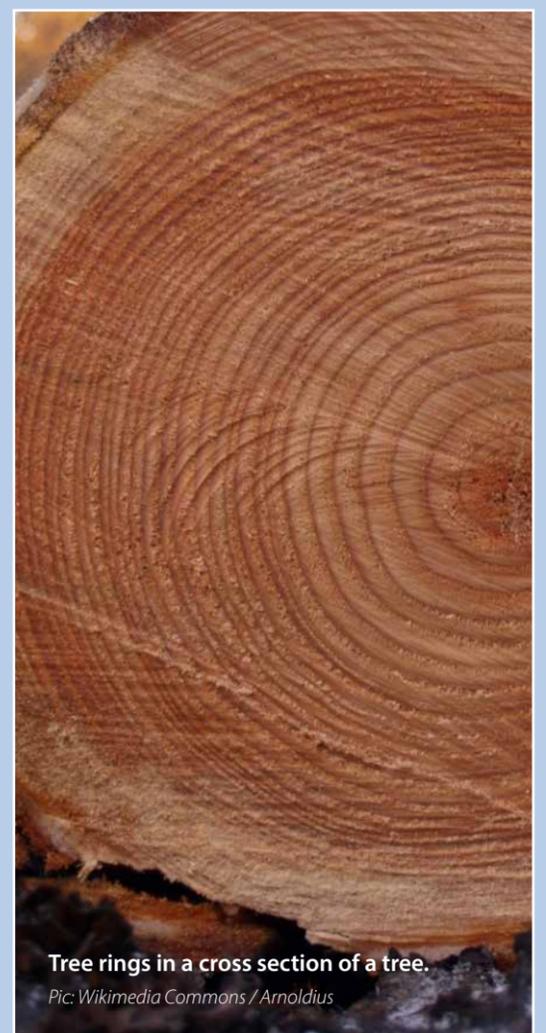
Looking back in time



An ice core segment. Pic: NASA's Goddard Space Flight Center / Ludovic Brucker

Scientists study things that have been around for a long time, so that they can get a better understanding of what the earth's climate was like a long time ago. One of the things that scientists study are trees. Trees that were alive years ago are very useful for telling us what the climate was like back then. The rings inside a tree can tell us how old the tree is, what the climate was like, if there was a fire, and whether the seasons were rainy and dry seasons.

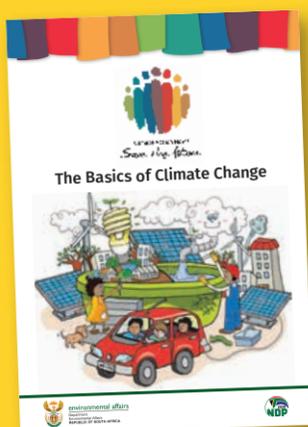
If scientists want to study what the earth's climate was like HUNDREDS of years ago, they study sediment and ice cores. Sediment cores come from the bottom of lakes or the ocean floor. Ice cores are drilled from places where there is thick ice, such as Antarctica. These ice cores give us clues about the earth's history, right up until the last layer was formed. The ice layers contain bubbles of air from each year, which scientists analyse to determine how much carbon dioxide (CO₂) they contain.



Tree rings in a cross section of a tree. Pic: Wikimedia Commons / Arnoldius

To find what the causes and impacts of climate change are and to learn more about the impacts of climate change, check out our **climate change** booklet, created in partnership with the Department of Environmental Affairs.

Take the 2 booklet sheets out of your Spaza Space publication.



Fold & Cut!

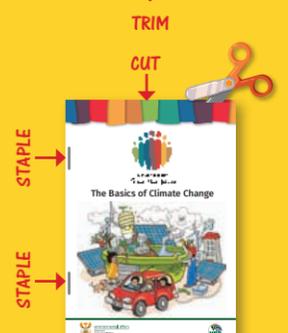
MAKE YOUR OWN BOOKLET TO LEARN MORE ABOUT CLIMATE CHANGE



4 Trim off the white border on the bottom and right hand side of your booklet. Be careful not to cut the spine!



5 Carefully cut along the line at the top of the booklet and staple the booklet's spine to hold all the pages together.



Now you can learn more about climate change!

Is climate change bad for your health?



Sabeehah Vawda

“Sjoe! This has got to be the hottest summer I have ever experienced, and mind you, I have been living here since I was born. I’m telling you – this climate change is bad.”

We all have conversations about the weather, mostly because a discussion on the weather is the perfect conversation starter and what better way is there to fill-up that awkward conversation gap, right? As normal as the weather may seem, everyone experiences it on a daily basis, and so a weather discussion can result in quite lively conversations. Nowadays, the term climate change is sure to pop up in casual conversations about the weather, directly related to the level of discomfort that someone is experiencing, and is generally used at the end of the conversation. One that no one can argue with. The grand finale to the weather discussion.

In reality, while the term “climate change” has become quite popular in casual conversations, print media and social media, very few people actually understand the impact of climate change. Climate change is about more than JUST the weather. For example, has it ever occurred to you that climate change may have a huge impact on your health? Possibly not; you may have had to think a bit about that one. So how does climate change affect your health?

Extremes of temperatures are obviously not good, and with climate change causing an increase in the average global temperatures, it’s definitely going to become much warmer. Continuous exposure to hot conditions can result in many heat-related illnesses ranging from sunburn to heat exhaustion, heat cramps, and the dangerous sun stroke (or heatstroke). While these may

happen to literally anyone, the very young, the very old, individuals with underlying medical conditions, those with weak immune systems, and those who do not have proper clothing and/or housing, are at a higher risk. Higher temperatures also result in an increase in air pollution and pollen, which could trigger asthma and worsen other cardiovascular and respiratory diseases. Believe it or not, temperature extremes can have effects on your mental health too, which may eventually affect your work and relationships.

It already sounds pretty worrying right? Unfortunately, there’s more. There are many indirect health effects of climate change as well. Weather-related natural disasters are on the rise. An increase in droughts will lead to unreliable levels of food production, leading to hunger and famine. Increase in floods will lead to local devastation and disruption, with injuries and death, and affected individuals will be exposed to unclean water sources. This will lead to an increase in infectious water-borne diseases such as bilharzia. The recent cholera outbreak in Mozambique, following Cyclone Idai, is just one, close-to-home example.

Insect and snail populations are also sensitive to climate change. Increasing temperatures would mean a wider distribution of vector-borne diseases (diseases which cause human illnesses, caused by parasites, viruses and bacteria carried by insects) such as malaria which is carried by mosquitoes, and possibly an escalation in the number of people infected.

So yes, climate change will definitely impact on health. According to the World Health Organisation, climate change will result in approximately 250 000 additional deaths per year, between 2030 and 2050. These would be as a result of heat stress, malaria, diarrhoea, and malnutrition.

So the next time you are having one of those well-known weather conversations, don’t forget about all the serious health effects of climate change. Try to steer the conversation to ways that we as individuals can impact climate change – waste less food, switch to a more plant-rich diet, save energy in our homes and using public transport are just some examples. The group effort of small changes can make a huge impact. Let’s do our part in the fight against climate change.

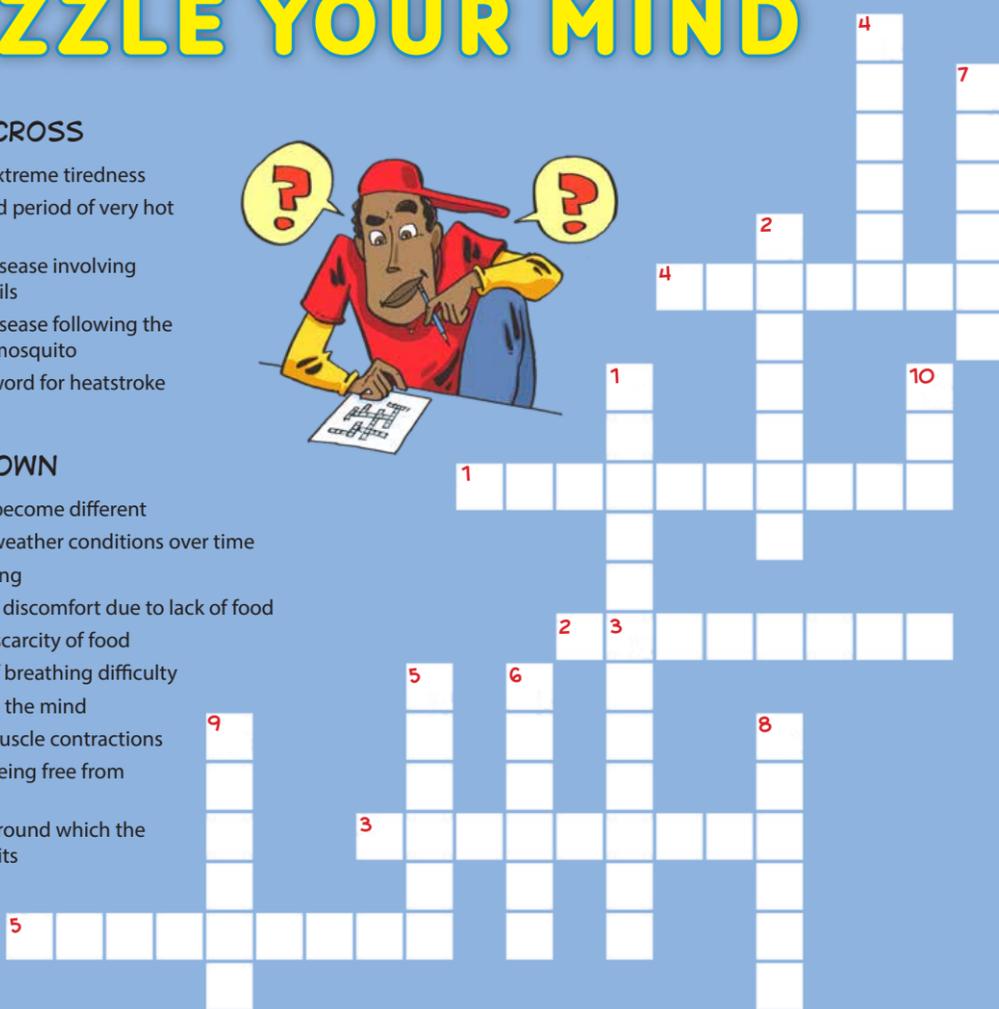
PUZZLE YOUR MIND

CLUES: ACROSS

- state of extreme tiredness
- prolonged period of very hot weather
- human disease involving water snails
- human disease following the bite of a mosquito
- another word for heatstroke

CLUES: DOWN

- make or become different
- average weather conditions over time
- old or aging
- feeling of discomfort due to lack of food
- extreme scarcity of food
- attacks of breathing difficulty
- related to the mind
- painful muscle contractions
- state of being free from illness
- the star around which the earth orbits



Answers – Across 1. change; 2. climate; 3. elderly; 4. hunger; 5. famine; 6. asthma; 7. mental; 8. cramps; 9. health; 10. sun
Down: 1. exhaustion; 2. heatwave; 3. bilharzia; 4. malaria; 5. sunstroke



This edition was supported by SAASTA

The hot zone; climate change and infectious diseases

While the spread of exotic infectious diseases makes you think of scientists in protective suits running around the forests of far off places, the threat is actually much closer to home. It is becoming obvious that climate change not only affects our natural resources; the availability of water, fertile land and extreme weather conditions, but it also affects the spread of disease.



Simone Richardson

Diseases are popping up where we have never seen them, and new and developing outbreaks will become more common. Climate change could result in differences in where, when and how often diseases appear. This means that as the environment changes to create the perfect conditions for the spread of devastating and deadly diseases (such as malaria, zika, and dengue), we will see higher rates of illness and death in populations that were previously not exposed to these diseases.

Climate change will probably impact diseases spread by insects, as changes in breeding patterns and increasing reproduction will spread diseases further than ever. More than 90% of malaria-related deaths occur in Africa, where humidity and tropical climate temperatures support the parasites' life cycle. If global temperatures increase by 2 to 3°C, as expected, it is estimated that the population at risk for malaria will increase by 5%, meaning millions of additional new infections. As climate patterns shift, it is possible that malaria will become common in new areas. Malaria has appeared for the first time in the highly populated region of the highlands in east Africa due to higher temperatures.

Climate change will likely affect other vector-borne diseases, like dengue fever, with increases in the spread of this disease expected in areas where higher rainfall and humidity will heighten the breeding of mosquitoes. However, Aedes mosquitoes typically breed in water containers used for household storage, a system which might be used in times of drought. Similarly, tick-borne diseases such as Lyme disease have nearly doubled in the United States, because of their now shorter winters.

Climate change is also lending a helping hand to water-borne pathogens that are found in warmer waters. Increased rainfall affects flooding, sanitary conditions and the spread of diarrhoeal

diseases including cholera. It is predicted that by 2030 there will be 10% more diarrhoeal disease than there would have been without climate change and it will mainly affect the health of young children. Salmonella and other food-borne diseases have been linked to increasing temperatures, a problem that could be worsened in low income countries.

The World Health Organisation has determined that although climate change is a global phenomenon, developing regions have and will be affected unevenly even though greenhouse gas emissions released by developed countries. This includes the United States, which has pulled out of the Paris accord – an agreement to lower emissions and the average temperature of Earth. U.S. President Donald Trump said "The Paris accord will undermine [the U.S.] economy," and "puts [the U.S.] at a permanent disadvantage". This statement has put the reduction of emissions at risk. Governments play a crucial role in reducing climate change because these international agreements form the basis of the policies that will directly affect health, with weak public health institutions likely being affected the worst by climate change effects. We should view the effect on infectious disease as a new sign that climate change will affect us in unexpected and unwelcome ways if we do not have policies and interventions in place by the time South Africa is in the hot zone.

DID YOU KNOW? MATHS CAN HELP US LEARN HOW DISEASES SPREAD

WHEN TALKING ABOUT THE SPREAD OF A SICKNESS, THERE ARE THREE GROUPS OF PEOPLE – **HEALTHY**, **SICK** AND **IMMUNE**.

EACH OF THESE GROUPS HAVE THEIR OWN GRAPH. SEE IF YOU CAN MATCH THE GRAPHS TO THE DESCRIPTION ON THE LEFT.

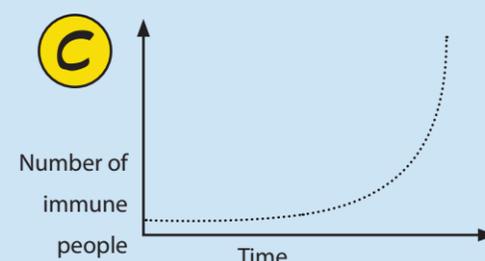
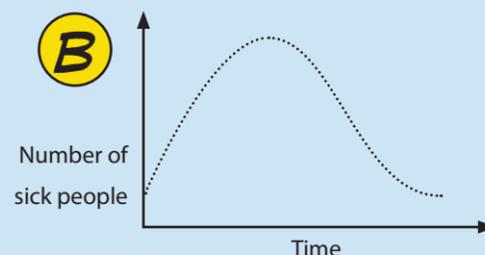
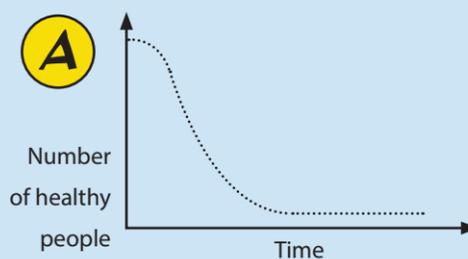
1 NOT MANY PEOPLE ARE **IMMUNE** TO A SICKNESS AT FIRST, BUT AS THEY GET SICK AND THEN WELL AGAIN, THE NUMBER OF IMMUNE PEOPLE GETS MORE.



2 LOTS OF PEOPLE ARE **HEALTHY** AT FIRST, BUT AS MORE GET SICK, THE NUMBER OF HEALTHY PEOPLE GETS LESS.



3 NOT MANY PEOPLE ARE **SICK** AT FIRST BUT MORE AND MORE GET SICK AS TIME GOES ON. THEN THEY GET BETTER AND THE NUMBER OF SICK PEOPLE GET LESS.



Answers: 1-C, 2-A, 3-B

Marching towards a better future!



The South African Climate Crisis Coalition (SA CCC) is one group that is getting serious about climate change!

The organisation began in 2011 and aims to address the impacts of climate change, while creating awareness and educating the youth of South Africa, who they believe play an important role in creating a sustainable future. The organisation is aligned with other climate coalitions in countries such as New Zealand, Australia, Kenya and Asia, as well as in many other countries.

Every Friday, the PMB CCC hosts a Fridays4Future march in Pietermaritzburg,

protesting against climate change. We visited them at one of their marches outside the Tatham Art Gallery in Pietermaritzburg, where young people from schools in Pietermaritzburg protested against climate change and put on a performance for the public. Here are some pictures of their awesome march and performance – you'll also see that the former Msunduzi mayor, Themba Njilo, was in attendance! Best believe they got a lot of hoots!



Check out this article by Luke Wylde from the PMB CCC. He's the one who took the initiative to organise the Fridays4Future marches in Pietermaritzburg!

Let's get to know the youth behind Fridays4Future better

I am Luke Wylde, 13, and I'm from the Pietermaritzburg Climate Crisis Coalition.

We have a catastrophe that affects all of us in every facet of society, and that catastrophe is global heating and extreme weather conditions. The thing many people don't realise about climate change is that it's not just a few degrees' rise in temperature, but that it causes major temperature fluctuations, like the drought in Cape Town and the floods in Durban.

Climate change disproportionately affects poor and disadvantaged people, as they can least afford to buffer the effects of climate change. But we can effect change, because we all hold the power to affect youth all over the world who are fighting for a future, and everyone has to pull together to fix this problem, because we only have eleven years to stop climate change becoming irreversible. So, we have to act now to save ourselves from this crisis.

If you would like to learn more or join the conversation, you can contact:

- **South African Youth Climate Change Coalition:**
Tel. +27 (0)33 260 6667;
sayccc@secretary.net
- **350.org:** www.350.org
- **Centre for Environmental Rights:**
+27 (0)21 447 1647;
info@cer.org.za

National Science Week 2019

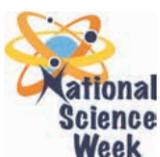
The climate change conversation heated up as we took to the streets to demand climate change action.

Learners from three schools in Pietermaritzburg (St. John's DSG, Maritzburg College and Slangspruit Primary School) put together song and dance performance pieces to express their concerns about our future. They collaborated with researchers and choreographers, and partnered with the PMB Climate Crisis Coalition (PMB CCC) to host a series of events during National Science Week, an initiative of the Department of Science and Technology. The theme this year was "facing the harsh realities of climate change".

Hip Hop Science Spaza created an opportunity for young people to explore how climate change impacts their daily lives and circumstances. Learners met with researchers from the University of KwaZulu-Natal, Research Chair in Waste and Climate Change and team members from the uMngeni Resilience Project to better understand climate science, and to develop songs to share what they had learned. They were also featured on television programme Hectic Nine-9. Be sure to catch their feature on our website!

The learners wrote their hip and happening songs after interviews with the researchers, and then recorded HOT tracks! Then, in association with local dancer and choreographer Bonwa Mbontsi, they created a dance routine to perform at the final event! Thank you to the Department of Science and Technology for supporting this initiative!

CHECK OUT THESE COOL CATS!



NEWS FROM THE CLUBS

EMAIL INFO@SCIENCESPAZA.ORG TO REGISTER YOUR SCIENCE CLUB



The awesome learners from **Tembisa Secondary School** enjoying their Green Chemistry edition of *Spaza Space*.

To celebrate Women's Month, we interviewed Prof. Christina Trois, who is behind some seriously awesome climate change research.

1. Please share a brief biography. Can you think of any noticeable effects of climate change around you?

I am from Sardinia in Italy, and moved to South Africa in 1998. I have been working at the University of KwaZulu-Natal since 1999, and have a PhD in Environmental Engineering from Cagliari University (Italy). I've noticed extreme weather conditions and mini tsunamis in Durban, and extreme droughts in Cape Town.

2. What did you study? Where? What was your field of focus? If you are still studying, please provide a short description of your work.

I studied in Italy, at the University of Cagliari. I am an engineer by profession, but have followed my passion into research, and am a C1-rated scientist with the National Research Foundation.

3. What inspires you about your work/career? What gets you going in the morning?

Finding real solutions to environmental problems. What has inspired me throughout my career and life in South Africa is inspiring and shaping new environmental engineers and scientists. I always say that I do not want to change the world, but I want to change many worlds ... those of my students!

4. How did you become interested in the climate change field?

In the past decade, the impact that climate change is having on the environment and human health



PROF. CRISTINA TROIS

has become really clear. Hence, I dedicated my research focus to studying mitigation (to reduce the intensity of something) and adaptation (the process of adapting to survive) strategies concerning climate change, with focus on the waste sector, which is a large contributor to greenhouse gas emissions into the atmosphere.

5. Where are you currently employed? What is your role? How do you focus on climate change in your job?

I am the NRF South African Research Chair in Waste and Climate Change (SARCHI) at UKZN. My focus is studying the impact that the waste sector has on climate change, developing innovative mitigation strategies, and also studying how climate change is influencing the waste sector.

6. What are some of the challenges that you face in your vocational field?

Lack of resources and lack of capacity may create barriers in the application and implementation of

innovative ideas and research. Also, engineering is still a male-dominated environment.

7. What do you think is the future of climate change, especially in South Africa?

I believe that international efforts to reduce GHG (greenhouse gases) emissions into the atmosphere will continue to keep climate change on the agenda, forcing South Africa to pay attention.

8. Why do you think learning about climate change and spreading awareness is important, especially among learners?

The learners of today are the engineers, scientists and leaders of tomorrow. Because our Science/Engineering in South Africa is as good as science anywhere else in the world, and it is also time that our young people understand that and drive change from the African continent.

9. What are some things that South Africans can do to reduce the effects of climate change?

With respect to solid waste, they MUST stop single-use plastic, they MUST stop littering, they MUST demand separate collection of waste from the municipalities. But, most importantly, they MUST start seeing waste as a resource, rather than as a problem that is forgotten the moment trash ends up in the bin.

10. What advice would you give to learners who want to study science?

To get at least a B (and possibly 70% or higher in matric) in Maths, English and Physics/Natural Science, to get a full exemption and to choose Mathematics and not Maths Lit, otherwise they will not be accepted into engineering or science degrees at universities in South Africa.