CLIMATE ACTION EDITION

UJ INSIGHT

April 2026

Innovative construction technologies advancing climate-resilient, low-carbon housing

Reimagining Community Water Security Through Climate Action

Harnessing climate-resilient food systems to support sustainable nutrition

Inside UJ's Climate Action Plan

and the transition to sustainable energy

UNIVERSITY OF JOHANNESBURG

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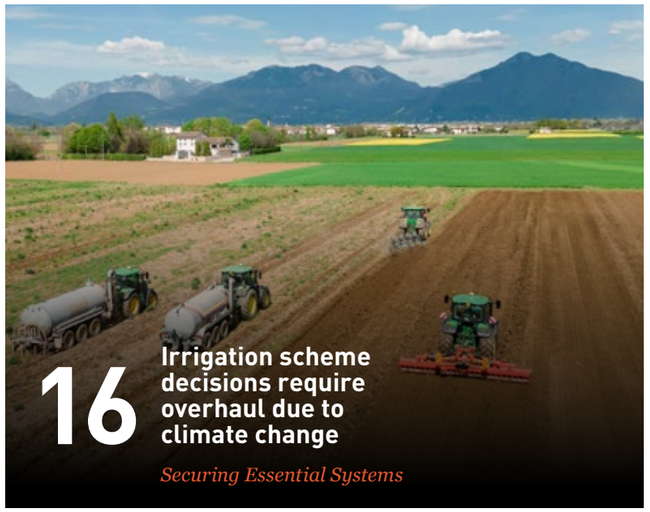

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21 YEARS OF IMPACT

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Editorial Team
Prof Bongani Ngqulunga;
Dr Phumelela Dhlomo;
Priyal Pillay; Lebogang Seale

Contributors
Mpiletso Motumi
Masego Panyane
Herman Esterhuizen
Therese van Wyk

Photography
Nokuthula Mbatha

Design
Purebrown Design

go2uj
university_of_johannesburg
go2uj
ujyoutube
university-of-johannesburg

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Inside UJ's Climate Action Plan and the transition to sustainable energy

As climate pressures intensify globally, the University of Johannesburg is taking decisive steps to reduce its environmental footprint and model a more sustainable future for higher education.

At the centre of this ambition is UJ's Climate Action Plan — a comprehensive, institution-wide strategy aimed at achieving net-zero carbon emissions by 2050. More than a policy framework, it is a practical roadmap that integrates infrastructure, research, teaching and partnerships to drive measurable impact.

A campus-wide commitment to net zero

UJ's climate agenda is guided by its Energy, Resource, Waste and Sustainability (ERWS) Plan (2022–2025), which prioritises reducing emissions, improving resource efficiency and embedding sustainability into everyday operations.

The plan aligns closely with the United Nations Sustainable Development Goal 13 on Climate Action, positioning the University as an active contributor to global climate solutions.

"Our approach is not only about reducing emissions," the University notes. "It is about rethinking how institutions operate, teach and engage with society in a climate-constrained world."

Scaling renewable energy

One of the most visible expressions of this commitment is UJ's investment in solar energy infrastructure.

Across its campuses, the University has installed approximately 4,450 solar panels on rooftops and carports, generating over 1,700 kilowatts (kWp) of solar photovoltaic capacity. This system is capable of producing up to 4.3 million kilowatt-hours of renewable energy annually, reducing reliance on the national grid by nearly 9% each year.

Beyond lowering carbon emissions, the shift to solar energy also supports energy resilience in the face of South Africa's ongoing electricity challenges, while reducing operational costs.

From operations to impact

UJ's Climate Action Plan extends well beyond energy generation. It incorporates:

- **Energy efficiency improvements** across buildings and infrastructure
- **Sustainable procurement practices**
- **Waste reduction strategies,** including recycling and composting
- **Sustainability reporting**, guided by Global Reporting Initiative (GRI) standards

These interventions ensure that sustainability is embedded across the full institutional value chain — from procurement to waste management.

A living laboratory for learning

Importantly, UJ's sustainability initiatives are not confined to operations. They serve as living laboratories for students and researchers.

The solar installations and broader sustainability projects provide hands-on learning opportunities, enabling students to engage directly with renewable energy systems, climate science and green technologies. At the same time, academic programmes and research initiatives increasingly focus on climate resilience, environmental management and sustainable development, often in collaboration with external partners and NGOs.

Partnerships for a sustainable future

UJ's climate ambitions are strengthened through strategic collaborations. The University has secured significant international funding — including a €1.8 million grant — to expand its climate action initiatives and deepen its research and implementation capacity.

These partnerships reinforce UJ's role as a knowledge hub and implementation partner, bridging the gap between research and real-world impact.

Leading by example

As universities globally grapple with their role in addressing the climate crisis, UJ's approach reflects a broader shift — from passive knowledge production to active societal leadership.

From the Desk of the Vice-Chancellor

Positioning Societal Impact at the Heart of Vision 2035

> **"Universities cannot exist in isolation from the societies they serve."**

UJ Strategy 2035

UJ's strategic vision positions the University as:

- An **international university of choice**
- **Anchored in Africa and the Global South**
- Focused on **societal impact and sustainability**
- Advancing **innovation through human-centred technology**

Imagine a university where technology, research and innovation are seamlessly integrated to drive meaningful societal change — where collaboration with communities, government and industry is not peripheral but central to the institution's mission.

This is the vision that guides the University of Johannesburg (UJ).

At UJ, research extends far beyond journal publications and academic outputs. It translates into tangible impact — improving lives in communities across South Africa and beyond. We believe knowledge is only truly meaningful when it contributes to positive and lasting change.

The late anti-apartheid activist and former Speaker of the National Assembly, Frene Ginwala, once observed that universities, as publicly funded institutions, must not only expand the national knowledge base through teaching and research, but must also respond to the needs and expectations of society. That insight remains profoundly relevant today, particularly in a world confronted by complex and interconnected challenges such as climate change, inequality, food insecurity and rapid technological transformation.

At UJ, this understanding informs how we approach our work as a modern African university.

Guiding our efforts is UJ's Strategic Plan 2035, which builds on the University's earlier focus on the Fourth Industrial Revolution while placing societal impact and sustainability firmly at the centre of our institutional vision. The strategy positions UJ as an international university of choice, anchored in Africa and the Global South, and dedicated to shaping a sustainable future through innovation, collaboration and human-centred technology. Across our faculties, research centres and institutes, UJ continues to demonstrate how universities can contribute meaningfully to addressing some of society's most pressing challenges. By working closely with partners in government, industry and civil society, we are able to translate research and innovation into practical solutions that improve lives and strengthen communities.

Recent events have once again highlighted the importance of preparedness, collaboration and shared expertise in responding to crises. UJ staff members were recently deployed to Mozambique as part of a humanitarian disaster response mission, contributing specialised rescue, aviation and coordination expertise to communities affected by severe flooding. Their involvement reflects the growing importance of interdisciplinary training and collaboration in addressing disasters that increasingly accompany climate change.

The deployment also demonstrates how investments in education and training can have immediate real-world impact. Facilities such as the University's Advanced Rescue Simulation Centre are designed not only to enhance academic learning but also to strengthen the capacity of professionals across the region to respond effectively in times of crisis.

Closer to home, UJ's partnerships with communities across South Africa continue to demonstrate how sustained engagement can unlock new opportunities for development, education and social progress. These collaborations reflect a recognition that universities do not exist in isolation; they are embedded within broader social ecosystems and share a responsibility to contribute to their advancement.

As the Nigerian economist and academic T.M. Yesufu once observed, an African university must not only pursue knowledge for its own sake, but also contribute to improving the conditions of life and work of ordinary people. In other words, universities must play an active role in social transformation and the development of human potential.

For us at UJ, positioning societal impact at the heart of our strategy therefore requires a fundamental shift in perspective. It means moving beyond the traditional question of "What are we good at?" and asking a deeper and more important one: "What are we good for?"

This shift calls for a more integrated approach to teaching, research and engagement — one that recognises the interconnected nature of the challenges we face. Whether addressing water scarcity, advancing sustainable technologies, strengthening education systems or supporting disaster preparedness, universities have a critical role to play in shaping a more resilient and inclusive future.

Through Strategy 2035, UJ is committed to ensuring that our research, innovation and partnerships continue to contribute meaningfully to this goal. By aligning academic excellence with societal relevance, we aim to demonstrate how universities can serve as powerful catalysts for sustainable development, innovation and human progress.

Professor Letlhokwa George Mpedi
Vice-Chancellor and Principal
University of Johannesburg

Driving Green Mobility: Inside the Electric Vehicle Innovation Centre

As South Africa confronts rising fuel costs, grid instability and mounting pressure to decarbonise its transport sector, the University of Johannesburg (UJ) is stepping firmly into the electric mobility arena.

Through the Centre for Automotive & Electric Vehicle Innovation (CAEVI), UJ is building a high-impact, multidisciplinary platform that moves beyond research papers to real-world implementation, reducing carbon emissions, stimulating green industrialisation and positioning South Africa as a serious player in Africa's electric vehicle transition.

Hosted within UJ's Faculty of Engineering and the Built Environment, CAEVI is far more than a conventional research centre. It is an action-driven implementation platform that brings together engineering, artificial intelligence, battery science, policy research and community development to tackle one of the country's most urgent priorities, the transition from internal combustion engines to a competitive, locally driven and sustainable electric mobility ecosystem.

"South Africa cannot afford to be a spectator in the global EV revolution,"

says Dr Samuel Gqibani, Head of the School of Mechanical and Industrial Engineering and Director of UJ's CAEVI.

"We must develop local solutions, build local skills and create a mobility system that is cleaner, more affordable and inclusive. The transition to electric mobility must be engineered in South Africa, for South Africa, in ways that strengthen our economy, empower our communities and advance long-term environmental sustainability."

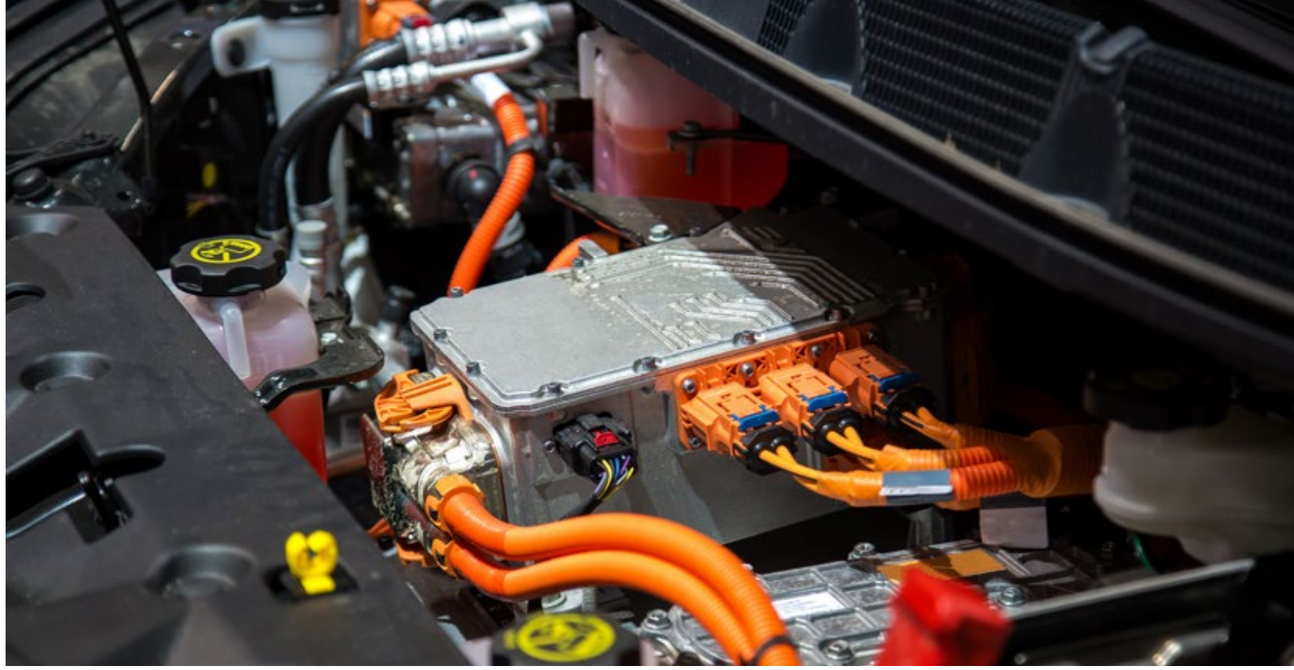
He adds that electric mobility is not only a technological shift but a societal one. "If we get this right, we will reduce carbon emissions, unlock new industrial opportunities, create jobs for young engineers and technicians, and ensure that the benefits of the green transition reach communities that have been historically excluded from high-technology sectors."

Turning research into road-ready solutions, CAEVI is confronting barriers such as EV adoption and the high cost of imported electric vehicles. Rather than waiting for global prices to decline, the Centre is advancing conversion engineering that transforms existing petrol and diesel vehicles into electric alternatives. This approach reduces lifecycle emissions, extends vehicle lifespan and provides a practical, cost-effective pathway to electrify public transport fleets and small logistics operators, while simultaneously strengthening local manufacturing capability, stimulating industrial growth and accelerating technical skills development.

Building Skills, Capacity and Communities

The Centre's research spans the full electric mobility ecosystem, including advanced battery diagnostics and thermal management, second-life battery applications, vehicle-to-grid systems, smart charging technologies and AI-powered vehicle management platforms.

"If we get this right, we will reduce carbon emissions, unlock new industrial opportunities, create jobs for young engineers and technicians, and ensure that the benefits of the green transition reach communities that have been historically excluded from high-technology sectors."



It also interrogates the economic, regulatory and industrial dimensions of EV adoption to ensure that technological innovation translates into national competitiveness, sustainable job creation and practical policy implementation.

Notably, the Centre's work is already translating into tangible, hands-on innovation.

Dr Gqibani explains, "One of our most significant current projects is the full conversion of a petrol-powered tuk-tuk into an electric vehicle. This is a deliberate intervention that responds directly to South Africa's affordability challenge in the EV market. We are demonstrating that electric mobility does not have to depend on expensive imports. It can be designed, engineered and assembled locally."

He adds, "The project involves a complete systems overhaul, from powertrain integration and battery architecture to thermal management, charging solutions and solar energy integration. It is being executed according to rigorous engineering standards, safety protocols and regulatory requirements. What makes it powerful is not only the technical outcome, but the message it sends. It proves that sustainable mobility can be practical, scalable and economically relevant, while building local expertise and advancing our climate commitments."

The project also functions as a live training laboratory. Students, technicians and emerging researchers are directly involved in design, procurement, integration, testing and commissioning, embedding skills transfer into every stage of development. In this way, the initiative advances sustainability not only environmentally, through reduced emissions, but socially, by equipping young engineers and artisans with future-focused capabilities, expanding technical capability and opening pathways into the green economy.

Beyond this initiative, the University of Johannesburg has already demonstrated its institutional commitment to decarbonisation through the introduction of electric buses across its campuses, significantly reducing transport-related emissions. The Centre for Automotive & Electric Vehicle Innovation (CAEVI) is strengthening this momentum by advancing research on smart charging systems, grid stability, renewable integration and fleet optimisation to ensure that electrification efforts are not only environmentally responsible, but technically robust and economically sustainable at scale.

Dr Gqibani concludes, "Over the next five years, we intend to support at least 10 municipalities with structured EV infrastructure planning and contribute to the conversion of more than 200 vehicles through focused pilot programmes. Through technical bootcamps, high-voltage EV certification courses and township-based workshops. We also aim to train more than 1,000 youth and technicians annually. This is about building real capacity on the ground and ensuring South Africa is ready for a just and inclusive energy transition."

He adds, "Electric mobility must translate into measurable impact. It must reduce emissions, unlock industrial opportunity and create sustainable livelihoods. Our work is about turning innovation into practical solutions that strengthen communities and drive long-term environmental and economic resilience."
The Centre is in collaboration with Nissan South Africa, Automotive Industry Development Centre (AIDC), Central Johannesburg College (CJC), UJ PEETS, Resolution Circle and the Faculty of Art, Design and Architecture (FADA).

CAEVI by the Numbers

200+ vehicles
to be converted over 5 years

1,000 youth/ technicians
trained annually

10 municipalities
supported with EV planning

"The project involves a complete systems overhaul, from powertrain integration and battery architecture to thermal management, charging solutions and solar energy integration. It is being executed according to rigorous engineering standards, safety protocols and regulatory requirements. What makes it powerful is not only the technical outcome, but the message it sends. It proves that sustainable mobility can be practical, scalable and economically relevant, while building local expertise and advancing our climate commitments."

"Electric mobility must translate into measurable impact. It must reduce emissions, unlock industrial opportunity and create sustainable livelihoods. Our work is about turning innovation into practical solutions that strengthen communities and drive long-term environmental and economic resilience."

Securing Africa's Water Future

How UJ's Water and Health Research Centre is advancing climate-resilient water quality solutions

The Water and Health Research Centre (WHRC) at the University of Johannesburg (UJ) serves as a vital link between environmental science and public health. Led by Director Professor Tobias Barnard, the centre is dedicated to developing innovative solutions that are centred on Africa's unique challenges regarding water scarcity and contamination. Its mission is to ensure that the fundamental right to clean water becomes a reality for everyone.

The WHRC is currently spearheading several high-impact projects that leverage the Fourth Industrial Revolution (4IR) and simple homemade technology to address South Africa's water quality backlogs:

- **Integrated Mobile Water Laboratory:** A flagship project funded by the Technology Innovation Agency and the Water Research Commission (WRC). It features a mobile laboratory equipped for working in remote areas without access to water and electricity, using a combination of solar power and a generator to run the lab. Drone technology was added with the help of Drobotics using winch systems to submerge digital biosensing probes into water sources to test water physicochemical parameters remotely. A self-sealing water sampling bag was designed to collect water with the drone for microbiological analysis in the mobile laboratory.

- **Fast isolation of bacterial pathogens for disease surveillance:** Working with colleagues in the Faculty of Health Sciences, the WHRC is developing a rapid bacterial capturing system for the targeted isolation of diarrhoea-causing bacteria from water sources, to assist with the wastewater epidemiological surveillance in the future.

- **Point-of-care bacterial identification:** Funded by the WRC, they developed a water test that works like a pregnancy test to identify targeted bacteria in water.

- **Hand wash station:** A low-tech solution to hand hygiene is the hand wash station. Made from a 2-litre bottle and a syringe, it allows up to ten people to effectively wash their hands with 2 litres of water.

- **Fast instant results hand wash test:** The research team continues to do hygiene training in communities and schools to help train people to effectively wash hands using an instant gratification approach with a fluorescent compound. The aim is not only to train effective hand washing procedures, but also to show the impact of hand hygiene on water contamination of stored water.

While the WHRC is naturally aligned with SDG 6 (Clean Water and Sanitation), its work is deeply rooted in SDG 13. Climate change disproportionately affects water cycles, leading to unpredictable droughts and flash floods that compromise water safety.

The WHRC addresses this by:

- Strengthening Resilience: By providing tools for rapid water testing, the centre helps communities adapt to climate-related hazards where traditional water infrastructure might fail.

- Climate Adaptation For Health: Their hygiene training and hand-wash station help communities stay safe during adverse climate events and when there are disruptions in water provision.

The WHRC is a primary vehicle for UJ's Strategic Plan 2035, specifically aligning with the university's core themes of Innovation, Impact, and Inclusivity:

1. Innovation and 4IR: By integrating drone technology and deep learning generated analytics for water monitoring, the WHRC embodies UJ's goal to be a leader in the Fourth Industrial Revolution.
2. Societal Impact: The centre's focus on rural and non-sewered communities ensures that research is not confined to the lab but has a direct, tangible impact on human health and dignity.
3. Purposeful Collaboration: Through partnerships with other institutions like Stellenbosch University and private tech startups (Drobotics), the centre reflects UJ's commitment to collaborative pursuit of knowledge

Reimagining Community Water Security Through Climate Action

UJ's work in Limpopo and the Eastern Cape is building climate-resilient water systems and empowering communities to adapt to a changing environment.

Across South Africa's rural landscape — from the heritage village of Buysdorp in Limpopo to the coastal communities of the OR Tambo District in the Eastern Cape — access to safe drinking water remains uneven, uncertain, and often invisible until crisis strikes. At the University of Johannesburg (UJ), two distinct yet complementary initiatives are redefining what water security means: community-embedded science in Buysdorp, and solar-powered atmospheric water generation in the Eastern Cape. Together, they demonstrate how research, technology, and trust can converge to transform lives.

Buysdorp, Limpopo: Science in Service of Heritage

In Buysdorp, a small heritage settlement in Limpopo's Vhembe District, families have long relied on springs, boreholes and irregular deliveries. For years, water was consumed without certainty — if no one fell ill, it was assumed to be safe.

Under UJ's Global Excellence and Stature 4.0 (GES 4.0) framework, a multidisciplinary team led by Dr Lee-Ann Sade Modley, Senior Lecturer in Environmental Management, launched the Buysdorp Water Security Project to change that narrative.

Water samples from springs and boreholes were analysed for microbial contamination, turbidity and chemical pollutants — establishing baseline data for the first time. The results now guide risk management, purification education and long-term planning.

> "We are not just testing water — we are building confidence, literacy and long-term resilience."
>
> — Dr Lee-Ann Sade Modley

Beyond laboratory science, hydrogeological assessments are underway to determine groundwater viability through aquifer mapping and sustainable borehole planning.

But what distinguishes the project is its community-first design. Residents share Indigenous Knowledge about rainfall patterns, soil behaviour and spring preservation. This knowledge is being digitally preserved and translated into animated science communication tools — ensuring that water literacy reaches both elders and schoolchildren.

For lifelong resident George Izak Chalmers, the impact is deeply personal:

> "Now we know our water is safe. Water is life — and we can protect it for the next generation."

The project's next phase includes school-based youth programmes, digital storytelling tools, continued groundwater feasibility studies, and a policy brief for local and provincial authorities — positioning Buysdorp as a living model of inclusive, research-led water governance.

OR Tambo District, Eastern Cape: Harvesting Water from Air

While Buysdorp focuses on testing and stewardship, UJ's Process, Energy & Environmental Technology Station (UJ PEETS) has taken a technological leap in the OR Tambo District.

In partnership with SOURCE Global and UJ's Faculty of Health Sciences – Water and Health Research Centre (WHRC), 400 solar-powered hydropanels were installed across four villages — including schools in Mthambalala and Cutwini — bringing clean drinking water directly to more than 1,000 community members.

Led by Dr Kousar Hoorzook, the initiative generates potable water from atmospheric vapour using solar energy — independent of reticulated supply systems.

> "We identified villages with no realistic prospect of infrastructure investment. The technology had to meet the community where it is."
>
> — Dr Kousar Hoorzook

The project goes beyond installation. Training programmes addressed system operation, vandalism prevention, hygienic water collection and safe storage practices. Emphasis was placed on empowering women, children, elders and persons with disabilities — those most burdened by water collection.

Funded by the Chan Soon-Shiong Family Foundation (USA), the initiative demonstrates how philanthropic partnership, university research capacity and renewable technology can converge for scalable impact.

One University, Multiple Pathways to Impact

Though different in method, both initiatives reflect UJ's research ethos: socially responsive, interdisciplinary and future-facing.

In Limpopo, impact begins with data, trust and co-produced knowledge.

In the Eastern Cape, impact begins with technology that generates water from air. In both cases, communities are not passive beneficiaries — they are collaborators, custodians and co-designers of solutions.

Building the Future

Driving climate-resilient urban development and low-carbon construction solutions

In the fast-changing world of building and housing across the Global South, one group stands out for its focus on new ideas and green living. Based at the University of Johannesburg (UJ), the Sustainable Human Settlement and Construction Research Centre (SHSCRC) is changing how we think about infrastructure. We took a closer look at this important center and the work of its Director, Professor Clinton Ohis Aigbavboa.

The SHSCRC is much more than just a research department. It is a powerful engine for improving both the construction industry and university learning. The Centre is home to the South African Research Chair in Sustainable Construction Management and Leadership, as well as the Construction Industry Development Board (CIDB) Centre of Excellence. Under the leadership of Prof Aigbavboa, an expert in digital construction and a top-rated scholar, the Centre operates within UJ's Department of Construction Management and Quantity Surveying.

The Centre has a clear and bold goal: to be a world-famous research hub that creates top-quality technology and ideas for sustainable building projects, no matter where they are located. This global vision matches Professor Aigbavboa's own background, which includes advanced training in Artificial Intelligence from MIT and Good Governance from UNISA. He uses this expertise to lead projects that solve real-world social and economic problems through careful study.

The Centre's impact can be seen in its many projects. For example, it studied why construction tenders are often canceled in South Africa and how that hurts the industry. Other important work includes the Global Excellence and Status 4.0 Project, which helps companies adopt digital tools, and international training on ventilation systems in Hong Kong. The Centre also works on the ADAPTT program, which helps university staff earn their doctoral degrees and promotes growth within the academic community.

Beyond South Africa, the SHSCRC has worked on creating 'green jobs' in Zambia for the International Labour Organisation (ILO) and contributed to a United Nations report on wealth and job creation. The true success of the Centre is shown through its people; so far, Professor Aigbavboa has supervised more than 100 PhD and 170 Master's students. With over 1,000 published works and 40 books to his name, he ensures the SHSCRC stays at the forefront of building better, more sustainable communities for everyone.

The SHSCRC is much more than just a research department. It is a powerful engine for improving both the construction industry and university learning. The Centre is home to the South African Research Chair in Sustainable Construction Management and Leadership, as well as the Construction Industry Development Board (CIDB) Centre of Excellence.

Irrigation scheme decisions require overhaul due to climate change

Shifting weather patterns and water scarcity are driving the need for smarter, climate-resilient irrigation strategies.

As weather patterns change in sub-Saharan Africa due to climate change, more small farmers watch their crops wither in the fields, wishing for rain, hoping for relief from the looming financial disaster caused by failed harvests. In some areas, irrigation schemes can combat the risk.

However, the decision-making on where to install irrigation needs an urgent overhaul, says Prof Farai Nyabadza from the University of Johannesburg (UJ). "Often the poverty and drought levels of an area are simply added together to decide, but a much more sensitive indicator is needed," he adds.

Prof Nyabadza is Head of Department at UJ Mathematics and Applied Mathematics.
The study examined 20 years of recent poverty and drought data in Malawi. Severe droughts lasting several years each have plagued the country during this time.

Poverty multiplies the harm

In the study, Prof Nyabadza and Dr Tichaone Chikore decided to multiply drought data with socioeconomic data in Malawi from 2002 to 2022 to better model how drought hits poor farmers harder. Satellite records and World Bank sources provided the information.
"A well-nourished person who breaks a leg, heals eventually because their body is strong enough. A malnourished person with the same injury can face infection and bones that may never reset correctly. They may not be able to work anymore," explains Dr Chikore.

"The injury is the same, but the outcome is different because poverty multiplies the harm. Drought hitting a community already deep in poverty also multiplies the harm."
Dr Chikore is a Postdoctoral Research Fellow and lecturer of Mathematics at UJ.

> "When you multiply drought by poverty, you are not measuring two problems at once," adds Dr Chikore. "You are measuring how poverty makes every drop of rain that doesn't fall, hit twice as hard."

The model shows the country exceeded its critical irrigation threshold for 10 of those twenty-one years, revealing a chronic, near-permanent drought pressure rather than a sequence of isolated disasters.

"When you multiply drought by poverty, you are not measuring two problems at once," adds Dr Chikore. "You are measuring how poverty makes every drop of rain that doesn't fall, hit twice as hard."

Prof Nyabadza frames the connection between rainfall and survival in stark terms. "When there is drought, you have nowhere to go," he says. "When there is rain, you will always find some alternatives, especially for the poor."

Narrow rain windows

The study's quadrant analysis plots each year according to rainfall and poverty levels.
"When there is no crisis, that is the perfect time to implement irrigation," says Dr Chikore, "so that the pressure is low and there is time, rather than trying to act during an emergency."
In the 20 years studied, only two years (2010 and 2017) had high rainfall and low poverty. Looking at the opposite on the spectrum, the years 2020 to 2022 had low rainfall and high poverty, with irrigation needs that exceeded the critical threshold by up to 100%. During the period 2005 to 2010, need exceeded the threshold by up to 25% for several years.

A single bad drought year can trap families in poverty long after rains return, because those who sold assets to survive a failed harvest have nothing left to plant with when conditions improve.

"For farmers, it is entrapment. You are locked into consecutive years of crisis," says Dr Chikore.

Green poverty

The study's most counterintuitive finding involves years of adequate rainfall that still recorded high poverty. The researchers call this the Inequity Risk Zone. Rain fell, but communities remained poor, pointing to structural failures including broken markets, absent storage infrastructure, and inequitable land access.

The study's decision-making framework currently operates at the national level. The next phase of the research will apply the index at district level, starting with Machinga in southern Malawi. In that area, decades of harvest data and contrasting agroclimatic conditions offer a natural experiment.

If that future validation succeeds, the index will be a precision tool that can direct investment in irrigation to the exact places and seasons where compounding crisis is most acute.

Powering Sustainable Transport: UJ's Electric Buses in Action

When UJ rolled out its first electric buses in 2023, it made history — becoming the first South African university to deploy electric vehicles (EVs) for inter-campus transport. What started as an ambitious pilot has since grown into a bold commitment to sustainable mobility: by 2028, UJ plans to replace its entire diesel fleet with 17 electric buses.

A quiet revolution on wheels

On 16 May 2025, the university unveiled two additional electric buses, bringing the fleet to five. These buses do more than reduce emissions — they reinvent campus transit. Passengers riding the EVs have noted their near silence; the hum of the air-conditioning is often the loudest element.

The buses carry up to 76 people (57 seated, 19 standing) and are outfitted with modern features: USB ports, CCTV cameras, and internal stop buttons. Their range is robust — up to 400 km on a single charge — making them suitable for long inter-campus routes. One of the most striking differences is operating cost. The electric buses cost roughly R1 per kilometre, compared to diesel buses which cost over R12 per kilometre. The lower maintenance burden further strengthens the financial case for electrification.

> These buses do more than reduce emissions — they reinvent campus transit. Passengers riding the EVs have noted their near silence; the hum of the air-conditioning is often the loudest element.

Scaling for 2028 and beyond

The expansion plan is ambitious but methodical: UJ intends to buy four electric buses annually through 2028 to phase out the diesel fleet entirely. The institution expects that battery supply will be the major constraint, since 60 % of bus components can be sourced locally but battery modules are imported.

To power this transformation, UJ is scaling its solar capacity and exploring on-campus charging infrastructure, mitigating reliance on Eskom during load-shedding.

Why It Matters

The electric bus initiative is about more than just better transport. It touches on multiple strategic aims:

- **Sustainability & carbon reduction:** Transport contributes a measurable share of campus emissions, and electrification shrinks that footprint.
- **Health & comfort:** Quiet, smooth rides reduce noise and air pollution exposure.
- **Institutional credibility:** UJ's commitment signals that the university is not just educating in the era of 4IR — it's acting within it.
- **Operational savings:** Lower fuel and maintenance costs free up resources for further innovation.

As a student rider put it: "The ride is so smooth … I'm used to buses being loud."

Challenges & Considerations

The path isn't without obstacles. Load-shedding remains a serious risk to charging schedules. UJ addresses this by planning solar back-up and redundant charging times. The global battery supply chain is another vulnerability; UJ seeks to offset this through local manufacturing strategy and smart procurement.

Another consideration: the source of electricity. If buses are charged using coal-heavy grid power, the emissions reductions are less dramatic. That is why solar expansion and grid cleaning are integral parts of UJ's long-term sustainability strategy.

Driving Forward

UJ's electric bus programme is a powerful example of technology in service of mission. It demonstrates that institutional structures — logistics, funding, infrastructure — can be reimagined to align with the vision of a greener, smarter university.

As UJ accelerates toward 2028 and beyond, the electric bus fleet will become a living symbol of how innovation isn't just in the labs or classrooms — it's on the roads, ferrying students, reducing emissions, and transforming the daily rhythms of campus life.

Praise for UJ's Pioneering 3D Housing Print Project

Innovative construction technologies are advancing climate-resilient, low-carbon housing

The University of Johannesburg's (UJ) groundbreaking 3D Housing Print Project took centre stage at the 2025 National Construction Summit in Boksburg yesterday, with State President, Honourable Cyril Ramaphosa touring its exhibition site.

The Summit, hosted by the Construction Industry Development Board (CIDB) in partnership with the Department of Public Works and Infrastructure (DPWI), is more than just a gathering. It is a national call to action to prioritise delivery, accountability, ethical leadership, and performance in construction, one of the most critical industries in the world. This year's two-day summit was held under the theme: *Unlocking Infrastructure Delivery for South Africa*, which is both a reflection and a rallying point for quality in the delivery of service. On Day One of the summit yesterday, UJ became the centre of attention because of its pioneering 3D Housing Printing Project on display. Such was its popularity that it also caught the attention of President Ramaphosa.

During his engagement with the UJ team, the President expressed great enthusiasm for construction 3D Printing as a technology of the future. He engaged keenly with the demonstration, inquiring about the cost of the 3D printer, the comparative cost of construction versus traditional methods, and the types of materials used in the printing process.

> "As UJ, we are proud to stand at the forefront of technological innovation that directly addresses South Africa's housing and infrastructure challenges"

The President also showed a strong interest in the academic dimension of the project — particularly the involvement of undergraduate and postgraduate students who are contributing to advancing this pioneering research. The 3D printer uses a specific type of cement that dries faster than normal cement used in the construction industry. It can print almost any structure. It can complete a full house in one day – quicker than traditional construction. For any additional elements, such as a bench or pot for the garden, the design is simply loaded into the machine, which then creates it out of the cement.

Professor Jeffrey Mahachi, Head of the School of Civil Engineering and The Built Environment at UJ said the University was honoured to have the President engaging with our groundbreaking 3D Housing. "Our engagement with the President at the National Construction Summit affirms UJ's commitment to research that delivers real, tangible impact — innovation with purpose. As UJ, we are proud to stand at the forefront of technological innovation that directly addresses South Africa's housing and infrastructure challenges, he said.

Added Prof Mahachi: "Through our Sustainable Materials and Construction Technologies (SMaCT) Research Centre, we have demonstrated how Construction 3D Printing can transform the way we deliver human settlements and infrastructure — faster, more sustainably, and with greater precision. This innovative project showcases the faculty's commitment to advancing sustainable, rapid, and affordable housing solutions through technology and engineering excellence."

The National Construction Summit is a collaboration between academia, the Department of Science, Technology and Innovation, and the Construction Industry Development Board (CIDB). Under the leadership of Minister of Public Works and Infrastructure, Dean Macpherson, the Summit reflects the collective will to do better, and the pressing need to turn plans into progress, and policies into projects.

UJ and Rescue South Africa

Showcase the Power of Global Partnerships in Disaster Response

This collaboration highlights how cross-border partnerships strengthen climate resilience and rapid response in Mozambique.

Global partnerships are critical to strengthening disaster relief and humanitarian response. This was the overarching message when the University of Johannesburg (UJ) welcomed back staff members recently deployed to Mozambique as part of an emergency disaster response mission. The six-person team was mobilised under the banner of Rescue South Africa, contributing specialised rescue, aviation and coordination skills to support relief efforts in flood-stricken areas of Mozambique.

Speaking at an intimate debriefing session, UJ Vice-Chancellor and Principal, Letlhokwa Mpedi, reflected on the rapid real-world impact of the University's newly launched Rescue Simulation Centre.

"When the Centre was launched about three months ago, I was asked what impact it would make. My response was that, given the rise in disasters linked to global warming, this facility would play an important role. Little did I know that we would see its impact so soon, with our colleagues deployed to Mozambique," he said.

While expressing hope that such disasters would become less frequent, Prof Mpedi acknowledged the reality of a changing climate. "The truth is that global warming will require more well-trained rescuers. There will be an ongoing need for skilled professionals and for organisations like Rescue South Africa to work hand in hand with our staff, students and graduates to assist communities in crisis."

Emphasising the importance of collaboration, Prof Mpedi said partnerships with organisations such as Rescue South Africa directly advance UJ's societal impact mandate as outlined in Strategy 2035. "We are grateful for this partnership and invite other like-minded organisations that share our mission and vision to join us in making a meaningful difference," he said.

Connor Hartnady, Acting Manager of the Rescue Simulation Centre and team leader of the Mozambique deployment, described the experience as both challenging and transformative. He said it had opened new opportunities for regional collaboration and positioned the Centre as a potential Southern African Development Community (SADC) hub for excellence.

> "It's not just about helicopters, fuel, water, medicine and food. It's also about coordination and cooperation. Border management, local authorities and emergency services all need to work together so that aid can reach people who are starving and in desperate need"

"We want to strengthen ties with other organisations and private helicopter operators who were part of the response, not only as UJ, but also as Rescue South Africa," Hartnady said. "We want to invite them to train at our facility. This is why the Centre was developed: to become a regional centre of excellence for rescue training in the SADC region."

UJ staff member and deployment specialist Xavier Millar highlighted the urgent humanitarian needs he witnessed on the ground, stressing that effective disaster response depends not only on resources, but also on cooperation.

"It's not just about helicopters, fuel, water, medicine and food. It's also about coordination and cooperation. Border management, local authorities and emergency services all need to work together so that aid can reach people who are starving and in desperate need," Millar said.

Rescue South Africa Chief Executive Officer Aidan Justus expressed his appreciation for the partnership with UJ, describing it as fundamental to the organisation's future impact.

"The only way we are going to make a real difference is through education, and that lies at the heart of what a university represents," Justus said. "UJ's ethos, and the way it invests in the people who will educate and train at the Centre, speaks volumes. This partnership is key to where we are going."

"To UJ, thank you for your partnership. I think this relationship is fundamental to the way that we're moving forward, and the reason that is, is because the only way we're going to make a difference is through education, and that's at the very heart of what a university is. The ethos and the way that UJ go about their business, the way that they invest in the people that are going to be educating at the Centre is testament to that. It is key to where we are going," Justus said.

"The only way we are going to make a real difference is through education, and that lies at the heart of what a university represents"

The Rescue Simulation Centre
Training Africa's Next Generation of Disaster Responders

The University of Johannesburg recently launched South Africa's first Advanced Rescue Simulation Centre, designed to provide high-level training for emergency responders, aviation teams and disaster management professionals.

The facility enables responders to simulate complex emergency scenarios in a controlled environment, helping prepare teams for real-world crises ranging from floods and aviation incidents to large-scale humanitarian emergencies.

The Centre aims to become a regional hub for rescue training across the Southern African Development Community (SADC).

Key Focus Areas

- Advanced rescue training
- Disaster response simulation
- Aviation and helicopter rescue coordination
- Multi-agency emergency preparedness
- Regional capacity building for SADC responders

(Source: UJ News — Launch of the Advanced Rescue Simulation Centre)

Driving a New Era of Smart Mobility and Climate Action

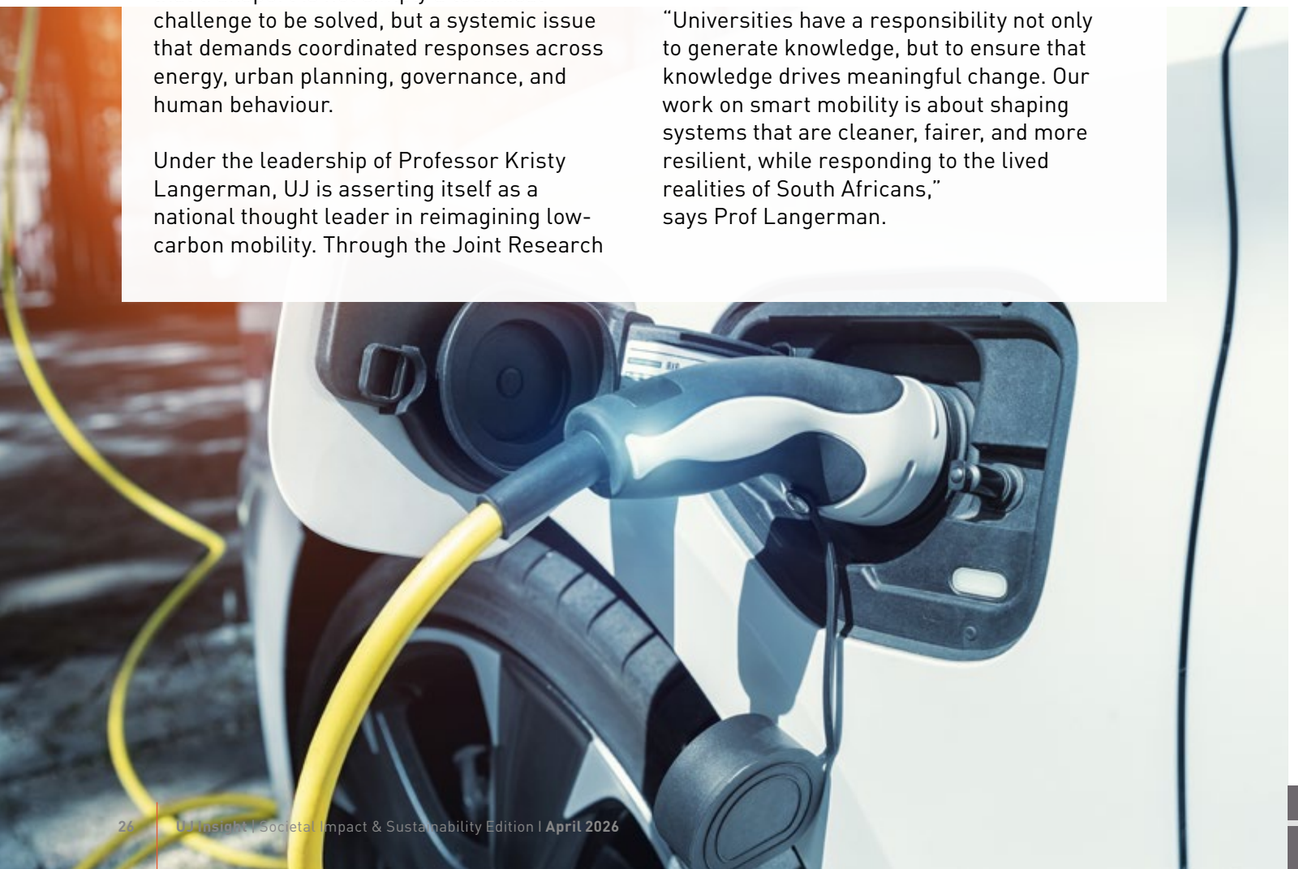
Inside the U's Joint Research Centre on Climate Change and Smart Mobility, advancing low-carbon transport solutions.

Transport is one of the most significant contributors to greenhouse gas emissions, yet it is also among the sectors most exposed to climate disruption. Roads buckle under extreme heat, flooding disrupts already fragile systems, and energy instability complicates the shift to cleaner alternatives. This is not a distant threat; it is a present and intensifying reality.

The University of Johannesburg's Joint Research Centre on Climate Change and Smart Mobility is confronting this reality with urgency and clarity. Aligned with Sustainable Development Goal 13 on climate action, the Centre occupies a critical space where science meets society. It recognises that transport is not simply a technical challenge to be solved, but a systemic issue that demands coordinated responses across energy, urban planning, governance, and human behaviour.

Under the leadership of Professor Kristy Langerman, UJ is asserting itself as a national thought leader in reimagining low-carbon mobility. Through the Joint Research Centre on Climate Change and Smart Mobility, the University is advancing rigorous, interdisciplinary research while actively shaping the direction of public discourse and policy in South Africa. The Centre - a partnership between the Departments of Geography, Environmental Management, and Energy Studies (Faculty of Science); the Process, Energy and Environment Technology Station (UJ-PEETS, Faculty of Engineering and the Built Environment); and the Department of Transport and Supply Chain Management (College of Business and Economics) - reflects an integrated, cross-faculty approach. This is research with intent and consequence, anchored in real-world application and driven by the urgent need for transition.

"Universities have a responsibility not only to generate knowledge, but to ensure that knowledge drives meaningful change. Our work on smart mobility is about shaping systems that are cleaner, fairer, and more resilient, while responding to the lived realities of South Africans," says Prof Langerman.



From this position, UJ is confronting some of the most complex and defining questions shaping the country's future.

Prof Langerman notes that critical questions remain at the centre of this work, including how South Africa can transition to a low-carbon transport system without entrenching inequality; what truly equitable mobility should look like in cities where access to opportunity remains uneven; and how decarbonisation can deliver immediate gains through cleaner air and healthier communities while strengthening long-term climate resilience. "These are not theoretical concerns. They are central to the country's development path, and UJ is actively helping to frame, interrogate, and answer them with the urgency they demand," she says.

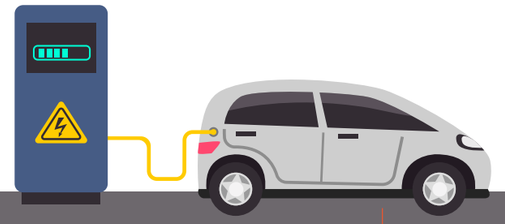
What sets the Centre apart is its deliberate rejection of research that remains confined to theory. Its work consistently moves beyond analysis into action, creating platforms where knowledge is tested, challenged, and refined. This approach is evident in its *Short Learning Programme on Introduction to Green Transport,* offered to government and industry, as well as its related implementation-focused programme. In addition, the Centre has contributed to key sector engagements, including participation in the *Smarter Mobility Africa Summit* and the hosting of a recent *Clean Transport Dialogue*. These initiatives go beyond showcasing concepts. "They engage directly with the realities of delivery, unpacking South Africa's Green Transport Strategy, exploring credible low-carbon pathways, and critically examining how sustainable energy must underpin the future of mobility. It creates a rare and necessary convergence between academia, government, and industry. Policymakers are challenged to engage directly with research, while academics are exposed to the practical constraints, trade-offs, and complexities that shape implementation. In this exchange, ideas are sharpened, assumptions are tested, and solutions emerge that are both credible and actionable."

Beyond emissions, the Centre's work brings into focus the immediate human impact of transport systems. Air pollution remains one of the most pervasive and underestimated threats in urban environments. By advancing low-carbon mobility, the Centre is also advancing public health, improving air quality, and contributing to more liveable cities. Climate action, in this sense, becomes tangible. It is felt in the air people breathe, in the safety of their commutes, and in the dignity of accessible movement.

The future envisioned by the Centre is not a single solution, but a decisive, system-wide transformation that integrates electric mobility, intelligent transport systems, expanded public transport, and cleaner energy. It recognises that technology alone will not deliver change. The real shift lies in how systems are designed, how decisions are made, and how policy, infrastructure, and investment are aligned to serve society more effectively.

In this framing, transport moves beyond being a source of harm to be managed. It becomes a powerful lever for change, advancing economic inclusion, strengthening environmental sustainability, and building resilience in the face of climate uncertainty. The Joint Research Centre on Climate Change and Smart Mobility reflects what the University stands for in this moment, not as a passive observer, but as an active shaper of the country's future, committed to turning knowledge into impact.

"As South Africa confronts the realities of a low-carbon transition, the question is no longer whether change is needed, but whether it can be achieved with the speed and fairness the moment demands. We are not only imagining that future; we are actively shaping it through research, partnership, and action. How we move will matter as much as how we power our lives," concludes **Professor Langerman.**



Indigenous Foods for a Healthier South Africa

By Prof Hema Kesa, Director of the Food Evolution Research Centre (FERC), University of Johannesburg

Harnessing climate-resilient food systems and traditional knowledge to support sustainable nutrition

At the University of Johannesburg (UJ), the Food Evolution Research Laboratory (FERL) has evolved into the Food Evolution Research Centre (FERC), a strategic shift that reflects both growth and impact. The Centre is addressing one of South Africa's most urgent public health challenges: the rise of non-communicable diseases (NCDs) driven by poor dietary patterns. At the same time, it is restoring the value and relevance of indigenous foods within contemporary food systems.

South Africa's rapid nutrition transition toward highly processed, Western-style diets has contributed to escalating rates of diabetes, cardiovascular disease and obesity. Yet research conducted by FERC in Gauteng reveals a compelling paradox: while many individuals hold positive perceptions of indigenous foods, fewer than 20% of urban residents consume them regularly. Limited access, a lack of modern recipes, and minimal representation in restaurants were identified as major barriers.

From Research to Innovation

FERC's response has been both practical and forward-thinking.

In collaboration with the South African Chefs Association (SAChefs), the Centre developed six vegetarian Ready-to-Eat Indigenous Foods (REIFs) using locally recognised ingredients such as millet, sorghum, amadumbe and marula. These recipes were carefully designed to be nutritious, affordable and appealing to modern consumers. Importantly, the development process was documented to preserve culinary knowledge and to support future education and training initiatives.

The products were evaluated at FERC's sensory facility, where trained panellists assessed taste, texture, aroma and overall acceptability. This rigorous testing ensured that the recipes were not only nutritionally sound but also desirable and market ready. Nutritional analyses confirmed their potential to support healthier dietary patterns and contribute meaningfully to NCD prevention.

Immersive Food Education Through Technology

Beyond product development, FERC is integrating Extended Reality (XR) technologies to transform food education. By combining storytelling, nutrition science and immersive environments, the Centre is creating engaging learning experiences that encourage both consumers and culinary professionals to embrace indigenous foods more frequently. Through international collaborations with partners in Finland and the Netherlands, UJ is positioning itself at the forefront of immersive food research in Africa bridging traditional knowledge with cutting-edge technology.

Societal Impact and Global Alignment

The societal impact of this work is far-reaching. It promotes nutrient-dense dietary alternatives, safeguards cultural heritage, strengthens industry partnerships, and aligns with the United Nations Sustainable Development Goals, particularly Zero Hunger, Good Health and Well-being, and Responsible Consumption and Production.

FERC's work affirms that indigenous foods are not relics of the past. With the right blend of science, innovation and collaboration, they can serve as powerful instruments for building a healthier and more sustainable future for South Africa.

Advancing School Nutrition in South Africa

In addition to indigenous food innovation, FERC leads critical research within school feeding programmes across South Africa.

The Effect of in-school breakfast programme on the nutritional status of learners in Mpumalanga: A Baseline Study

This baseline study examined the impact of a sponsored in-school breakfast programme delivered at selected schools in Mpumalanga province.

The research aimed to:

- Assess the nutritional status of participating learners using anthropometric measurements and clinical observations.
- Evaluate the programme's influence on attendance, punctuality, alertness and overall academic performance.

The findings informed strategies to improve children's access to healthy diets, particularly in areas with higher rates of malnutrition, thereby strengthening national school nutrition interventions.

Food Waste Analysis in the In-School Breakfast Programme

While school feeding programmes play a vital role in reducing hunger and improving academic outcomes, food waste can undermine their effectiveness, especially when meals do not align with learners' cultural and taste preferences.

FERC conducted a comprehensive mixed-method study across five provinces: Gauteng, KwaZulu-Natal, North West, Limpopo and Northern Cape. The research included 25 schools, 75 interviews and 25 focus groups involving educators, coordinators, food handlers and learners, alongside quantitative data from Food Waste Diaries.

Although many schools lacked formal waste management systems, informal strategies such as redistribution, composting and recycling were common. Participants also recommended increasing meal variety, adjusting portion sizes, improving food quality and strengthening feedback mechanisms.

While the breakfast programme delivers substantial benefits in attendance and learner performance, addressing food waste remains essential to enhancing both efficiency and sustainability.

Technology-Driven Sustainability: Virtual Reality for Kitchen Waste Management

FERC is also pioneering the use of Virtual Reality (VR) technology to advance kitchen waste management training.

This project immerses chefs and culinary students in a virtual kitchen environment where they work with a variety of ingredients including imperfect or misshapen produce to prepare assigned recipes. Their actions are monitored for research purposes, allowing the team to identify waste patterns and behavioural trends.

Based on these observations, a targeted training module is developed and implemented. Participants' knowledge and behaviours are assessed before and after training to measure impact, ensuring that education translates into measurable reductions in food waste.

Through its integrated approach, combining indigenous culinary innovation, public health research, school nutrition analysis and immersive technology, the Food Evolution Research Centre continues to redefine how food systems can support health, sustainability and cultural preservation in South Africa.

UJ's food security initiative empowers single mothers

Strengthening household resilience through sustainable food systems, skills development and community-driven support.

Creating sustainable jobs through food security is possible and to prove this the University of Johannesburg's (UJ) Community Engagement Unit (UJCE) together with the Centre for Ecological Intelligence (CEI), invited mothers to the Centre to learn how to grow their own vegetable gardens. The UJCE and CEI hosted over 20 mothers, to close off their Mandela Month activities, for a Single Parents Empowerment Programme on Tuesday, 25 July 2023.

"For us, creating sustainable jobs through food security is possible. We look at food systems – projects within food security that are aimed at generating food or at least contributing to generating food," said CEI Manager Mr Godfrey Ndamane.

The CEI facilitates, supervises and mentors scholarly and applied research on urban agriculture, food systems, enterprise and entrepreneurship, water, energy, and waste technology through critical reflection and evaluation.

"We have a food garden for planting vegetables – things that people can do at home. But sometimes they forget to use those patches of land for gardens and planting.

With just a small space, it allows you to eat. You can plant spinach and bunch some of it and give to your neighbours or even sell it to buy seeds and plant again. This is one of the things we want to teach people," added Ndamane. UJCE Specialist Lebogang Ayobiojo said the programme was part of an ongoing initiative to empower single mothers.

Earlier in July, the mothers were invited to attend a session with the UJ Centre for Psychological Services and Career Development (PsyCaD) to address issues such as effective methods of healing from abuse, dealing with pain, understanding emotional abuse and embracing change for success.

"We have students who have done problem-based learning – identifying problems and coming up with solutions. Those students have 400 hours to be in community engagement. Under the theme Climate, Food and Solidarity we have partnered with the Centre to help the mothers focus on food security and environmental sustainability," said Ayobiojo.

The mothers who took part come from communities that often face difficulties like unemployment, lack of food and drugs. These include Diepsloot, Vrededorp, Westbury, Soweto, Coronation, Alexandra and different parts of Ekurhuleni. "Food insecurity means you don't have access to food. It also means you can still eat but the food you are eating has no nutritional value or you are barely surviving, only eating what you can find. Vegetables give us dietary diversity," said Ndamane adding that the CEI was looking to provide a certified course for the mothers.

"It is good to show them what to do but the best thing is to give them a certified course that will not only increase their chances of employment but also give them that confidence to continue in the work. There are a lot of companies that are now venturing into food security projects."

Ayobiojo added: "With the mothers, the project is so broad- the mothers are not only informed and aware, next year we hope to take this as a pilot project and enrol the mothers for the accredited SETA course. Now that students are back from their break they are able to continue to help the mothers with their children through literacy and the soup kitchens among other things."

Ndamane said there was also a project in the works where CEI would be teaming up with student affairs to launch food gardens at all the campus residences.

"We are open to collaborations with all departments. We want CEI to become a site for tourism and grow the space to be able to sustain itself and to be able to continually donate food to the students." After the mothers were shown around the garden and the different types of food production systems and how to create their own gardens for growing vegetables, UJCE and CEI donated the vegetables that were harvested to the mothers.

> "We want the mothers to see that we understand their situations and we want them to know that they are important to society,"
> concluded Ayobiojo.

Prof Clinton Aigbavboa

Leading the Shift to Sustainable Infrastructure

Driving sustainable construction and digital transformation in the Global South

At the intersection of infrastructure, sustainability and digital innovation, Clinton Aigbavboa is shaping how the built environment responds to the realities of climate change and rapid urbanisation. As Interim Chair of the DSI|NRF Research Chair in Sustainable Construction Management and Leadership in the Built Environment at the University of Johannesburg, and Director of the Construction Industry Development Board (CIDB) Centre of Excellence, Prof Aigbavboa leads research that reimagines construction systems for a low-carbon, resource-constrained future.

Building sustainably in a changing climate

His work focuses on the integration of sustainability principles with digital transformation — particularly within the Global South, where infrastructure demands are growing rapidly under complex socio-economic conditions. By advancing frameworks in sustainable construction management, his research contributes to improving efficiency, reducing waste, and embedding environmental responsibility into large-scale infrastructure delivery. A key dimension of his work explores the implications of the Fourth Industrial Revolution (4IR) for the construction sector — from smart technologies and data-driven project management to more resilient and adaptive building systems.

A prolific and influential scholar

Prof Aigbavboa's academic output is both extensive and globally recognised. He has authored and co-authored over 1,300 accredited publications, including journal articles, conference papers and book chapters, alongside 27 scholarly books with leading international publishers such as Springer Nature, Emerald, Routledge and Elsevier. His work continues to shape scholarly and industry discourse, reflected in a Google Scholar h-index of 52 and a Scopus h-index of 32, underscoring his sustained research impact.

Shaping future leaders

Beyond research, Prof Aigbavboa is a committed mentor and capacity builder. He has supervised and graduated over 180 master's and 78 doctoral students, many of whom now occupy influential roles across academia, industry and government. His contribution to human capital development is further supported by significant research funding — exceeding R46 million — enabling large-scale projects that bridge theory and practice in sustainable infrastructure.

lobal reach, local relevance

With an National Research Foundation C1 rating, Prof Aigbavboa is recognised for his international research standing. He is an active participant in global academic networks, serving as a visiting professor at institutions including the University of the West of England Bristol, Shandong University, the University of Nigeria Nsukka, and the Federal University of Technology Akure. As a keynote speaker and thought leader, his insights continue to influence how cities, industries and policymakers respond to the dual imperatives of development and sustainability.

> By advancing frameworks in sustainable construction management, his research contributes to improving efficiency, reducing waste, and embedding environmental responsibility into large-scale infrastructure delivery.

The Sustainable Human Settlement and Construction Research Centre (SHSCRC) at the University of Johannesburg is an interdisciplinary research hub in South Africa focused on sustainable housing, construction, and urban development. Led by Prof. Clinton Aigbavboa, it provides policy advice, technical assistance, and training to support resilient, affordable infrastructure.

Core Focus Areas

- Sustainable Human Settlements: Research into housing delivery, urban development, and human settlements.
- Construction Innovation: Development of sustainable materials, 3D printed housing, and digital construction methods (e.g., through the SMaCT research initiative).
- Industry Development: Focus on construction management, safety, and sustainable infrastructure within South Africa.

Key Services & Activities

- Training: Offers programs such as the Certificate in Construction Management (CCM).
- Research Output: Publishes the State of the Nation's Housing report, academic books, and a bi-annual scientific journal.
- Collaboration: Hosts visiting scholars and provides research opportunities for postgraduate

Prof Bettine van Vuuren

DNA of Survival:

How genetic diversity is shaping the future of life in a rapidly warming world

Climate change is not only reshaping landscapes and weather patterns. It is rewriting the rules of survival at a biological level. Hidden within the DNA of every species lies a story of adaptation or decline. Professor Bettine van Vuuren is uncovering that story, revealing how life responds when the environment shifts faster than ever before.

She serves as Registrar as well as a Professor of Zoology at University of Johannesburg (UJ). Her work moves beyond surface level observation into the genetic foundations that determine which species endure and which decline. By linking molecular science with the realities of a changing planet, she brings sharp focus to a defining question of our time. What enables a species to remain resilient as environmental conditions shift at an unprecedented pace?

Climate science often focuses on large scale environmental data, yet her research looks deeper into the genetic structure of life itself. She explores how variation within and between populations shapes their ability to adapt. By examining how traits shift in response to changing conditions and how populations differ across regions, she identifies patterns of resilience. Some populations carry genetic traits that allow them to adjust and survive, while others do not. Adaptation, her work shows, is not random. It is rooted in the diversity contained within species.

With a PhD in Zoology from the University of Pretoria and research experience in Europe, she joined UJ in 2011 and was promoted to full professor soon after. Her academic contribution includes more than one hundred and fifty peer reviewed publications, with her work widely cited across the global scientific community.

Remote sub-Antarctic islands provide a powerful lens into the speed and impact of climate change. These environments respond rapidly to shifts in temperature and ecological balance, making them critical for understanding broader global patterns. Prof van Vuuren has led research in these regions, including work on sub-Antarctic Marion Island as well as the Antarctic Peninsula, where she served as the first female Chief Scientist on a South African National Antarctic Programme Relief Voyage. Her work reveals how fragile these ecosystems have become under mounting environmental pressure.

Her research has traced the origins of invasive species such as the house mouse, demonstrating how human activity and climate change interact to reshape ecosystems. She has also examined native plant species that face increasing stress as warming conditions alter their environment. Through international collaborations focused on Antarctic ecosystems, she contributes to a growing understanding of how life responds in some of the most sensitive regions on Earth.

Scientific knowledge gains real value when it informs action. She has worked closely with government to shape biodiversity policy in South Africa, contributing to the National Environmental Management: Biodiversity Act and Regulations, and ensuring that research translates into protection for natural systems. Her leadership also extends globally through her role in guiding research priorities linked to the Scientific Committee on Antarctic Research (SCAR), as the South African representative on science programmes, and as the South African National Delegate to SCAR.

Addressing climate change requires sustained investment in future expertise. She has supervised and mentored more than 50 postgraduate students and postdoctoral researchers, many of whom now contribute to conservation and ecological science. As Director of the Centre for Ecological Genomics and Wildlife Conservation, she leads a space where research, training, and innovation converge, strengthening UJ's role in advancing knowledge that supports biodiversity and climate resilience.

Prof van Vuuren explains: "Climate change is accelerating faster than many species can adapt, placing unprecedented pressure on the genetic limits of life on Earth. The difference between survival and extinction will rest on the depth of genetic diversity within species and how quickly they can respond to change. The solutions are not abstract. They already exist in the DNA around us. Our responsibility is to understand that genetic resilience and act decisively to protect it before it is lost."

"Climate change is accelerating faster than many species can adapt, placing unprecedented pressure on the genetic limits of life on Earth. The difference between survival and extinction will rest on the depth of genetic diversity within species and how quickly they can respond to change. The solutions are not abstract. They already exist in the DNA around us. Our responsibility is to understand that genetic resilience and act decisively to protect it before it is lost."

Department of Accountancy and Auditor-General South Africa (AGSA) launch Impactful Public Sector Programme

The University of Johannesburg's (UJ) Department of Accountancy, in partnership with the Auditor-General of South Africa (AGSA), has launched a groundbreaking educational initiative aimed at strengthening the number of Chartered Accountants in the public sector, and uplifting the accounting profession through purposeful, future-focused education.

This collaboration reflects a shared commitment to long-term societal impact and the development of highly skilled accounting professionals equipped to serve the public interest. The programme aligns with UJ's vision of education as a catalyst for societal change and AGSA's mandate to enhance accountability and governance within the public sector.

The project was initiated by the Deputy Auditor-General (DAG), Mr Vonani Chauke, and fully supported by the visionary leadership of the UJ Vice-Chancellor and Principal, Professor Letlhokwa Mpedi. AGSA trainees are enrolled in UJ's Postgraduate Diploma in Accounting Science (PGDAS) programme on a part-time basis, enabling them to further their studies while continuing to contribute meaningfully in their professional roles. At the same time, they complete their training contracts at the AGSA. This ensures that they have the best possible chance of qualifying as Chartered Accountants, and the AGSA supports the students throughout their journey while they are working.

"The public sector plays an integral role in society and the wellbeing of our country. Against this background the role that the Auditor General plays as custodian of governance and accountability and an employer of choice makes this partnership with UJ groundbreaking as it provides the opportunity for trainees to work and study at the same time," said Professor Ben Marx, Head of the School of Accounting at UJ.

He added that the students require dedication and commitment to go through the rigorous CA qualification.

"Studying part time requires great support and enablement from the employer and a dynamic, well structured and innovative academic programme. The partnership has created a unique programme that is responsive to the work environment and its pressures."

A Rigorous Programme for Future Leaders

Piloted successfully in 2025 with an inaugural cohort of 50 students, the programme has already demonstrated its potential to make a lasting impact. Plans are underway to expand the programme in future years, increasing access and extending its benefits to a broader group of public-sector accounting professionals. The first cohort worked diligently on the programme, attending classes on a block release basis and working consistently and actively throughout their studies.

"The achievements of the students are remarkable given that the volume of the content that needs to be covered during the year cannot be reduced. The curriculum is determined by SAICA, guided by the SAICA Competency Framework, and all students, whether from public sector or private sector, write the same high stakes examinations. This requires the students to study consistently from the first day, and not just during the block periods. Through a blended learning model, content is made available online and in person, and structured guidance from the team ensures that students are progressing through their studies," said Professor Ahmed Mohammadali Haji, Head of Department, Department of Accountancy.

He added that the feedback from the programme has been extremely positive.

"The AGSA has been amazing in ensuring that the students can fulfil their professional duties while focusing on their studies. Studying part-time on such a demanding programme, is itself a challenge, but this recipe shows that it's possible and we are very proud of the first cohort of students."

The programme ensures that ethical leadership and governance are translated from classroom theory into the daily professional roles of the trainees.

"Ethics, ethical leadership and governance is present in everything we as accounting educators do. Through case studies, guest lectures and practical examples, we reinforce these fundamental principles," said Prof Haji

Education for Societal Impact

The programme is a move toward purposeful, future-focused education. Prof Marx reiterated that the programme - an excellent preparation for students for the world of work - creating capacity in the public sector to serve the greater good of the country, was a service to society.

"Beyond the graduate numbers, societal impact is measured through the students' career prospects, progression and enabling leadership qualities for the business leader of the future."

By integrating academic excellence with practical public-sector experience, the programme seeks to uplift current and future accounting professionals, strengthen ethical leadership, and contribute to improved financial management and governance in South Africa. Ultimately, this partnership represents a significant step towards building a more capable, accountable, and resilient public sector, while advancing UJ's commitment to shaping the future of accounting education for societal good.

Bridging Worlds:

The Work of Professor Walter Musakwa

In the rapidly evolving landscape of environmental science, few scholars manage to balance high-tech innovation with deep-rooted human wisdom as seamlessly as Professor Walter Musakwa. Currently a Professor at the University of Johannesburg's Department of Geography and Environmental Management and Energy Studies, Musakwa is at the forefront of redefining how we understand our planet and our place within it.

Prof Musakwa's journey into the complexities of the Earth began with a PhD in Geography and Environmental Studies from Stellenbosch University. Today, he occupies a pivotal role in the Faculty of Science, where he mentors the next generation of researchers while spearheading critical inquiries into the sustainability of our global ecosystems. Prof Musakwa is a geographer who bridges two worlds. A major focus of his research is the use of earth observation, geographic information systems in environmental management and crop analysis. He understands that data alone cannot save a planet. His work is fundamentally rooted in understanding human-nature relationships, actively elevating Indigenous Knowledge Systems to work with modern science and ensuring that conservation supports ecosystem services and local livelihoods.

A Global Academic Ambassador

Professor Musakwa's influence extends far beyond South Africa's borders. His expertise is recognised by some of the world's most prestigious scientific bodies:

- Global Collaboration: He is a former visiting research fellow of The World Academy of Sciences-German Research Foundation (TWAS-DFG).
- Sustainability Leadership: He serves on the International Geographical Union (IGU) Commission on Geography and Sustainability, a group dedicated to studying the coupled human-earth systems essential for a sustainable future.
- Editorial Authority: Helping shape the discourse of his field, he sits on the editorial boards of the Geospatial Information Science Journal, the Geography and Sustainability Journal and Discover Conservation.

Research with Real-World Impact:

Whether acting as a principal investigator or a collaborator, Prof Musakwa's projects are characterised by their practical application. From tackling the immediate threats of climate change, biodiversity loss, to advocating for sustainable development, his research seeks to find the sweet spot where environmental preservation and human prosperity overlap.

Some of the projects include:

Climate Smart Conservation - In partnership with the University of Natural Resources and Life Sciences in Vienna, Austria, Prof Musakwa conducted a study on the impacts of climate change on conservation in Gonarezhou and Hwange National Parks in Zimbabwe. In this study the 2022-2023 droughts precipitated a massive negative impact on both the ecosystem and community livelihoods, rendering visible a profound injustice in the simultaneous failure to protect nature and ensure human well-being. This dual crisis has manifested in a drastic increase in human-wildlife conflicts, primarily through escalated subsistence poaching and park encroachment via illegal grazing - direct survival responses to the drought's pressure. A follow up study is on climate change and its impact on human-wildlife conflict in fishing villages adjacent to Matusadonha National Park on Lake Kariba. This work can shape real-world policy as it demonstrates that effective conservation and climate adaptation require integrated strategies that address both ecosystem protection and community livelihood security, moving beyond siloed approaches to tackle the root causes of socio-ecological conflict.

Impact of Climate Change on Human Health - Prof Musakwa has looked at climate change impacts on malaria as well as the link between malaria, poverty and climatic extremes. Climate change is not a distant threat; it is fuelling a public health crisis today and the studies reveals a direct link between rising temperatures, erratic rainfall, and surging malaria cases, trapping rural communities in a vicious cycle where a changing climate worsens disease, poverty, and food insecurity. To break this cycle, Prof Musakwa suggests the urgent move beyond outdated, one-size-fits-all mosquito control and invest in climate-smart, community-led health programs that combine local knowledge with scientific evidence to protect the most vulnerable.

"This work is vitally important to the world because it demonstrates that solving intertwined crises of climate change, biodiversity loss, human health, and human injustice requires integrated, community-centred solutions that move beyond technical fixes to address the root socio-ecological causes of vulnerability," he said.

In an era of climate uncertainty, Professor Walter Musakwa stands as a vital bridge - linking data with the ancient rhythms of indigenous knowledge to chart a more resilient path forward for us all.

"This work is vitally important to the world because it demonstrates that solving intertwined crises of climate change, biodiversity loss, human health, and human injustice requires integrated, community-centred solutions that move beyond technical fixes to address the root socio-ecological causes of vulnerability."

Harnessing the power of communication to inspire action on climate change:

Dr. Sanele Justice Gamede

He is tasked with leading a significant research project on effectively communicating climate change for young people in the Southern African Development Community (SADC) region. This is in recognition of his expertise in the effectiveness of climate change communication to reach and engage the youth, especially in areas such as extreme weather events and technological developments. Meet Dr. Sanele Justice Gamede, a Lecturer and Researcher and a Graduate Employability specialist in the Department of Communication and Media, within the School of Communication and Media at the University of Johannesburg.

Empowering young people with effective communication skills to advocate change and promote enhanced climate action

Dr. Gamede's primary research interests are, amongst others, the relationship between media and audience, particularly the impact of public participation in the media and media and politics. This positions him as a strategist in identifying current gaps in climate change communication and equipping young people with effective communication skills to advocate change and promote enhanced climate action towards sustainable development and inclusive green growth.

Dr. Sanele Justice Gamede

> Children in 98 percent of African countries are at high or extremely high risk of the impacts of climate change. Young people in particular bear the brunt of climate change, hence the need to involve them in drawing up climate change solutions.

One critical area he has identified, for instance, is that the lack of effective communication around climate change has led to a discrepancy between the scientific community's increasing certainty about anthropogenic (human-made) interference in climate and the public's limited concern about effective climate policies. This is more pronounced in Sub-Saharan Africa where the youth are not actively engaged in climate mitigation and adaptation.

Closing the knowledge gap to achieve Africa Agenda 2063

Despite this, there is an assertion that most youth view climate change as a global issue and that they are not aware of the roles that they can play as individuals, in the community, and in the country to address the climate change challenge. As such, there is a need to close this knowledge gap by developing climate change information interventions centred young people and empower them with effective communication skills and strategies to raise awareness, influence policy, inspire action, and drive the most needed positive change. This is key to the achievement of Africa Agenda 2063 and ultimately, contribute to the UN Sustainable Development Goals in the region through informed, climate-compatible mitigation and adaptation strategies.

Young people more exposed to climate change risks

However, if not achieved, the SADC region, and African by extension, will continue to be exposed to the risks associated with climate change. For instance, model projections predict temperature and evaporation increases, increased rainfall variability, and frequency of floods and droughts. This will exacerbate the existing challenges that are already being faced by most Southern African developing countries. Research has confirmed that women, youth, and children bear the significant brunt of the negative consequences of climate change. Children in 98 percent of African countries are at high or extremely high risk of the impacts of climate change. Young people in particular bear the brunt of climate change, hence the need to involve them in drawing up climate change solutions.

This is why experts like Dr. Gamede are critical in driving positive climate change. With a PhD in Media and Cultural Studies PhD under his belt, and honorary doctorate in Leadership and Management, Dr Gamede is well primed to contribute positively in climate initiatives through effective communication strategies. A published author with five non-academic books to his name, Dr. Gamede actively contributes to various media platforms, advocating for access to quality education, graduate employability, youth development, and skills enhancement initiatives both within and beyond South Africa. He leads several youth-centric community programmes and campaigns, targeting learners, students, and unemployed young individuals.

Youth, Media and Climate Change and Action: Reclaiming Narrative Power for Transformative Climate Futures in Southern Africa

Later this year, he will be part of the team that will lead a conference on Youth, Media and Climate Change and Action, Reclaiming Narrative Power for Transformative Climate Futures in Southern Africa. The conference, which will be hosted by the UJ Department of Communication and Media and the Centre for Data and Digital Communications, is scheduled for November 4 – 5. The conference aims to foster dialogue among scholars, students, media practitioners, the private sector, civil society, and organizations on youth, radio, social media, poetry, music, film, and digital storytelling related to climate change communication. It repositions youth as active knowledge producers rather than passive stakeholders, advancing climate justice through narrative, culture, and ethics.

Hemp Brick Innovation Signals a New Era for Sustainable Rural Housing in South Africa

Low-carbon materials and circular construction approaches are advancing climate-resilient housing

Researchers at the University of Johannesburg (UJ) are driving a breakthrough that could shift the national housing conversation. By transforming locally grown hemp into a high-performance construction material, UJ has partnered with Canna-B-Africa which has developed a hemp-based brick designed specifically for energy efficient, climate responsive and sustainable housing with measurable societal impact.

The hemp brick is the product of years of advanced research within UJ's Civil Engineering Technology Department, where scholars and hemp industry experts are pioneering the transformation of hemp into hempcrete as a sustainable alternative to traditional cement.

This work forms part of a broader national drive, in partnership with the Department of Science, Technology and Innovation, to explore advanced materials and innovative building technologies, including UJ's 3D printed housing systems aimed at accelerating housing delivery.

At the centre of this breakthrough is the Hemp Brick prototype, a lightweight, breathable and carbon negative building material designed to redefine how South Africa builds. Developed through a collaboration between Canna-B-Africa, the Centre for Ecological Intelligence (CEI) and its subdivision, the Hemp Research and Technical Station (HERTS) and the Sustainable Materials and Construction Technology Research Centre in UJ's Faculty of Engineering and the Built Environment, the brick represents a science driven, locally engineered response to the country's housing crisis.

"Rural communities carry the heaviest burden of the housing backlog, which is why we are not simply developing another brick. We are developing a solution that can accelerate housing delivery in a way that is affordable, energy efficient and environmentally responsible. For rural South Africa, building smarter and more sustainably is not optional, it is essential."

> "Housing is a major problem in both urban and rural areas. The current informal dwellings are dangerous and unsustainable. Many families are still living in poorly insulated homes, exposed to extreme temperatures and unreliable electricity, while the cost of conventional building materials keeps rising,"

says Professor Michael Rudolph, Director of the CEI.

Hemp is a rapidly renewable crop that requires minimal pesticides and absorbs significant carbon dioxide during growth. When used in construction, that carbon is locked into the walls of homes, lowering the overall carbon footprint and supporting South Africa's transition to greener infrastructure.

"Its benefits go well beyond sustainability," says Mr Brenton Abrahams, founder of Canna-B-Africa, UJ's Senior Research Associate and Advisor to HERTS. "The brick offers excellent thermal efficiency, with a porous structure that naturally regulates temperature and humidity, reducing the need for artificial heating and cooling. For rural households with limited or costly energy access, this passive climate control can lower monthly expenses and improve living conditions. It also delivers strong fire resistance and is naturally resistant to mould and pests, enhancing safety and durability without chemical treatments. Acoustic performance adds further value by minimising noise transfer and creating healthier indoor environments."

The hemp brick is manufactured using the woody core of the hemp plant combined with a natural lime-based binder. Beyond its technical performance, the innovation carries broader societal impact. Expanded hemp cultivation could stimulate rural agricultural value chains, create new green economy jobs and support local enterprise development linked to sustainable construction. The hemp brick can also be used for energy storage and bioremediation both innovative technologies which are currently being researched at UJ.

"UJ scholars have been actively exploring how hemp can be transformed into hempcrete as a sustainable alternative to traditional cement, forming part of broader research into innovative construction technologies, including 3D printed housing systems," says Prof Jeffrey Mahachi, Director of Sustainable Materials and Construction Technology at UJ.

He emphasises the importance of rigorous validation. "The second-generation prototype is undergoing full testing, validation and certification. Our objective is to bring a credible, certified product to market that meets national building requirements while delivering on its sustainability promise."

Mr Brendan Wood, technical hemp expert at HERTS, emphasised the national significance of the innovation, which was highlighted at the 2026 Innovative Building Technologies Summit, where the UJ Hemp Brick prototype drew strong interest from policymakers, industry leaders and President Cyril Ramaphosa. During his engagement with the UJ team, the President acknowledged the brick's potential to advance sustainable infrastructure development while unlocking economic opportunities within emerging green industries.

Prof Mahachi concludes,

> "As South Africa confronts the interconnected challenges of housing delivery, climate resilience and rural development, the hemp brick represents more than a new building material. It is a locally developed, science driven solution aligned with national priorities and designed for real world impact."

"If adopted at scale, it has the potential to accelerate housing delivery, stimulate rural economies, reduce carbon emissions and redefine sustainable housing in South Africa. The future of construction can quite literally be grown from the ground up."

UJ driving citizen science initiative for cleaner water

Engaging communities to monitor and protect water quality, strengthening climate resilience and sustainable water management in South Africa.

On 11 February 2025, the University of Johannesburg (UJ) led a significant Citizen Science Event at Hippo Stream in Eikenhof, Johannesburg South, reinforcing its leadership in environmental research and community engagement. The initiative, funded by UJ's GES 4.0 SI project, was a collaboration between UJ's Process Energy and Environmental Technology Station (UJ PEETS), the Department of Geography, Environmental Management & Energy Studies (UJ GEMES), KlipWaS, and the Organisation Undoing Tax Abuse (WaterCAN OUTA). UJ experts, including Prof Chris Curtis and Dr Jonathan Levin from UJ GEMES, alongside Dr Ferrial Adam from WaterCAN, provided hands-on training in water quality assessment techniques, engaging with local communities and international scholars.

UJ's role in training future environmental leaders

The event equipped participants with essential skills in two key water quality assessment techniques: miniSASS and WaterCAN water testing kits. Attendees included students from Yellowwood Environmental School, members of the Khoisan Community and surrounding local community, Erasmus Mundus scholarship students from the University of Padova visiting UJ, and representatives from the Department of Water and Sanitation (DWS).

The training covered essential skills such as:

- Proper river access safety protocols
- Kick sampling techniques for macroinvertebrate collection
- Identifying macroinvertebrates using dichotomous keys
- Calculating water quality scores based on macroinvertebrate sensitivity to pollution
- Conducting chemical water quality tests using WaterCAN kits

Data collected during the event was prepared for upload to online monitoring platforms, contributing to broader water quality mapping initiatives led by UJ.

UJ's impact on education and community engagement

This initiative underscored UJ's commitment to inclusive education and research excellence. Honours and MSc students from UJ-GEMES gained practical experience in environmental monitoring, while students from Yellowwood Environmental School were introduced to professional scientific methodologies. UJ also played a pivotal role in empowering the Khoisan Community and the Emaplatini Heritage Forum in Soweto with practical tools for monitoring their local water sources. The visiting Erasmus Mundus students from the University of Padova gained firsthand exposure to UJ's community-based research approach, strengthening international academic collaboration.

Reflections from UJ participants

Students involved in the project shared their reflections on the experience:

"As a Climate Change and Environmental Management student at UJ, gaining hands-on experience with citizen science tools is invaluable. During this activity, I learned how to use the WaterCAN Citizen Science Monitoring Tool, which allows users to analyse key water quality parameters, including pH, nitrates, phosphates, total hardness, chlorine, bromine, total alkalinity, and the presence of harmful bacteria like Escherichia coli. The kit was highly user-friendly, delivering results for most parameters within two minutes. This experience reinforced the idea that environmental monitoring doesn't have to be limited to scientists or institutions—anyone can play a role. And when people are given the right tools, they don't just collect data; they become active participants in protecting their environment." — Fatou Abbah, MSc Environmental Management, University of Johannesburg & University of Padova

"Participating in this UJ-led citizen science activity was both enriching and practical. In the field, we conducted simple tests like miniSASS and used WaterCAN monitoring tools to assess river water quality. What struck me the most was the direct identification of small aquatic organisms like insects and larvae, which serve as biological indicators of ecosystem health. Interacting with other participants enriched my understanding of the links between aquatic biodiversity and water quality. This activity not only helped me develop practical skills in scientific observation but also deepened my awareness of the issues related to water pollution." — Balbine Alindekon, MSc Environmental Management, University of Johannesburg & University of Padova

Sustainable environmental solutions

The Citizen Science Event at Hippo Stream exemplifies UJ's role as a driver of sustainable environmental solutions and community empowerment. By equipping participants with scientific knowledge and practical skills, UJ continues to bridge the gap between academic research and real-world environmental challenges. Through initiatives like these, UJ not only contributes to global environmental sustainability but also strengthens its position as a leader in citizen science and community engagement.

Universities as Catalysts for Climate Action:

UJ Leading a UNESCO Global South Sustainability Initiative

The University of Johannesburg (UJ) has been appointed as the lead institution for a UNESCO IESALC Global South sustainability initiative under the South-South University Cooperation Network (SUCN). Bringing together 54 higher education institutions across the Global South, the initiative is explicitly framed around the imperatives of Sustainable Development Goal 13 (Climate Action), recognising higher education as a critical site for accelerating climate-responsive transformation. At UJ, climate action is approached not as an isolated environmental concern, but as a system-wide institutional responsibility embedded across teaching, research, operations, and partnerships. This ethos is reflected in the University's Climate Action Plan, which foregrounds the integration of sustainability into organisational culture and academic practice as a means of generating tangible, long-term impact.

Prof Kathija Yassim has been chosen to lead this UNESCO initiative anchored in Activity 1.2 (Sustainability Consciousness Integration in Higher Education), which focuses on the development of an open-access Sustainability Consciousness Toolkit. This work builds directly on a 2023 pilot study that I led, examining how sustainability awareness translates into everyday decision-making and behaviour within university contexts. Her leadership of a pilot study, conducted across 23 universities globally (Africa, South America, Asia and the Middle East) revealed a significant gap between climate awareness and climate action. While sustainability and climate change are widely acknowledged as urgent concerns, this awareness does not consistently result in behavioural change at individual or institutional levels. In the context of escalating climate risks, this disconnect is critical. Addressing climate change requires not only knowledge dissemination, but deliberate shifts in values, practices, and institutional cultures that shape how decisions are made and resources are used.

The findings further underscore the importance of Global South driven climate responses. Dominant sustainability and climate frameworks are often developed in contexts that do not fully reflect the realities of the Global South, where climate vulnerability intersects with socio-economic inequality, development pressures, and historical marginalisation. Effective climate action in these contexts must therefore be locally grounded, culturally responsive, and informed by lived experience rather than imposed models.

Over a five-year (2025–2030) period she will lead a Global South consortium that reimagines sustainability education through a decolonised, climate-responsive, and action-oriented lens by integrating a green pedagogical approach into existing curricula. The initiative explores innovative pedagogical approaches including gamification, digital storytelling, virtual reality, and interdisciplinary collaboration to support climate learning that moves beyond abstraction and fosters meaningful engagement with real-world challenges. Within this framework, universities are deliberately positioned as living laboratories for climate action. These are spaces where climate knowledge is not only generated, but actively tested, practiced, and scaled. Students are engaged as emerging climate actors, developing the ethical awareness, agency, and competencies needed to influence climate-responsive practices within their communities, professions, and policy environments.

"This initiative positions students as active agents rather than passive recipients of climate knowledge," she said. "It advances a" loca-global" approach in which local climate realities inform global responses, and global frameworks are reshaped through Global South perspectives," she added. The Sustainability Consciousness Toolkit is designed to support measurable shifts in behaviour, institutional practice, and climate-informed decision-making across participating universities. By foregrounding sustainability consciousness as a prerequisite for climate action, the initiative contributes to a broader transition in higher education from knowledge production alone towards impact-driven implementation.

UJ's leadership in this initiative builds on its growing global recognition as a Global South knowledge hub. Ranked 23rd globally and first in South Africa and on the African continent in the 2025 Times Higher Education Impact Rankings, UJ has demonstrated sustained progress in advancing the United Nations Sustainable Development Goals, including SDG 13 (Climate Action). This recognition reflects UJ's strengthening role in bridging research, policy, and practice to advance climate-responsive, inclusive, and scalable solutions within higher education and beyond

Being selected to lead this UNESCO initiative marks an important moment for UJ and for Global South higher education more broadly. It enables the co-creation of a climate action framework that is by the South, for the South and one that reflects our realities, amplifies our voices, and affirms our capacity to lead. In a climate-constrained world, this work ensures that the Global South is not merely included in shaping the future but is actively driving it.

UJ's Centre for Ecological Genomics and Wildlife Conservation:

Using genetic data to guide decisions about saving African animals

Plant and animal life is being lost at such an alarming rate that some scientists believe that Earth is entering its sixth mass extinction.

Major environmental issues such as climate change, habitat destruction, pollution, and invasive species are drastically altering where animals live and how well they survive, often in completely unexpected ways.

The old idea that animals just stay in one place is completely outdated. It is now known that wildlife ranges are constantly shifting. This completely changes how their ability to adapt, spread out, and evolve must be analysed. To make the right choices to save threatened species, decisions must be backed by solid scientific data.

At UJ's Centre for Ecological Genomics and Wildlife Conservation, the main goal is to map out the genetic makeup of land and water animals to understand exactly what is driving their survival and movement.

By working closely with government and conservation groups, the Centre ensures its scientific discoveries directly help shape conservation plans on the ground. The Centre is a specialized genetics research lab located in the Department of Zoology within UJ's Faculty of Science. Three senior scientists lead research at the Centre.

Aquatic Projects

Professor Peter Teske focuses on the genetics of marine and freshwater life, studying how current and historical environments have shaped these animals. His work primarily looks at the coastline of southern Africa, specifically where the marine life of the Atlantic and Indian Oceans mix.

His team uses advanced DNA technology to understand how ocean environments impact where marine life can survive and thrive. Current projects include analysing the genetics of South African sardines, protecting the endangered Knysna seahorse, and identifying different types of South African sea sponges using DNA.

Recently published work from his group explores how popular, well-known animals get too much research attention from scientists; provides evidence that the species of octopus that lives along the Cape coast is a new species; the foundational DNA of microscopic life in coastal rock pools; and a rescue plan for a rare, slender fish closely related to the seahorse found only in South African estuaries

Terrestrial Projects in Southern Africa

Professor Krystal Tolley studies the genetics, habitats, and conservation of African reptiles and amphibians. Her current work looks at how reptiles, especially chameleons, adapt to their environments over time by looking at their physical traits, behaviour and DNA.

The team also focuses on tracing the genetic family trees of highly venomous African snakes (like vipers and cobras), heading out into the field to survey local wildlife, tracking the health and numbers of frog populations over many years, and helping officially classify which animals are at risk of extinction so they can be protected globally.

Her recently published work includes a look ahead at the future of South African biodiversity conservation in 2026; a survey of reptiles and amphibians in the Northern Cape's Meerkat National Park; a study proving that body size is the main reason why African dwarf chameleons glow under UV light; and a historical look at how pythons (large, non-venomous constrictor snakes) spread across Africa.

Terrestrial Projects in Antarctica and the Southern Islands

Professor Bettine Jansen van Vuuren uses genetic tools to figure out how and why plants and animals are spread out the way they are across different landscapes. She primarily works in the dry regions of southern Africa, Antarctica, and the remote Southern Oceanic Islands, especially the Prince Edward Islands.

Her past research on these sub-Antarctic islands showed that the genetic variety of local plants and insect-like species is much more complex and diverse than anyone originally thought.

While invasive species are a known global threat to nature, and Antarctica remains largely untouched, increasing numbers of human visitors are accidentally bringing in foreign plants and animals. Using Marion Island as a test site, her research maps out the genetics of these invasive species.

Her latest published papers cover DNA identification of South African wildlife; the genetics of African wild dogs; the importance of protecting Hooded Vultures living at the very edges of their natural ranges; and how multiple introductions and mixed breeding habits have helped a highly invasive weed spread across the Southern Ocean islands.

"The old idea that animals just stay in one place is completely outdated. It is now known that wildlife ranges are constantly shifting. This completely changes how their ability to adapt, spread out, and evolve must be analysed."

UJ Research Centres driving climate action through integrated innovation

The University of Johannesburg (UJ) 's climate action agenda is driven by a dynamic, cross-disciplinary network of research centres that collectively address mitigation, adaptation, sustainability and policy. Spanning the areas of science, engineering, economics and environmental health, these centres reflect an integrated approach, one that moves beyond isolated research to deliver practical, scalable solutions for climate resilience and sustainable development across Africa and the Global South.

- **Centre for Automative and Electric Vehicle Innovation (CAEVI)**
  Faculty of Engineering and the Built Environment (FEBE)
- **Centre for Ecological Intelligence**
  FEBE
- **Centre for Ecological Genomics and Wildlife Conservation**
  Faculty of Science
- **Centre of Excellence for Integrated Mineral and Energy Resource Analysis (CIMERA)**
  Faculty of Science
- **Food Evolution Research Centre (FERC)**
  Faculty of Science
- **Hemp Research and Technical Station (HERTS)**
  FEBE
- **Joint Research Centre on Climate Change and Smart Mobility (JRC-CCSM)**
  Inter-faculty (Science + Engineering & the Built Environment + College of Business & Economics)
- **Joint Research Centre for Water and Environmental Science & Technology (JRC-WEST)**
  Inter-faculty (Science + Engineering & the Built Environment)
- **Process Energy and Environmental Technology Station (PEETS)**
  FEBE
- **Postharvest & Agro-Processing Research Centre**
  Faculty of Science
- **Public and Environmental Economics Research Centre (PEERC)**
  College of Business & Economics (CBE)
- **Research Centre for Plant Metabolomics**
  Faculty of Science
- **The Water and Health Research Centre (WHRC)**
  Health Sciences
- **Sustainable Materials and Construction Technology Research Centre (SMCTRC)**
  FEBE

Advancing climate change through innovation and partnerships

Professor Bongani Ngqulunga:
Senior Executive Director: University Relations, Student Affairs and UJ Sport

Across this Climate Action Edition, a clear and consistent message emerges that climate change is no longer a distant, abstract concern, but that more than that, it is a present and defining reality that shapes how we live, work, build, travel and sustain ourselves. What is equally evident is the University of Johannesburg's deliberate evolution from a site of knowledge production to a catalyst for innovation and societal impact and sustainability.

This edition brings into sharp focus the depth and breadth of our continuous work in the critical area of climate change. Our catalytic Climate Action Plan has positioned the University as the leading institution of higher education in using technology to drive a positive transition to renewable energy through a myriad of projects. From electric mobility and smart transportation systems to stainable construction and solar energy, UJ leads the way in embedding climate change across the full education ecosystem.

Our climate change initiatives reflect an integrated and multidisciplinary approach to sustainability, the type that recognises the importance of harnessing opportunities across various faculties with urgency and pragmatism. A defining strength of the work presented here is its grounding in real-world contexts.

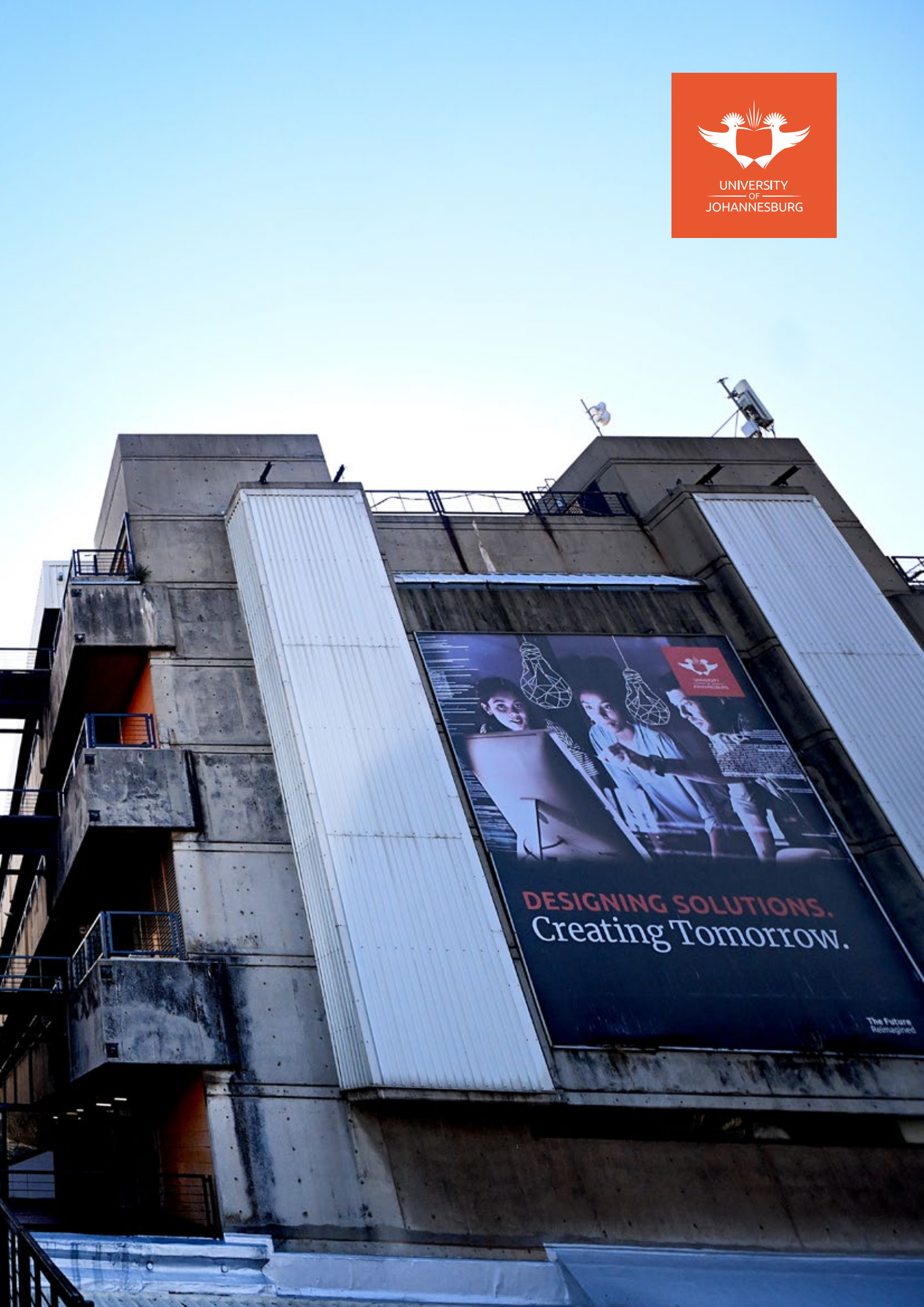
Whether through reimagining water security in vulnerable communities, advancing climate-resilient food systems, or strengthening disaster response capabilities across the region, the University's research consistently moves beyond theory into application. In doing so, it affirms a central principle that the value of knowledge lies in its ability to empower people and expand opportunities.

Climate action is inseparable from broader societal and economic realities. The transition to a low-carbon future must also be a just and inclusive transition. The work highlighted in this edition also reflects a conscious effort to ensure that innovation creates pathways for skills development, job creation and economic participation, particularly for young people and communities historically excluded from high-technology sectors. In this framing, sustainability becomes not only an environmental goal, but a vehicle for transformation.

A key aspect of our climate change initiatives is the importance of partnerships as critical enabler of impact. Collaboration with government, industry, communities and international partners strengthens the University's ability to translate research into scalable solutions. Just as importantly, these partnerships reinforce the understanding that no single institution can address the complexity of the climate crisis alone. Collective effort, shared knowledge and coordinated action are essential.

A distinguishing aspect of this body of work is its clarity of purpose and focus. It reflects a University that is not only concerned with responding to climate change challenges, but an institution actively shaping pathways through which society can adapt and thrive. It signals a shift in how we understand the role of higher education, from observing and analysing the world, to engaging directly and meaningfully in its transformation for a better future.

As this edition makes clear, the question is no longer whether action is required, but whether it can be achieved with the urgency, scale and inclusivity that the threats posed by climate change related challenges demand. That is at the heart of UJ's commitment. To align insight with action, to ground innovation in societal relevance, and to contribute meaningfully to building a more sustainable, resilient and equitable future for all.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