



9 Months of Five Years of Resilience and Sustainability

Centre for Global Change, Sol Plaatje University



SOL PLAATJE
UNIVERSITY

Centre for
Global Change
BRIDGING THE GAP BETWEEN SCIENCE AND SOCIETY



National
Research
Foundation



science, technology
& innovation

Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

Vision

To be a globally recognised centre of excellence in global change research, driving sustainable solutions for arid and semi-arid regions while empowering communities through inclusive, transdisciplinary, and impact-driven science.

Mission

The Centre for Global Change is committed to advancing climate resilience in vulnerable regions, particularly the Northern Cape, through collaborative research, education, and community engagement.

Core Values

Care

Inclusivity

Community
engagement

Sustainability

Collaboration

Impact driven
science

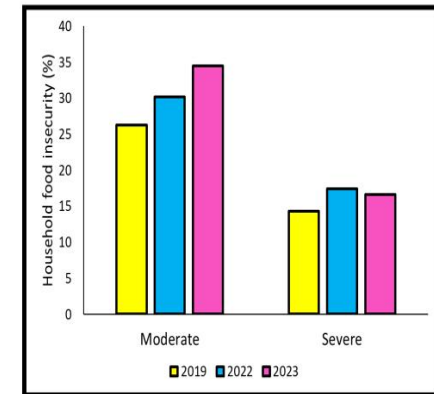
Project 1: Climate-resilient food systems in arid regions

Drought Challenges Over The Past Decade

- December 2013 **Drought and debt for Northern Cape small farmers**
- July 2017 **Drought depletes farmers' cash flow in Northern Cape**
- November 2017 **NORTHERN CAPE FARMERS REDUCING HERDS**
Livestock farmers in the Northern Cape had thus far reduced their livestock numbers by more than 30% as a result of the persisting drought, according to Henk van Wyk, the president of Agri Northern Cape.
- January 2020 **Drought-ravaged Northern Cape to be declared a disaster area**
- January 2023 **Northern Cape farmers' drought misery continues**
- January 2025 **DESERT BREAKING POINT**
Karoo Dust Bowl (Part I) — here come the dunes, a death knell for plant species and farmers' livelihoods

3

Dry Lands, Empty Hands: The Food Security Fallout



Rising hunger: Stats SA sounds alarm on food insecurity

Food insecurity is worsening in South Africa, with Northern Cape, North West, and Mpumalanga among the hardest-hit provinces.

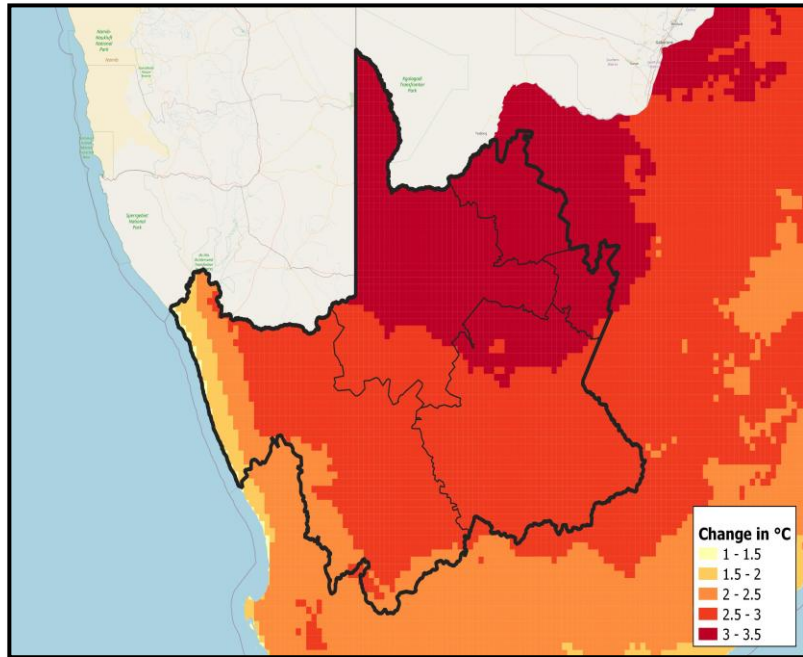
06 Mar 2025

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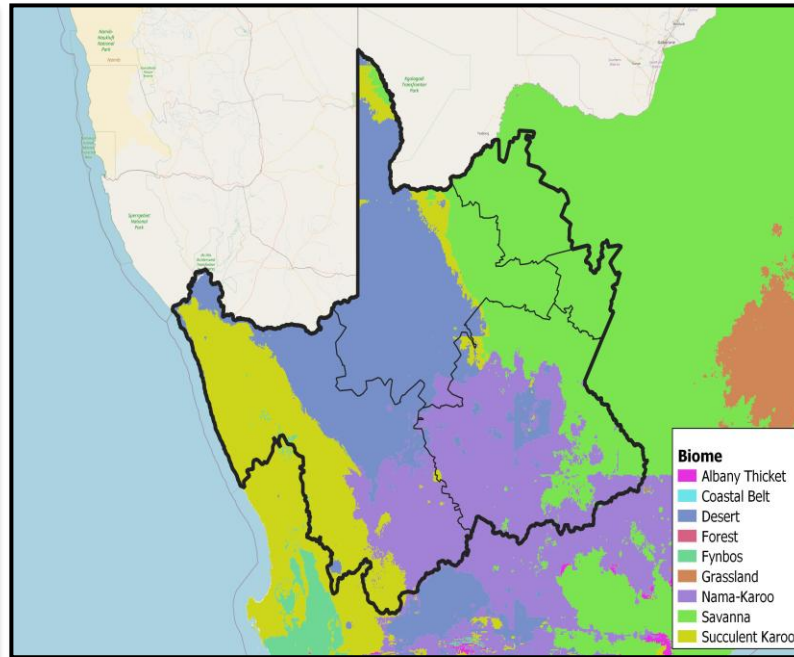
Postgraduate students:

PhD: Mncedisi Motaung, Emihle Ngonini
MSc: Motjelele Kgotsofalo

Project 2: Carbon sequestration in arid ecosystems



Northern Cape projected to be affected by higher annual average temperatures.

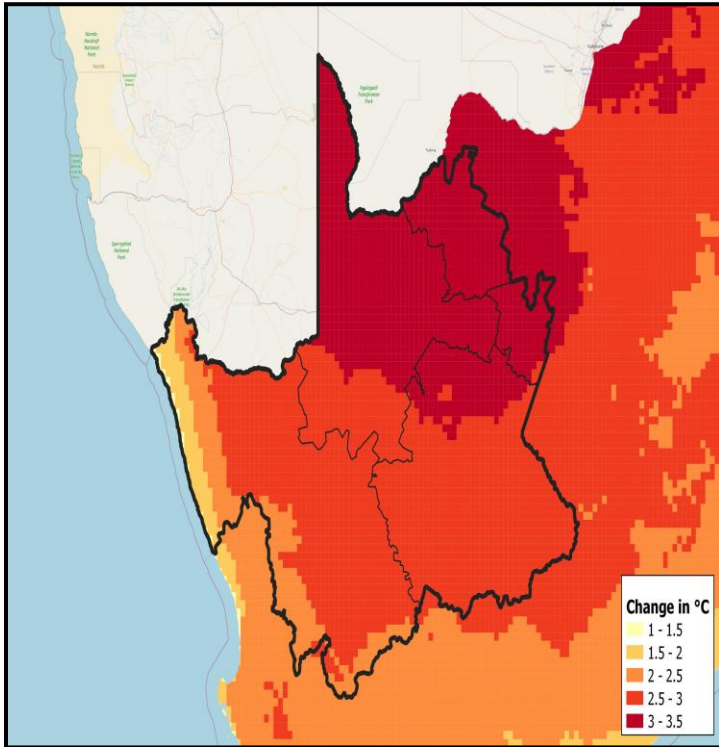


Northern Cape Biomes showing sensitivity to projected climate change impacts.

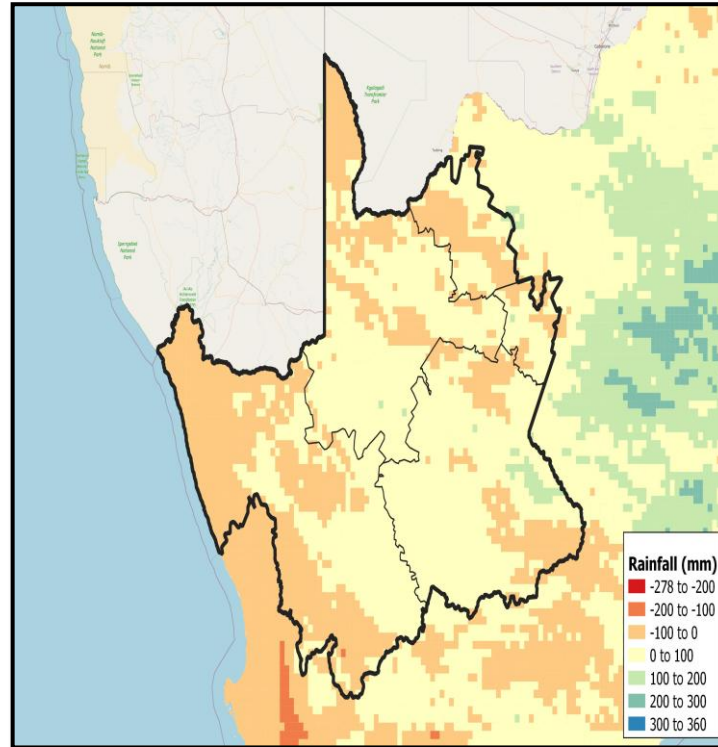


Reduced capacity to capture and store atmospheric carbon dioxide.

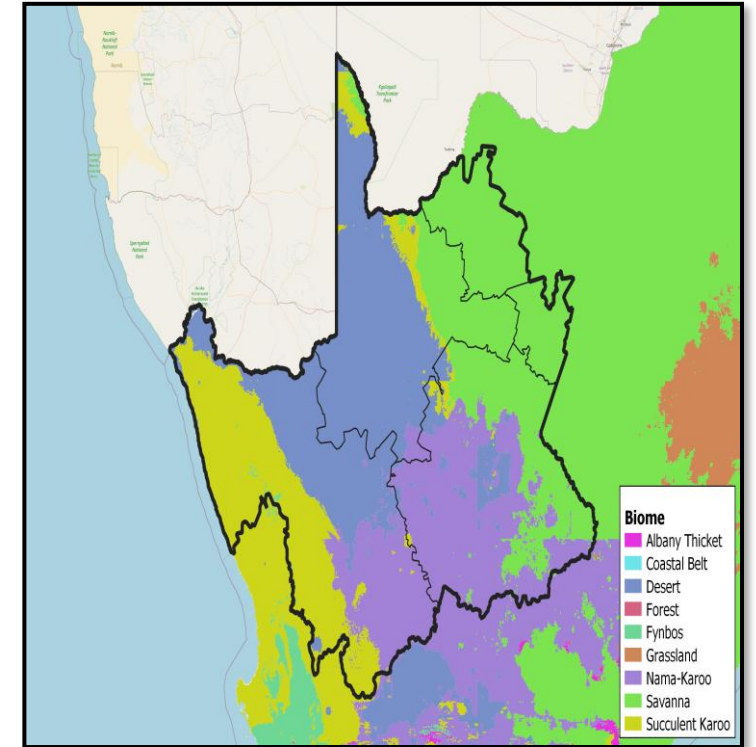
Project 3: Arid Ecosystem Stability



Higher annual average temperatures



Shifts in annual average rainfall



Biome sensitivity to climate change

Postgraduate students

MSc: Sebonesho, Naledi Lenah

Project 4: Rangeland productivity in arid regions



SABC News

Drought in Northern Cape expected to change farming 'forever'

Farmers in the Northern Cape say the persistent drought in the province has reached a crisis point. Former Agri Northern Cape Deputy Chairperson Marais Klug...

24 Dec 2019



fw Farmer's Weekly

Northern Cape farmers' drought misery continues

Farmers in the Northern Cape, where a devastating drought has prevailed since 2011, are still in dire straits, despite the rainfall that occurred recently in...

19 Jan 2023



Food For Mzansi

'We need feed': NC farmers plead amid prolonged drought

Drought-stricken farmers in the Namakwa district of the Northern Cape say they are nearing a breaking point. Some are spending R15 000 a...

1 month ago



Postgraduate students:
MSc: Sibabalo Sidlayi, Veronica Oratile Sehemo

Project 5: Bioremediation for climate-resilient land restoration in arid zones

 Mining Weekly

More indications of quality copper in South Africa's well-endowed Northern Cape

JOHANNESBURG (miningweekly.com) – The final assay results from diamond drill holes completed to test strike and down-dip extensions of the...

17 Dec 2024



 The Mail & Guardian

Remnants of asbestos mine still a hazard for Northern Cape residents

Activists are pressing the government to clean up abandoned asbestos mines, warning that Cape Plc's toxic legacy still endangers...

6 days ago



 Daily Maverick

Photo essay: Among the forgotten mountains and deserted mines of the Northern Cape

Weathered, historic diamond-find ledgers, fossilised oyster shells, mineralised rock formations, salt deposits and old rusted excavators are...



 Kimberley City Info -

Sewage river flowing again – The DFA

MILLIONS of litres of foul-smelling raw sewage are flowing into the veld near Platfontein every day as the Gogga Pump Station,...

14 Mar 2016



Postgraduate students

PhD: Sydney Tshilingalinga

MSc: Belina Mafokeng, Poppie Violet Letskane, Naledi Sebonesho

Integrating Climate Modeling and Sustainable Agriculture Solutions

“Climate modeling informs sustainable agriculture by predicting shifting weather patterns, enabling the development of climate-smart, resilient food systems that increase productivity while reducing environmental impact”

D. Behera, J. Fathima, N.M.C. Saady et al. 2025 <https://doi.org/10.1016/j.jgrets.2025.100242>

Scientific Reports

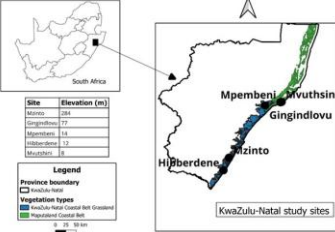
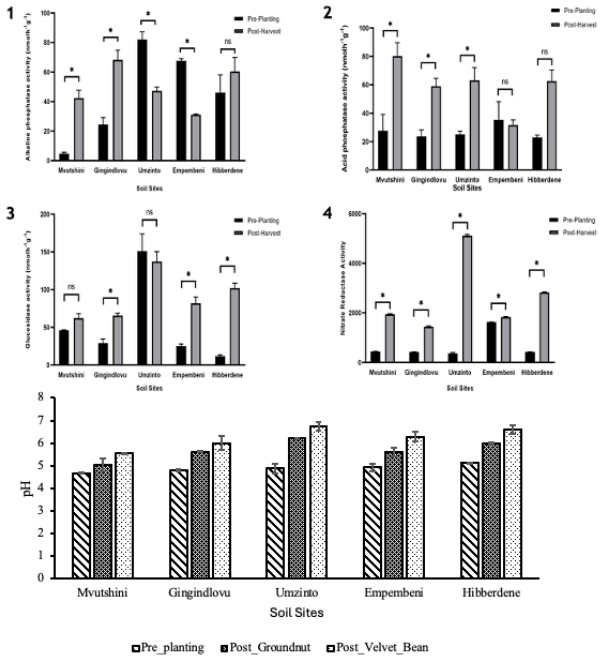
Article in Press

<https://doi.org/10.1038/s41598-026-37961-6>

Legume cover crops ameliorate soil acidity and enhance nutrient availability in South African sugarcane fields

Received: 7 May 2025
Accepted: 28 January 2026

Naledi Zama, Skhanyiso Khwela, Mncedisi Motaung, Emihle Ngonini & Anathi Magadlela



		Nitrogen (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	pH	Exchange Acidity (Al+H)
Mvutshini	Pre	0.085±0.00 ^{ab}	3.70±0.12 ^a	33.00±0.00 ^a	196.00±13.86 ^a	72.50±8.37 ^a	4.67±0.03 ^a	0.50±0.15 ^a
	<i>Vicia sativa</i>	0.070±0.01 ^a	2.85±0.14 ^b	40.50±4.91 ^a	400.00±54.80 ^b	134.50±22.80 ^b	4.75±0.16 ^a	0.36±0.03 ^b
	<i>Vicia villosa</i>	0.090±0.00 ^b	3.60±0.00 ^a	43.00±0.00 ^a	391.00±3.46 ^a	119.00±1.15 ^{ab}	5.04±0.05 ^b	0.33±0.00 ^b
Pre-planting								
Site	Species	Functional traits		<i>Vicia sativa</i>		<i>Vicia villosa</i>		
				Species	Functional traits	Species	Functional traits	
Mvutshini	<i>Paraburkholderia phyumatum</i> (Acc: HIE864336.1, %ID: 100)	N-fixing		<i>Arthrobacter</i> sp. (MT256364.1, %ID: 97.2)	N-fixing, P-solubilising, N-cycling	<i>Lysinibacillus sphaericus</i> (Acc: MH260970.1, %ID: 96.46)	N-fixing, P-solubilising, N-cycling	
	<i>Paraburkholderia subsp.</i> (Acc: MK139731.1, %ID: 99.8)	N-fixing, P-solubilising		<i>Pseudomonas</i> sp. (Acc: MN305768.1, %ID: 97.6)	N-fixing, P-solubilising	<i>Burkholderia</i> sp. (Acc: LC561717.1, %ID: 99.11)	N-fixing, P-solubilising	
	<i>Pseudomonas koreensis</i> (Acc: ON428965.1, %ID: 100)	N-fixing, P-solubilising		<i>Arthrobacter</i> sp. (AF409020.1, %ID: 94.2)	N-fixing, P-solubilising, N-cycling	<i>Burkholderia</i> sp. (Acc: KY022417.1, %ID: 98.17)	N-fixing, P-solubilising	
	<i>Burkholderia</i> sp. (Acc: MK612762.1, %ID: 100)	N-fixing, P-solubilising		<i>Bacillus</i> sp. (Acc: OP808999.1, %ID: 94.2)	N-fixing, P-solubilising	<i>Pseudomonas</i> sp. (Acc: CP117460.1, %ID: 98.39)	N-fixing, P-solubilising	
	<i>Chromobacterium piteciniae</i> (Acc: LR634122.1, %ID: 99.9)	P-solubilising, N-cycling		<i>Burkholderia</i> sp. (Acc: AB911043.1, %ID: 99.3)	N-fixing, P-solubilising	<i>Pseudomonas bengalensis</i> (Acc: MT912698.2, %ID: 96.79)	N-cycling, N-fixing, P-solubilising	
	<i>Pseudomonas nitroreducens</i> (Acc: KY038284.1, %ID: 99.6)	N-cycling		<i>Burkholderia</i> sp. (Acc: AB299574.1, %ID: 99.2)	N-fixing, P-solubilising			
				<i>Pseudomonas saccharophila</i> (Acc: AF368755.1, %ID: 83.5)	N-cycling			

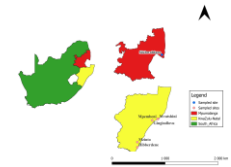
Journal of Soil Science and Plant Nutrition
<https://doi.org/10.1007/s42729-025-02312-3>

ORIGINAL PAPER

Mitigating Soil Sodicity in Irrigated Sugarcane Plantations with *Canavalia Rosea*: A Pot Experiment

Nonkululeko Sithole¹ · Maria A Pérez-Fernández² · Anathi Magadlela^{1,3}

Received: 11 October 2024 / Accepted: 5 February 2025
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Parameter	Cultivation period			
	Initial	3 months	5 months	7 months
Soil				
macronutrients				
N concentration	0.082± 0.002a	0.054± 0.002a	0.068± 0.006a	0.057± 0.008a
P concentration	0.041± 0.000a	0.422± 0.025c	0.244± 0.018b	0.365± 0.0221c
Relative pH				
Exchange acidity	0.050± 0.000a	0.050± 0.000a	0.050± 0.000a	0.050± 0.000a
pH (H ₂ O)	6.550± 0.029a	8.075± 0.003c	8.335± 0.043d	7.910± 0.017b

Saturation extracts				
Ca ²⁺ (meq L ⁻¹)	33.600± 0.635b	0.340± 0.017a	0.310± 0.029a	0.270± 0.012a
Mg ²⁺ (meq L ⁻¹)	54.900± 1.097b	0.325± 0.032a	0.335± 0.061a	0.235± 0.003a
Na ⁺ (meq L ⁻¹)	149.850± 2.165b	9.000± 1.478a	8.045± 1.371a	5.640± 0.618a
Electrical conductivity (dS/m)	24.285± 0.309b	1.027± 0.168a	0.820± 0.123a	0.649± 0.039a
Sodium adsorption ratio (SAR)	22.500± 0.289b	15.440± 2.026a	14.055± 1.435a	11.325± 1.365a
Cation exchange capacity (cmol/L)	21.500± 0.289a	20.875± 0.078b	22.810± 0.514c	24.880± 0.843c

Exchangeable cations				
K (μmol K g ⁻¹)	5.218± 0.007b	4.034± 0.103a	4.152± 0.165a	3.960± 0.435a
Ca (μmol Ca g ⁻¹)	86.100± 0.130a	65.075± 4.826a	75.114± 0.779ab	62.142± 1.435a
Mg (μmol Mg g ⁻¹)	68.063± 0.493a	58.657± 2.554a	62.487± 3.557a	57.671± 2.355a
Na (μmol Na g ⁻¹)	271.870± 0.728b	60.637 ± 5.192a	56.781± 2.378a	51.573± 0.381a
Total cations	58.350± 0.202c	31.110± 0.941a	33.510± 0.768ab	29.425± 0.095a
Plant mineral nutrition				
Total plant N (mmol N g ⁻¹)	1.901± 0.080b	1.586± 0.062a	1.690± 0.079ab	
Total plant P (μmol P g ⁻¹)	26.569± 0.263b	20.674± 0.380a	28.460± 0.605c	
Plant Na concentrations				
Total plant Na (μmol Na g ⁻¹)	66.769± 0.966a	78.824± 2.787b	118.606± 1.277c	

Environmental Modeling and Sustainable Solutions

“Studies in Johannesburg and the West Rand use MODFLOW and MT3DMS to simulate pollutant transport from tailings and landfills, often identifying Mn, Pb, Co, Ni, and U as high-risk contaminants that exceed safe limits.” <https://repository.nwu.ac.za/bitstreams/3b757184-43f2-4976-ad31-a2c69b8d4ebc/download>

Water Air Soil Pollut (2026) 237:268
<https://doi.org/10.1007/s11270-025-08946-4>



Soil Beneath the Grass: *Eragrostis Curvula* Cultivars Reduce Metal Contamination and Improve Soil Health

Nqobile Motsomane¹ · Anathi Magadlela¹

scientific reports

www.nature.com/scientificreports



OPEN ***Eragrostis curvula* cultivars reduce aluminium concentrations and promote the proliferation of beneficial bacteria in acidic ecosystem soils**

Nqobile Motsomane¹ & Anathi Magadlela^{1,2}✉



scientific reports

www.nature.com/scientificreports



OPEN ***Eragrostis curvula* cultivars improve soil bacterial diversity, extracellular enzyme activities, and nutrition in grassland ecosystem soils**

Nqobile Motsomane¹ & Anathi Magadlela^{1,2}✉

RESEARCH ARTICLE

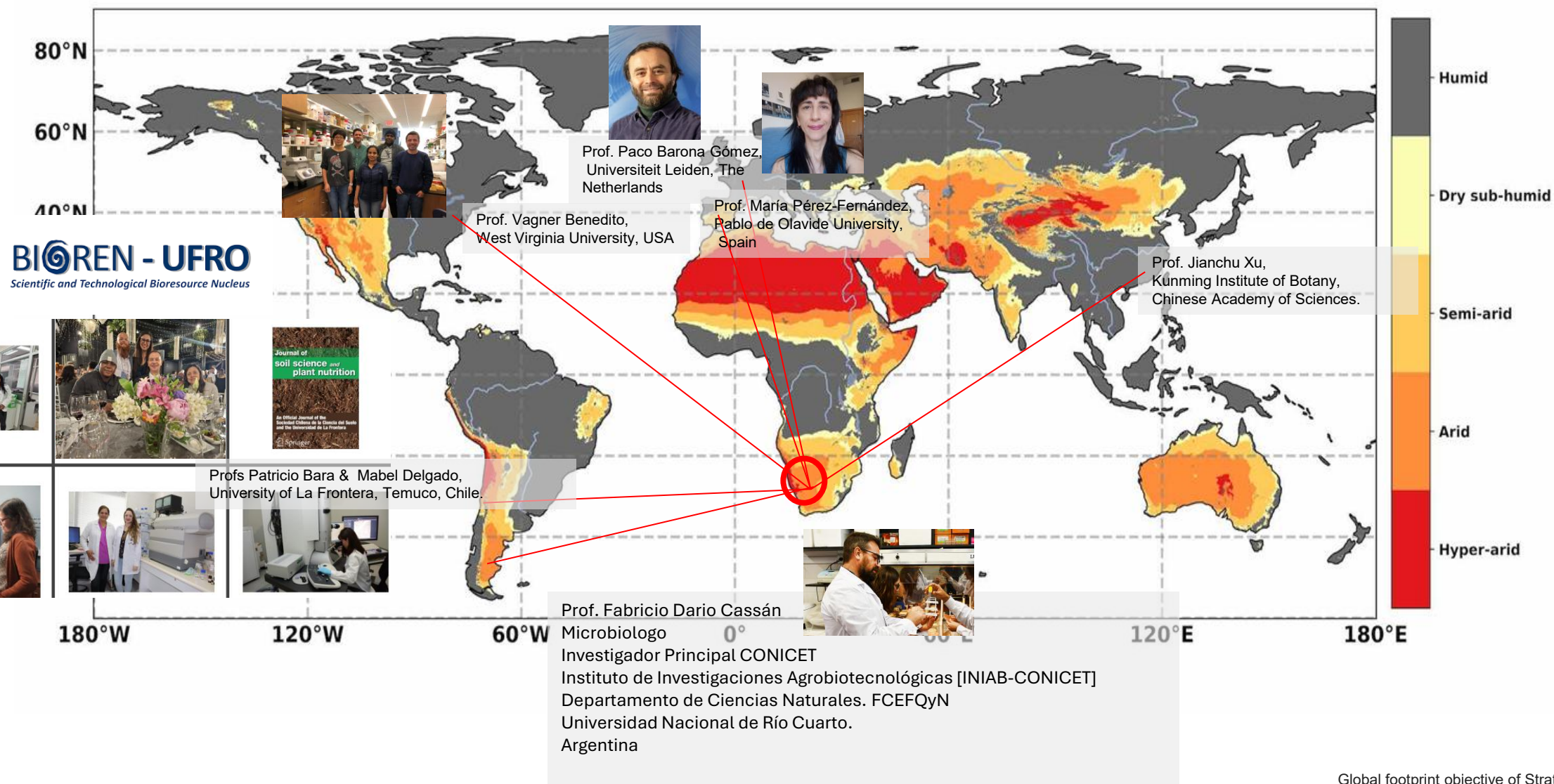
Soil nutrient concentrations influence micronutrient concentrations in *Eragrostis curvula* seeds

Nqobile Motsomane¹, Rob Slotow², Anathi Magadlela^{1,3*}

¹ School of Life Sciences, College of Agriculture, Engineering, and Science, University of KwaZulu Natal (Westville Campus), Private Bag X54001, Durban, South Africa, ² Oppenheimer Fellow in Functional Biodiversity, Centre for Functional Biodiversity, School of Life Sciences, College of Agriculture, Engineering, and Science, University of KwaZulu Natal (Pietermaritzburg Campus), Private Bag X01, Scottsville, South Africa, ³ Department of Biological and Agricultural Sciences, Faculty of Natural and Applied Sciences, Sol Plaatje University, Private Bag X5008, Kimberley, South Africa

Environmental modeling provides the scientific foundation, and sustainable solutions are the practical application in Jameson Park, Kaydale, and Rensburg in Heidelberg, South Africa

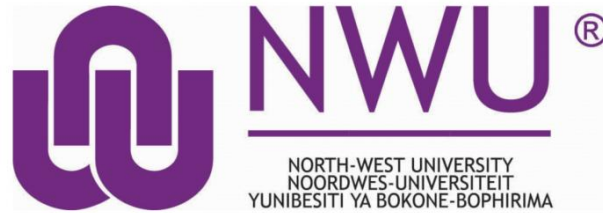
International Collaborators



Academic Collaborators



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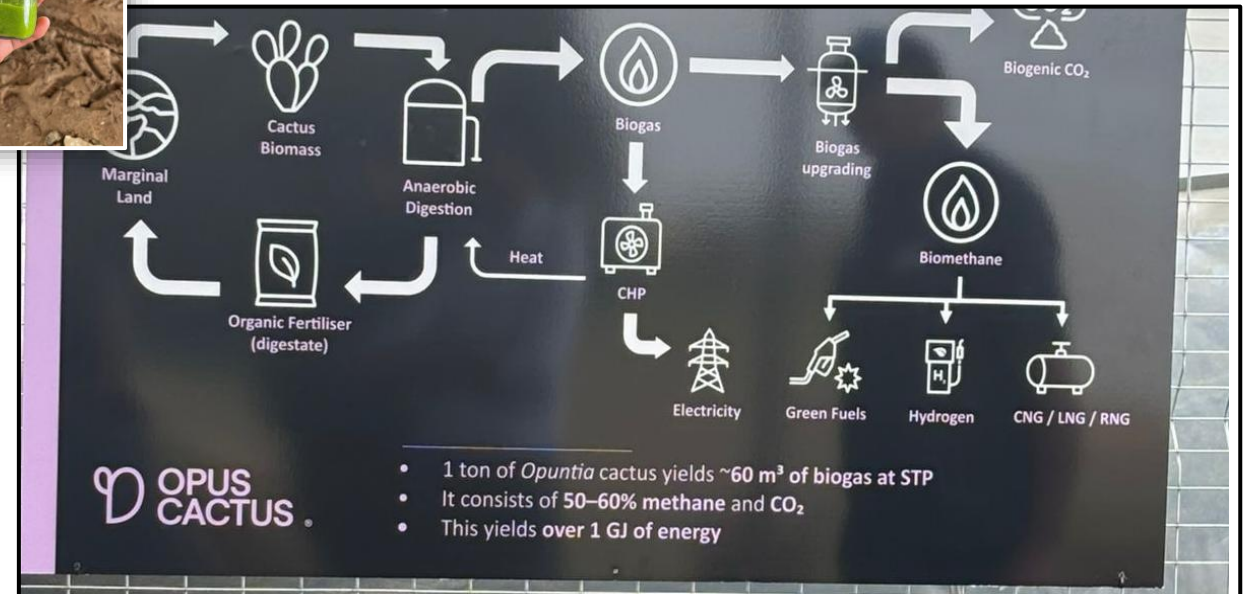
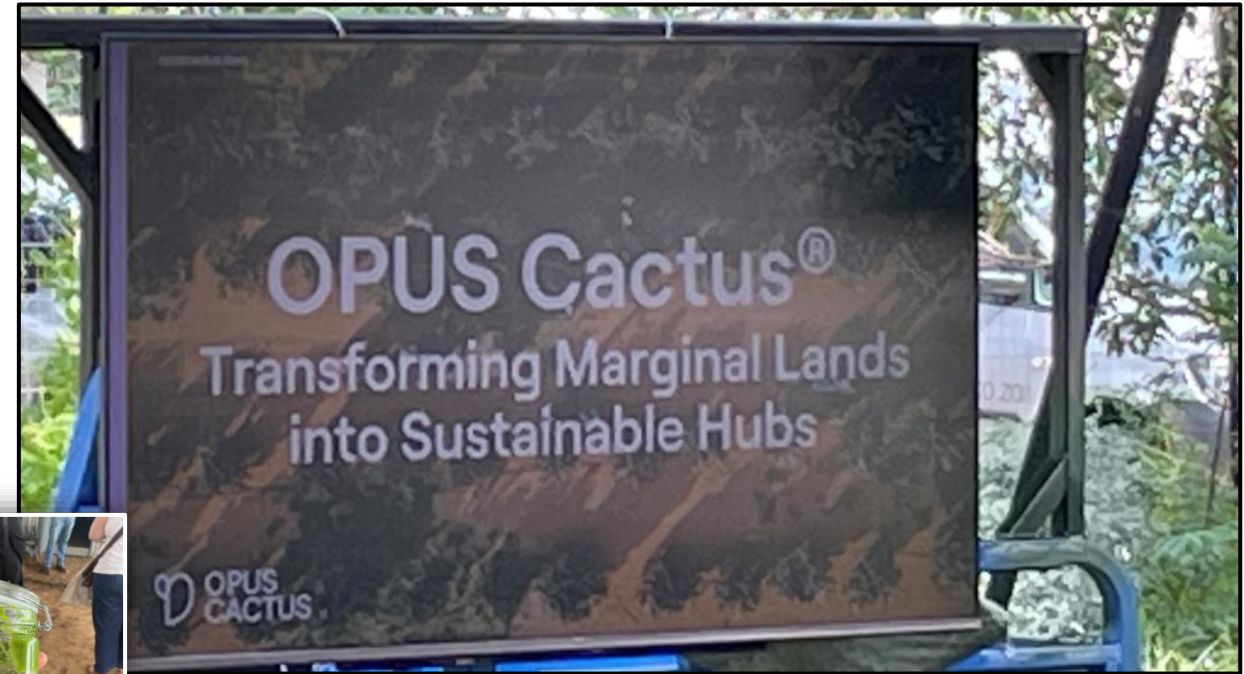
Industry Collaborators



NET ZERO NEXUS-INSTITUTE FOR TECHNOLOGY AND SOCIETY

“Global non-profit, focused on applied research and scalable Nature-based Solutions for regenerative ecosystems”





Living Lab dedicated to applied R&D in Climate-Smart Agriculture in Kakamas
Net Zero Nexus Project Centre (Augrabies) and Institute of Technology and Society (Kakamas)



Community Engagement: Growing for Good School Project



**Community engagement:
Tree planting in collaboration with the Department of Forestry, Fisheries and the
Environment**



Capacity Building

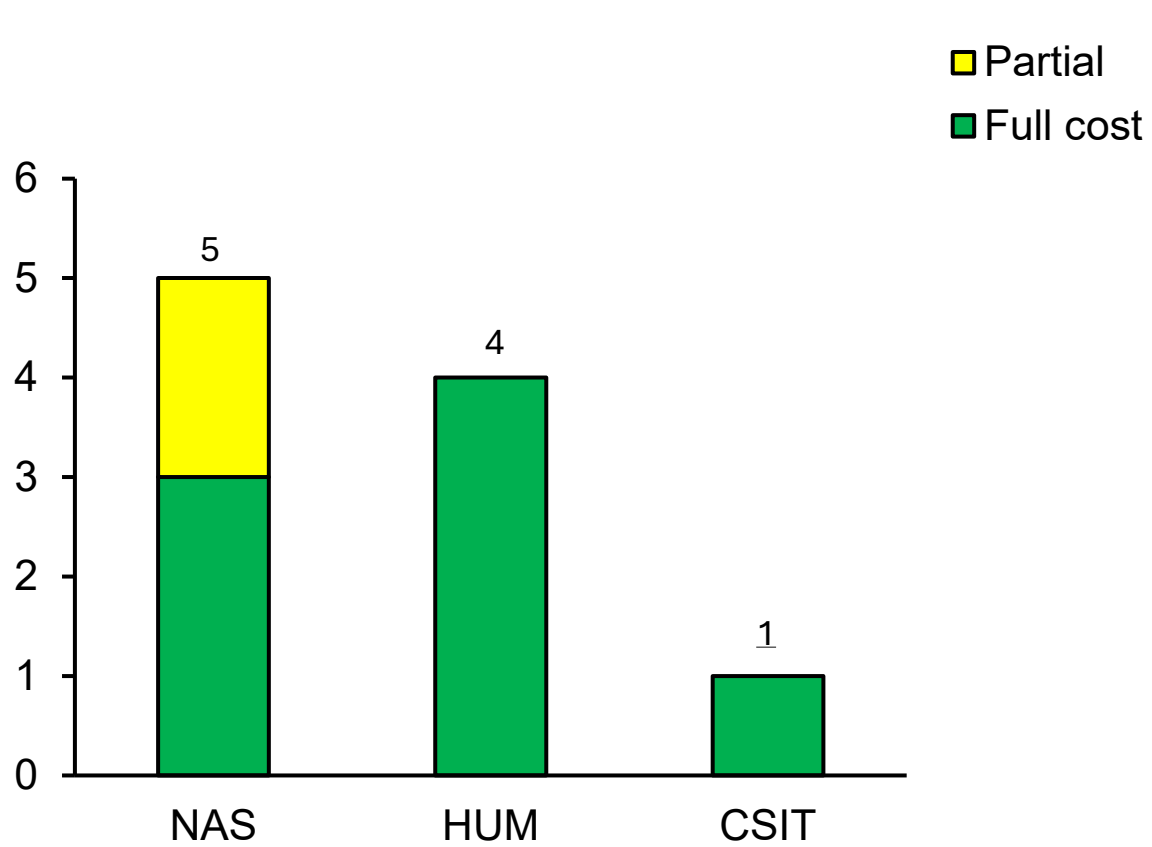


Figure 1. Funding provided by the Centre

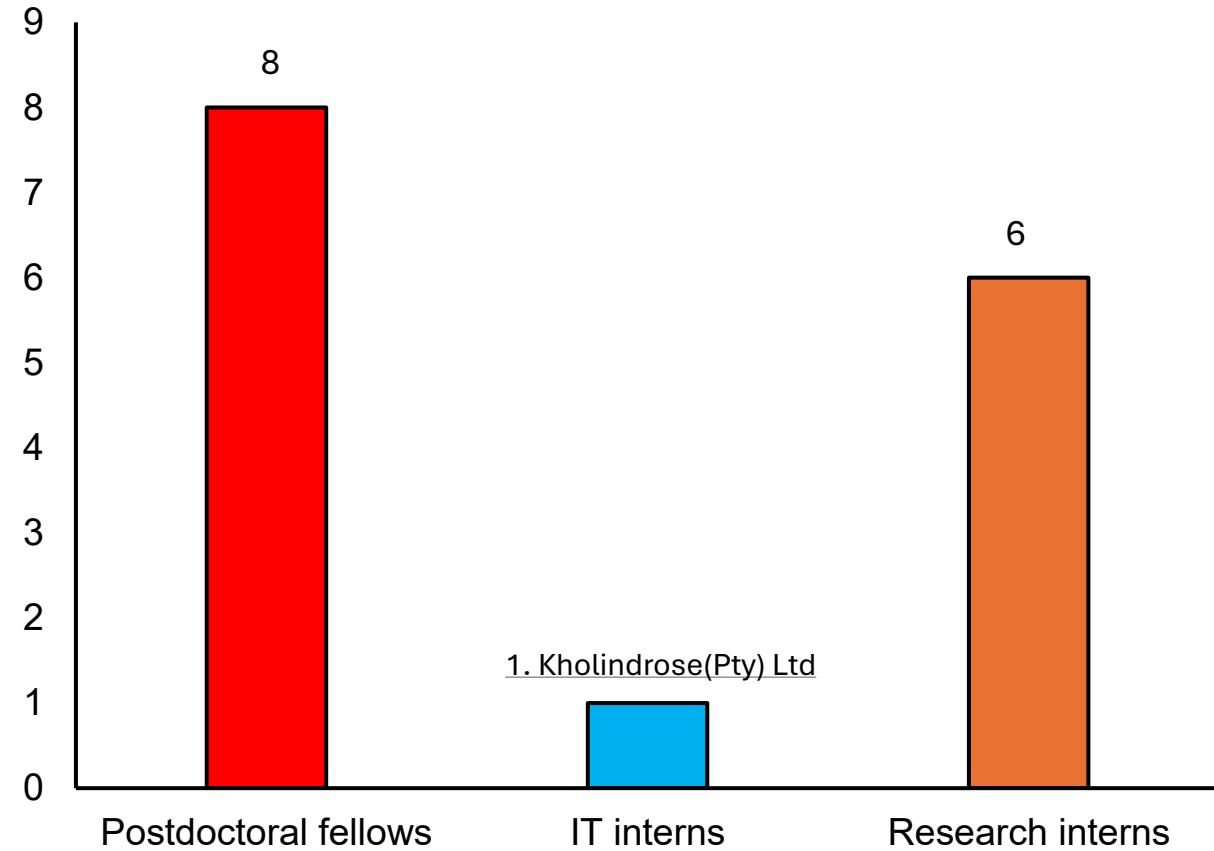
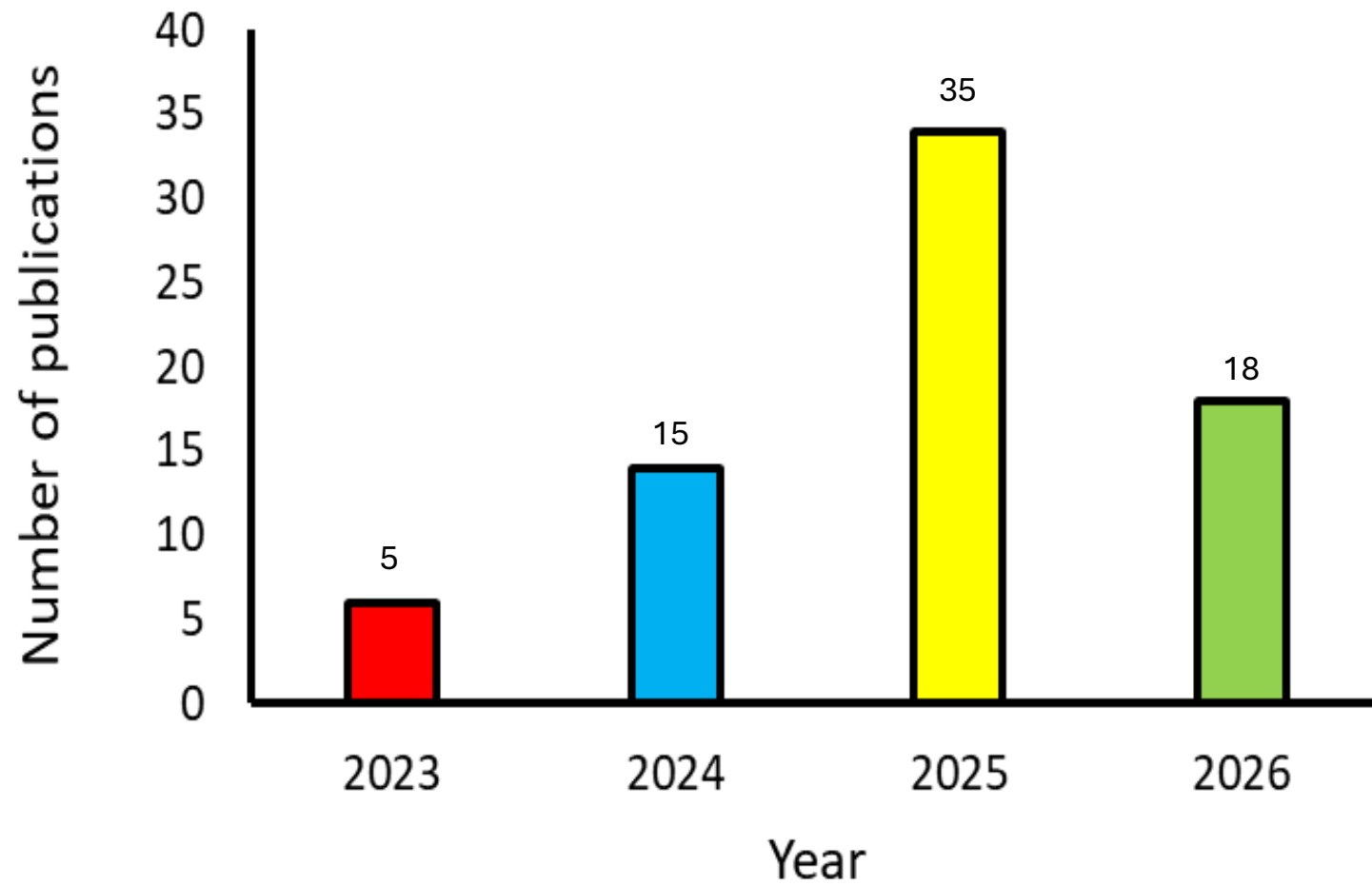
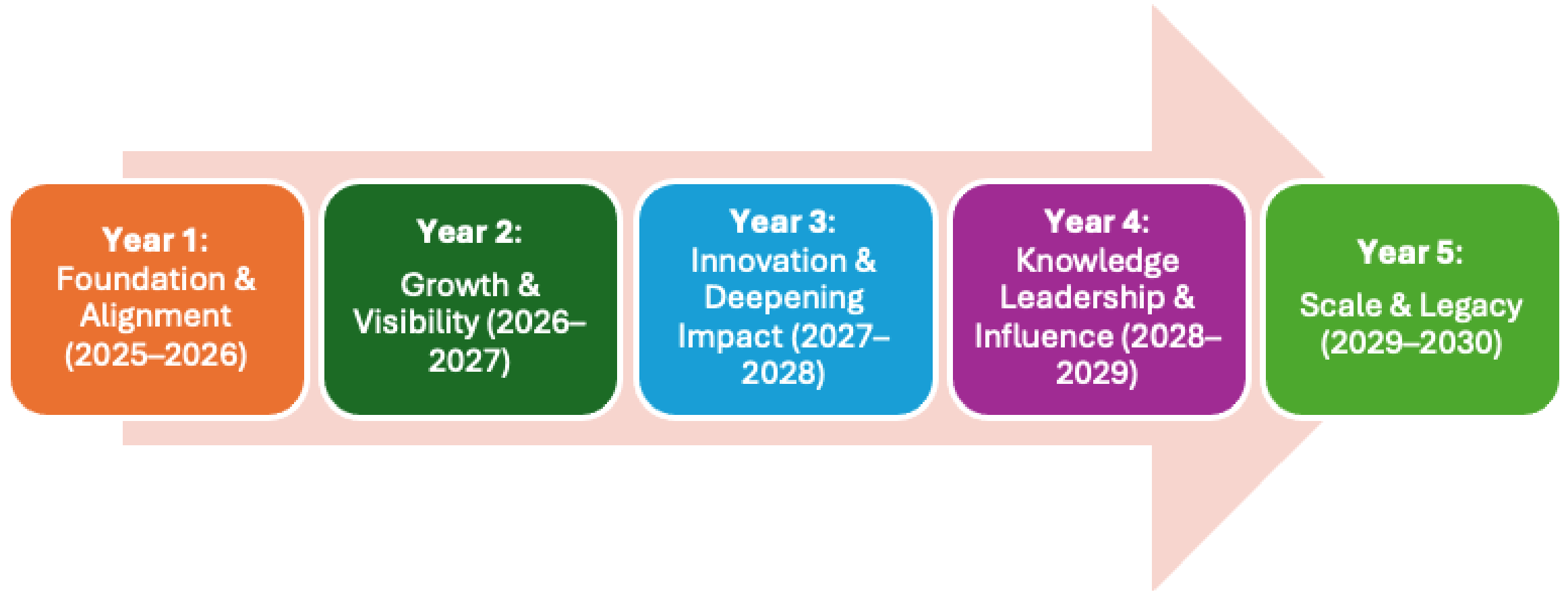


Figure 2. Employee categories

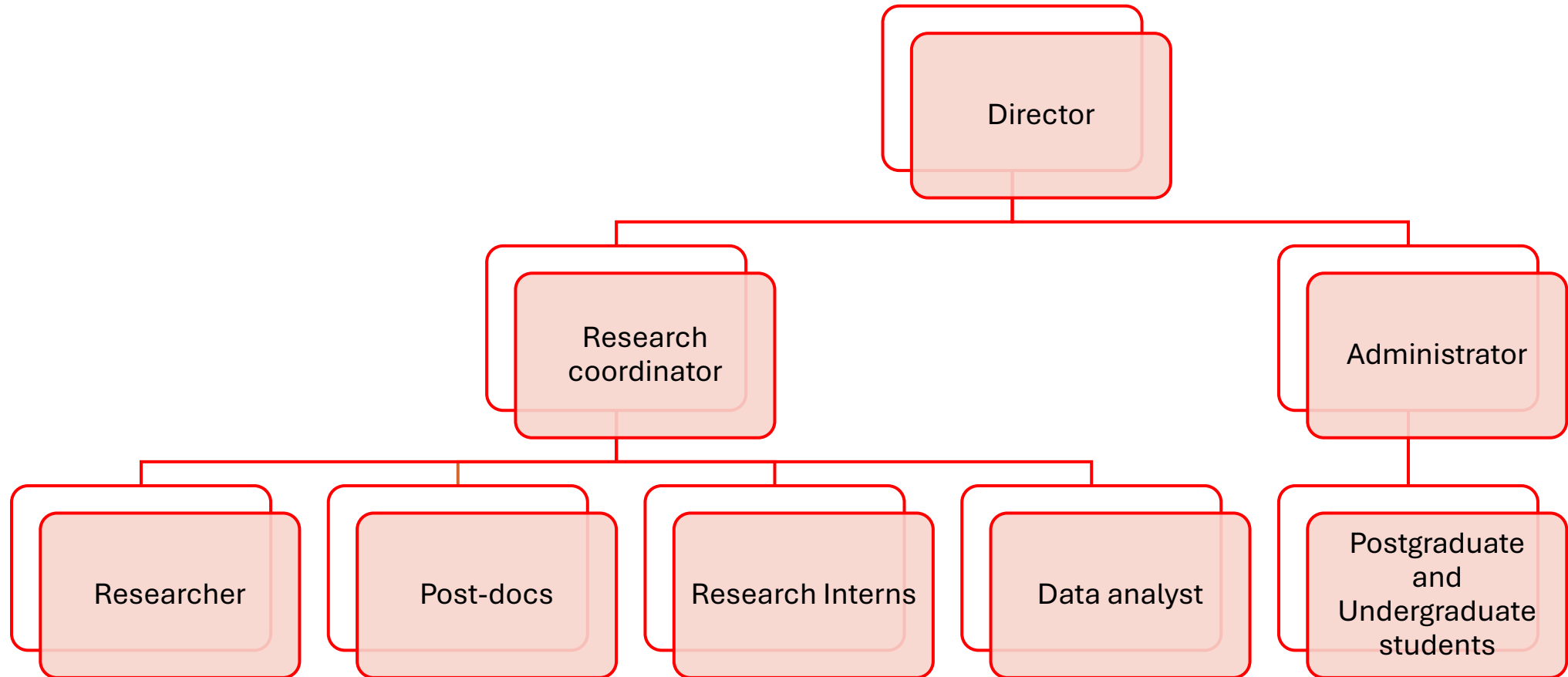
Publications



Centre's strategic focus for the 2025–2030 period



Staffing



Genomics Lab



**Centre for
Global Change**
BRIDGING THE GAP BETWEEN SCIENCE AND SOCIETY

CENTRE FOR GLOBAL CHANGE
FACULTY OF NATURAL AND APPLIED SCIENCES
SOL PLAAATJE UNIVERSITY
Private Bag X5008, KIMBERLEY, 8300
Scanlan Street, KIMBERLEY, 8301
Website: www.spu.ac.za

18 March 2026

Call for Applications: Postdoctoral Research Fellow (Genomics Laboratory)

The Centre is currently advancing its strategic vision through a five-year programme on resilience and sustainability (July 2025 – July 2030), aimed at addressing environmental and socio-economic challenges in arid and semi-arid regions. As part of this initiative, the Centre is establishing a Genomics Laboratory to strengthen molecular research capacity.

Vision

To be a globally recognised centre of excellence in global change research, driving sustainable solutions for arid and semi-arid regions while empowering communities through inclusive, transdisciplinary, and impact-driven science. The Centre strives to strengthen community capacity to respond to global change, promote education and meaningful engagement, and bridge the gap between science and society.

Mission

The Centre for Global Change is committed to advancing climate resilience in vulnerable regions, particularly the Northern Cape, through collaborative research, education, and community engagement. The Centre aims to:

- Develop context-specific strategies to address agricultural vulnerability, environmental degradation, and food insecurity.
- Empower young researchers and students, especially from historically disadvantaged backgrounds, through active participation in research projects.
- Foster partnerships across academia, government, industry, and civil society to ensure that research findings translate into practical impact.
- Promote equitable and sustainable development through research that serves people and the planet.

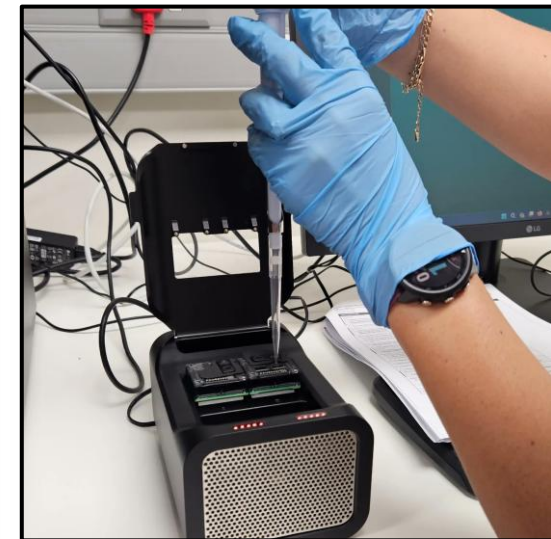
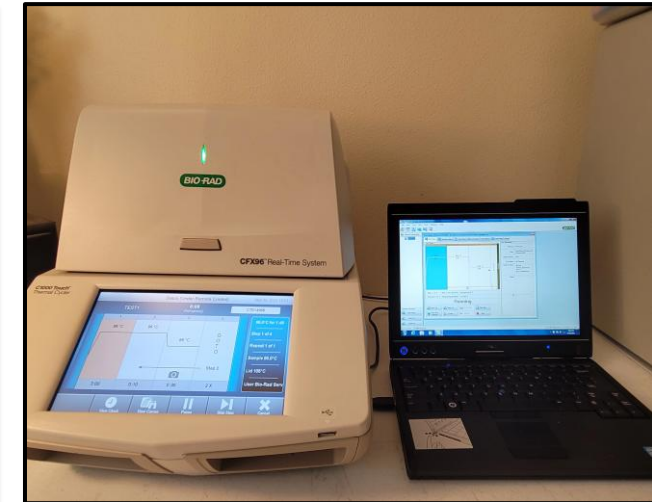
This position offers an exciting opportunity for a highly motivated researcher to play a key role in developing laboratory and analytical capacity in genomics while contributing to impactful research aligned with global change, resilience, and sustainability themes.

Requirements and Expertise:

The successful candidate must demonstrate strong expertise in:

- Quantitative PCR (qPCR)
- DNA/RNA sequencing technologies
- Bioinformatics analysis and data interpretation

Candidates should have a proven ability to independently design, execute, and analyse experiments, as well as contribute to the establishment and optimisation of laboratory workflows and protocols.



Thank you

