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umthombo

INCLUSIVE. ENGAGED. AFRICAN.

Karoo predators
Unexpected findings about how predators prey on livestock

Rural democracy
Lungisile Ntsebeza: sociologist, political prisoner & defender of democracy

Unknown beauty
Looking into pressing questions of contemporary astrophysics

umthombo

Umthombo is the isiXhosa word for a natural spring of water or fountain. The most notable features of a fountain are its natural occurrence and limitlessness. *Umthombo* as a name positions the University of Cape Town, and this publication in particular, as an undepletable well of knowledge. In the context of the Cape Town water crisis, *umthombo* represents hope itself.

Title conceptualised by Thando Mgqolozana, a novelist, screenwriter and founder of Abantu Book Festival. He lives in Cape Town where he works as a research development officer at the University of Cape Town.

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

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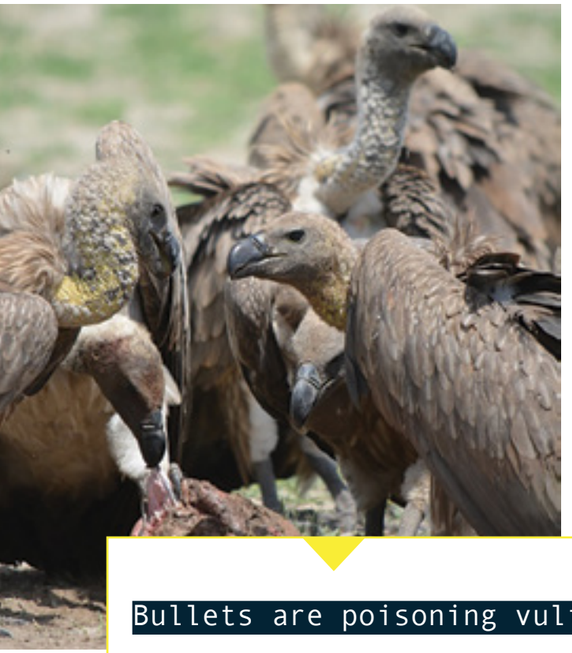
RESEARCH NOTES



Bullets are poisoning vultures

One-third of the nearly 600 critically endangered African white-backed vultures caught and tested in Botswana as part of a UCT study had elevated levels of lead in their blood. This was most likely due to fragments of lead bullets in the flesh they had been eating; hunters' bullets shatter inside their prey and the lead can be absorbed into the bloodstream of vultures when they feed on the remains.

Lead poisoning was one of the main reasons for the near extinction of the Californian condor and is known to increase mortality and reduce breeding performance in birds.

Higher lead levels were found in the blood of vultures during the hunting season and in hunting areas. "The only logical explanation for the patterns of lead poisoning we observed is lead bullets," said the study's lead author Beckie Garbett, who conducted the research as part of her PhD.

The study has prompted a call for a ban on lead bullets in Botswana in the hope of minimising negative impacts on vulture populations.

Small plastics stay close to home

A study of small plastic fragments on South Africa's beaches repeated every 10 years since the mid-1990s has found that most plastic pollution derives from local sources. This study – the first of its kind – was conducted by UCT's FitzPatrick Institute of African Ornithology and Marine Research Institute.

The researchers sampled debris at 82 sandy beaches along the South African coast in 1994, 2005 and 2015. The man-made items they found included wood, wax, glass, metal, cigarette butts, rubber, metal and paper, but plastic was by far the most abundant – comprising 99% of litter items. The highest concentrations were at beaches in the country's four major urban centres: Cape Town, Port Elizabeth, East London and Durban.

"We need a complete overhaul of solid waste management in South Africa, from government to grass-roots levels," said Professor Peter Ryan, the study's lead author. "Probably the biggest failing occurs at municipal level, where there is inadequate waste management – more than half of the solid waste in South Africa is mismanaged, compared to 12% in Brazil and 2% in the United States."

Potential novel vaccines for tuberculosis

During 2016, 1.7 million people died from tuberculosis (TB), and more than 95% of such deaths occur in low- and middle-income countries. TB vaccines that prevent infection and disease in adolescents and adults are a core component of the global strategy to control the illness.

Research, led by scientists from UCT, has shown that re-vaccination with an already-available TB vaccine and an experimental vaccine candidate were effective in preventing sustained infections in adolescents. Introduced in 1921, the Bacille Calmette-Guerin (BCG) vaccine is the only licensed TB vaccine available globally; the experimental candidate is under development.

Although neither vaccine proved to be statistically significant in preventing an initial infection, there were encouraging signs that both vaccines prevented sustained tuberculosis infections.

Injectable birth control may raise HIV infection risk by 40%

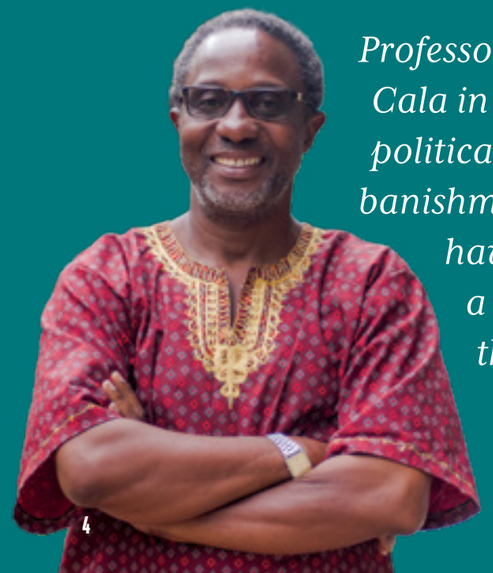
The intramuscular injectable contraceptive depot medroxyprogesterone acetate, or DMPA, may raise the risk for HIV infection by 40% in women. DMPA is the major form of hormonal contraceptive used in sub-Saharan Africa, which also has the highest worldwide HIV prevalence, particularly in young women.

How many lives has antiretroviral treatment saved? A simulation

Deaths among adult South Africans have declined substantially since the mid-2000s. UCT researchers were the first to evaluate how much of this decline was due to the scale-up of antiretroviral treatment (ART) around that time. Using a mathematical model to simulate the HIV epidemic in South Africa, they concluded that ART had a dramatic impact on adult mortality in South Africa. However, delays in the rollout of the treatment, especially in the early stages of the programme, contributed to substantial loss of life.

BETWEEN
2000
&
2014,
the South African ART programme is estimated to have
REDUCED
the cumulative number of HIV DEATHS IN ADULTS by
1 720 000
and
SAVED
6 150 000
LIFE YEARS

Defending DEMOCRACY IN THE *countryside*



Professor Lungisile Ntsebeza was born in Cala in the Eastern Cape. After overcoming political barriers – including imprisonment and banishment during apartheid – his life and work have come full circle as his research played a critical role in a landmark case fought by the Cala Reserve community, igniting a movement to restore democracy across the rural Eastern Cape.

Humble roots

Early life for Ntsebeza unfolded in the rural Eastern Cape. He was born in 1954 in the small town of Cala to parents who were teachers. They influenced him from a young age to read newspapers and listen to the radio news.

"I grew up as a reader. This was an influence of my parents and siblings," explains Ntsebeza. "There was always something to read at home." This, he says, gave him a sense of what was happening in his country and the world and influenced him towards his studious habits.

Through his involvement with study groups that looked at the political situation in South Africa and alternatives to apartheid, Ntsebeza developed his abilities in analytical thinking. It would be his involvement in these study groups that would precipitate his imprisonment at the age of 22. At the time, political study groups were considered subversive and Ntsebeza had by then been organising them.

> *"I grew up as a reader. This was an influence of my parents and siblings.*

Ntsebeza spent more than five years in prison – but not idly. While incarcerated, he completed his first degree: a Bachelor of Arts in philosophy and political science. On his release, Ntsebeza was banished to Cala where he revived a bookshop belonging to his parents, both of whom had passed away. The bookshop, it seems,

> *"Like Naki, I didn't allow it to discourage me from fighting against the odds and turning disadvantage – being sent to prison and banished – into advantage: reading and selling books.*

was another step in his intellectual preoccupations: In 1987, Ntsebeza registered for an honours degree in African studies at UCT. After completing a master's degree at the University of Natal and a PhD in sociology at Rhodes University, he returned to UCT and became a professor in 2007.

Now the National Research Foundation (NRF)/Department of Science and Technology South African Research Chair in land reform and democracy, the AC Jordan Chair in African studies, and director of the Centre for African Studies at UCT, Ntsebeza is as committed as ever to addressing economic and social justice through leading-edge research on land reform and democracy.

Among legends

During 2017, Ntsebeza was awarded the NRF Hamilton Naki Award, which is bestowed on individuals achieving world-class research performance despite considerable challenges. The award is named after Hamilton Naki, who – like Ntsebeza – was able to overcome political obstacles and realise research excellence.

Born in the Eastern Cape during 1926 to a poor family, Naki's first job was as a gardener at UCT. But his abilities would take him much further. In spite of his lack of schooling and the apartheid system working against him, Naki went on to help with the research and experimental work that preceded and followed the historic first heart transplant.

"Despite the fact that I did not, as Naki did, come from a poor family and was in fact very privileged to get good education, the political situation in apartheid South Africa was a major hindrance to me achieving my life goal of using education to make a difference in the lives of especially the poor and downtrodden," says Ntsebeza.

"Like Naki, I didn't allow it to discourage me from fighting against the odds and turning disadvantage – being sent to prison and banished – into advantage: reading and selling books. Thus, I set myself up for where I am now, where I am able to conduct relevant research that impacts the lives of the marginalised majority in South Africa."

Research that's relevant

Ntsebeza's research centres on three main areas at the interface of theory and practice: democratisation in South Africa's countryside, land and equity in the context of the struggle against poverty, and social movements in the land sector.

Ntsebeza argues that recognition by the government – led by the African National Congress – of traditional leadership coupled ▸

> *The judgment has already been instrumental in igniting a movement across rural areas of the Eastern Cape that poses the very same question I raise about the meaning of democracy for people living under the jurisdiction of chiefs.*

with the establishment of traditional councils, which are modelled on apartheid-era tribal authorities, compromises South Africa's democracy. In both traditional leadership and traditional councils, the majority of members are unelected.

"This gives rise to questions around the meaning of democracy for people living in rural areas under the jurisdiction of traditional authorities," he says.

On the subject of land and equity, Ntsebeza has focused on the South African land reform programme. "I've not only looked at the limitations of the South African Constitution and the land reform programme, but also the broader question of whether access to land makes a difference to the livelihoods of South Africans, both rural and urban," says Ntsebeza. "My research has shown clearly that those people with access to land, regardless of its extent, are better off than those without."

His interest in social movements also relates to the land reform programme. "Until 2013, I had been arguing that one of the reasons the land reform programme in South Africa was proceeding at a snail's pace was that social movements in the land sector were weak," explains Ntsebeza. "However, the historic farmworkers' and -dwellers' revolt towards the end of 2012 and beginning of 2013 compelled me to reconsider."

A landmark court case

Ntsebeza's expertise and research have taken him around the world. But it is research he undertook in the region around his home town that has had a resounding impact on the lives of South Africans in rural communities and the immense structures of governance and democracy.

This research played a crucial role in supporting a landmark decision by the Eastern Cape High Court on the succession of headmen – administrative officials in tribal authorities below the level of chief. The story unfolded in Cala Reserve and began in 2013 with a resignation: that of Jongilizwe Hamilton Fani, headman of the reserve, who had served the community there since 1979.

Following Fani's resignation, the Cala Reserve community proceeded to elect a successor – as was their custom. At a community meeting, the majority present elected a sub-headman and Fani's *de facto* deputy as their new leader. However, the amaGcina traditional council rejected their choice of headman. The head of the traditional council, Chief Gecelo, imposed his own choice, an unelected clansman, on the community – to their dismay.

The Cala community responded by writing complaints to the Eastern Cape Premier, the Member of the Executive Council for Local Government and Traditional Affairs, and the Qamata Regional Traditional Council. When these complaints were rejected, the community turned to the Legal Resources Centre, which launched an application on their behalf in the Eastern Cape High Court against the decision of the Premier.

During 2014, the court found in favour of the Cala Reserve community and declared that the customary law of the community requires its headman to be elected by community members. The Premier appealed.

It was the decision, taken by a full bench of the Eastern Cape High Court, to dismiss the Premier's appeal that represented a landmark win for democracy in the countryside. The full impact of this decision is still reverberating across South Africa, and Ntsebeza's research was critical in determining the outcome of the case.

A force for democracy

Having conducted extensive research over the course of 20 years into the history of traditional authority in the Xhalanga district, which includes Cala Reserve, Ntsebeza was able to provide the court with a detailed account of the area's history of electing headmen. Ntsebeza drew attention to a provision in national legislation, the Traditional Leadership Governance Framework Act, stating that the royal family can only appoint a headman after taking into account the practice of the community.

The practice in Cala Reserve, as he showed, was to elect their own leaders.

"Both the lower High Court of Bisho and the full bench agreed that the task of appointing headmen resided with the royal family," explains Ntsebeza. "However, both courts pointed out that the law required that the royal family should take into account the custom of the community concerned. This is where my evidence proved decisive."

Of Ntsebeza's input, Judge Clive Plasket wrote: "His evidence stands unchallenged. It is the only admissible evidence on the issue. No reason was advanced as to why it ought not to be accepted."

Plasket also suggested that the case of Cala Reserve should act as a model on how to democratise traditional authority, a suggestion that Ntsebeza himself asserts.

"Indeed, the judgment has already been instrumental in igniting a movement across rural areas of the Eastern Cape that poses the very same question I raise about the meaning of democracy for people living under the jurisdiction of chiefs," he says.

> *His research work has grown in prominence and now provides essential reading on the important debates about the future of land and the institution of traditional authorities and social movements.*

More to come

Ntsebeza's career path has been long and challenging, and now he is nearing retirement, but throughout, he has remained committed to addressing economic and social justice. His research work has grown in prominence and now provides essential reading on the important debates about the future of land and the institution of traditional authorities and social movements. His seminal work, *Democracy Compromised: Chiefs and the Politics of Land in South Africa*, a book based on his PhD thesis, was described by a leading historian as an "instant classic". Now, he is working on a sequel, including new information drawn from his involvement in the events following the Xhalanga case.

"I am currently exploring the implications of the High Court judgment, as well as the social movement it has given rise to, for the meaning of democracy for residents of rural areas that are under the control of traditional authorities," says Ntsebeza. He expects the book to be published in 2019. U

the UNEXPECTED APPETITES of PREDATORS in the KAROO

An extensive study on the eating habits of predators on farms and a reserve in the Karoo has yielded some surprising findings: Few of the predators in the reserve - leopards, jackal and caracal - prey on livestock on neighbouring farmland. This contrasts with the widespread perception by farmers that protected areas are 'predator nests' that present a constant threat to livestock. The findings lay a useful base for an attempt to understand and resolve the ongoing conflict between farmers and predators in South Africa.

IMAGE: Lenses for Conservation / Houdin & Palanque

The first time that French researcher Marine Drouilly laid eyes on a caracal it was lying lifeless on the lawn in front of a farmhouse in the Northern Cape. Alongside it were a number of black-backed jackals – all with gunshot wounds.

When she approached the farmer about the macabre sight, he told her about the perpetual friction between carnivores – particularly jackals and caracals – and the region's sheep farmers.

"It was clear that he regretted killing those animals, but he said it was either that or his livelihood," she explains.

This conversation left Drouilly feeling confused. In trying to learn more about the wildlife conflict that affects most of the farmers in South Africa, she was surprised to find that there was a lack of consensus by government, non-governmental organisations (NGOs) and researchers on both the drivers of conflict and potential solutions.

> I walked thousands of kilometres and conducted what at the time was the largest camera trap survey in the history of the Karoo.

When she had an opportunity to register for a PhD at UCT in 2013 – under the main supervision of Professor Justin O'Riain, director of the Institute for Communities and Wildlife in Africa – she knew that this complex tension between farmers and small predators was the topic she would tackle.

SCAT AND TRAPS

In order to understand how the presence of livestock influences predators, Drouilly split her research between two contrasting areas: small-livestock farmland in the Central Karoo (dominated by domestic sheep) and a nature reserve in the Western Cape.

To understand predator diet, Drouilly set out to compare the scat (droppings) of jackals, caracals and leopards found in these two landscapes. She also set up an extensive network of camera traps to find out what medium- to large-sized mammals are available as prey to predators in the two areas.

"I walked thousands of kilometres and conducted what at the time was the largest camera trap survey in the history of the Karoo," she explains.

Throughout this period, Drouilly lived mostly with farmers and immersed herself in their daily lives.

The first fruit of her labour was recently released in the form of a research article – 'Dietary niche relationships among predators on farmland and a protected area' – in the *Journal of Wildlife Management*. ▸

› *As part of her PhD research, Marine Drouilly set up camera traps that helped to reveal what mammals are available as prey in the Karoo.*

IMAGE: Lenses for Conservation / Houdin & Palanque

› *Her findings showed that caracals, such as this one, would rather eat dassies – robust, small and furry herbivorous mammals – and small antelope than livestock.*

PREDATORS' PREFERENCE FOR WILD PREY

Although many of the findings were close to what Drouilly had expected, there were some surprises.

In contrast to farmers' beliefs, jackals, caracals and leopards in the protected area rarely consumed livestock, despite frequently moving out onto farmlands. Drouilly found no remains of domestic sheep in any of the scat in the reserve. "This is positive news that might help the relationships between farmers and reserve managers in the future," says Drouilly.

It turned out that farmers were right to be concerned about jackals on farmland, which consumed more sheep than predicted by their availability in the landscape.

Caracals by contrast did not prefer livestock to similarly sized wild prey. Thus, while lambs and sheep made up the biggest component of their diet on farmland, the caracals showed a preference for dassies and small antelope. The results suggest that maintaining healthy dassie populations may reduce livestock losses to caracal predation.

No leopards were detected on farmland – as was expected – and those living in the protected area showed a preference for bushpigs and mountain-dwelling antelopes with no appetite for livestock.

WHAT CAN BE DONE?

Drouilly's study has shed light on the ongoing conflict between farmers and predators in the Karoo, yet she believes that a lot more can be done by academics, government, NGOs – and everyone who consumes meat.

> The results suggest that maintaining healthy dassie populations may reduce livestock losses to caracal predation.

Several factors, argues Drouilly, could help to alleviate the situation.

There needs to be more funding for applied research on how to improve farmers' livelihoods without adversely affecting the welfare and health of wildlife. There is a lack of appropriately scaled research on the long-term costs and benefits of both lethal and non-lethal management approaches with the result that many bad practices are retained and good alternatives overlooked. NGOs and the government need to step in and help farmers to improve their management of predators and livestock, as farmers simply cannot bear the full cost of predation alone. NGOs could also help fund non-lethal tools for farmers; some are doing it already by placing guard dogs on farms, for example.

Finally, if people want to keep eating meat raised with free-ranging predators, they will have to help find or fund solutions, Drouilly argues.

"At the moment," she says, "I have the feeling that we are only beginning to recognise the extent of the problem." U

Meet Nabeel Hussain

INVENTING THE FUEL CELLS OF THE FUTURE

Nabeel Hussain, family man, operations manager and the co-inventor of an innovative process that could offer the world a clean and reliable energy source.

The world needs an alternative energy supply, one that is not only clean but also reliable. Fuel cells convert energy from a fuel – like hydrogen – into electricity, and according to Dr Sharon Blair, director of the HySA Catalysis Centre of Competence, South Africa, with its local platinum resources, has great potential to develop the fledgling fuel-cell industry and capture a share of the growing sector.

Key to this is a process invented by Nabeel Hussain, chemical engineer and operations manager at UCT spinoff company HyPlat (Pty) Ltd, and his co-inventor Duarte Sousa. "The manufacturing method involves a new way of combining the different layers of the core component of a fuel cell, called the membrane electrode assembly (MEA), a process which results in lower cost and better quality," says Hussain.

> **The manufacturing method involves a new way of combining the different layers of the core component of a fuel cell**

HyPlat, the specialist fuel-cell technology company, is manufacturing and selling the MEA products using Hussain and Sousa's method. The invention has allowed HyPlat to expand its product portfolio and offer a new cost-competitive product line. For Hussain – who holds a master's degree in chemical engineering and a postgraduate diploma in business administration from the Graduate School of Business – life as a qualified chemical engineer was not always on the cards. Initially, he wanted to become a medical doctor. He enjoyed mathematics and high school chemistry so much, though, especially learning about the industrial processes, that when he was in his final year of high school, Hussain made the decision: He would pursue chemical engineering.

"I was told that chemical engineering requires strong mathematical capability and it seemed the natural fit," he says.

When Hussain is not taking care of operations at HyPlat or serving as its technical point of contact for customers, the Zimbabwean-born family man can often be found running or exploring Cape Town's many hiking routes. His wife is also a chemical engineer and they have two young children. She shares his love of the outdoors. U

connecting isiXhosa & isiZulu to the digital age

BY DR MARIA KEET

We live in a world where around 7 000 languages are spoken, and one where information and communication technologies are becoming increasingly ubiquitous. This puts increasing demands on more, and more advanced, human language technologies.

These technologies comprise computational methods, computer programmes and electronic devices that are specialised for analysing, producing or modifying texts and speech.

Engaging with a language like English is made easier thanks to the many tools to support you, such as spellcheckers in browsers and autocomplete for text messages. The situation is somewhat to very different for most languages in the world.

This is beginning to change. Profit-driven multinationals, such as Google, Facebook and Microsoft, for instance, have invested in the development of human language technologies also for African languages.

Researchers and scientists, myself included, are also investigating and creating these technologies. It has a direct relevance for society: Languages, and the identities and cultures intertwined with them, are a national resource for any country.

Just learning a language, however, is not enough if there's no infrastructure to support it. Where are the spellcheckers to assist you in writing emails, school essays or news articles, for instance?

That's why we have been laying both theoretical foundations and creating proof-of-concept tools for several South African languages. This includes spellcheckers for isiZulu and isiXhosa, and the generation of text in mainly these languages from structured input.

Using rules of the language to develop tools

Developing tools for the Nguni group of languages – and isiZulu and isiXhosa in particular – wasn't simply a case of copying and pasting tools from English. I had to develop novel algorithms that can handle the quite different grammar. I have also collaborated with linguists to figure out the details of each language.

Rule-based approaches are preferred for morphological analysers, which split each word into its constituent parts, and for natural language generation. Natural language generation involves taking structured data, information or knowledge, such as the numbers in the columns in a spreadsheet, and creating readable text from them.

A simple way of realising that is to use templates where the software slots in the values given by the data or the logical theory. This is not possible for isiZulu, because the sentence constituents are context-dependent.

A grammar engine is needed to generate even the most basic sentences correctly. We have worked out the core aspects of the workflow in the engine. This is being extended with more details of the verbs.

Using lots of text to develop tools

The rules-based approach is resource intensive. This, in combination with global hype around big data, has brought data-driven approaches to the fore.

The hope is that better quality tools may now be developed with less effort and that it will be easier to reuse those tools for related languages. This can work, provided one has a lot of good quality text, referred to as a corpus.

Such corpora are being developed, and the recently established South African Centre for Digital Language Resources (SADiLaR) aims to pool computational resources. We investigated the effects of a corpus on the quality of an isiZulu spellchecker, which showed that learning the statistics-driven language model on old texts, like the Bible, does not transfer well to modern-day texts, such as news items, nor vice versa.

The spellchecker has about 90% accuracy in single-word error detection and it seems to contribute to the intellectualisation of isiZulu. The algorithms were reused for isiXhosa simply by feeding it a small isiXhosa corpus: It achieved about 80% accuracy even without optimisations.

South Africa has 11 official languages, with English as the language of business. That has resulted in the other 10 being sidelined.

Relevance for South Africa

This sort of natural language generation could be incredibly useful in South Africa. The country has 11 official languages, with English as the language of business. That has resulted in the other 10 being side-lined, and in particular those that were already under resourced.

This trend runs counter to citizens' rights and the state's obligations as outlined in the Constitution. Take, for instance, the right to have access to the public health system. One study showed that only 6% of patient-doctor consultations were held in the patient's home language.

The sort of research I'm working on with my team can help. It could contribute to, among others, realising technologies such as automatically generating patient discharge notes in their own language, text-based weather forecasts and online language learning exercises.

Dr Maria Keet is a senior lecturer in computer science at UCT.

This article first appeared in The Conversation (**theconversation.com/africa**), a collaboration between editors and academics to provide informed news analysis and commentary.

THE FUTURE OF WATER

Water - the availability and scarcity of it - is a critical topic in our changing world. By its nature, water provision is a multifaceted issue - encompassing engineering, the built environment, science and health, politics and law, commerce, and humanities - that requires interdisciplinary solutions. The Future Water research institute at UCT brings together researchers across six faculties to envision and create a water-secure future for all.

IMAGE: Hugh Sitton, Stocksy

A Maasai woman carries a 20-litre container of water for two kilometres from a clean water point to her home. Future Water at UCT aims to inform the new paradigm around water, its scarcity and equitable access through rigorous inter- and transdisciplinary approaches.

The interdisciplinary approach of Future Water

PROFESSOR SUE HARRISON

Both globally and in South Africa we find ourselves colliding with water scarcity - Cape Town in crisis presents a complex picture in terms of provision, equity and ongoing impact. It came before we were ready, yet water scarcity is recognised as a top risk facing humankind. How do we prepare ourselves to handle this such that the world and our country thrive? As researchers, how do we approach these complex or "wicked" problems?

Traditionally, academics have relied on their deep knowledge of their own field of study to provide new insights into tough problems. However, solutions to intractable problems may need expertise from multiple disciplines; these often work alongside each other using their own toolboxes and sharing their results, in a multi-disciplinary way.

Increasingly, interdisciplinary engagement needs researchers to jointly use their expertise to develop solutions to today's "wicked" problems. Through interdisciplinary interaction using integrated and critical thinking, they deepen their disciplinary knowledge but broaden its reach and applicability.

Transdisciplinary research extends yet further to interconnect knowledge, understanding and technical innovation, to address multiple requirements and mitigate multiple risks, typically using engaged scholarship.

Disciplinary, interdisciplinary and transdisciplinary approaches build on each other, allowing researchers to build new knowledge and co-create real-world solutions to complex problems, an approach imperative to addressing water scarcity.

UCT is recognised locally and globally for its water-focused research. Flagships include climate change, wastewater treatment, sanitation, urban water management, the position of water in society viewed through anthropology and water politics lenses.

Increasingly, a single disciplinary lens limits the level of influence to mitigate complex problems such as water scarcity and equity, and implement solutions like water-sensitive design. Addressing this, UCT launched its interdisciplinary research institute, Future Water, in late 2016.

Future Water brings together researchers across six faculties and 11 departments to wrestle with these issues in diverse groupings. Its drivers are urgency in providing enhanced capacity to manage water infrastructure and scarcity, the need to adapt to water scarcity and build resilience through effective governance, the need to innovate for water supply to meet demand and the imperative of technically sound, socially acceptable and sustainable water management.

Future Water aims to inform the necessary new paradigm around water, its scarcity and equitable access through rigorous inter- and transdisciplinary approaches to co-create new knowledge and new ways to meet the new 'normal'. We contribute tools and skill sets, expertise and understanding, and grow leadership for the future. U

Professor Sue Harrison is the director of Future Water at UCT.

Water-sensitive cities, by design

DR KIRSTY CARDEN

A water-sensitive city is a sustainable city that uses water in a practical and aesthetically pleasing way through water-sensitive design. This planning approach includes social, governance and engineering aspects to minimise the impacts of urban development on the environment.

Research at UCT's Future Water Institute is informing the design and development of water-sensitive cities. Among other projects, Future Water has investigated the feasibility of implementing permeable pavements and sustainable sanitation options, and a range of alternative water sources for "fit-for-purpose" uses. The goal is to offset the demand for potable water by using groundwater, storm water, grey water and treated effluent.

Other research is looking at nature-based options for water treatment to clean the water that is discharged from the poorly-serviced settlements that are typical in urban areas in South Africa. An example is a biofiltration cell: a chamber filled with a medium, such as peach pips, on which micro-organisms grow and act as "cleansing" agents for the contaminated water that flows through it.

Worldwide, evidence suggests that water-sensitive design offers choices in the management of scarce and often-deteriorating water resources, and that it adds economic and environmental value to cities. In South Africa, water-sensitive design has the potential – through relatively modest interventions – to increase the sustainability and resilience of water systems. U

Dr Kirsty Carden is the research coordinator at Future Water, UCT.

IMAGE: Roark Robinson of MRA Architects

› *At a facility under development in Franschhoek, about 75 kilometres east of Cape Town, Future Water is experimenting with tools for water conservation and management of water demand, and on metering and leakage in water distribution systems. This is an architectural illustration of the site.*

Enabling Africa's water future through research and innovation

As the fastest growing continent on the planet, Africa is a competitive and innovative environment for water researchers. Future Water draws together researchers from fields as diverse as anthropology and architecture to collectively question the status quo and develop novel solutions to water-related challenges through research.

ENGINEERING

BUILT ENVIRONMENT

SCIENCE & HEALTH

POLITICS & LAW

COMMERCE

HUMANITIES

FUTURE WATER

Fostering new ways of thinking and building conversations. Allowing different disciplines to be partners in research that addresses intractable water challenges.

AFRICAN CENTRE FOR CITIES

An interdisciplinary programme focused on unsustainable urbanisation in Africa and identifying systemic responses.

AFRICAN CLIMATE & DEVELOPMENT INITIATIVE

An inter- and transdisciplinary institute that produces innovations to help solve Africa's climate and development challenges.

THE WATER HUB, FRANSCHHOEK Research, demonstration and training centre for advancing the ecological treatment and management of contaminated storm water and water reuse.

WASTEWATER BIOREFINERIES Integrated wastewater processing that can generate products of value, through a circular-economy approach, to ultimately encourage and incentivise water treatment.

WATER-SENSITIVE DESIGN Management of the urban water cycle combined with consideration of the roles and interactions of all stakeholders to minimise the impacts of urban development on the environment.

MONITORING WATER RESOURCES Innovations in the design and production of cost-effective water-monitoring systems with an emphasis on use in remote areas.

WATER MANAGEMENT IN CATCHMENTS Addressing the competing water needs of communities, the environment, mines and other economic processes with a focus on providing water that is "fit for purpose".

BUILDING RESILIENCE Research into the diversification of water sources - as well as resource efficiency, recovery and reuse - to contribute to cities that are liveable and resilient to the impacts of climate change.

5 lessons learnt from Cape Town's water crisis

DR KEVIN WINTER

IMAGE: Zaian [CC BY-SA 4.0], Wikimedia Commons

There is a general perception that climate change will be slow and methodical, which will allow governments time to systematically adjust their plans and policies. Reality is different. Over the past three years, Cape Town and the surrounding region have experienced an abrupt change in weather conditions with three successive years of the lowest annual rainfall on record. There are five lessons to be learnt from the crisis.

1 Adaptation to climate change

Cities need to adapt much faster to climate change. One of biggest lessons for Cape Town is that storage dams are not reliable when there is inadequate rainfall to recharge them. Almost 98% of Cape Town's water supply comes from surface water dams. A diversity of water sources and supplies is required to climate proof the city. In addition, the urban water cycle must be re-examined. We need to become smarter about capturing rainfall, treating and storing storm water, and reusing treated water and effluent for a variety of purposes.

2 Cities lead

Local government has to take a decisive lead together with citizens, communities and businesses – and researchers. National government is too slow to deal with abrupt changes at a city scale. Intergovernmental cooperation is necessary but actions are not timely or at the appropriate scale.

3 Measure more, manage better

"You can't manage what you don't measure" is a rallying cry for effective management. A city without reliable data cannot second-guess its way out of a water crisis. There is a host of emerging technological knowledge and capabilities, but technology is only helpful if it is reliable, and accompanied by public education and acceptance.

4 Mixed messages

Communication from the local authority will be put to the test. This is a space that is contested between politicians and technical managers, and will be filtered in unexpected ways through social media platforms. While the City of Cape Town was acknowledged by international water associations for its weekly reporting on the state of water resources, this did little to contain widespread criticism and misinformation that was shared in public domain.

5 Public trust

Establishing public trust and confidence in the management of water resources is key to achieving widespread cooperation in water-saving behaviour.

Climate variability is brutal and unpredictable. Exactly how cities prepare for the global onslaught will depend to some extent on their available financial, technical and human capital resources, but it will largely depend on new forms of governance systems, which might still need to be invented to deal with an uncertain future.

Dr Kevin Winter is a theme leader at Future Water, UCT.

Nearly 98% of Cape Town's water supply comes from surface water dams like this one: the Theewaterskloof Dam. A diversity of water sources and supplies, as well as a re-assessment of the urban water cycle, is required to climate proof the city, according to Kevin Winter.

The politics of water

As water is usually approached from a socio-economic and environmental point of view, we often fail to see the political side of this precious resource. Professor Horman Chitonge from the UCT's Centre for African Studies has dedicated part of his academic career to the study of hydro-politics, focusing specifically on sub-Saharan Africa.

IMAGE: Aliwal2012 (GFDL or CC BY-SA 3.0) from Wikimedia Commons

The Gariep Dam was a key component of an extensive water infrastructure project, initially referred to as the Orange River Project, developed in part to satisfy South Africa's increasing demand for water.

Challenges facing cities in sub-Saharan Africa

The provision of water in sub-Saharan Africa is characterised by two major trends. On the one hand, populations are increasing – in many cases rapidly. On the other, infrastructure is not growing at a commensurate rate.

"Part of my work is to emphasise the importance of expanding infrastructure. In some cities, the infrastructure was laid in the '60s when these cities were meant to cater for 500 000 people," Chitonge explains. "Now those cities have grown to 3 million, 4 million, 5 million people and they're using the same infrastructure. It's becoming a huge problem."

Chitonge says that up until now governments have been working with a static model that seems to assume that population growth will stabilise at some point. Of course, this is wishful thinking and Chitonge believes that long-term plans should be put into place to develop infrastructure every 15 years or so.

Establishing a funding model

Since water infrastructure is expensive, securing capital investment for these sorts of projects is challenging. In most cities, water services are supposed to pay for themselves through tariffs paid by consumers, but those mostly only cover operation and maintenance costs; they don't cover the capital expenditure and infrastructure costs. This is essentially where the problem lies.

For this reason, Chitonge says, a suitable funding model for the extension of water infrastructure has to form part of the long-term planning in all cities.

The state of private sector involvement

During the late 1980s and early 1990s, the problem of funding for water infrastructure upgrades in many African cities seemed to be momentarily solved with keen participation by the private sector and the establishment of public–private partnerships.

Horman Chitonge

By the end of the 1990s, a lot of these companies discovered they had over-estimated their returns on investment and a large-scale pull-out from the private sector followed.

Chitonge says there are two major reasons for this. First, the profit projections were over-cooked by the private sector to begin with. Second, as a basic requirement, water is a highly sensitive commodity with a lot of politics surrounding it.

"Increasing a water tariff is not like increasing the price of a pair of shoes. Nobody would make noise if the price of shoes went up. But the moment you touch water, there are political ramifications," he explains.

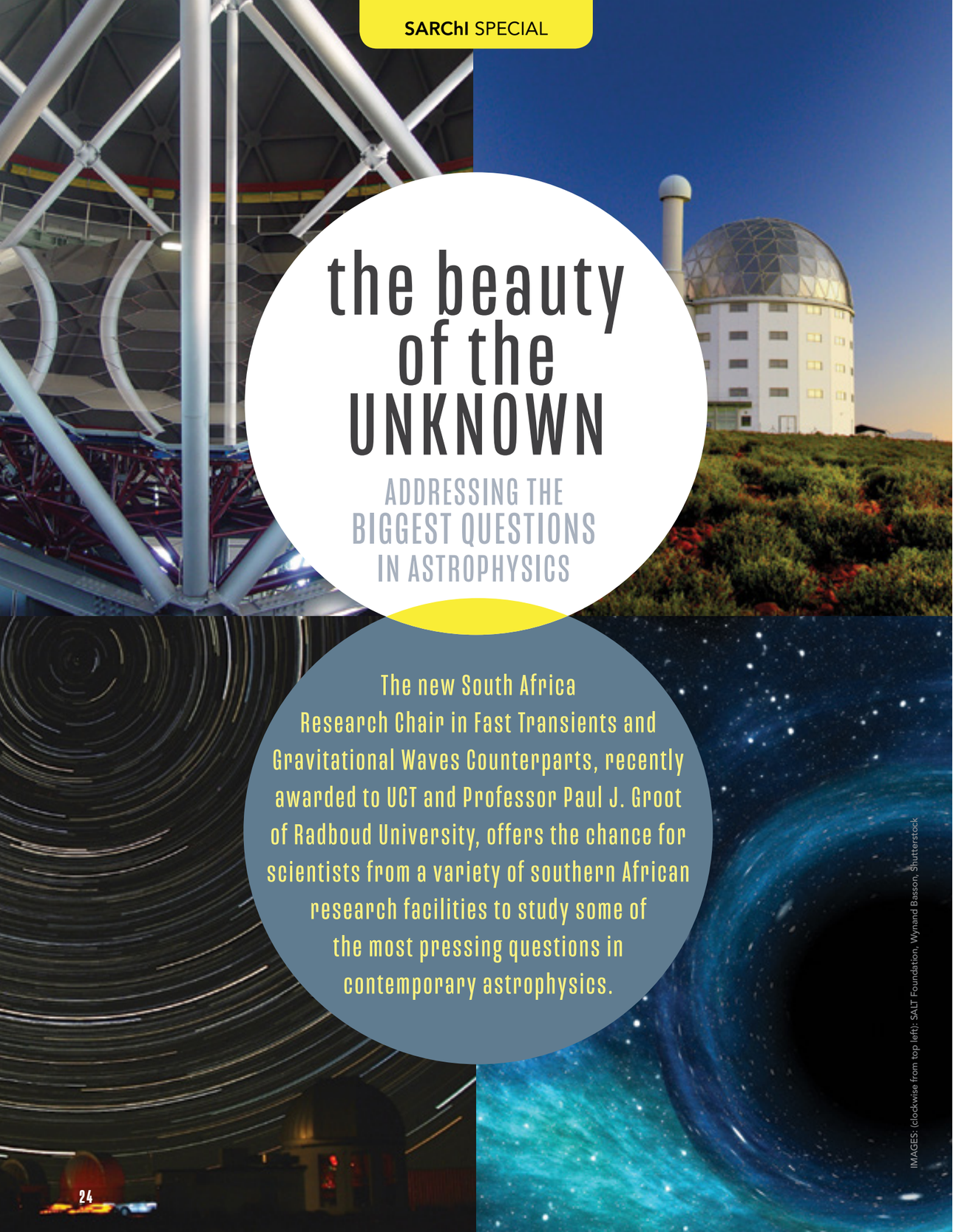
The situation in Cape Town

One does not have to look very far to understand just how complex provisioning water to an ever-growing city can be. Cape Town is proving to be a fascinating case study: from 2000 up until 2017, the population of Cape Town grew by almost 50%; water infrastructure expanded at a much lower rate over the same period.

One good thing that has come out of the city's water crisis, however, is the fact that people have learned that they can live with less. Since the first set of water restrictions were put in place late in 2016, Cape Town has seen a 57% reduction in water consumption.

"I've done work on different African cities, but what has happened here is incredible," says Chitonge. "Of course, it's a crisis and we feel this is not comfortable, but it has taught us that we can actually reduce our consumption drastically."

Chitonge believes that this sort of radical reduction in consumption could be the key to future global water security. Essentially, there's an onus on people everywhere to be more water-wise. U



the beauty of the UNKNOWN

ADDRESSING THE BIGGEST QUESTIONS IN ASTROPHYSICS

The new South Africa Research Chair in Fast Transients and Gravitational Waves Counterparts, recently awarded to UCT and Professor Paul J. Groot of Radboud University, offers the chance for scientists from a variety of southern African research facilities to study some of the most pressing questions in contemporary astrophysics.

IMAGES: (clockwise from top left): SALT Foundation, Wynand Basson, Shutterstock

SARChI SPECIAL

> The research chair will allow a network of scientists to study one of the hottest topics in contemporary astrophysics: the origin of gravitational wave mergers.

Professor Groot discovered a vocation for astronomy during his early days as an undergraduate at the University of Amsterdam. "The beauty and mystery of the unknown, the universality of the laws of physics and the inventiveness required to deduce what is going on out there by using the small amount of information encapsulated in the light of stars still captures me as the ideal combination of discovery, wonder, research and creativity," he says.

He first visited South Africa in 2005 together with 17 students from Radboud University. Since then, UCT and Radboud University have collaborated on data science research in astronomy, culminating in the MeerLICHT telescope being installed at the Sutherland Observatory last year.

Groot will now continue this work in the role of the new South Africa Research Chair in Fast Transients and Gravitational Waves Counterparts, funded by the Southern African Large Telescope (SALT) and awarded by South Africa's Department of Science and Technology and the National Research Foundation to UCT at the end of 2017.

"SALT is important for many reasons," explains Groot. "As the premier optical telescope for the South African community, it allows South Africa to be among the top countries in astronomy worldwide.

"I work in the field of transient astronomical events. These are explosive events that signal the destruction of stars. In their final death throes, they flare up for seconds to weeks, and then dim completely after that. SALT will play a very important role in the study of such events because it is the only major telescope in the southern hemisphere outside of Chile. For fast-fading events, this gives us a clear, competitive edge."

Using SALT and other multi-wavelength facilities, the research chair will allow a network of scientists to study one of the hottest topics in contemporary astrophysics: the origin of gravitational wave mergers. These events were first detected in 2015, a hundred years after they were predicted by Einstein. As Groot explains: "Two black holes or neutron stars merge and give off an enormous amount of radiation, all in the form of gravitational waves. If a neutron star is involved, it can also give a short-lasting, faint 'blip' of light. This was first detected from an event that went off last August."

According to Groot, the new MeerLICHT telescope at Sutherland combined with the new Lesedi telescope and SALT makes a very powerful package for the detection and characterisation of these short-lasting, faint events. "The flexibility of SALT, together with its light-gathering power, will be enormously important for gravitational wave counterparts," he says. ▸

What is a SARChI chair?

The South African Research Chairs Initiative (SARChI) promotes excellence in research and innovation at South African public universities. The Department of Science and Technology and the National Research Foundation started the initiative in 2006 by establishing a number of long-term research chairs. A university can hold a SARChI chair for up to 15 years, and each chair is held in conjunction with a public research institution such as another university, a science council or a national research facility.

The idea behind the creation of these posts was threefold:

1. **to increase the capacity for local universities to produce a high calibre of postgraduate students**
2. **to create career pathways for junior and mid-level researchers, and**
3. **to improve the overall competitiveness of South African research while addressing social and economic problems.**

To be able to have an in-depth look in how these explosions work requires teaming up a number of telescopes

Another of the goals of the new research chair is to foster a community of scientists and to connect to other multi-wavelength facilities in South Africa.

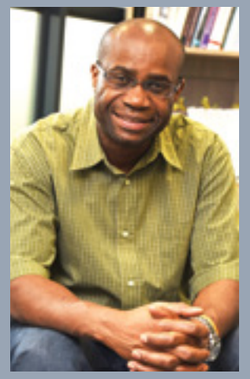
"First and foremost, these will be the MeerKAT radio array and the MeerLICHT optical telescope," says Groot. "Our aim is to open up the field of radio-optical transient events, and try to understand the physics connected to stellar explosions and how binary star mergers work.

"The radio and optical radiation emitted by these events is radiated away through different physical processes and at varying times. To be able to have an in-depth look in how these explosions work requires teaming up a number of telescopes."

Groot explains that this trio of telescopes can also be tied in with orbiting X-ray and UV satellites to make an even more powerful combination. "As a SARChI chair, as the principal investigator on MeerLICHT and as a member of the Virgo collaboration, I am in an ideal position to connect all of these facilities."

One of FORTUNE'S 50 GREATEST LEADERS 2018

Q&A WITH PROFESSOR KELLY CHIBALE



"We're working together to eliminate malaria in South Africa by 2020."

Chibale holds a SARChI chair in drug discovery and heads up UCT's Drug Discovery and Development Centre (H3D), and will be joining forces with four other research institutions around South Africa in a Community of Practice (CoP) dedicated to developing new malaria intervention strategies.

Q Your work is focused on building a pipeline of malaria drug leads: Why is this necessary?

Our most advanced drug candidate is in Phase II human clinical trials but we have a pipeline of molecules at different stages. There is a high attrition or failure rate in the process of developing drugs along the preclinical and clinical value chain. There is just no guarantee of success from one stage to the next. A drug can fail at any stage for a variety of reasons.

When a drug fails, at any stage, there are always useful lessons to be learnt and built on for the next round of the discovery process. Even if a drug, for any disease, makes it all the way to the market, it is only a matter of time before resistance to the drug emerges and renders it useless and the disease impossible to treat.

Understanding the molecular basis for the resistance then becomes critical in addressing or circumventing the problem of resistance in the next generation of medicines.

Q South Africa wants to stamp out malaria by 2020; do you think this is possible?

Yes. South Africa formally adopted a malaria elimination strategy in 2012. A mid-term review in 2015 indicated that South Africa is now officially classified as pre-elimination due to a sustained incidence of less than one case per 1 000 people at risk, restricted to only three provinces (Limpopo, Mpumalanga and KwaZulu-Natal) at the low-lying regions bordering Zimbabwe and Mozambique.

Although this success is due to malaria control efforts in South Africa that have been rigorously sustained since the 1940s, this control is fragile and our malaria programme is extremely vulnerable, as evidenced by several episodes of malaria epidemics in the country.

Since the disease knows no borders, cross-country regional initiatives are imperative for achieving the goals of malaria control and elimination. Encouragingly, the Southern Africa Development Community (SADC) has pledged to eliminate malaria, resulting in the establishment of the Elimination 8, a cross-country coordinated effort to achieve malaria elimination in eight SADC member states: The four frontline countries (Botswana, Namibia, South Africa and Swaziland) will aim to eliminate malaria by 2020, followed by Angola, Mozambique, Zambia and Zimbabwe.

Q Your SARChI chair is now part of a wider community of practice in eliminating malaria. How many institutions are involved and how do you work together?

The CoP will centre on the current expertise of five SARChI chairs from UCT, the University of Pretoria, Stellenbosch University and the University of the Witwatersrand.

The focus area of the members of the CoP will revolve around malaria intervention strategies. These include the discovery of novel drug leads (SARChI in Drug Discovery, myself, UCT) with optimised delivery systems (SARChI in Advanced Macromolecular Architectures, Professor B Klumperman, Stellenbosch University) against both the malaria parasite (SARChI in Sustainable Malaria Control, Professor L Birkholtz, University of Pretoria) and mosquito vectors (SARChI in Medical Entomology and Vector Control, Professor M Coetzee, University of the Witwatersrand), modelled within a malaria elimination setting (SARChI in Mathematical Models and Methods in Biosciences and Bioengineering, Professor J Banasiak, University of Pretoria).

UCT hosted

39 chairs in 2017

17 held by women

Almost 1/5 of the country's SARChI chairs have been awarded to UCT

WHAT OCEAN AND ATMOSPHERE MODELLING CAN TELL US ABOUT CLIMATE AND WEATHER

According to newly appointed SARChI chair and oceanographer Professor Mathieu Rouault, studying patterns of how the ocean and the atmosphere interact not only improves weather forecasting but can help us to better predict and ameliorate the social impact of climate events.

"Modelling is an excellent tool to understand the mechanisms linking the interaction between our oceans and the atmosphere to our weather and climate," says Rouault. "Take the phenomenon of El Niño in the Pacific Ocean, which is playing a part in the current droughts in southern Africa."

According to Roualt, modelling, when applied strategically, can be used to predict climate impact and therefore help to mitigate the effects of natural climate variability or climate change on human societies. As examples of the kind of social and economic impacts he is talking about, Rouault points out that in the 2015 to 2016 drought, inflation of food prices rose 20%, 100 000 cattle died, maize production fell by 50% and it was triggered by El Niño and properly forecasted.

Rouault is now looking forward to using his appointment to the renewed SARChI chair in ocean–atmosphere modelling to test and develop models specific to our oceans. "This includes gaining a better understanding of the effect of the Agulhas Current on extreme weather conditions and the creation of an aquaplanet model – where only the oceans are modelled, without including the continents – to better understand the role of the current in regional weather patterns, and an in-depth exploration of how El Niño affects local climate conditions."

Roualt's second aim for the chair is to develop the modelling capacity of African students.

"I already have a cohort of six doctoral students from four African countries; the research chair also helps to create two positions for postdoctoral fellows. This will enable students to continue their studies while finding another postdoctoral fellowship in the best institutions around the world."

> Modelling can be used to predict climate impact and help to mitigate the effects of natural climate variability or climate change

Rouault is also co-director of the Nansen Tutu Centre for Marine Environmental Research, a joint initiative between Norway and South Africa that is based in UCT's Department of Oceanography. Together with UCT and the Nansen Tutu Centre, Rouault is looking forward to collaborating with ocean and climate modellers from Japan, Norway, France and Germany.

Modelling can tell us about climate events that have happened in the past as well as events in the future. Rouault is going to continue work on his hypothesis that our local Agulhas Current had a part to play in the survival of *Homo sapiens* through the penultimate ice age.

"It is technically difficult to model, but feasible, and it will take some time to implement," Rouault says. "But it is a very exciting idea and one that could show that the effects of ocean and atmosphere have always had a big impact on humankind." U

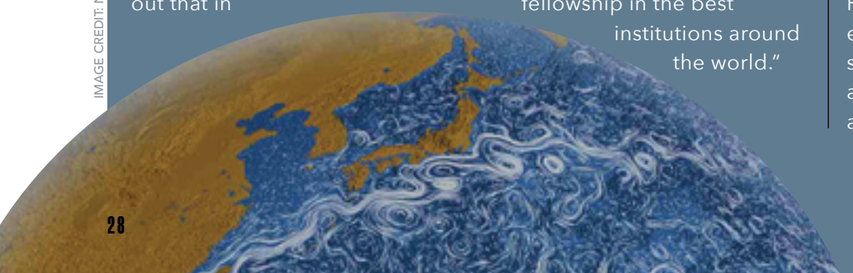
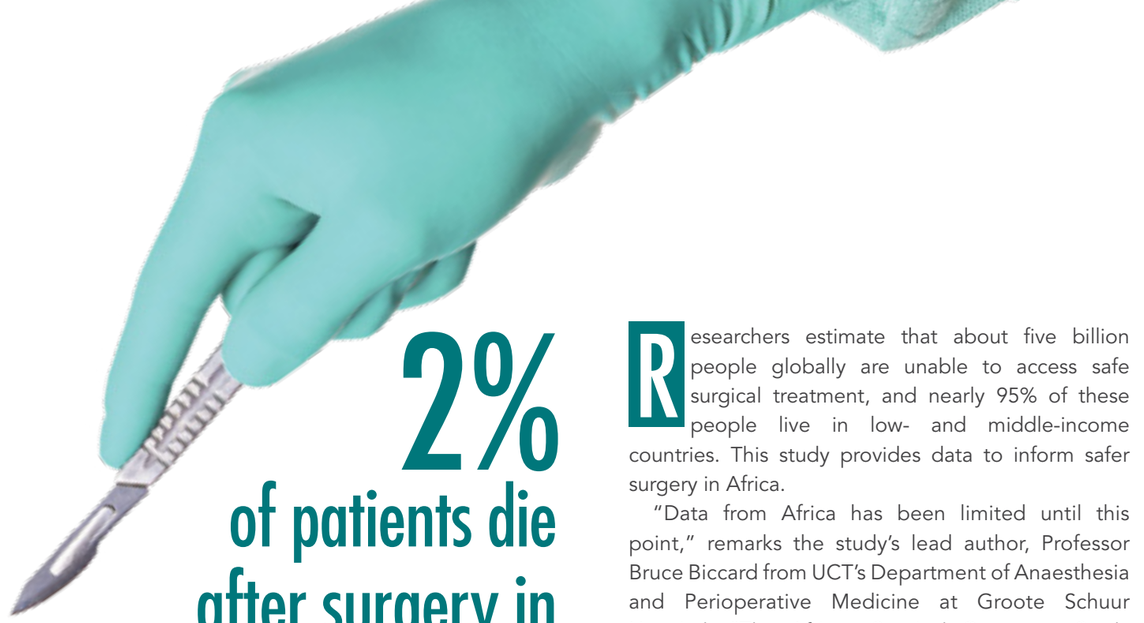


IMAGE CREDIT: NASA



2% of patients die after surgery in Africa: twice the global average

A UCT study reveals that one in five patients who undergo surgery in Africa will develop complications and 2% will die following surgery. This was the main finding from a study that involved more than 11 000 patients from 247 hospitals in 25 African countries, including South Africa, Algeria, Egypt and Zambia.

Researchers estimate that about five billion people globally are unable to access safe surgical treatment, and nearly 95% of these people live in low- and middle-income countries. This study provides data to inform safer surgery in Africa.

"Data from Africa has been limited until this point," remarks the study's lead author, Professor Bruce Biccard from UCT's Department of Anaesthesia and Perioperative Medicine at Groote Schuur Hospital. "The African Surgical Outcomes Study provides important data necessary to understand the challenges to improving surgical outcomes on the continent.

"Although increased access to surgery is important, it is essential that surgery is safe."

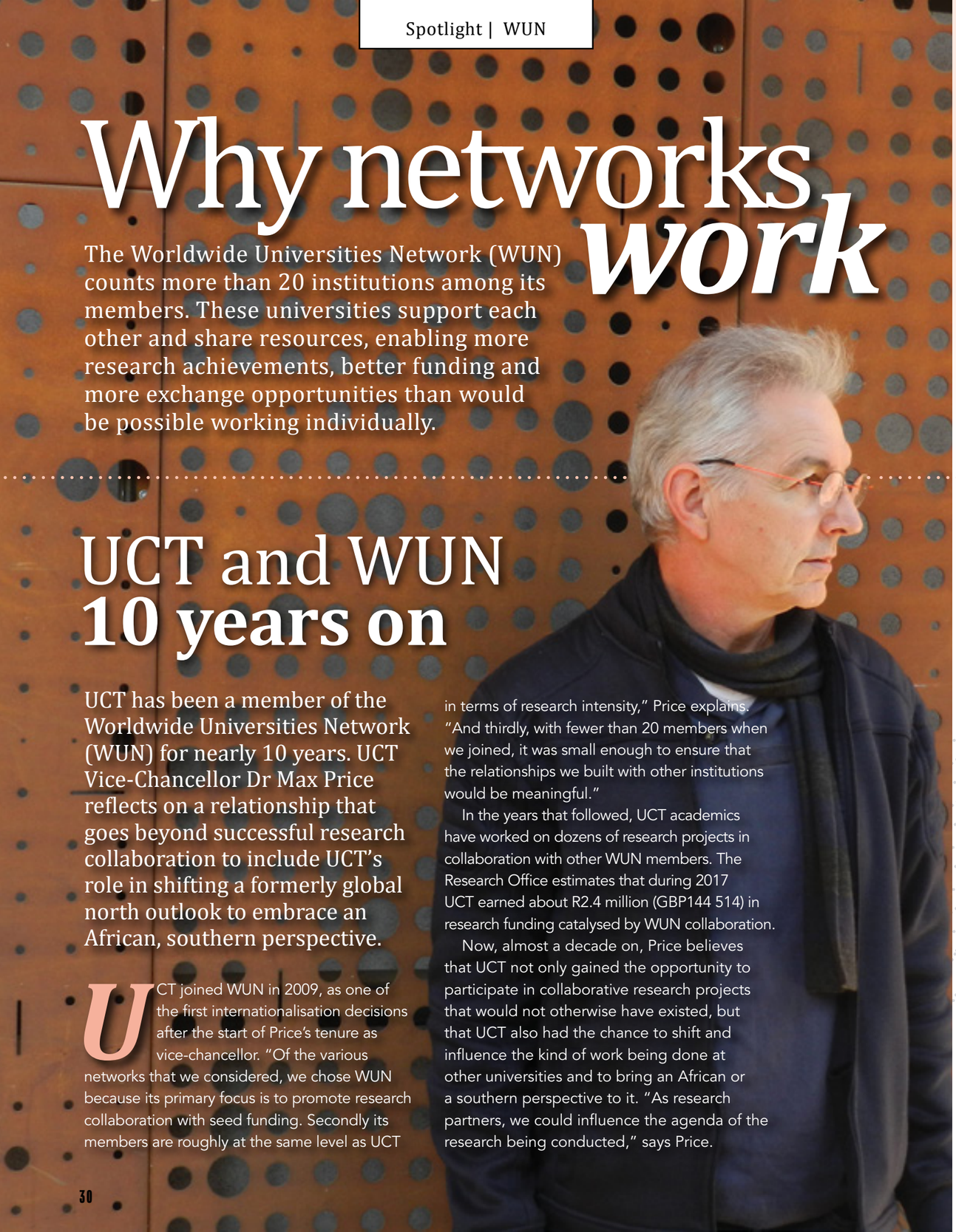
Nearly 95% of the deaths in the study occurred after the day of the surgery. A lack of resources seemed to be a significant contributor to postoperative mortality in Africa. A continent-wide quality improvement programme – addressing the problem of limited surgical resources and increasing postoperative surveillance of surgical patients – may lead to better surgical outcomes on the continent.

> Nearly 95% of the deaths in the study occurred after the day of the surgery. A lack of resources seemed to be a significant contributor to postoperative mortality in Africa.

Besides documenting surgical patients' outcomes, the researchers also looked at the available hospital resources for surgery, which included the number of beds, operating rooms, critical care beds and specialist personnel, including anaesthetists, surgeons and obstetricians. In the countries that participated in the study, there were only about 0.7 specialist surgeons, obstetricians and anaesthesiologists per 100 000 population – around 30 times lower than the recommended global minimum. U

Why networks work

The Worldwide Universities Network (WUN) counts more than 20 institutions among its members. These universities support each other and share resources, enabling more research achievements, better funding and more exchange opportunities than would be possible working individually.



UCT and WUN 10 years on

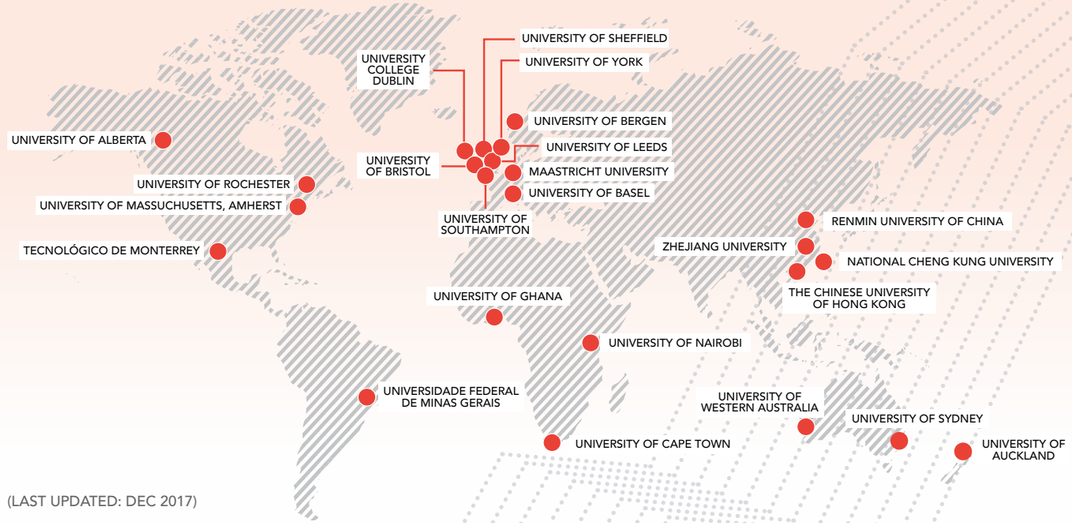
UCT has been a member of the Worldwide Universities Network (WUN) for nearly 10 years. UCT Vice-Chancellor Dr Max Price reflects on a relationship that goes beyond successful research collaboration to include UCT's role in shifting a formerly global north outlook to embrace an African, southern perspective.

UCT joined WUN in 2009, as one of the first internationalisation decisions after the start of Price's tenure as vice-chancellor. "Of the various networks that we considered, we chose WUN because its primary focus is to promote research collaboration with seed funding. Secondly its members are roughly at the same level as UCT in terms of research intensity," Price explains. "And thirdly, with fewer than 20 members when we joined, it was small enough to ensure that the relationships we built with other institutions would be meaningful."

In the years that followed, UCT academics have worked on dozens of research projects in collaboration with other WUN members. The Research Office estimates that during 2017 UCT earned about R2.4 million (GBP144 514) in research funding catalysed by WUN collaboration.

Now, almost a decade on, Price believes that UCT not only gained the opportunity to participate in collaborative research projects that would not otherwise have existed, but that UCT also had the chance to shift and influence the kind of work being done at other universities and to bring an African or a southern perspective to it. "As research partners, we could influence the agenda of the research being conducted," says Price.

Spotlight | WUN



(LAST UPDATED: DEC 2017)

At the time, UCT wanted to consolidate its role as a hub connecting universities on the African continent. "Joining WUN meant that we could extend our project to become a global meeting point between the rest of the world and African academia," he says.

During Price's tenure as WUN chair and then deputy chair, two other African universities – the University of Ghana and the University of Nairobi – were invited to join WUN, with two South American universities currently in the process of joining.

Another important benefit derived from being a WUN member has been the open-door policy enjoyed by universities in the network, which results in valuable knowledge sharing. "We have also been able to send our professional staff, such as those that work in alumni relations or the registrar's office, to visit other WUN members and see how similar challenges are addressed there.

> "UCT had the chance to influence the kind of work being done at other universities

"The annual vice-chancellors meeting," says Price, "is one of WUN benefits I value most highly. The meeting brings together university presidents and vice-chancellors from universities that are broadly similar, but facing different national concerns and environments.

"It's an opportunity for the leaders of institutions to hear how different universities are thinking about, for example, the future of online learning, the fourth industrial revolution, the changing nature of work and jobs, the pandemic of mental disorders on campuses or the consequences of identity politics for intellectual debate. The meeting is closed – so people aren't there just to make their universities look good, as can happen on public platforms; they're there to talk about the shared challenges we face and to learn from one another." U

8 WUN UNIVERSITIES – INCLUDING UCT – ARE AMONG THE 60 MOST INTERNATIONAL INSTITUTIONS WORLDWIDE
(Times Higher Education World University Rankings 2018)

156 INTERDISCIPLINARY RESEARCH GROUPS SINCE 2009

1/3 UCT HAS BEEN INVOLVED IN OF THESE RESEARCH GROUPS

7 RESEARCH GROUPS ARE OR HAVE BEEN LED BY UCT RESEARCHERS

18 REFEREED PUBLICATIONS PRODUCED BY UCT RESEARCHERS AS CATALYSED BY WUN COLLABORATION IN 2017

£144 514 = ABOUT **R2.4 MILLION** IN FUNDING FOR UCT CATALYSED BY WUN COLLABORATION IN 2017

Spotlight | WUN

A RESEARCHER'S PERSPECTIVE ON WUN

BUILDING THE AFRICA *we want*

PROFESSOR MAANO RAMUTSINDELA

When I was asked to represent UCT as part of the steering committee of the Worldwide Universities Network (WUN), I had very little idea of what the network could offer me. I have since found out – but I am sure I have not been the only one to wonder this!

Networks offer opportunities, but it is up to us – as researchers – to make use of these networks for our benefit.

WUN facilitates collaborative, action-oriented research for the benefit of science and society. Although collaborative research is necessary and desirable for tackling many of society's problems, which require diverse skills and interdisciplinary knowledge, it is a challenge to find collaborators across universities. Networks such as WUN provide a platform for potential collaborators to set the research agenda together, within the key strategic areas of the network.

> WUN facilitates collaborative, action-oriented research for the benefit of science and society.

One of the greatest benefits I've derived from WUN is the opportunity to expand my research in southern Africa to other parts of the continent, and to test the relevance of my research questions in Africa's diverse regions.

In particular, the formation of the WUN Global Africa Group (GAG) in 2015 fitted well with the scope and perspective of my research. The WUN GAG builds on existing expertise and international partnerships among WUN members, in Africa and abroad, to identify sustainable and equitable solutions to critical local, regional and global challenges of relevance to Africa. The plan of the WUN GAG to establish regional hubs in eastern, southern and western Africa – anchored at the universities of Nairobi, Cape Town and Ghana – supports my research focus but also offers me the chance to work with scholars in these regions.

Looking at the five priority areas of the WUN GAG – which are environmental change and food security; public health; governance, inequality and social inclusion; higher education and research capacity; and natural resources for inclusive growth and sustainable development – UCT has expertise in all of them. I was excited to see that the network has endorsed a research theme on Africa's natural resources, which I have been passionate about for many years for three main reasons.

> Africa's natural resources have been a blessing but also a curse.

First, Africa's natural resources have been a blessing but also a curse. In the sense that, although the continent is endowed with abundant natural resources necessary for its development, competition for these resources by both local and international actors have caused many conflicts, and contributed to political instability in many African countries. Second, the ownership of resources and how they are accessed remain crucial to Africa's development because they hugely affect the livelihoods of ordinary people. Third, the theme offers opportunities for scholars to contribute to the refinement of resource policies for Africa's development.

It is my hope that the WUN GAG will play its role in creating – as outlined in the African Union's Agenda 2063 – The Africa We Want.

Professor Maano Ramutsindela is the deputy dean of the Faculty of Science at UCT and co-chair of the WUN Global Africa Group.

Africa and the Sustainable Development Goals

WUN's Global Africa Group has a publishing contract with Springer for a pivotal new book: *Africa and the Sustainable Development Goals*. It will be co-edited by co-chairs of the WUN GAG, Professor Maano Ramutsindela (UCT) and Dr David Mickler (University of Western Australia).

In this book, authors across WUN member universities explore themes pertinent to human development in 21st-century Africa. This book intersects with the African Union's Agenda 2063 and the UN 2030 Agenda for Sustainable Development.

RESOLVING GLOBAL CHALLENGES

WUN research projects

WUN brings together researchers and resources from universities around the world to develop solutions to global problems that can't be solved by one institution. These are some of the 45 international projects that UCT researchers are involved in via WUN.

Understanding globalisation: margins and peripheries

Globalisation, migration, and their social and cultural consequences are experienced across the urban and rural divide in both the global north and south. Yet research into globalisation and migration remains largely limited to urban metropoles, primarily in the so-called 'developed world'.

This interdisciplinary project seeks to better understand the complex processes of globalisation in rural and peri-urban areas, with a particular focus on developments in the global south. The project traces the cultural effects of globalisation through the lenses of consumption and production, on one hand, and language, on the other.

UCT researcher: Ana Deumert (academic lead)

UCT | Maastricht University | University of Sheffield | University of Sydney | University of Western Australia | University of York

Resilience in youth and service providers

The WUN Resilience Working Group includes two thematic projects: the Youth Resilience Core Global Project and the Resilience in Service Providers in Public Health Project. Here, resilience describes positive adaptation to adversity in the context of a particular population or culture. Both working groups aim to understand how resilience compares among young people from different cultures, the factors that contribute to resilience, and to explain why and how service providers adjust positively to occupational adversity over time. Their overall goal is to use the understandings to enhance support systems and design interventions.

UCT researcher: Steve Reid (academic lead)

University of Auckland | UCT | Chinese University of Hong Kong | University of Leeds | University of Sheffield | University of Sydney | University of Western Australia | University of York

Immune responses underlying Chronic Obstructive Pulmonary Disease pathology

Chronic obstructive pulmonary disease (COPD) describes a common set of lung diseases that are largely untreatable and affect more than 80 million people mainly in low- and middle-income countries. A patient's history of past infections appears to be important in initiating or preventing the changes to lung tissue that drive such diseases.

This research collaboration is investigating how infections with parasites can protect against the lung remodelling of infections which predispose us to COPDs. To address this complex question, this research collaboration is conducting complementary clinical and basic immunological studies alongside major epidemiological studies on lung health.

UCT researcher: Bill Horsnell (academic lead)

University of Bergen | UCT | University of Southampton

IMAGE: Abraham Ortelius [public domain] via Wikimedia Commons

Indian Ocean Archaeology Network

Archaeological evidence indicates that the Indian Ocean has been a key region of cultural interaction and trade for around 2 000 years. This network is exploring the long-term history of trade and interaction across the region to answer a key question: How did African plants and animals get to India? The network allows archaeologists working around the Indian Ocean to develop links between existing projects, researchers and postgraduate students to create a framework for collaboration. A focus will be threats to the region's archaeological heritage, especially in coastal and island communities affected by climate change.

UCT researcher: Shadreck Chirikure

University of Bristol | UCT | University of Southampton | University of Sydney | University of Western Australia | University of York

Healthy-Polis: developing urban lifecourse approaches in response to climate change

This project brings together researchers, practitioners and stakeholders from environmental science, public health, urban planning, geography and local government. Together they are studying two concepts within the research agendas of climate change and urban health: Future Cities and Healthy Cities. The collaborators will improve our understanding of the combined impact of climate change and non-communicable diseases in urban areas, and the design of effective adaptation interventions.

Future Cities involves architects and planners using a set of qualitative approaches, whereas Healthy Cities focuses on promoting healthy lifestyles for an urban population increasingly under pressure to mitigate and adapt to climate change.

UCT researcher: Andrea Rother

University of Auckland | University of Bristol | UCT | Chinese University of Hong Kong | Maastricht University | University of Sydney | University of Western Australia

5 QUESTIONS WITH Floretta Boonzaier

Floretta Boonzaier, an associate professor in the Department of Psychology at UCT, is driven by a belief that research has the ability to make a difference. Her research spans feminist, critical and postcolonial psychologies, as well as subjectivity – especially in relation to race, gender and sexuality and gendered violence.

1 Could you give us a snapshot of your research?

My research in the field of gendered violence interrogates the ways in which gender, race, location and identity are implicated in violence and how they are represented in media and popular ideas about violence.

2 Why are you passionate about this area of research?

My research allows me to work against representations on violence and marginalised people, representations that include me, as a black woman from a working-class background.

3 What is the most enjoyable part of doing research?

I especially enjoy doing research that provides the opportunity for collaboration. Research and writing can be a lonely endeavour, so the opportunity to engage with others in your field can be hugely enriching and my experience suggests that it advances innovative, creative and novel scholarship.

I especially enjoy opening collaborative spaces through supervision of master's and doctoral students and have often learned more from the students I supervise rather than the other way around.

4 What has been the practical impact of your research?

Ending men's violence towards women is a key concern, not only for women's well-being, but for the well-being of society as a whole. South Africa is notorious for its excessively high levels of gendered violence. My work has made practical recommendations for ending men's violence and contributing to gender equity that have been taken up by a number of organisations.

5 Do you have any advice for young, future psychology researchers?

Pursue research interests that drive and sustain your passions – but also look around you and consider the contexts in which you work and what your work might be doing at the level of ethics, politics and representation.

It is important to think critically and to reflect on the ethical and political impact of your research – regardless of the 'kind' of psychology you end up doing. The contexts in which we work as researchers and psychologists – that involve deepening global and local inequalities, growing legitimised and institutionalised forms of racism, sexism, misogyny, homophobia, transphobia, and increasing poverty and dispossession – demand that we think carefully about how or whether our work advances social justice. U

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