

# NEWS LETTER

4TH QUARTER 2020/21



**Rocket Launch**  
**GCIP Awards**  
**Vaccine Local Manufacture**

Making sure it's possible



science & innovation

Department:  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA



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Dr Charles Takalana's passion for the stars saw him excel in the field of Astronomy. Last year he reached a significant milestone by obtaining his PhD.

## Mission: Connecting Africa to the stars

Armed with a PhD in astronomy and astrophysics, Dr Charles Mpho Takalana is on a mission to popularise astronomy across the length and breadth of Africa.

One of only a few black astronomers in South Africa, Dr Takalana, who obtained his PhD in 2020 from the University of the Witwatersrand, may have his head in the clouds or in this case the starry skies, but he is firmly rooted in the African continent, deeply passionate about sharing his enthusiasm with Africa's young people.

"We need to invest more in human capital and citizen science. In this fourth industrial revolution, it is important that we equip our young people with science and mathematics to become leaders on the continent and to be in a position to play a pivotal role in the greater development of the continent."

As Head of the Secretariat of the African Astronomical Society (AfAS), a Pan-African professional society for astronomers, Dr Takalana's main mission is to contribute to the vision of creating a globally competitive and collaborative astronomy community in Africa. He wants to be a voice for astronomy in Africa and contribute to addressing the challenges faced by Africa through the promotion and advancement of astronomy.

"I hope to increase the footprint of astronomy in Africa by contributing to the use of astronomy to attract African youth into STEM careers and ensuring that an organisation such as AfAS continues to support collaborative international astronomical activities and projects in Africa," he says.

His passion started at a young age. A naturally curious child, with a love of nature, his imagination took him beyond the clouds.

"I was curious about the origin of everything we see around us and how the Universe itself works. I was fascinated by stars before I could even say the word "star". I wanted to know about the big picture. Growing up I also loved watching any television show that had to do with space or astronomy."

The more he discovered, the more engrossed he became. "The stars became more than just objects that lit up the sky; they became living beings," says Takalana.

However, his achievement was no walk in the park. It took a lot of hard work, determination and commitment, coupled with a passion for mathematics and science in general.

***"Luckily, I enjoyed Maths and Science at school, and when I got to university my fascination for astronomy became my passion, and I was determined to make it my profession."***

He hopes to change the common misconception that astronomy is blue sky research that takes place in ivory towers. "There are real everyday benefits," he says.

"The impact of astronomy on the world can be seen in the spin-offs it generates, from medical equipment and imaging techniques to pushing the limits of computing and the birth of Wi-Fi, which is critical in keeping communities

connected. Recently, astronomy has started changing the way we do tourism and created new economic opportunities. We should draw inspiration from all of this because it stems from human curiosity," he emphasises.

Dr Takalana's enthusiasm is infectious, and a listener is quickly drawn into a world light years away. As he continues to talk about megascience initiatives driven by the Department of Science and Innovation (DSI) that are propelling long-held dreams into reality, one sees that South Africa is indeed a country of possibilities.

In 2012, South Africa and Australia won the bid to host the Square Kilometre Array (SKA), which will be the world's biggest radio telescope.

"I was excited about this project and how it would put our country on the map, and I wanted to be part of the success story that would push the boundaries of human knowledge about the universe and how it works. I also realised how this big project in a country with a history like ours would make a difference – leave a legacy for maths and science, bring up great scientists in the future and transform the face of science in our country."

Dr Takalana's hard work saw him receiving funding from the South African Radio Astronomy Observatory (SARAO) for his undergraduate and PhD studies, as part of the SARAO Young Professionals Development Programme. This allowed him to study towards his doctorate while working on secondment at the DSI.

"I appreciate my time at the DSI, and I consider myself fortunate to have had the opportunity to grow and learn more about the astronomy landscape, strategy and policies in South Africa, and how from these we can derive benefits for our African nation. This experience fuelled my desire to serve the African astronomy community and contribute to the field's growth," he adds.

Dr Takalana's research focused on data analysis techniques for differential observation of the low-frequency radio cosmological background that probes the physics of reionization, the cosmic Dark Ages, and the Epoch of Recombination.

His thesis presented an analytical approach to studying the cosmology of the Dark Ages and subsequent Epoch of Reionization, which are very early epochs in the history of the universe.

Following the Big Bang, astronomers believe the Universe underwent many dramatic changes, but have been able to see very little of this period.

According to Dr Takalana, several detection methods have been proposed for studying this period, but astronomers have one modest information basis – a single, remote wavelength emitted and absorbed by atomic hydrogen, the element that created almost all ordinary matter after the Big Bang.

The effort to detect this mysterious signal – a line in the spectrum of hydrogen with a wavelength of 21 centimetres – is driving astronomers to deploy increasingly sensitive observatories in some of the world's

most remote places "My work demonstrated how these epochs can be studied with an indirect probe called the SZE-21cm. This is a specific form of the Sunyaev-Zel'dovich Effect which provides a unique way to derive the properties of the global 21 cm signal of neutral hydrogen by observing massive clusters of galaxies," he says.

Unlike experiments to directly determine the cosmological 21cm background spectrum involving a total intensity measurement on the sky, differential observations of the SZE-21cm with radio interferometry are less affected by confusion from foregrounds.

The work produced the first simulated maps of the SZE-21cm and showed that the SZE-21cm can be extracted from future observations with low-frequency radio interferometers such as the Hydrogen Epoch of Reionization Array (HERA) and the Square Kilometre Array, both located at the SKA site in Carnarvon, in the Northern Cape.

He believes the level of astronomy and the required infrastructure in South Africa is already world-class.

To maintain the momentum, the country needs to support innovators, continue to work towards addressing issues of transformation and create an inclusive environment that will attract and retain more young African people in the field of astronomy so that they can become leaders in the future.

A young man with such immense passion can truly serve the country and inspire millions of young people, not only in South Africa and Africa, to literally reach for the stars.

# DSI New Appointments

**Sechaba Tsubella**

**Director:** Emerging and Converging Technologies

**Date of appointment:** 16 November 2020  
(Internal promotion)



**Khuliso Tharage**

**Director:** Administration office of the DDG: Socio-Economic Innovation Partnerships

**Date of appointment:** 1 December 2020



**Dr Siyavuya Bulani**

**Deputy Director:** Industrial Bio-Innovation

**Date of appointment:** 1 March 2021



**Tumisang Modiole**

**Director:** Earth Observations

**Date of appointment:** 1 April 2021

# Test Rocket- Phoenix-1B Mark IIr launches successfully in the Overberg



The successful launch of the Rocket-Phoenix-1B Mark IIr ushered in a new era in the country's ability to develop local launch capabilities.

It was third time lucky for the developers of the University of KwaZulu-Natal's Phoenix-1B Mark IIr sounding rocket on their successful test launch that took place at the Denel Overberg Test Range in the Western Cape on 8 March 2021. The successful launch saw the test rocket travel 17,9 km into the air achieving a new African hybrid rocket altitude record. The launch is hugely significant for South African engineering and the development of African satellite rocket launch capability.

The Phoenix-1B Mark IIr is the third rocket variant to be developed by the UKZN's Aerospace Systems Research Group (ASReG), which is funded by the Department of Science and Innovation (DSI). The first, the Phoenix-1A, was flight tested in 2014, but experienced a nozzle failure, which limited altitude. The second launch, in 2019, of the Phoenix-1B Mark

II, was unsuccessful because of a software fault in the code that controlled the opening and closing of the main oxidizer valve. Valuable lessons were learnt from past failures, which assisted in today's successful launch of the cost-effective Phoenix-1B Mark IIr, a revised version of the Mark II lost in 2019.

ASReG's Phoenix Hybrid Rocket Programme is a skills development initiative that focuses on suborbital launch vehicle design and testing.

The Phoenix-1B Mark IIr hybrid rocket, developed by postgraduate students under the supervision of ASReG, reached an altitude of 17,9 km and a velocity of twice the speed of sound. The rocket was launched seawards and was not

recovered. The Minister of Higher Education, Science and Innovation, Dr Blade Nzimande also sent his congratulations to the team and described the success as a historic moment for South African space science.

"This is a game-changer for South African space science and positions the country to take the lead on the continent in the development of rocket launch capabilities," said Dr Nzimande.

It is envisaged that the space industry will be one of the key drivers and instruments in addressing South Africa's national priorities of job creation, poverty eradication, resource management and rural development. The continued advancement and sustainability of the industry would also present opportunities to turn South Africa into a knowledge-based economy, promotion of human capacity development in launching capability in particular, and playing a key role in the implementation of African Space Policy and Strategy. To ensure the long-term progression and sustainability of the South African space industry, the South African space programme is required to unlock dedicated investment for exploring the country's space capabilities.

"Recent disruptive satellite technology trends are reshaping the traditional launch market using launch technologies with a reduced entry barrier (cost and complexity) and leveraging significant South African heritage technologies. The target market is commercial small satellite launches with payload of 200 kg to an altitude of 500 km, and sounding rocket launches into space from Overberg Test Range," said Dr Mmboneni Muofhe, the Department's Deputy Director-General of Technology Innovation.

He explained that the ASReG programme was a multi-pronged strategy through which South Africa was developing human capital, and projects like the Phoenix-1B Mark IIr provided opportunities to do just that.

Dr Muofhe said that the government would continue to invest in the project, which was resulting in critical research and development in engineering, infrastructure and technology.

The University of KwaZulu-Natal is currently the only South African university pursuing an applied rocket propulsion programme, producing graduates with skills in advanced manufacturing, aerospace systems design, and computational analysis.

Sounding rockets are rocket-propelled launch vehicles that carry experimental payloads to the upper reaches of the atmosphere or into space. They play a crucial role in facilitating experiments in a wide variety of scientific disciplines, including biotechnology, astronomy, astrophysics, materials science and meteorology. The Phoenix-1B Mark IIr hybrid rocket was developed as a technology demonstration platform from which a future commercial sounding rocket programme can be developed.

The DSI is funding the ASReG programme, which has enabled UKZN to develop key expertise in the engineering disciplines of rocket propulsion technology, launch vehicle design and flight dynamics modelling. It has also enabled unique cooperation between the university and industry.

The programme started in 2010, and a number of students involved in it are now working in key technical positions in institutions such as Armscor, Milkor and Rheinmetall Denel Munition. This is the main objective of the programme, together with developing indigenous space propulsion technologies.



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# Investment in R&D declines, but vital in the era of **COVID-19**



As government looks to boost its vaccine rollout campaign, the COVID-19 environment has highlighted the importance of a well-resourced science, technology and innovation system. The country is able to safely store the vaccine, roll it out and monitor its implementation. Since the outbreak of the pandemic, local scientists and research infrastructure have played a significant role in fighting the COVID-19 pandemic.

South Africa is currently benefitting from past investments made by the Department of Science and Innovation (DSI) in research and development (R&D). Not only has the DSI invested heavily in health and medical research, but also in modernising industries like mining and growing renewable energy technologies.

Given the immense benefits of past investments, a bigger focus is required across government and the private sector for increased investment in R&D. This is particularly critical now, as it is unclear for how long COVID-19 will continue to impact communities around the world.

A call for increased investment also comes at a time when South Africa's expenditure on R&D has declined for the first time since recovering from the contractions experienced in 2009/10 and 2010/11.

This is the key finding of the 2018/19 National Survey of Research and Experimental Development (R&D Survey), which was published on Thursday.

Gross domestic expenditure on research and development (GERD) for 2018/19 amounted to R36,784 billion at current rand values. This represents a decline of 5% (R1,941 billion) from the R38,725 billion recorded in 2017/18 after seven consecutive years of year-on-year growth. In constant

2010 prices, GERD fell from R25,963 billion in 2017/18 to R23,732 billion in 2018/19, a year-on-year change of -8,6%.

These data are reported in the latest R&D Survey, which is undertaken annually on behalf of the DSI by the Centre for Science, Technology and Innovation Indicators (CeSTII) of the Human Sciences Research Council (HSRC), with support from Statistics South Africa.

GERD is an aggregated measure of in-house R&D expenditure performed domestically in five institutional sectors, namely government, science councils, higher education institutions, the business sector, and the not-for-profit sector.

South Africa's R&D intensity, that is, GERD as a percentage of gross domestic product (GDP) at current prices, declined by eight basis points, from 0,83% in 2017/18 to 0,75% in 2018/19.

A modest increase in R&D expenditure by the higher education sector, of R173 million (1,3%), and by the not-for-profit sector, of R269 million (22,1%), were not enough to off-set declines in government and business R&D expenditure.

Notably, the financial and manufacturing sectors experienced substantial year-on-year decreases in R&D expenditure, of 17,7% and 29,2% respectively. By contrast, R&D expenditure in mining and quarrying increased by 58,8%, from R1,101 billion in 2017/18 to R1,748 billion in 2018/19.

Even though the amount of R&D expenditure by state-owned enterprises (SOEs) declined by R44 million, the contribution of SOEs to R&D expenditure in the business sector increased by 1,3 percentage points to 17,3% in 2018/19.

The proportion of R&D performed in Gauteng province decreased from 49,5% in 2009/10 to 42,9% in 2018/19.

### Other key headline indicators

South Africa's total R&D personnel headcount declined from 84 262 in 2017/18 to 84 036 in 2018/19, a slight decline of 0,3%. The ratio of 1,8 full-time equivalent (FTE) researchers per 1 000 employed reported for 2018/19 remained unchanged from the level reported in 2017/18. The proportion of female researchers increased by 0,8 percentage points, from 44,9% in 2017/18 to 45,7% in 2018/19.

The continued decline in the number of technicians supporting R&D, in terms of the headcount and FTE, remains a concern.

The main sources of funding for R&D in South Africa in 2018/19 were government (47,5%) and business (39,5%). The government sector, which includes science councils and universities' own funds, funded 3,4% less R&D in 2018/19 than in 2017/18. The business sector's funding for R&D also declined, by 9,5% year-on-year. By contrast, R&D funding secured from foreign sources increased by 1,6% in 2018/19.

The largest proportion of R&D expenditure in 2018/19 was allocated to applied research at R19,316 billion (52,5%), followed by basic research at R10,364 billion (28,2%) and experimental development at R7,103 billion (19,3%). By research field, R&D expenditure was concentrated in the social sciences

(22,4%), followed closely by medical and health science (21,2%) and the engineering sciences (12,9%).

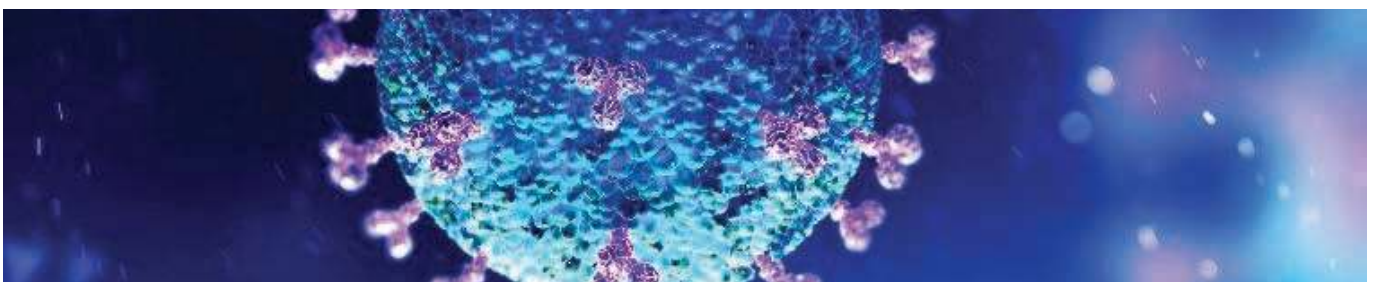
### COVID-19 caveat

The 2018/19 R&D Survey was negatively impacted by the COVID-19 lockdown restrictions, particularly during the final data collection phase. To mitigate against the likelihood of a lower response rate, fieldwork was extended to improve the rate of return, especially in the business sector.

Given the impact of COVID-19 on the 2018/19 R&D Survey, the results are published with the caveat that trend analysis of indicators that use business sector statistics should be treated with caution owing to the unusually high number of imputations used to estimate the business sector statistics.

The R&D Survey offers important information for stakeholders across all sectors to understand the trends in national R&D expenditure and human resources devoted to R&D. The DSI will conduct deeper analysis of the 2018/19 R&D Survey results and facilitate stakeholder consultations in order to contribute to strengthening the country's national system of innovation.

The 2018/19 R&D Survey Statistical Report can be downloaded from the DSI and HSRC websites – [www.dst.gov.za](http://www.dst.gov.za) and [www.hsrc.ac.za](http://www.hsrc.ac.za).



# Iraka Biotech wins a whopping **R200 000** for its green animal vaccine technology



Iraka Biotech presented with R200 000 prize in the Global Cleantech Innovation Programme (GCIP-SA)

An innovation aimed at reducing the transmission of zoonotic diseases, and thereby improving the health of communities that rely on livestock for livelihoods, proved a winner, for Iraka Biotech Co-founder and Chief Scientific Officer, Dr Cornelius Cano Ssemakalu, as he scooped first prize-R200 000, in the Global Cleantech Innovation Programme (GCIP-SA) for 2020.

An innovation start-up based in the Vaal, Iraka Biotech, won for its green and clean vaccine production platform that makes high quality veterinary vaccines affordable and reliably accessible.

The GCIP-SA an initiative of the Technology Innovation Agency (TIA), an entity of the Department Science and Innovation (DSI), announced the winner, in Johannesburg on Friday, 26 March. The process started in March 2020, attracting 81 prospective participants from around the country following an intensive drive of screenings.

Reacting to the win, Dr Ssemakalu said the innovation had the potential to reduce reliance of the animal sector on imported vaccines. He believes that the innovation will contribute to making quality vet vaccines available at a favourable price point.

Dr Ssemakalu, oversees the optimisation of the company's platform technology for the different animal husbandry sectors and veterinary needs.

"I feel very honoured to have been part of the 2020 GCIP-SA cohort. I am also truly grateful for having emerged as a finalist and more importantly the recipient of the 2020 GCIP-SA's topmost award. Iraka Biotech intends to use this award to reduce the time it would have taken to validate a vaccine produced using its novel vaccine production platform technology," he said.

He said it all started as an idea, and expanded when he shared his vision with relevant people that helped to develop concept and also help build his confidence to take the dream further.

"I then realised that perseverance is the common denominator among all the entrepreneurs that have survived this journey. The path is never straightforward but there is always help along the way, TIA offered me the assistance I needed. For me, it has always been about dignity, respect and equitable sharing of scientific discoveries," said Dr Ssemakalu.

The GCIP-SA promotes clean technology innovation and supports entrepreneurs in growing their small, medium and micro enterprises (SMMEs) and start-ups into viable, investment-ready businesses.

The initiative was co-founded by the United Nations Industrial Development Organisation (UNIDO), the Global Environment Facility (GEF) and Cleantech Open.

First and second runners-up were Marlene Badenhorst of SlideLuvre and Ruse Moleshe, Sanineat (Pty) Ltd who each received a R100 000 for their clean and green innovations.

Badenhorst, described SlideLuvre, as an intelligent shading system for commercial buildings. Her innovation optimises solar energy generation, energy efficiency and occupant comfort thus reducing energy consumption and carbon emissions by as much as 50%.

Moleshe's, Sanineat is the first green innovation enterprise in Mpumalanga that grows low-cost and drought resistant moringa 'miracle' trees to produce biodiesel, oil, powdered leaves, and seedcake, among others. The seed residue of the moringa tree is used to purify water, thus creating several jobs in the community and alleviating poverty and malnutrition in children and livestock.

The company makes a positive impact on the South African socio-economy by providing affordable clean fuel, employing rural communities, contributing to reduction of global CO2 emissions and water use through its efficient dry wash system.

Deputy Director-General for International Cooperation and Resources at the DSI, Daan du Toit said the awards coincides with the week in which Cabinet approved the first draft of the Department's decadal plan for science and innovation, which is highly significant in South Africa's science and technology landscape.

"The GCIP-SA is one of the programmes advancing the circular economy, new knowledge and a green economy which is a critical part of South Africa's economic recovery plan. The finalists are excellent ambassadors for South Africa and can count on the support of government and the Department of Science & Innovation."

Lead judge, Mr Mphathi Nyewe of Black Business Council (BBC) congratulated all the finalists, saying all of them winners

and that all their pitches were of high standard. He said the future was in science and innovation and it was encouraging to see young people taking the leading and participating in such initiatives. TIA Acting Chief Executive Officer, Patrick Krappie, emphasised the importance of partnerships in achieving the country's goals for innovation and economic growth. "This team embodies the capabilities we have as South Africans; it is the young entrepreneurs that will put South Africa on the world stage. In fact, one of our previous winners went on to win the global competition of GCIP."

The acting Head of the Programme, Senisha Moonsamy said the deliverables of the programme were in line with TIA's key performance indicator which aims to assist SMMEs with receiving technological support.

"We are proud of the achievements of all our finalists, a special congratulations to Cornelius for his groundbreaking innovation. Our 2020 GCIP contestants have truly shown the immense potential and growth we have as a country that thrives on innovation and curbing youth unemployment through their innovative and needed products and services," said Ms Moonsamy.



# Renewable energy should be accessible to all in society

There is growing scientific evidence suggesting that accelerated global warming, along with deforestation, loss of biodiversity, and forms of mass agriculture that increase the risk of disease transmission from animals to humans, may give rise to more frequent pandemics in the future.

If we are to counter this, stabilisation of the earth's climate and retention of natural capital must be central to our growth strategies going forward. Clearly, the shift away from carbon-intensive fossil fuels in favour of greener, renewable energy forms is crucial in this regard.

Economies the world over have been devastated by the COVID-19 pandemic. In South Africa, the government is focusing on extraordinary measures of economic recovery and reconstruction to achieve inclusive growth following this devastation. As part of this, in common with many governments implementing recovery strategies, a more sustainable and greener energy approach is being adopted.

The Minister of Higher Education, Science and Innovation, Dr Blade Nzimande, has called for renewable energy to be made accessible to all, and not only to the rich. Addressing a webinar on renewable hydrogen and green powerfuel opportunities for South Africa on Tuesday, Dr Nzimande said public entities such as Eskom should be leading in this space.

The webinar was co-hosted by EE Business Intelligence and the European Union Delegation to South Africa in association with the Department of Science and Innovation (DSI), the European Commission, Nedbank and Air Liquide.

Green powerfuels are synthetic gaseous or liquid fuels based on renewable hydrogen, which is hydrogen obtained by the electrolysis of water using renewable electricity. These fuels can be used in sectors that are difficult to decarbonise, or to power directly by means of renewable-based electricity, such as road and rail transportation, shipping, and production of steel, cement and fertiliser.

Dr Nzimande said South Africa had a comparative advantage in renewable hydrogen and green powerfuels, and

exceptional wind and solar resources, in addition to 50 years' experience in the commercial production of synthetic fuels.

"Good shipping access to the rapidly growing international markets of the European Union and the Far East, including China and Japan, should position us as a key role player in renewable hydrogen and green powerfuels, both locally and internationally."

The Minister said South Africa would establish strategic partnerships with countries looking to participate in the global hydrogen value chain. "We will also ensure that our universities and private sector are given an opportunity to play a pivotal part in the green hydrogen economy."

For this reason, he said, research, development and innovation would be critical to reduce the cost of electrolysed water technology, and to scale up green hydrogen and powerfuels production in order to put the price of the commodity on a par with grey hydrogen.

A study on green powerfuels opportunities for South Africa, commissioned by the European Union-SA Partners for Growth Programme, was also presented at the webinar. According to the study, by Thomas Roos and Dr



Jarrad Wright of the CSIR Energy Centre in Pretoria, the carbon required for the production of green hydrocarbon powerfuels must be obtained from captured CO<sub>2</sub>.

While the EU Hydrogen Strategy does not currently place conditions on the form of CO<sub>2</sub> used, Minister Nzimande said the feedstock and process would be relevant when future greenhouse gas emission thresholds were set.

He noted that the DSI had set aside R1,2 billion of funding in this financial year for international calls aimed at attracting foreign direct investment in areas relevant to enabling academia and the private sector to participate in the global hydrogen economy.

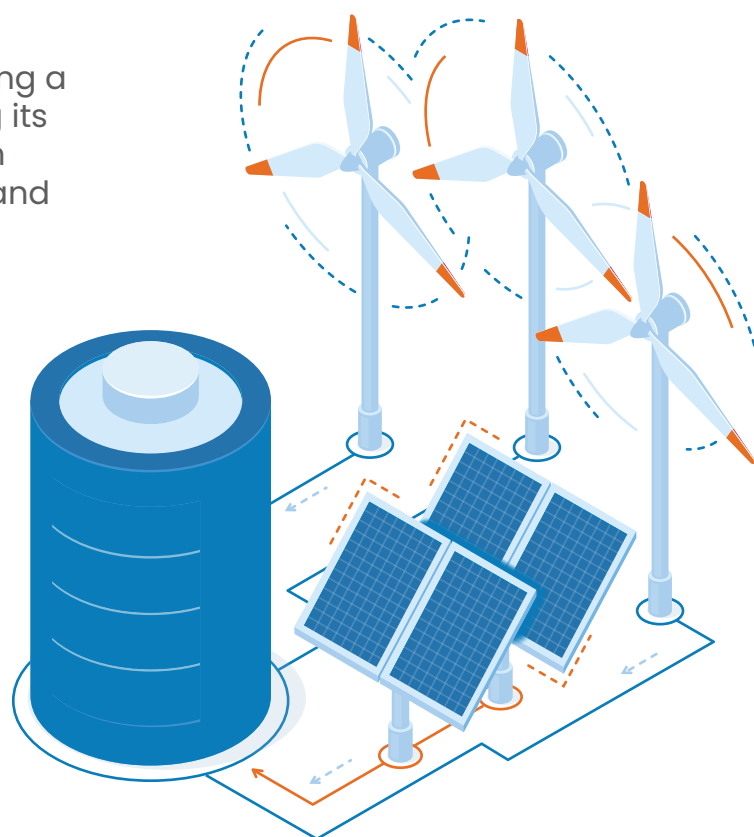
South Africa was one of the pioneers in terms of developing a hydrogen strategy, launching its national hydrogen strategy in 2007. Between January 2019 and December 2020, 18 more countries released national

strategies linking the growth of a hydrogen economy with supporting a green and circular economy to speed up economic recovery post COVID-19.

Building on the strategy, a South African Hydrogen Society Roadmap was developed that set out a vision for an inclusive hydrogen society, so that an enabling compact between industry, labour, communities and the government could be developed.

The Roadmap will enable the government and industrial stakeholders to develop a policy framework to promote the exploitation of the benefits of hydrogen through its integration in various sectors of the economy.

The aim is to position this policy framework to leverage on existing policy documents, while identifying regulatory gaps that need to be addressed, to enable the widespread use of hydrogen as an energy source in the economy and society.



# Creating accountability mechanisms for ending gender-based violence in higher learning institutions

By Ramneek Ahluwalia

As the world continues to deal with the deadly COVID-19 pandemic, many nations including South Africa has been in some form of lockdown since late March. And while Governments have been trying to contain one scourge—the COVID-19 pandemic, another, gender-based violence (GBV) has reared its ugly head, with incidences rising sharply in many countries around the world. Hopes that GBV would decrease with citizens compelled to stay at home to curb the spread of the virus have been dashed, and in fact women have found themselves even more vulnerable. In South Africa, more than 2 000 GBV cases were reported in the first week of the lockdown alone.

In this period of 16 Days of Activism for No Violence against Women and Children, we are faced once more with the reality that this is a grievous issue faced by South African women and children 365 days out of 365.

Earlier this year, in a township in the North West, a woman was raped in some bushes by 20 men who took turns violating her. She and a friend



Prof Ramneek Ahluwalia, Chief Executive Officer of Higher Health

had been lured into "smoking a pipe" with gang members, one of whom was an acquaintance.

This is but one example of the ever-increasing occurrence of rape and other forms of gender-based violence (GBV), as reflected in the crime statistics for the 2019/20 financial year.

Institutions of higher learning are not exempt from this. Students are exposed to all the variations of GBV within faculties, on campuses, in their residences and at their homes. There are few safe spaces in which they can pursue their education.

While Statistics South Africa reports that physical violence is more prevalent among less-educated women, there is concern that unreported cases among those with secondary education or higher are skewing the findings.

In July, the Minister of Higher Education, Science and Innovation, Dr Blade Nzimande, released a policy framework aimed at creating an enabling environment for eradicating GBV, instilling respect, and protecting and promoting the human rights enshrined in the Constitution within the post-school education sector.

The "other pandemic" of gender-based violence, as President Ramaphosa described it, is multisectoral and multidimensional, and when it comes to writing policy for responding to such a pandemic, the issue of intersectionalities becomes extremely challenging.

Minister Nzimande raised this issue during a sitting of Parliament in 2016, when the question of developing a sectoral policy was discussed. While every institution had sexual harassment policies and the like in place, we wanted one for higher education as a whole, to enable government to put accountability mechanisms in place across all tertiary institutions in the country.

This is where Higher Health became involved, working with all stakeholders to shape a sectoral policy that would be actionable. Before the policy was crafted, research was conducted and data going as far back as 1970 was gathered to show that GBV is far from being a new phenomenon. In 1992, for instance, the University of Cape Town hosted a GBV conference attended by 18 institutions.

It is important to realise that higher education alone cannot fight GBV. When mergers were happening and technical and vocational education and training (TVET) colleges were evolving into today's post-school education system, activism increased. Silent protests and actions to create awareness and drive change are an important part of the history of South Africa's post-school education transition.

From around 2005, universities and colleges started reporting on sexual violence perpetuated by staff wanting "sex for marks", academics who were found guilty began to be named and shamed, and various activities were

undertaken to raise awareness of GBV among students. These developments formed the foundation for the policy that was announced in July.

And because peer-to-peer accountability mechanisms are among the most effective, we have started a second curriculum on GBV which runs as an extramural for students across all campuses.

Treating GBV within the context of life-skills development is another preventative method being used to curb GBV on and off campus. There are also risk assessment tools to alert students who might be unaware of the behavioural patterns of the different forms of GBV to possible perpetrators in their home and campus environments.

This policy framework is about saving lives. Perhaps that one woman who, instead of becoming another victim, graduates, gets a job and adds to the change in the country, will be the first of many to follow in her steps.

The post-school education system plays a vital part in moulding future employers, industry leaders, community advocates, financiers and politicians who will change the trajectory of our country and their own future. This is the impetus behind the policy.

Higher education institutions are required to set up programmes ensuring that security personnel are on campus 24/7/365; that students and staff can access a safe room; that rape kits are

available; and that these interventions are underscored by psychosocial counselling. A toll-free 24-hour helpline – 0800 36 36 36 – has been launched to assist students who are afraid to report such crimes in person.

We are also working towards establishing robust, effective multiparty disciplinary systems and infrastructure that is capacitated for immediate action. And all of this will be backed by proper record-keeping and reporting mechanisms.

Accountability is the key to curbing GBV, and all parties must be held answerable in the delivery of this programme – from administrators, academics and other staff to students and their representative bodies.

Higher education is slowly moving in the right direction by putting actionable policies in place – a first in Africa. But it all comes down to accountability across institutions of higher learning to create safe spaces for tomorrow's leaders and community builders.

After all, as a student, the only thing you should have to be worrying about is how well you did in your last assessment.

**Prof. Ramneek Ahluwalia is the Chief Executive Officer of Higher Health.**

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# Learning Buddy proves to be a hit in overcrowded classrooms



The learning buddy innovation maximises tiny spaces while also providing a measure of social distancing.

Overcrowding in classrooms continues to be a challenge for South Africa's teachers, as lack of space hampers both teaching and learning. The challenge is particularly acute in the lower grades, where teachers need to move between desks to engage pupils on a one-to-one basis.

The Learning Buddy, developed by entrepreneur and philanthropist Marié Janse van Rensburg of the HOLO Foundation in the Western Cape, together with her husband, addresses this challenge in a way that is both innovative and practical.

The Technology Innovation Agency (TIA), an entity of the Department of Science and Innovation (DSI), and the Product Development Technology Station at Central University of Technology, helped the husband-and-wife team to enhance their concept and develop prototypes.

Through TIA, the DSI provides financial support to universities that house technology stations under the Technology Stations Programme. The stations provide technical support, in the form of solutions for complex engineering challenges, to small and medium enterprises within prioritised industrial sectors.

The Learning Buddy is a low-cost, robust, foldable, two-in-one desk and chair designed to accommodate children from Grades R to Grade 3, or from 6 to 9 years old. The innovation is ideal for cramped environments, providing learners with their own individual desks.

For teachers and learners around the country, this will come as welcome news. In 2018, the Department of Basic Education reported that a quarter of South Africa's 23 796 state schools were without adequate desks and chairs, meaning that learners are often forced sit on the floor or to squeeze together into small old-fashioned desks.

"When we were using old school benches, I was unable to move around in class," said Mary Ludho, a Grade R teacher at Excelsior Wine Farm School in Ashton in the Western Cape. "But since we received Learning Buddies, I am able to manage the class as well as free up space, because Learning Buddies can be stacked in a corner to create space for learners to work in groups when necessary."

Ludho said the Learning Buddy was particularly helpful for learners with attention deficit hyperactivity disorder. "Because Learning Buddy is made to accommodate only one learner, they are easy to control and less able to disturb others."

The idea for the Learning Buddy came about when Van Rensburg and her husband had quadruplets almost 10 years ago. "My husband and I realised that there is such a big need for the most basic things in families, one of these being a safe sleeping space for a baby. We designed and developed our first product, the Balambie – a convenient additional sleeping cot for babies for indoor and outdoor use."

The Balambie brought the couple into contact with the non-profit sector, and it was during one of their meetings that the need for safe learning spaces came up. They conducted some research and realised that a safe, strong, single desk would make a big difference in schools where furniture was limited.

"In the current wave of COVID-19, the Learning Buddy is great furniture to own. It allows for social distancing and discourages learners from sharing stationery," Ludho said, adding that she had adapted the desks slightly to accommodate a plastic bag for a cleaning cloth and crayons.

Van Rensburg said the feedback received so far had been overwhelmingly positive. "The best feedback was from teachers who use the Learning Buddies for children with special needs. The Learning Buddy provides a safe space for a child where distractions are limited, as the sides of the sitting area are also 'closed in'. Pencils don't fall off the writing space, and teachers can put name tags on the Learning Buddies and the children love this, as it is their own space."

Shelly Lourens, who teaches at rural Baden Primary School outside Montagu, said she suffered from backaches, therefore moving heavy desks in class was a nightmare. Now, because the Learning Buddies are lightweight, she can easily move them to make space for practical work exercises.

The Learning Buddy project started with a basic design, with each new prototype being sent to a school for testing. Through the design process, which took

approximately 12 months, teachers gave input on height, sitting position, back support and other issues. The prototype was then sent to two occupational therapists for testing, and all the feedback was incorporated into the final design.

Learning Buddy is made from corrugated board, and as with many innovations made from recycled material, it is a challenge to convince people that the product is strong and durable. "We do however believe that, as more and more schools use the Learning Buddy, the uniqueness and strength of the product will overcome these concerns," Van Rensburg said.

She added that they had also struggled to raise funding and find a manufacturer that could produce a small quantity. "We were unable to find a company who could help us with this, as the cutting dyes and process required us to make larger quantities, and financially we were not able to do this."

More than 500 Learning Buddies have so far been donated. Van Rensburg wishes they could donate them to every school and centre in need of the product, but this is not possible because manufacturing and distribution come at a cost.

"We would love to have organisations or companies get involved. If we could sell Learning Buddies to organisations or companies who then donated them to schools, they could be branded. However, branding would be limited to the sides of the Learning Buddies, so learners would not be distracted by images on the writing space."

Making sure  
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# Local manufacture of a **COVID-19** vaccine is possible



Deputy President David Mabuza, visited BIOVAC facilities in Cape Town to assess the country's ability to manufacture vaccines locally.

With the global COVID-19 pandemic showing no signs of dissipating, vaccination has become a key weapon to combat the scourge.

However, more and more developing countries are being marginalised is gaining access to the life-saving vaccines, as countries of the north are purchasing hundreds of millions of vaccine doses for their citizens.



While the country has a vaccine rollout strategy in place to vaccinate its citizens, it is finding challenging to meet targets as vaccines are in short supply. A target to vaccinate one million people in Phase one by April was not achieved.

The situation is forcing countries to local to local capacity to manufacture vaccines. In South Africa, past investments by the Department of Science and Innovation in science, technology and innovation infrastructure has placed the country in a position to possibly manufacture its own vaccines.

During March 2020, members of the Interministerial Committee on COVID-19 Vaccines, visited the Biovac, biopharmaceutical company in Pinelands. The delegation, led by the Deputy President, David Mabuza were able to see first-hand the scientific capabilities and biotechnology infrastructure that could enable local vaccine manufacture.

Accompanying the Deputy President, was the Minister of Higher Education, Science and Innovation, Dr Blade Nzimande, the

Minister of International Relations, Dr Naledi Pandor, and the Deputy Minister of Health, Dr Joe Phaahla.

The manufacturing facility in Cape Town performs product development, the formulation and filling of vaccines, packaging and labelling, as well as cold chain and distribution processes.

"Part of implementing a successful COVID-19 vaccine rollout plan means we have to explore our capability of locally manufacturing vaccines in line with the industrial policy of the country," said the Deputy President after touring Biovac's vaccine filling facility, where the Hexaxim production line was running.

Last November Biovac commenced the local manufacture of Hexaxim in partnership with Sanofi. The vaccine is the world's first fully liquid hexavalent (6-in-1) vaccine, which protects against six childhood diseases, namely, diphtheria, tetanus, whooping cough, hepatitis B, Haemophilus influenza Type B and poliomyelitis.



Minister Nzimande said that the facility was moving up the value chain fast in order to manufacture vaccines, starting with a vaccine for COVID-19 and then looking at other diseases.

The Minister announced that Biovac is exempted to sign a partnership agreement with ImmunityBio, a US-based immunotherapy company, owned by South African-born Patrick Soon-Shiong. "The company is currently doing clinical trials in Khayelitsha and the US, and whatever gets produced from that process we will be partners," he added.

Elaborating further, Biovac said in a statement that the facility had entered into a strategic collaboration with ImmunityBio to develop the full value-chain capability for manufacturing biologicals in South Africa, including the

COVID-19 vaccine.

ImmunityBio has developed a COVID-19 vaccine intended to be more broadly protective than the current first-generation vaccines.

The collaboration with Biovac will be through technology transfer aimed at building capability for active pharmaceutical ingredient (also referred to as "drug substance") manufacture and capability in South Africa, for South Africa and for export markets.

This capability, would initially be targeted at a COVID-19 vaccine, which would form the basis for Biovac and South Africa to be able to respond to future pandemics.



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# Rethinking medical training: Nelson Mandela University Medical School

*Dr Thandi Mgwebi*



Deputy Vice-Chancellor for Research, Innovation and Internationalisation at NMU Dr Thandi Mgwebi

Like many sectors, higher education must adapt to the continuously changing environment in order to remain relevant, and to contribute effectively to socio-economic advancement. While some universities are quick to adopt new approaches and technologies, most public universities are slow to make changes to their teaching, learning and research practices.

The COVID-19 pandemic has presented higher education with both challenges and opportunities. For instance, there has been a rapid increase in the use of e-learning and communication channels in the sector, using platforms like Zoom. Academics have had to re-equip themselves to use these platforms effectively.

In the public health sector, the pandemic has highlighted the need to improve public health systems continuously, and to try new ways of doing things, such as using holistic approaches when training medical practitioners – focusing not only on health, but also on socio-economic factors and the broader environment.

On the research side, the pandemic has amplified the need for systems approaches that bring together different experts, subjects and sectors when addressing global challenges.

## Innovative training for medical practitioners and specialists

Despite the growing demand for medical practitioners, the highly contagious nature of COVID-19 has disrupted in-hospital medical training. There are social distancing rules, and restrictions on hospital access for medical students. Trainee doctors and

specialists are being redeployed to help manage COVID-19 patients.

With less than one doctor per 1 000 population in 2016, compared with the OECD (Organisation for Economic Co-operation and Development) average of 3,4, more doctors are urgently required. South Africa needs at least an additional 4 294 medical practitioners and 7 471 medical specialists. Compounding this challenge is the inequitable distribution of doctors between the public and private sectors; the majority of doctors work in the private sector, which serves only a small proportion of the population. As in many other countries, the rural areas in South Africa are historically under-served.

In addition to these challenges, until last year only nine of South Africa's 26 public universities offered medical degrees. In December 2020, Nelson Mandela University (NMU) became the 10th institution to offer the MBChB (Bachelor of Medicine and Bachelor of Surgery) qualification. With the growing demand for medical practitioners, the new medical school is a beacon of hope in the Eastern Cape.

## It's not just medicine

Modern medicine has seen rapid advancements in the past century. These advancements require the continuous development of innovative training approaches in order to equip

practitioners with skills relevant to modern-day and future health challenges.

The NMU Medical School is using innovative, transformative, distributive teaching models, with an emphasis on comprehensive primary health care, and makes use of technology for effective education in the health professions.

In addition, NMU has an inter-professional programme that will see students come together to study across health science disciplines. This transformative model will see doctors work and study alongside nurses, radiographers, psychologists, environmental health practitioners, pharmacists, emergency medical care students and the like, to offer holistic and integrated health care.

The training approach incorporates a community-based approach to allow for a better understanding of related challenges in society, and an improved contribution to urban renewal and development.

NMU's medical students will receive "decentralised" training, dividing their time between lectures – many of which may be online – and working in primary healthcare clinics.

The programme will produce family doctors, appropriately trained for the medical and health needs of both South Africa and Africa, with comprehensive skills and a greater capacity to serve diverse communities. By 2030, the university aims to train 200 new doctors each year.

Nelson Mandela University is optimistic that this will help to address the Eastern Cape's scarcity of doctors.

***Dr Thandi Mgwebi is the Deputy Vice-Chancellor for Research, Innovation and Internationalisation at Nelson Mandela University.***



# Government invests in development of nanosatellites for maritime industry



Government is investing heavily in developing a pipeline of young researchers and knowledge workers for the fledgling satellite industry.

The Department of Science and Innovation has invested about R18,9 million in the development of two nanosatellites, towards increased maritime domain awareness in South Africa. It is the first such initiative for the country to provide communication services to the maritime industry.

The funding was channelled through the Technology Innovation Agency (TIA), an entity of the DSI, to the Cape Peninsula University of Technology (CPUT), an institution that is playing a leading role in growing space science and technology in South Africa. The university has developed cutting-edge nanosatellites and cube satellites

(CubeSats) over the years, demonstrating advanced technological capabilities in the country's space industry.

South Africa needs a more strategic and coordinated approach to ensure optimal surveillance of the waters off its coast, including shipping movements within the country's exclusive economic zone. This will promote improved maritime domain awareness and enhanced maritime security.

The two maritime industry nanosatellites will be powered by "M2MSat" technology, in the form of cutting-edge VHD Data Exchange System (VDES) software-defined radios for machine-to-machine (M2M) communication.

A software-defined radio (SDR) system uses software for the modulation and demodulation of radio signals, performing significant amounts of signal processing in a general-purpose computer. The technology brings flexibility, cost-efficiency and power to drive communications forward, with wide-reaching benefits.

The innovative SDR technology will provide emerging M2M and Internet of things applications capable of delivering complex analytics and ubiquitous positioning of high-value assets, as well as mission-critical services, at a lower cost than the deployment of traditional satellite systems.

Developed as a collaboration between CPUT and local company Stone Three Communications, the M2MSat technology advances the state of the art in space innovation, significantly improving on the technology onboard CPUT's ZACube-2 nanosatellite, which was launched in 2018.

In the South African context, the space industry ecosystem – including supporting space engineering programmes, human capacity development, infrastructure investments and technological innovations – is part of the high-end infrastructure sectors that are critical to the country's economic recovery.

The development and commercialisation of the M2MSat platform will position South Africa as a key contributor of innovation in the space sector globally, feeding into the space value chain, growing partnerships with industry, and fast-tracking the creation and exploitation of space knowledge and innovation.

Meanwhile, plans are underway to develop Denel's Overberg Test Range (OTR) in the Western Cape as a facility to launch future CubeSats developed by the CPUT.

Already the OTR has proven the capacity to function as a launch pad. Earlier this month, researchers and students at the University of KwaZulu-Natal's Aerospace Systems Research Group successfully launched two hybrid rockets as part of the Phoenix Hybrid Sounding Rocket Programme.

The successful launch saw one of the test rockets travel 17,9 km into the air achieving a new African hybrid rocket altitude record, a significantly huge success for South African engineering and the development of African satellite rocket launch capability. The second rocket made more than 10 km altitude with a payload from CPUT.

# Social science for the seas

*Prof. Moenieba Isaacs*



The largest group of ocean users, small-scale fishers, are excluded from blue economy initiatives

In the era of a global health pandemic that is exacerbating issues such as poverty, gender inequality, food insecurity, and unemployment, ocean conservation and sustainability in South Africa and along the Atlantic Ocean coast of Africa, are a vital focus of research efforts by the Institute for Poverty, Land and Agrarian Studies.

Looking at the societal challenges for small-scale fisheries from the point of view of the United Nations (UN) Decade of Ocean Science for Sustainable Development, and the

vulnerability of women in small-scale fisheries owing to a lack of credit and inadequate water and sanitation, among other challenges, it is clear the government participation is crucial in research to ensure equity.

The UN declared 2021–2030 the Decade of Ocean Science for Sustainable Development to support efforts to reverse the growing decline in ocean health, and to get ocean stakeholders worldwide behind a common framework to create improved conditions for a sustainable blue economy.



Marine science is a cross-cutter in preserving the health of ocean ecosystems and in ensuring the use of ocean resources for economic growth and improved livelihoods in an environmentally acceptable way.

Science and technology make it possible to tap the resources of phosphate, oil and gas beneath the ocean to feed into local economies, but competing players vie for a share in the new frontier for capital. Often, oil and gas concessions and property developments for elite tourism are given the go-ahead by governments without sufficient consideration being given to long-term environmental effects or the livelihoods of smaller players.

The largest group of ocean users, small-scale fishers, are excluded from blue economy initiatives. This is a mistake, as the African continent has the most food insecure populations, and its people could do with the protein and other nutritional value offered by fish, especially smaller species.

The language government and business use around inclusion and participation do not equate to meaningful engagement with affected communities.

For example, with fish being the most traded commodity in the world, there is data available for large-scale and industrialised fisheries, but there is inadequate information about the state of the resources that small-scale fishers need for their livelihoods.

In discussions where the goal is address societal challenges through ocean sciences, we need to start with the

research design, method, approach and team composition as these aspects are crucial.

In South Africa we have shown excellence in marine and ocean sciences since 1896, but we have failed to raise social sciences in this sector to the same level of excellence. We need natural and social scientists to be part of research teams, and a good mix of emerging and young scholars involved in a transdisciplinary approach – not because the call for proposals say so but because we really want to make a difference to society.

Travel bans resulting from the COVID-19 pandemic have shown us the importance of local researchers on research teams, and it is important to invest in local researchers and scholarship programmes to ensure inclusivity in any blue economy research. We still have a long way to go in ensuring the inclusion and leadership of black women scientists in research on the African continent.

A good starting point would be to invest in expanding networking platforms, using innovative forms and formats to connect with researchers. Equality in infrastructure to communicate is key in regard to both the cost of data and a common open-source database with interactive online systems and a common language.

Social scientists need to learn the language of marine scientists and vice versa. Integrated research projects, and transdisciplinary research and methods, need not only investment, but also commitment to impact change. Funding opportunities should be localised and regionalised. Currently, the bulk of

research funding comes from developed countries in the Global North. More national research foundations on the continent need to fund research, and to build, nurture, support and invest in local, national and regional capacity through active learning and training.

When we co-design projects with local researchers and communities, we also need to make sure we co-author and make the community part of the research. This can only be done when we increase the role of resident researchers in international collaborative teams – not only to collect the data but also to be part of the conception of the research and proposal development.

When we have the teams, we need to see how we can address the Sustainable Development Goals (SDGs) holistically, taking into account the social, infrastructure and conservation goals of SDGs 1 to 6 – no poverty, zero hunger, good health and well-being, quality education, gender equality, and clean water and sanitation.

The Convention on Biological Diversity's Post-2020 Global Biodiversity Framework has ambitious targets, to safeguard at least 30% of the ocean in a network of protected, well-managed marine areas and to take other effective area-based conservation measures by 2030. However, we cannot address SDG14 on life below water in isolation of SDGs 1, 2 and 3.

Here, I am referring specifically to the small-scale fishers who are using low technology gear, target multiple species in the inshore coastal areas, and produce about 60% of Africa's fish. Women, in

particular, play a critical role in small-scale fisheries, processing, salting, drying and trading fish. This sector provides significant employment and income for over 10 million people on the continent, and is an affordable source of protein for 200 million (mostly local) people.

We need to acknowledge the historical rights of traditional users, small-scale fisheries and fishing communities to marine and inland resources and coastal space. To ensure the protection of their access, rights and livelihoods – blue justice – it is critical that these people be part of decision making.

To achieve the sustainability and social benefit goals of the UN Decade of Ocean Science for Sustainable Development, research needs to be disruptive and transformative in nature, mindful of new frontier research, and bringing the political economy and food security into debates on ocean sciences. We need to transform the economy, rethinking and disaggregating the idea of economic growth to ensure a more equitable distribution of the wealth that we already have.

Marine protected areas – large wild areas necessary for the survival of important biodiversity – are vital to allow nature to flourish. The people who use the ocean for their livelihoods must also be allowed to flourish, and the sciences – human and natural – play an essential part in finding sustainable solutions.

Moenieba Isaacs is a Professor at the Institute for Poverty, Land and Agrarian Studies at the University of Western Cape.

# More health research based on data from Africa will benefit the continent and the world

*By Michèle Ramsay*

Prof Ramsay believes the potential for discovery from African genomes is high, especially when coupled with detailed health data.



The global outbreak of the deadly COVID-19 pandemic, and the race to bring an end to this scourge which has affected every segment of society, has thrust the role of genomics into the spotlight.

From discovering and understanding the virus that causes COVID-19 to developing vaccines and detecting new mutations in the viral genome, the study of genomics has proven beyond doubt to be a potent tool. Scientists in South Africa and across the continent are using genomics-based surveillance to track the evolution of the virus in a local context, while the sequencing of hundreds of viral genomes has enabled studies of the COVID-19 strains in Africa.

What has become clear in the process is that much more home-grown genome sequencing is needed in Africa to address a wide range of diseases plaguing the continent.

Scientific discovery in the health sciences emerges from good data, based on carefully chosen participants, thoughtfully developed questionnaires and strategies for sample collection, and good governance structures for the responsible management of data and biological samples.

In the field of non-communicable diseases (NCDs), size does matter.

International studies and large consortia now routinely publish on cohorts of over 100 000 or even a million participants, unravelling the genomic contributions to common traits and diseases such as diabetes, hypertension and stroke. Less than 2% of the participants in these studies are of African ancestry, with the majority being African Americans, leaving resident Africans largely unexplored.

Genetic susceptibility alters the odds for developing common NCDs, but environmental factors and lifestyle choices are important contributors that can exacerbate or ameliorate individual risk. Polygenic risk scores (PRSs) are a metric developed to stratify individuals in a population according to the relative risk for developing specific diseases. The current clinical utility of PRSs is a matter of hot debate, but it is clear that their predictive ability is maximised for populations where the research and the target populations are most similar.

Africans therefore stand to gain little from PRSs developed in European populations, and research on African populations is vital if we are to reap the benefits of genomic medicine-informed approaches.

It is estimated that by 2050 Africa will have a population of 2,5 billion and will make up about 25% of the world's population. Meeting the health challenges of NCDs and infectious diseases will require innovative solutions based on excellent and abundant African phenotype and genomic data. This will enable a clinical path toward better screening and prevention, more accurate diagnoses, and a better understanding of effective treatments.

### **Why do we need African genomic and health data?**

Africa is characterised by a large diversity of climate, culture, diet and exposure to

pathogens, providing a natural backdrop for exploring the interactions between genetic variants and the environment. There is unique potential for discovery based on the high genetic diversity in African populations, which could lead to uncovering new disease pathways and identifying novel drug targets.

There are already several good examples emanating from a better understanding of African genetic variation. Specific genetic variants in the PCSK9 gene, which codes for a protein that regulates low-density lipoprotein cholesterol (LDL-C) levels, naturally lead to lower levels of LDL-C.

These variants are more common in African populations, and a therapeutic approach was developed to mimic their action by treating people with high LDL-C levels to lower their risk of heart attacks and other lipid-related diseases. In another example, several mutations initially thought to cause hypertrophic cardiomyopathy were later found to be common variants in Africans, and their disease-causing status was revised to being benign, and the diagnosis rescinded for many patients.

### **Why is it important to share African data with the world?**

The potential for discovery from African genomes is high, especially when coupled with detailed health data. Undoubtedly, the more people work on a dataset and the more questions are explored, the more valuable the data become, and the higher the chance that participants could benefit from translational research. Large and complex datasets can be mined in many different ways, and analysing the data together with other datasets further increases the power to detect important but sometimes subtle effects.

We need to remain mindful of the potential for stigmatisation of recognisable and

identifiable minority groups, and to protect personal identification, while on the other hand supporting the potential of translational research from bench to bedside. The availability of genomic data from five African populations released from as early as 2010 as part of the 1000 Genomes Project is proof of principle that much good comes from making African data available for research.

### The pioneering example of the H3Africa Consortium

The Human Heredity and Health in Africa (H3Africa) Consortium was initiated in 2012 to explore genomic and environmental contributions to health and disease among Africans and to strengthen genomic research capabilities on the continent. With over 40 research projects ranging from NCDs, communicable diseases and bioinformatics to ethical, legal and social issues, the consortium has published widely and developed genomic research resources. These include openly shared policies and guidelines on genomic research in Africa, and databases and biobanks to enable further research.

### Is there a role for genomic medicine-informed approaches in Africa?

It is vital for research to inform innovative approaches to healthcare in African settings, something that is only possible through building research infrastructure, large longitudinal African cohorts, big data and data linkage programs, and a skilled work force.

Understanding genetic vulnerability for disease and key environmental interactions could form the bedrock of preventative medicine. Furthermore, knowledge of individual drug responses, safe and effective delivery doses, and overall efficacy of treatments in African populations could inform public health

approaches and help to maximise scarce resources.

What are some of the critical enablers for genomic health research in South Africa?

- Enabling laws and regulations to support and promote participation in regional and global research, while balancing the protection of research participants and enabling future benefit sharing.
- More national investment in large research initiatives such as the Southern African Human Genome Programme and the South African Population Research Infrastructure Network (SAPRIN), an initiative supported by the Department of Science and Innovation (DSI) through the South African Research Infrastructure Roadmap (SARIR).
- Developing and expanding support for the disciplines of bioinformatics and genomic studies at tertiary institutions, and implementing sustainable educational programmes.

We have a duty to enable genomic research in Africa for the benefit of its peoples and the world. Not only is Africa the cradle of humankind, it is a hub for health researchers, and the trove of African genomes beckons.

*Michèle Ramsay is a Professor of Human Genetics, Director at the Sydney Brenner Institute for Molecular Bioscience at the University of the Witwatersrand, the holder of the DSI-NRF Research Chair in Genomics and Bioinformatics of African Populations, the 2019 South African Women in Science Awards winner in the category of Distinguished Women Researchers: Natural (Physical and Life) and Engineering Sciences and the winner of the 2020 Lifetime Award of the National Science and Technology Forum.*

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# IP Wise™ workshop at Gert Sibande TVET college



Raising awareness about intellectual property rights among young people at technical and vocational education and training (TVET) colleges has become a focus area for the Department of Science and Innovation's National Intellectual Property Management Office (NIPMO).

As TVET colleges expand their mandate to include innovation and commercialisation, intellectual property (IP) education is becoming increasingly important.

NIPMO hosted about 100 students and staff from the Gert Sibande College Centre for Entrepreneurship/Rapid Incubator at a

two-day workshop to learn the basics of IP rights, ownership and management, and the legislation governing IP.

The Deputy Principal responsible for Corporate Services at Gert Sibande College, Jannie Pretorius, welcomed the initiative, saying that training in this sphere was important not only for the centre but for TVET colleges in general.

"TVET colleges need to supplement their incomes in

order to remain sustainable because government funding is decreasing each year," he said.

He added that, where possible, TVET colleges needed to conduct research and development (R&D).

"Outcomes of R&D have to be commercialised in order to bring in additional income and also to be utilised in order to make a difference in the lives of people," he said.

Pretorius added that, for the past three years, one of their main funders, the Small Enterprise Development Agency, had given Gert Sibande College a mandate to commercialise IP as one of their key performance areas, and the college was looking at ways to make sure that they fulfilled this mandate.

The workshop, which took place at the Evander campus in Mpumalanga, was attended by students from various faculties, including marketing, finance, business management and technical disciplines. To ensure compliance with lockdown safety and social distancing protocols, the participants were divided into four sessions of 25 each.

The IP Wise™ workshop, held on 25 and 26 February 2021, provided a platform to promote the objects of the IP Rights from Publicly Funded Research and Development Act, and to educate students and staff about publishing versus patenting.

For Jetane Charsley, NIPMO's Acting Head, transforming ideas into products, processes and services that can make an impact in people's lives starts with education.

"Educating ourselves through IP training such as the IP Wise™ sessions on how to protect our ideas, and managing and utilising them appropriately so that we can see and feel the difference our IP is making in society, is important," she says.

Participants at the session learnt about the activities of an office of technology transfer (OTT) and about using IP to make an impact in society. An OTT is set up to ensure that IP emanating from R&D at publicly funded institutions is identified, protected, used and commercialised for the benefit of South Africa. OTTs serve as a link between publicly funded R&D institutions/organisations and industry.

The session also promoted the services offered by NIPMO and, at the end of the workshop, the NIPMO team and their Gert Sibande College counterparts engaged in a formal discussion on how best NIPMO could assist the college to identify and manage IP to make a difference in the college and the community.

NIPMO interacts with TVET colleges around the country to help them understand the basics of IP and how to identify and protect it.

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