2022 Biennial Society of South African Geographers (SSAG) conference programme

12-14 September

University of Pretoria

SSAG Biennial Conference: Programme and Abstracts

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SSAG Council 2022	
Full name	**Affiliation**
Dr Richard Ballard (President)	Gauteng City Region Observatory
Prof Jennifer Fitchett (President Elect)	University of the Witwatersrand
Prof Luke Sandham	North West University
Prof Ashley Gunter	University of South Africa
Prof Zarina Patel	University of Cape Town
Prof David Hedding	University of South Africa
Prof Onisimo Mutanga	University of KwaZulu-Natal
Dr Innocent Sinthumule	University of Johannesburg
Dr Gina Weir-Smith	Human Sciences Research Council
Dr Adriaan van der Walt	University of the Free State
Prof Dirk Cilliers	North West University
Dr Delia Ah Goo	North West University
Dr Manfred Spocter	Stellenbosch University
Prof Cecil Seethal	Retired
Dr Julia Giddy	University of Johannesburg
Dr Adrian Nel	University of KwaZulu-Natal
Dr Nerhene Davis	University of Pretoria
Prof Samuel Adelabu	University of the Free State
Ms Sandra Brits	University of the Free State

Welcome message

Welcome to the Society of South African Geographers (SSAG) 2022 biennial conference! We are delighted to be welcoming you to the University of Pretoria and the chance to experience our wonderful campus. The Covid-19 pandemic has sadly disrupted many academic activities including face-to-face conferences so we are very happy to be able to provide one of the first in-person events of 2022.

In our discussions we purposefully decided not to include a specific 'conference theme' per se. While others may disagree, we felt that this may be restrictive and since we wanted as many people as possible to attend this years' event, especially given the lifting of the Covid-19 restrictions, we decided to leave the interpretation of the conference theme up to you.

We are pleased to have three key note speakers at the conference. We first welcome Professor Brent McCusker from West Virginia University who will give the **first keynote** on Monday morning (12th September), Prof Abel Ramoelo (University of Pretoria) will give the **second keynote** on Tuesday morning (13th September) and the President-Elect of the SSAG, Prof Jennifer Fitchett (University of the Witwatersrand) with deliver the **final keynote** address on the 14th September. We also invite you to join us for a **Roundtable Discussion** on South Africa's New Energy Action Plan: Light at the End of the Tunnel? on Wednesday 14th September. There are a number of **GIS workshops** that will also be presented on first-come, first-served basis (details in the programme). We are also pleased to announce that the conference is registered with the South African Geomatics Council (SAGC) for three CPD credits (the CPD number allocated for the event is UNI857). For those interested, please remember to fill in the attendance register which will be available daily.

The conference is presented in hybrid which means that there is a dedicated venue and session/s for delegates to present online (via Zoom) for those unable to attend in person. The conference has four broad **Sessions** on Human Geography, Physical Geography, Geoinformation Science, and Education in Geography. The majority of sessions run in parallel and we hope that the conference participants will take the opportunity to easily change between these parallel sessions.

We hope you will enjoy the conference!

Your 2022 Conference Organising Committee
Nerhene Davis, JJ Gregory, Gregory Breetzke, Corne van Aardt, Azile Mdleleni, Victoria Rautenbach
(University of Pretoria)

SSAG 2022 programme committee	
Full name	**Affiliation**
Prof Samuel Adelabu	University of the Free State
Dr Delia Ah Goo	North West University
Prof Emma Archer	University of Pretoria
Dr Richard Ballard	Gauteng City Region Observatory
Prof Gregory Breetzke	University of Pretoria
Prof Markus Breines	London School of Hygiene and Tropical Medicine (UK)
Prof Dirk Cilliers	North West University
Prof Serena Coetzee	University of Pretoria
Dr Nerhene Davis	University of Pretoria
Prof Ronnie Donaldson	Stellenbosch University
Mr Jean du Preez	University of Augsburg (Germany)
Prof Liesl Dyson	University of Pretoria
Prof Jennifer Fitchett	University of the Witwatersrand
Prof Rebecca Garland	University of Pretoria
Dr JJ Gregory	University of Pretoria
Prof Ashley Gunter	University of South Africa
Dr Christel Hansen	University of Pretoria
Dr Hali Healy	University of Johannesburg
Prof Gijsbert Hoogendoorn	University of Johannesburg
Dr Amini Kamete	University of Glasgow (UK)
Mr Samy Katumba	University of Pretoria
Prof Anson Mackay	University College London (UK)
Dr Zahn Munch	Stellenbosch University
Prof Onisimo Mutanga	University of KwaZulu-Natal
Dr Adrian Nel	University of KwaZulu-Natal
Prof Zarina Patel	University of Cape Town
Dr Victoria Rautenbach	University of Pretoria
Prof Abel Ramoelo	University of Pretoria
Prof Jennifer Robinson	University College London (UK)
Dr Claudine Roos	North-West University

Prof Peter Schmitz	University of South Africa
Prof Cecil Seethal	Retired
Dr Innocent Sinthumule	University of Johannesburg
Mr Barend van der Merwe	University of Pretoria
Dr Clinton van der Merwe	University of Pretoria
Dr Adriaan van der Walt	University of the Free State
Prof Gustav Visser	Stellenbosch University
Ms Elizabeth Webster	University of Pretoria
Dr Gina Weir-Smith	Human Sciences Research Council
Dr Kevin Winter	University of Cape Town

Keynote speakers

Dr. Brent McCusker is the Department Chair and Professor of Geography at West Virginia University. He has published extensively on land use and livelihoods systems in sub-Saharan Africa, specifically South Africa and Malawi. His current research focuses on the implications of climate change on rural livelihoods and broader economic development in Malawi. He also works with USAID's GeoCenter on livelihood vulnerability analysis and mapping across a range of countries in sub-Saharan Africa and south Asia.

Keynote title: *Geography's future is youth-powered*

When: Monday 12th September, 0920-1030

Where: Geography 1-2

Prof. Abel Ramoelo (abel.ramoelo@up.ac.za) is the Director of the Centre for Environmental Studies, and an Associate Professor at the Department of Geography, Geoinformatics and Meteorology, University of Pretoria. Abel completed his first and second degrees in Environmental Sciences at the University of Venda, in 2003 and 2004, respectively. He then completed his MSc in Geoinformation Science and Earth Observation for Environmental Management and Modelling at four European Universities: Southampton, Lund, Warsaw and, the University of Twente (ITC). He holds a PhD degree in remote sensing from the University of Twente (ITC). Research interest is in using passive or optical (hyperspectral and multispectral) and active (SAR/LiDAR) remote sensing data at various scales for informing decisions about natural resource and environmental issues (i.e. biodiversity conservation, land degradation, climate change impact, water resources), and food security. He successfully supervised over 16 MScs and PhDs. He published over 80 peer-reviewed scientific and conference papers, and book chapters. He is an Associate Editor for the International Journal of Applied Earth Observation and Geo-Information Science, and Editor-in-Chief for SANParks' KOEDOE journal: African Protected Area Conservation and Science journal. He is a member of the Editorial Board for the ISPRS International Journal of Photogrammetry and Remote Sensing.

Keynote title: *Monitoring and assessment of essential biodiversity variables (EBVs) in ever-changing environments: An Earth Observation approach*

When: Tuesday 13th September, 0900-1000

Where: Geography 1-2

Jennifer Fitchett (Jennifer.Fitchett@wits.ac.za) is an Associate Professor of Physical Geography at the University of the Witwatersrand, and the incoming president of the Society of South African Geographers. Her research is situated within the discipline of Biometeorology, exploring climate and climate change, and the impacts on plants, animals and people. This has included research into changing climatologies of tropical cyclones, droughts, extreme temperature events and seasonality, and applied climate research on tourism and climate change, climate change and health, and plant phenology. She holds a Y1 rating from the National Research Foundation, and was elected of the South African Young Academy of Science in 2020. She also currently serves as the African Councillor of the International Society of Biometeorology

Keynote title: *Assessing the suitability and applicability of biometeorological indices for southern Africa*

When: Wednesday 14th September, 0900-1000

Where: Geography 1-2

Roundtable Discussion

South Africa's New Energy Action Plan: Light at the End of the Tunnel?

On July 25th, 2022, President Cyril Ramaphosa addressed the nation, outlining his action plan for ending the energy crisis. In his speech[1] he promised to take "bold, courageous and decisive action" to end over a decade of unreliable electricity supply and a severely disruptive programme of load shedding. These actions, he declared, would improve the performance existing Eskom power stations; accelerate investment in and procurement of new generation capacity; and fundamentally transform the electricity sector, positioning it for future sustainability. The strategy has been praised for its plans to increase budgets for critical maintenance, to tackle crime and corruption, and to roll out measures to substantially increase the uptake of renewables. Multiple concerns have also been raised however, over the possible waiving of environmental and procurement regulations to enable new generation capacity, measures that could lead to gas infrastructure lock-in and stranded assets, and a failure to address calls by climate justice activists for a Green New Eskom that would ensure "a rapid and just transition to a more socially owned, renewable, energy powered economy, providing clean, safe, and affordable energy for all, with no worker and community left behind in the transition". This transdisciplinary roundtable welcomes energy experts from academia, civil society and the policy realm to discuss and debate South Africa's latest energy action plan. Its aim is to explore the challenges and risks inherent in the strategy, but also to identify solutions and opportunities, and the potential under the strategy for practices of "energy commoning" as a means of meeting local energy needs while building social and economic resilience.

When: Wednesday 14th September, 10h10-11h30
Where: Centre for the Advancement of Scholarship (CAS)
Panelists: Dr. Hali Healy, University of Johannesburg (Chair)
Dr Trevor Ngwane, University of Johannesburg, Dept of Sociology
Vuyokazi Futshane, Oxfam,
Cleopatra Shezi, Climate Justice Coalition
Ferron Pedro, SAFTU

Di Scott Memorial

The South African Geography community - and many around the world - were deeply saddened by the passing of Prof Dianne Scott in Cape Town on 22 June 2022. A group of Di's academic friends would like to use the opportunity of the Society of South African Geographers conference in Pretoria to hold an event recognising Di's academic contributions. A number of speakers have been invited to give short inputs that illustrate her contributions to many different academic debates, her work on various applied issues and her remarkable support to students and colleagues. Time allowing, we will also open for input from others at the event, and we encourage further contributions to a tribute page established to capture memories of Di (more details in the memorial).

When: Monday 12th September, 14h40-16h00
Where: Centre for the Advancement of Scholarship (CAS)
Zoom link: https://up-ac-za.zoom.us/j/92804887271?pwd=ZDc4SzJFVXM5amFoVkRENittd0owZz09

[1] https://www.gov.za/speeches/president-cyril-ramaphosa-address-nation-energy-crisis-25-jul-2022-0000

GIS workshops

Workshop 1

Telling intriguing stories with story maps

Story maps are a way of representing spatial data in a narrative that is accessible and easy to follow. In this workshop you will learn how data for a story map should be collected and how to create a narrative that is easy to follow.

When: Monday 12th September, 13h00-14h30
Where: Geography 2-3
Facilitator: Azile Mdleleni (University of Pretoria)

Workshop 2

Amazon - is it a rainforest, online shopping or a cloud computing ecosystem?

Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 200 fully featured services from data centers globally. Millions of customers such as large enterprises and leading government agencies are using AWS to lower costs, become more agile, and innovate faster. But how does it all tie back to a rainforest, online shopping and cloud computing? And more importantly - what does it have to do with GIS? In this workshop you will be introduced to the basics of how cloud computing and GIS are being used to protect the rainforests and deliver online orders quickly to you and others all around the world - all from a single laptop with an internet connection.

When: Tuesday 13th September, 10h10-11h40
Where: Geography 2-3
Facilitator: Cameron Green (Swift Geospatial)

Workshop 3

Open source data collection tools

In this workshop, you will learn to design and implement a mobile data collection project using, EpiCollect+, KoboToolbox and Input.

When: Tuesday 13th September, 11h50-13h10
Where: Geography 2-3
Facilitator: Azile Mdleleni and Dr Victoria Rautenbach (University of Pretoria)

Workshop 4

YouthMappers OpenStreetMap

YouthMappers is an international network of university-student-led chapters who organise, collaborate, and implement mapping activities that respond to actual development needs around the globe. The network creates and uses geospatial data and information that is made publicly available through open platforms.

When: Tuesday 13th September, 14h00-15h30
Where: Geography 2-3
Facilitator: Prof Brent McCusker (West Virginia University)

Workshop 5

Making your own maps for publication

This workshop will introduction you to QGIS and how to use QGIS to make maps for academic papers.

When: Wednesday 14th September, 10h10-11h40
Where: Geography 2-3
Facilitator: Brandon Louw and Seabilwe Tilodi (Kartoza)

ESRI presentation and workshops

Presentation

The future of GIS

When: Monday 12th September, 13h00-13h20
Where: Geography 3-8
Speaker: Richard Kaufholz (ESRI)

Workshop 1

Building a Digital Twin with the University of Pretoria

ESRI South is assisting the Architecture and Geography, Geoinformatics and Meteorology (GGM) Departments at the University of Pretoria to build a digital twin of the Hatfield Precinct using existing spatial data and tools. The initial phase of this project includes the integration of a variety of spatial and non-spatial datasets to provide both a historical view of the area and provide insight into the ongoing and future developments. The workshop will discuss the sourcing, integration, and modelling of the various datasets to provide the basis of a digital twin. This Digital Twin will be enhanced over time to provide data to assist with decision making and the continual improvement of the Hatfield Precinct.

When: Monday 12th September, 10h40-12h10
Where: Geography 2-3
Facilitator: Ruan O'Toole & Stuart Martin (ESRI)

Workshop 2

The Geography of Business

Through the rapidly evolving implementation of location intelligence in business, the role of geography has grown significantly to assist companies to improve operations, sustainability, and client service. Geography has always been used in logistics, site selection, territory management, etc. and recently has been become invaluable in business intelligence applications. Here, location is adding the ability to integrate diverse data from a variety of sources and through this model patterns, relationships and provide spatial context. The workshop will discuss the various applications and use cases which take advantage of location in support of business intelligence using innovative data modelling and visualisation techniques.

When: Monday 12th September, 14h40-16h10
Where: Geography 2-3
Facilitator: Lebogang Mashishi (ESRI)

Society of South African Geographers (SSAG) Awards

Fellowships (2021):

- Prof Luke Sandham (North-West University)
- Prof Ronnie Donaldson (University of Stellenbosch)
- Prof Trevor Hill (UKZN)

Gold Awards (2021):

- Dr Clinton van der Merwe (University of Pretoria)
- Prof Serena Coetzee (University of Pretoria)

Centenary Awards (2021):

The Centenary Award marks the Society's centenary through recognition of, and investment in, emerging academics.

- Dr Sifiso Xulu (University of the Free State)
- Dr Adriaan van der Walt (University of the Free State)
- Dr Julia Giddy (University of Mpumalanga)

Masters Prizes and Awards

2021 (for best theses in 2020)

- Bronze medal (Full thesis): Mogammad Yaaseen Samuels (University of Cape Town) *Governing coastal risk: The case of Langebaan's disappearing shoreline* yaaseensamuels94@gmail.com

- Certificate (Coursework thesis): Geetika Anand (University of Cape Town) *A place to live: Incremental building and its logics in informal settlements of Cape Town and Delhi* anand.geetika@gmail.com

2022 (for best theses in 2021)

- Bronze medal (Full thesis): Christina Liesker (University of Pretoria) *Characteristics of warm season supercell thunderstorms over the Gauteng and Mpumalanga provinces of South Africa* cgthaele@gmail.com

- Certificate (Coursework thesis): Michael Lambrecht (University of Cape Town) *A preliminary assessment into perceptions of accuracy and utility of the environmental assessment screening tool, South Africa* mslambrecht@gmail.com

Honours Bursaries and Awards

The winners for the Honours awards for 2021 are:

Honours Jubilee Bursary (2021):

- Aidan Africa (University of the Western Cape)
- Nikki Hoefnagels (Rhodes University)
- Tafadzwa Makhuza (Rhodes University)

Honours Research Report Award (2021):

- Cameron Wesson (Nelson Mandela University)
- Keegan Fraser (University of the Witwatersrand)

The winners for the Honours awards for 2022 are:

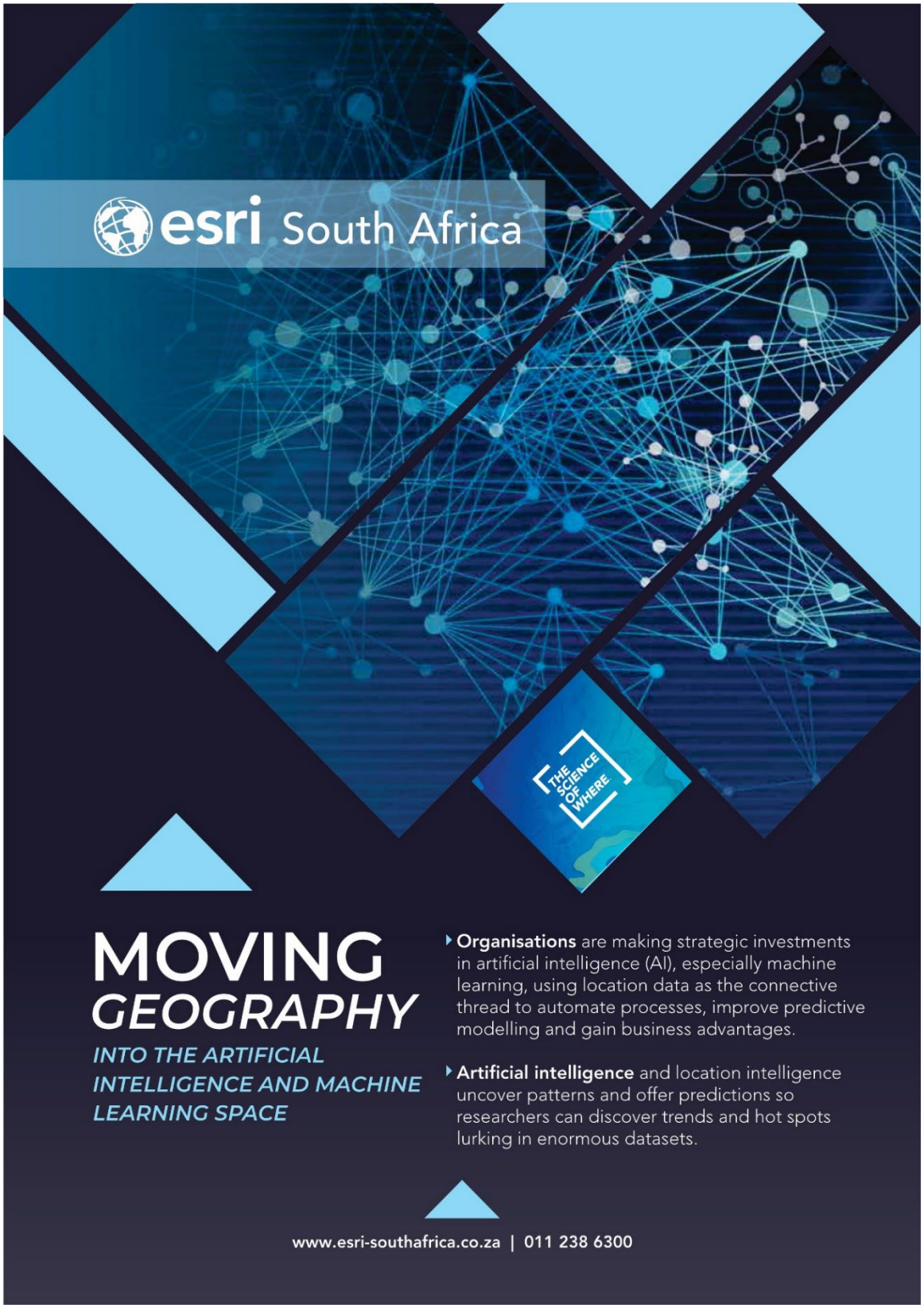
Honours Jubilee Bursary (2022):

- Hannah Chemaly (Stellenbosch University)
- Milela Marawu (University of Cape Town)
- Zeenat Patel (University of Pretoria)

Honours Research Report Award (2022):

- Aidan Africa (University of the Western Cape)
- Kayla Theron (University of Pretoria)

Sponsors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PROGRAMME

All presenters (including joint presentations) have ± twenty (20) minutes for their presentations with ± FIFTEEN (15) minutes of consolidated questions at end of a session. Chairs have been given strict instructions to keep presenters to their allotted times or the Panels to finish on time allocated.

DAY 1: Monday 12th September

08h30 – 09h00	**Coffee/Tea and final registration** *Geography 1-2*				
09h00 – 09h15	**Dean's Welcome** *Geography 1-2*				
09h15 – 09h20	**SSAG President Opening & Welcome** *Geography 1-2*				
09h20 – 10h30	**Keynote Address 1: Prof Brent McCusker (West Virginia University):** Geography's future is youth-powered *Geography 1-2*				
	Human Geography *Geography 1-2*	**Physical Geography** *Geography 1-11*	**Geoinformation Science** *Geography 3-8*	**Education in Geography** *Centre for the Advancement of Scholarship (CAS)*	**GIS Workshop** *Geography 2-3*
10h40 – 12h00	Cultural centres and knowledge-scapes: Comprehending the relationship between the built environment and creative encounters, *Evans Shoko*	Using Groth's algorithm as a possible means to detect changes in plants, *Peter Schmitz*	Mapping South Africans opinions on Covid-19 vaccines, *Terisha Pillay*	Student profile of first-year Geography students in an ODeL context: Ngijabula ukukwazi! (Nice to meet you!), *Sanet Carow*	**ESRI** Building a Digital Twin with the University of Pretoria (1.5 hours) 10h40 – 12h10

	Beyond the 'Hustling': The everyday discourse of hope of informal traders in Ghanaian cities, *Samuel Twumasi Amoah*	Atmospheric moisture source and transport linked to April 2022 heavy rainfall event over the Pongola-Umzimkulu, South Africa, *Ramontsheng Rapolaki*	Social facility planning: Comparing accessibility In Tshwane based on different transport networks, *Rebone Komane*	The undergraduate military geography curriculum at the South African military academy: 1956 to 2020, *Lebo Matjane*	
	A decade of climate change conversations among South African Twitter users, *Izelque Botha*	Cut-off lows over South Africa: An in-depth review, *Nkosinathi Xulu*	Estimating aboveground net primary productivity of reforested trees in an urban landscape using biophysical variables and remotely sensed data, *John Odindi*	A plea for responsible safari tourism in South Africa: A sustainable development imperative, *Michael deVivo*	
	Current and emerging practices of solid waste management in Accra's open-air markets, *Rosina Sheburah Essien* **Chair:** Izelque Botha	Microphysiography and Drakensberg alpine grassland vegetation characteristics at Witsieshoek, South Africa, *Zeenat Patel* **Chair:** Peter Schmitz	Towards a citizen science solution for daily rainfall in South Africa, *Riley Kamstra* **Chair:** John Odindi	Mapping the unsafe school journey: Rural primary school children's perspectives on dangerous social geographies in South Africa, *Ndumiso Daluxolo Ngidi* **Chair:** Sanet Carow	
12h00 – 13h00	Lunch *Rautenbach Hall*				
	Human Geography *Geography 1-2*	**Physical Geography** *Geography 1-11*	**Geoinformation Science** *Geography 3-8*		**GIS Workshop** *Geography 2-3*
13h00 – 14h20	Where to with evolving gay and lesbian tourism	High-resolution analysis of heatwave trends in the Maloti-Drakensberg	The evolution of GIS *Richard Kaufholz (ESRI)*		Telling intriguing stories with story maps (1.5 hours)

	practices? *Gustav Visser*	region: 1979-2021, *Adriaan van der Walt*			13h00 – 14h30
	The changing nature of nature-based tourism in South Africa, *Julia Giddy*	Long-term trends of rainfall and temperature and their impacts on water resources in the maize triangle of South Africa, *Nomthandazo Mosia*	A methodology for assessing the accuracy of heights derived from Unmanned Aerial Vehicles, *Thabani Thuse*		
	The urbanisation of imagination in South Africa, *Richard Ballard*	Tracking moisture sources of precipitation in Lesotho through stable oxygen and hydrogen isotope analysis, *Jennifer Fitchett*	Modelling the suitable habitats for Schistosoma host snails in Limpopo, South Africa, *Nisa Ayob*		
	A sustainable livelihood framework for community-based tourism in the African ivory route of Limpopo Province, South Africa, *Josephine Letsoalo* **Chair:** Julia Giddy	**Chair:** Adriaan van der Walt	Understanding crime in the context of covid-19: The case of the western cape province of South Africa, *Nkosana Mayoyo* **Chair:** Gregory Breetzke		
14h20 – 14h40	Tea/Coffee *Rautenbach Hall*				
	Human Geography *Geography 1-2*	**Physical Geography** *Geography 1-11*	**Geoinformation Science** *Geography 3-8*	**Memorial celebration** *Centre for the Advancement of Scholarship (CAS)*	**GIS Workshop** *Geography 2-3*

14h40 – 16h00	Social capital, collaborative governance, and drought: A case study of Graaff-Reinet, *Rebecca Light*	Institutionalising the climate change mitigation agenda in local government: the case of the West Rand District Municipality, *Phetoho Rasebechele*	Classification of land cover changes of natural resources harvested by communities surrounding the GGNHP, *Ntebohiseng Sekhele*	Di Scott memorial	**ESRI** The Geography of Business (1.5 hours) 14h40 – 16h10
	Assessing governance changes in small-scale fisheries in South Africa: Analysing policy, rhetoric, perceptions of change and livelihood responses, *Samantha Williams*	Two tales of one fire: The Knysna inferno, *Danie Boshoff*	Mapping smallholder maize farm distribution using multi-temporal Sentinel-1 data integrated with ancillary data in Google Earth Engine, *Colette de Villiers*		
	Cultivating food justice: A re-examination of urban community food gardens in Cape Town, South Africa, *Tinashe Kanosvamhira*	South African winter rainfall zone shifts: A comparison of seasonality metrics for Cape Town from 1841–1899 and 1933–2020, *Sarah Roffe*	Modelling the spatial distribution of wildlife in a protected mountainous area using remote sensing and GIS, *Efosa Adagbasa*		
	Spatial targeting and economic development corridors in South Africa, *Andre Brand* **Chair:** Samantha Williams	 **Chair:** Sarah Roffe	Towards understanding geographic accessibility for sustainable livelihoods – A case study in Mankweng and surroundings, Limpopo, South Africa, *Azile Mdleleni* **Chair:** Azile Mdleleni		

DAY 2: Tuesday 13th September

09h00 – 10h00	**Keynote Address 2: Prof Abel Ramoelo (University of Pretoria):** Monitoring and assessment of essential biodiversity variables (EBVs) in ever-changing environments: An Earth Observation approach *Geography 1-2*				
	Human Geography I *Geography 1-2*	**Human Geography II** *Geography 1-11*	**Human Geography III** *Geography 3-8*	**Geoinformation Science** *Centre for the Advancement of Scholarship (CAS)*	**GIS Workshop** *Geography 2-3*
10h10 – 11h30	Holding on: Resident strategies against displacement in a gentrifying neighbourhood, *Delia Ah Goo*	The spatio-temporal context of major Afrikaans arts festivals in South Africa, *Luke Sandham*	A small-scale component model analysis of low-income household housing demand in Cape Town, South Africa, *Robin Gutting*	Spatiotemporal patterns of heatwaves across the Northern Cape Province, South Africa: 1979-2021, *Jacobus Kruger*	Amazon - is it a rainforest, online shopping or a cloud computing ecosystem? (1.5 hours) 10h10 – 11h40
	The missing debate in South African gentrification scholarship: Gentrification management policy, *Ronnie Donaldson*	An exploration of the perceptions and sense of place of women living in peri-urban settlements in Mankweng, Limpopo Province, *Yajna Sewmohan*	Impact-based severe weather warning service in South Africa: How it really works and how do the public respond to these warnings, *Elizabeth Viljoen*	The purposes and requirements for addressing, and considerations for a transformative way-forward for South Africa, *Sharthi Laldaparsad*	

	Artwashing and gentrification in Salt River, Cape Town, *Emma Campbell*	The politicisation of housing and service provision in the neo-apartheid city: A study from Lamontville Township, KwaZulu-Natal, *Mbali Pewa*	Precarisation, precarity and proletarianisation in the informal sector: Modes of counter-conduct and citizenship during the Covid-19 lockdown in South Africa, *Herman Geyer*	The geospatial information frame (gif): Lessons from South Africa, *Coleman Dube*	
	Gentrification in a South African township: Rethinking parts of Soweto, *Gustav Visser* **Chair:** Delia Ah Goo	Contested Heritage - whose heritage do we value the most? *Clinton van der Merwe* **Chair:** Luke Sandham	e-waste Recycling behaviour: A case study of the city of Johannesburg, *Savannalee Hodgkinson* **Chair:** Herman Geyer	Assessing the effects of changes in rainfall patterns on commercial farmers using remote sensing and GIS in the Eastern Free State Region, South Africa, *Lokuthula Msimanga* **Chair:** Jacobus Kruger	
11h30 – 11h50	Tea/Coffee *Rautenbach Hall*				
	Human Geography I *Geography 1-2*	**Human Geography II** *Geography 1-11*	**Human Geography III** *Geography 3-8*		**GIS Workshop** *Geography 2-3*
11h50 – 13h10	Gated communities for the people: A Cape Flats case study, *Musfiqah Majiet*	The availability and the use of medicinal plants by traditional practitioners in UMkhanyakude District Municipality, *Amos Mthembu*	Conflicts and synergies between customary land use management and urban planning in informal settlements, *Herman Geyer*		Open source data collection tools (1.5 hours) 11h50 – 13h10
	Localised forms of urban governance in	Changing geographies of South African	The 'contestation of crime': Using a spatial		

	neighbourhoods, *Caryn Abrahams*	festivals in response to COVID, *Fiona Drummond*	theory of crime to examine livestock theft among small-scale farmers in Swartruggens, North West province, *Gregory Breetzke*		
	Is segregation a thing of the past or is it here to stay: Analyzing the decolonization process through the spatial transformation of the post-colonial city of Bloemfontein, South Africa, *Palesa Beloved Ngo*	Factors associated with non-payment for selected services In South African metropolitan municipalities, *Casment Mahlwele*	"I feel scared of being a girl": Adolescent girls' conversations about heteropatriarchal sexual violence in South African townships, *Ndumiso Daluxolo Ngidi*		
	Politics and the smart city: Globalisation from within on South Africa's Wild Coast? *Hali Healy* **Chair:** Hali Healy	An insight into environmental stewardship of students at the Nelson Mandela University, *Njabulo Ntombela* **Chair:** Amos Mthembu	Livelihood strategies of women living in Nchechane, Limpopo, *Melon Matcheke* **Chair:** Ndumiso Daluxolo Ngidi		
13h10 – 14h00	Lunch *Rautenbach Hall*				
ZOOM SESSIONS					

	Human Geography I *Geography 1-2*	**Human Geography II** *Geography 1-11*	**Physical Geography** *Geography 3-8*	**Geoinformation Science** *Centre for the Advancement of Scholarship (CAS)*	**GIS Workshop** *Geography 2-3*
14h00 – 15h20	Exploring the dynamics of cultivation patterns, Felicity *Aphiwe Mkhongi*	Examining the challenges in developing an effective web scraping tool in automating and analyzing TripAdvisor reviews, *Dineo Mokgehle*	Exploring climate change vulnerability of the South African tourism sector – a high resolution application of the CVIT, *Tamzyn Smith*	Improving landslide susceptibility mapping using spatial models, ensemble learning and neural networks, *Zahn Munch*	YouthMappers OpenStreetMap (1.5 hours) 14h00 – 15h20
	Round Number 2: Public-private partnership and service delivery in small town, Free State, *Deidre van Rooyen*	The influence of built environment characteristics on neighbourhood crime patterns in subsidised housing neighbourhoods in Cape Town, *Samukele Ngema*	Assessing the applicability of tourism climate indices to quantify climate suitability and the impacts of climate change for tourism in Réunion Island, *Ariel Prinsloo*	Towards an open source python library for automated exploratory spatial data analysis, *Nicolas de Kock*	
	Alternative resident-led governance in the housing sector: The case of Ruo Emoh, Cape Town, *Jevon Jacobs*	The impact of displacement on children in the inner city of Cape Town, *Naeemah Sadien*	Exploring the role of climate on temporal seasonality in the incidence of influenza and respiratory disease hospitalisations in Gauteng, South Africa, *Ogone Motlogeloa*	Assimilating remote sensing data into crop models: a global systematic review, *Luleka Dlamini*	
	Seasonal vulnerabilities and copying strategies at WEF nexus in Harare	Risk identification and analysis in suburban areas and its potential to inform insurance	Drought history and vegetation response in the Angolan Highlands, *Mauro Lourenco*	Using GEE to classify sentinel 2 imagery to differentiate the Marula tree from surrounding	

	low income areas: Moving towards sustainable cities, *Crecentia Gandidzanwa* **Chair:** Gregory Breetzke	companies, *Keegan Fraser* **Chair:** Nerhene Davis	 **Chair:** Ogone Motlogeloa	landcover, *Thendo Mugwena* **Chair:** Serena Coetzee	
15h30 – 17h00	Green Garden tour		Sculptural Route tour *Outside the Geography Building*		Hatfield tour

DAY 3: Wednesday 14th September

09h00 – 10h00	**Keynote Address 3: Prof Jennifer Fitchett (University of the Witwatersrand) -** Assessing the suitability and applicability of biometeorological indices for southern Africa *Geography 1-2*				
	Human Geography I *Geography 1-2*	**Human Geography II** *Geography 1-11*	**Human Geography III** *Geography 3-8*	**Roundtable discussion** *Centre for the Advancement of Scholarship (CAS)*	**GIS Workshop** *Geography 2-3*
10h10 – 11h30	Mapping public art to explore the Africanization of space in the city of Durban, *Fidelis Udo*	Reimagining South Africa's social cohesion in the context of built geographical environments: The case of Durban, *Monica Otu*	The role of traditional leaders in flood disaster risk management: A case study of traditional leaders in the Cuvelai-Etosha basin of	South Africa's new energy action plan: Light at the end of the tunnel?	Making your own maps for publication (1.5 hours) 10h10 – 11h40

			northern Namibia, *Loide Shaamhula*		
	Taming The Wilds: Tactical urbanism and creative placemaking in the revitalisation of a nature reserve in Johannesburg, South Africa, *JJ Gregory*	The urban materialities of disused quarries in Cape Town, *Manfred Spocter*	The environmental impacts of extreme weather and climate events: The case of a severe hailstorm in Goromonzi district, Zimbabwe, *Hardlife Zinhiva*		
	Artwashing juxtaposed documentary film, *Ronnie Donaldson*	South Africa and the geography of corruption, *Sagie Narsiah*	A public political ecology agenda for collaborative anti-extractivist research in Mpondoland and Northern Kwazulu-Natal, *Adrian Nel*		
	Mapping gendered spatial dynamics of access to public places in urban areas, *Tariro Mukwidigwi* **Chair:** Ronnie Donaldson	**Chair:** Gregory Breetzke	**Chair:** Adrian Nel		
11h30 – 11h50	Tea/Coffee *Rautenbach Hall*				

ZOOM SESSIONS					
	Human Geography I *Geography 1-2*	**Human Geography II** *Geography 1-11*	**Human Geography III** *Geography 3-8*	**Physical Geography** *Centre for the Advancement of Scholarship (CAS)*	
11h50 – 13h00	Spatial inequality in Port Elizabeth / Gqeberha: recent trends, *Anton de Wit*	The impact of socio-economic inequality on spatial justice in cities: The case of Kimberley, Northern Cape Province, Republic of South Africa, *Gofaone Imelda Tsile*	Citizen science and GIS: Mapping Jacaranda trees in Johannesburg city, *Rohini Reddy*	Potential impacts of stratospheric aerosol injection on rangelands in southern Africa, *Ashleigh Ho*	
	Competitive cities: An exploration of location and human capital in South African cities, *Mpho Mashego*	Chaos theory approach to understanding tourists' behaviour during the Covid-19 pandemic, *Tina Iirmdu*	Coastal tourism, climate change and risk perceptions: Unpacking the views of key stakeholders along the garden route, *Wayde Pandy*	Comparative analysis of analytical network process and analytical hierarchical process in mapping flood vulnerability using local and indigenous knowledge-based indicators, *Garikai Membele*	
	The influence of human agency on development: The case of an airport in South Africa, *Masilonyane Mokhele*	Community knowledge, attitudes, perceptions and practices on schistosomiasis in Ha-Nesengani, Limpopo Province, *Nape Mothapo*	Investigating the patterns of semigration to Hermanus in the Western Cape from 2020 to 2021, *Lodene Willemse*	Macroplastic pollution in the Jukskei-Hennops-Crocodile River system: What type, how much and where does it come from? *Kyle van Heyde*	

	Inclusion of local community farmers into the last mile logistics distribution systems of wildlife tourism destinations, *Hugo van den Berg* **Chair:** JJ Gregory	How do the indigenous environmental defenders resisting mining in Xolobeni (uMgungundlovu) experience violence? *Orthalia Kunene* **Chair:** Nerhene Davis	**Chair:** Victoria Rautenbach	An unusual 2020/21 La Niña summer over southern Africa, *Hector Chikoore* **Chair:** Gregory Breetzke	
13h00 – 14h00	Lunch *Rautenbach Hall*				
14h00 – 14h30	**Closing and thanks** *Geography 1-2*				
14h30 – 16h00	**SSAG Biennial General Meeting** *Geography 1-2* https://up-ac-za.zoom.us/j/92146282819?pwd=Wnk2aEUxT0FUaEpkMDN1aG0vbVg2Zz09				
18h00 – 22h00	**Conference gala dinner** *Filos Restaurant (37 Lynnwood Rd, Brooklyn, Pretoria – opposite the University of Pretoria main gate)*				

ABSTRACTS

LOCALISED FORMS OF URBAN GOVERNANCE IN NEIGHBOURHOODS

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The article critically examines the way the state and others frame resident associations in various policy instruments, popular discussions, and pronouncements, and how these discourses are mobilized through various interventions. The cases seek to demonstrate the contestations of meaning of local forms of governance across a range from representation, access control to maintaining oversight, and to instantiate notions of a social contract where neighbourhoods are governed by the state and by the people who live in it. In so doing it produces a discursive rubric for local governance in particular places. The subsequent reproduction of these discourses in everyday life, for ordinary people means that while neighbourhood types may be common as it comes to kinds of physical design and infrastructure, the experience of neighbourhood life is profoundly mediated by local forms of governance where the different forms of governance are rehearsed, reinforced and reinterpreted. It is precisely this production and reproduction of the way local level governance is framed, and enacted, together with the confluence of urban management and the exercise of these tropes in everyday society, that creates the grander project of spatial transformation and urban governance.

MODELLING THE SPATIAL DISTRIBUTION OF WILDLIFE IN A PROTECTED MOUNTAINOUS AREA USING REMOTE SENSING AND GIS

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Wildlife plays an essential role in a wildlife reserve. Still, an ecosystem without a natural predator and the presence of human activities will result in a behavioural change in the prey species. The animal species might overstay in one place and cause overgrazing, leading to soil erosion and land degradation. The Golden Gate Natural Highland Park is a protected area with no apex predators. The park is already disturbed by frequent wildfires and invasive species that affect the native vegetation species. The effects of overgrazing in concert with these other disturbances may further deteriorate the ecosystem faster. This study, therefore, aims to model the spatial distribution of wildlife within a protected mountainous grassland ecosystem by using wildlife presence and absence data collected from the park from 2017 to 2020 to predict wildlife presence and movement. Spatial analysis was used to map the distribution of the animals in the park from 2017 to 2020. The wildlife distribution models will be generated using logistic regression to determine factors influencing wildlife presence or absence. Explanatory variables related to fire severity, slope, elevation, distance from streams, soil type, rainfall, and anthropogenic will be used to create a habitat distribution model. Preliminary results from the spatial mapping of the animals show that about 70% of the animals are concentrated

in the Northeastern and Northwestern parts of the park. The Northwestern of the park is an isolated area of 2000 to 2500 meters in elevation. At the same time, the Northeastern part of the park is also isolated with lower heights of 1600 meters. That section has the largest water bodies in the park. Further expected result will determine which factors most and least determines the distribution of the wildlife in the park.

MODELLING THE SUITABLE HABITATS FOR SCHISTOSOMA HOST SNAILS IN LIMPOPO, SOUTH AFRICA

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Schistosomiasis is a vector-borne disease prevalent in people residing in rural areas, particularly where domestic and agricultural activities are predominant. Open water sources like rivers and dams are a major contributor to the transmission of schistosomiasis since the water is infected by the trematode worms. People may be exposed to snail-infested water due to the lack of basic sanitation and clean water. The intermediate hosts require tropical, humid, and aquatic environments to thrive. Although the host snails reproduce through aestivating during dry seasons, snails are limited to areas with enough humidity for survival. Specific habitats are governed by climatic and bioclimatic drivers. Changes in rainfall and temperature may alter the distribution patterns of the host snails and their habitats. Understanding this is essential for identifying high local risk areas and controlling infections by reducing their prevalence. Not many studies in South Africa studied snail habitats using ecological models. Thus, this paper aims to investigate the correlation between climate change drivers and the habitat of bilharzia transmitting snails using multiple ecological niche models. The snail species that will be modelled are Biomphalaria Pfefferi, Bulinus Africanus and Bulinus Globosus. This paper will use ERA5- Land monthly remote sensed data from 1950 to 2021 to model the habitat suitability of the intermediate host snails. Specific climate variables will be chosen, and multiple regression analysis will be conducted to identify the most suitable variables. The ecological niche models will be used to estimate the suitable habitat by using snail sample points, climate, and bioclimatic variables. The ecological models will be validated using the area under the curve (AUC).

THE URBANISATION OF IMAGINATION IN SOUTH AFRICA

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This paper is based on the introductory chapter of an edited volume published in June 2022: https://www.gcro.ac.za/outputs/research-reports/detail/south-african-urban-imaginaries-cases-johannesburg/ It offers a preliminary answer to the question: What are the different ways in which South African cities have been imagined? It proposes a list of 22 different imaginaries, showing for example that imaginaries held by white minority governments before 1991 were not one racist imaginary but three contradictory racist imaginaries. In the post-apartheid period, a different set of divergent imaginaries have been established as dominant modes of thinking about urban spaces.

TWO TALES OF ONE FIRE: THE KNYSNA INFERNO

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In 2017 a fire event along the Garden Route of South Africa is estimated to have caused ZAR 2 billion in property damages, consumed more than 5 000 ha of forest, 800+ buildings, and the death of seven people. Inappropriate land management practices with regard to the expansion of the wildland-urban interface (WUI), commercial forestry activities and inefficient control of invasive alien species (IAS) have been highlighted as contributing factors to the severity of the fire event. Two reports were published on the physical characteristics of the fire event, based on 'data-driven analysis'. However, closer perusal of meteorological and remotely sensed data seems to tell a different tale of the event. This study used data from South African Weather Service (SAWS), the European Centre for Medium-Range Weather Forecasts (ECMWF) and the European Space Agency (ESA) Sentinel-2 satellite to evaluate the reports.

A DECADE OF CLIMATE CHANGE CONVERSATIONS AMONG SOUTH AFRICAN TWITTER USERS

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Twitter© has become an important social media platform for digital civic engagement on issues such as climate change. Social media platforms are increasingly used by Environmental Campaigning Organisations (ECOs) to communicate their messages, gain support for action and to encourage desired behaviour change amongst their followers. Several studies also identified Twitter© as a useful proxy for measuring user awareness of specific issues. Although awareness of an issue does not necessarily translate to behavioural change, behavioural change without adequate levels of awareness is not possible. It is therefore important to understand digital engagement on climate change related issues. This research aimed to explore the changes in the level and nature of climate change awareness/engagement of Twitter users between 2012 and mid-2022. The Twitter Application Programming Interface (API) was used to mine Twitter© data generated in South Africa from January 2012 to 31 May 2022 using 17 climate change related search terms. We then analysed: 1) the standalone frequency of climate change related mentions over time; 2) the mention volume relative to all other tweets and; 3) the context of climate related mentions in tweets. Frequency of mentions for all search terms combined saw a prolonged peak from August 2019 to January 2020, followed by another short-lived peak in frequency (108 tweets) between 29 November and 5 December 2021. Nine environmental campaigning organisations and individuals were identified as most active/influential based on their number of followers and frequency of engagement with Twitter users on climate change related issues. Findings from this study could improve our understanding of climate change related discourse on Twitter. Furthermore, identifying key role players in digital climate

change communication in South Africa could highlight strategies to improve public engagement and mobilisation for future #ClimateAction in South Africa.

SPATIAL TARGETING AND ECONOMIC DEVELOPMENT CORRIDORS IN SOUTH AFRICA

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As economic development corridors link areas geographically, policymakers are required to adjust and harmonize institutional policies and frameworks in order to provide the opportunities for trade, economic growth and development. South Africa identified two prominent economic development corridors, namely the 1) Durban-Free State-Gauteng corridor which is vital in facilitating economic growth for the country and the southern African region; and the 2) Maputo corridor which is vital to establish trade and investment ties to maximize investment, social development and employment opportunities. Both corridors are considered as having high economic potential that can reconstruct spatial transformation. Spatial targeting and transformation is more explicit, in terms of its geographical application. Stronger focus is placed on areas where sufficient agglomeration economies exist and is the outcome of selecting certain cities or regions as preferred locations to create development opportunities. To promote an alternative that sanctions a degree of objectivity, both corridors were analyzed ensuing four distinct steps, namely 1) converting cities constituting an axis into broader development nodes i.e. quantifying the relationship between cities based on the distance separating them; 2) quantifying the degree of economic attraction by each development node i.e. measures the dominance each development node represents on the axis (fundamental to understand efficiency); 3) quantifying the attraction levels (gravitational forces) between the development nodes i.e. measures the overall strength of connectivity based on distance friction; and 4) quantifying the potential significance of development corridors i.e. potential spatial targeting on an axis. The analysis shows that although both corridors exhibit high potential for spatial targeting that can unlock inherent economic potential in specific locations, it also exhibits low potential for spatial targeting. Both corridors are limited in promoting spatial targeting as an instrument to help policies achieve their objectives more efficiently.

THE 'CONTESTATION OF CRIME': USING A SPATIAL THEORY OF CRIME TO EXAMINE LIVESTOCK THEFT AMONG SMALL-SCALE FARMERS IN SWARTRUGGENS, NORTH WEST PROVINCE

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Crime is a complex and multi-layered phenomenon that impacts the lives of every South African. One crime type - and its causes and consequences - that has been relatively under-researched in the country is livestock theft. This crime is becoming of increasingly concern due to its progressively organised nature and its consequential impact on local and national food security. In this study, we use a seminal spatial theory of crime – the routine activities theory - to examine the incidence of livestock theft in the farming community of Swartruggens, a small town in the North West Province of

South Africa. Using group conversations with local community members as well as a series of interviews with farmers we obtain a better theoretical understanding of the causal and contributary factors to the occurrence of livestock thefts in the area. We further motivate for a 'contestation of crime' in this community whereby various role players provide different and distinct rationales behind this scourge afflicting this town and its surroundings.

ARTWASHING AND GENTRIFICATION IN SALT RIVER, CAPE TOWN

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Artwashing is a classic profit-driven regeneration manoeuvre used by councils and developers in an attempt to emulate normal organic, artist-led gentrification processes, by purposefully moving artists in to areas of cities which they wish to see developed/rejuvenated. The presence of the artists in this new contrived context is conceived, from the start, as an interim measure as tools for reshaping areas of decay. Since 2016, the organisation Baz-Art has created over 200 murals in the inner-city areas of Cape Town, with many of them being in lower residential Salt River. In the paper we explore the intersection of artwashing and gentrification in Salt River. A structured questionnaire survey was conducted among 61 residents to understand their perception of the value of Salt River, reasons why they feel they want to/do not want to stay in the area, opinions regarding the mural art, as well as their interpretation of the intentions of the art. Further analysis includes an account of the active resistance of the Salt River Heritage Society against gentrification and mural art as well as the justification of Baz-Art for their art projects.

STUDENT PROFILE OF FIRST-YEAR GEOGRAPHY STUDENTS IN AN ODEL CONTEXT: NGIJABULA UKUKWAZI! (NICE TO MEET YOU!)

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Successful implementation of SDG 4 (Quality Education) requires increasing access to inclusive, equitable and quality education while aiming for minimal or non-existent exclusion due to entry requirements, financial resources, social circumstances, gender and race. Open Distance e-Learning (ODeL) institutions have the potential and capability to deliver quality higher education to students on the African continent and specifically in South Africa, who cannot afford on-campus education and find themselves in marginalized and geographically remote or inaccessible contexts. Therefore, there is a need to have insight into student profiles within the ODeL context to understand the challenges experienced by students and to manage their expectations. Previous studies conducted by researchers to compile student profiles did not consider the physical location of students. This research aims to specify the student profiles by taking geographical location and disparities within the South African context into account and personifying the typical student based on their socio-economic and cultural background. The postal codes of almost 5200 students registered for a first-year Geography module at the University of South Africa (UNISA), an ODeL institution, were used to geolocate the students

and extract lifestyle data from Census 2011 per sub-place. Kernel Density estimation was used to determine hotspots where students reside. Data sets available from UNISA and the lifestyle data were then extracted per hotspot. As a final step, the institutional and lifestyle data were used to build student profiles to personify the typical student. The research results indicate four hotspot areas where students registered for the first-year Geography module reside. An avatar representing each group of students living within the hotspots was created and given a predominant name, followed by a depiction of the students' typical lifestyles. The socio-economic and cultural backgrounds demonstrate the various opportunities and challenges experienced by the first-year students.

AN UNUSUAL 2020/21 LA NIÑA SUMMER OVER SOUTHERN AFRICA

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Southern Africa is vulnerable to the occurrence of Pacific El Niño and La Niña events which impact on the atmospheric circulation, summer rainfall and surface air temperatures. The most severe droughts have occurred during El Niño, whilst La Niña tends to favour above normal seasonal rainfall. This study focuses on the anomalous 2020/21 La Niña summer rainfall season over the subcontinent. NOAA Pacific sea-surface temperature and circulation anomalies from the ERA5 reanalyses were analysed to determine impact on rainfall characteristics, including temporal distribution and anomalies from long-term means. Results show that large areas extending from 15-25°S, between 20 and 45°E (including the Mozambique Channel) experienced above average seasonal rainfall. Angola and the Indian Ocean east of Madagascar were anomalously dry. An interesting finding was that temporally; some areas did not experience the traditional mid-summer dry spell (drought). Several tropical cyclones made landfall including TC Guambe that returned to the Mozambique Channel and intensified; and TC Jobo that went far north near Tanzania. Despite La Niña, Indian sea temperature anomalies also contributed to anomalous circulation, rainfall and tropical cyclone activity. Regrettably, the cyclonic activity caused devastation, including loss of lives and livelihoods. Some of the areas that received high rainfall and soil moisture experienced bumper maize harvests, with very green and dense savanna grasslands for livestock and wildlife. The unusual 2020/21 summer rainfall season over southern Africa followed a very dry trend including the severe 2015/16 drought, highlighting the challenges of climate change.

TOWARDS AN OPEN SOURCE PYTHON LIBRARY FOR AUTOMATED EXPLORATORY SPATIAL DATA ANALYSIS

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The exploratory spatial data analysis (ESDA) process refers to the use of various functions to gain an initial understanding of a spatial dataset. These include measures of spatial heterogeneity and spatial autocorrelation. Currently, the ESDA process is repetitive and time-consuming. Additionally, while different results arise for different datasets, how these results are generated does not change

significantly. Results are also generated individually for each variable which means that they cannot be easily compared or shared. The automation of the ESDA process would therefore have multiple benefits as it would not only save time, but it would also allow the data analyst to keep up with the rapid rate at which we generate data. This paper aims to introduce the first iteration of autoESDA – a Python library capable of automating the ESDA process by summarising the results into a single report. In this paper, we present the defined high-level requirements for the implementation of autoESDA. Various dependency libraries are discussed and a high-level overview of the workflow of autoESDA is described. The library is then evaluated against the requirements laid out earlier in the study. Semi-structured interviews were carried out, which yielded a wealth of feedback and suggestions from the participants, describing how the output report could be improved. Finally, a roadmap of proposed further developments and improvements is discussed. The first version demonstrates that the automation of ESDA is possible and lays the foundation for further development in this regard. This is an important contribution to understanding spatial data as it enables the data analyst to keep up with the magnitude of data that is generated on a daily basis.

A PLEA FOR RESPONSIBLE SAFARI TOURISM IN SOUTH AFRICA: A SUSTAINABLE DEVELOPMENT IMPERATIVE

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Currently, Americans and Europeans make up 75% of overseas tourists in South Africa, many of whom include safari experiences on their trips. Given that, it is contended that for optimal African wildlife conservation and community development to occur, the onus must be placed not merely upon safari-belt countries, but some burden of responsibility must be on the travel agencies and people of North American and European countries who engage in safari tourism. Because the USA accounted for the greatest number of overseas tourists in 2021, provided here is a template for the pragmatic assessment of American tourists intending to take part in safari experiences, in addition to suggested strategies for developing coalitions of willing participants in responsible safari tourism. The influx of US tourists is likely to grow in coming months, for Americans' vigorous appetite to travel abroad remains high. "Bucket List" dreams driven by pandemic era isolation spark travel to South Africa, and the safari experience is often considered essential. Tourists frequently are led to believe they contribute to the sustainability of the natural environment, as well as the local villages in the vicinity of their wilderness visits; but unfortunately, the safari camps embracing the kind of corporate social responsibility that fosters community development are more often the exception than the rule. This must change. American travel agencies and their clients should acknowledge the importance of the role played by safari camps practicing the Tanda Tula Leadership Model, which incorporates specific transformational leadership behaviors in everyday operations. Moreover, American travel agencies and prospective tourists should engage in the careful selection of tourism enterprises committed to bringing long-lasting positive changes to their employees and local communities, and safari operations in South Africa must work to influence the industry to do so as well, for responsible safari tourism is an imperative.

MAPPING SMALLHOLDER MAIZE FARM DISTRIBUTION USING MULTI-TEMPORAL SENTINEL-1 DATA INTEGRATED WITH ANCILLARY DATA IN GOOGLE EARTH ENGINE

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Mapping smallholder maize farm distribution is a continuous challenge in complex rural landscapes due to their smaller size and complex structures. Multi-temporal Sentinel-1 and Sentinel-2 data integrated with ancillary data such as monthly climate data and terrain data have proven to provide an improvement in delineating smallholder maize farms. The Google Earth Engine (GEE) platform enables multi-temporal data fusion and analysis without computational constraints. In this study, we used the GEE platform and multi-temporal satellite data sets to map smallholder maize farms from 2015 to 2021. We applied data reduction (principal component analysis) to Sentinel-1 polarizations on a seasonal basis. The Random Forest machine learning algorithm was used for each model to classify the data. The findings indicate that the best performing models were the models with Sentinel-1 polarizations and Sentinel-2 monthly NDVI integrated with monthly climate and terrain data, which produced favourable overall accuracies (OA) above 81%. We observed spatial and temporal variations in farming practices by the smallholder maize farmers between the 2015 and 2021 seasons. These derived spatial and temporal maps can provide some insights into the challenges faced by smallholder maize farmers and improve agricultural land-usage monitoring mechanisms. Local government agencies can use such information to support and address food security, which contributes to the Sustainable Development Goals (SDGs).

SPATIAL INEQUALITY IN PORT ELIZABETH / GQEBERHA: RECENT TRENDS

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Port Elizabeth's pre-1994 socio- economic and political dispensation bestowed a highly unequal arrangement upon the city's welfare geography. Like South African cities in general at the time, Port Elizabeth entered the post-Apartheid era with clearly defined welfare contrasts. At the time, well-endowed suburbia on the one hand and deprived peripheral townships on the other, offered a predictable snapshot of the status-quo. This spatial arrangement was unravelled in the decades following the early 1990s by new socio-political forces and defining moments in Port Elizabeth's economic history. This paper traces the ongoing evolution of unequal spatial development in Port Elizabeth over the last few decades. It moreover highlights the changing spatiality of social inequality across the city's fabric, that is both peculiar relative to earlier times, as well as highly problematic. Critical factors which collectively determine the spatial outcome of unequal development are assimilated into the discussion. Desegregation trends and demographic realities; middle class needs and suburban reactions; peripheral estates for opposite extremes on the social continuum; inner-city

decay and gentrification; alternative faces and new places of depravation; mainstream and coalition politics; and the reality of the bio-physical environment, are all brought into the paper's drive to illustrate and explain 'who gets what where and how', using the well-known adage of David M Smith and subsequent methodological implications.

ASSIMILATING REMOTE SENSING DATA INTO CROP MODELS: A GLOBAL SYSTEMATIC REVIEW

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Accurately estimating crop growth and yield is pivotal for timely sustainable agricultural management and ensuring food security. Crop models and remote sensing can complement each other and offer a strong analysis tool to improve crop growth and yield estimations. This study aims to systematically categorise the potential, strengths, and weaknesses of research that exclusively focus on assimilating remote sensing data into process-based crop models and their prospect for developing farming and scarce data conditions. A strict search string was applied in the Scopus and Web of Science databases and 497 potential publications were obtained. A predefined inclusion/exclusion criterion to screen for relevance was followed and 123 publications were considered in the final review. Over 81% of the studies were conducted in countries associated with high socio-economic and technological advancement, mainly China, the United States of America, France, Germany, and Italy. Many of these studies integrated MODIS or Landsat data into WOFOST to improve crop growth and yield estimation of stable crops at the field and regional scales. Most studies use recalibration or updating methods alongside various algorithms to assimilate remotely sensed leaf area index into crop models. However, these methods are limited by the excessive computational time required during the iteration process and they are unable to account for the uncertainties in remote sensing observations and the crop model itself. Over 85% of the studies were based on commercial and irrigated farming systems, respectively. Despite a great global interest in data assimilation into crop models, there is limited research that has been conducted in resource- and data-limited regions like Africa. We foresee a great potential for such application in those conditions, hence facilitating and expanding the usefulness of such an approach, from which developing farming communities could benefit.

ARTWASHING JUXTAPOSED DOCUMENTARY FILM

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The concept artwashing (which is the aestheticisation of urban decay that acts as a value-adding amenity with the purpose to attract investors) is juxtaposed in this short documentary film to visualize how art can create awareness about the process of gentrification in affected communities. A land art project in each of the three rural hamlets of Stellenbosch (Pniël, Raithby, Jamestown) under threat was designed and constructed in collaboration with world renowned land artist, Strijdom van der Merwe and my urban honours students, with the main purpose to use art as awareness creation. In

addition, visual arts students created short animation films on the same topic. The impact of the art projects so far include two communities requesting me to address them on the issue of gentrification, a silent protest in Pniël with the handing over of a memorandum to Thuli Madonsela, the mobilization of community leaders in these three hamlets in a unified front to meet with the mayor and a philanthropist willing to donate land in one hamlet specifically for the development of GAP housing. All the art-related projects will conclude in 2023 with an art exhibition where the full-length documentary film will premiere.

THE MISSING DEBATE IN SOUTH AFRICAN GENTRIFICATION SCHOLARSHIP: GENTRIFICATION MANAGEMENT POLICY

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Gentrification scholarship in South Africa largely focuses on issues of displacement and change in the social and urban character of neighbourhoods. In this paper it is argued that the country is lagging in terms of policies and regulations to manage and/or control gentrification. Using the historical rural hamlets around Stellenbosch, namely, Pniël, Raithby and Jamestown as case studies, an argument is presented for incorporating intangible heritage as part of a proposed gentrification management overlay zone for these hamlets. The hamlets have a rich cultural heritage as they were established with the church as key historical landmarks. However, development-led gentrification poses the risk of destroying their heritage in the near future. In the absence of municipal bylaws and South African legislation and policies for the management of gentrification, experiences from elsewhere in the world are drawn upon, to present recommendations to the Stellenbosch Local Municipality on how gentrification can be managed to the benefit of the hamlets.

CHANGING GEOGRAPHIES OF SOUTH AFRICAN FESTIVALS IN RESPONSE TO COVID

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South Africa has been subject to one of the most restrictive and longest COVID-19 lockdowns in the world, which has dramatically affected live events, including cultural festivals. The Future Festivals South Africa project has tracked the changes to the South African festival landscape in a number of ways including changing festival geographies on the global, national and local levels. Firstly, on the national level, GIS was used to map the impact of the lockdown for those that were cancelled, and the adaptation strategies used by South African festivals to respond to COVID-19 restrictions in 2020 and 2021. Across South Africa, approximately half of all cultural festivals were cancelled in 2020 as compared to 2019, with the remainder taking on virtual, small live COVID-compliant or hybrid approaches. The maps show the severe impact that the pandemic has had on the festival landscape

and raises questions around the health and potential recovery of the festival ecosystem as fewer festivals took place in 2021 than 2020. The adaptation strategies used also changed over time as the pandemic situation evolved with fewer virtual approaches and more live and hybrid festivals having occurred in 2021. The virtual adaptation strategy was the most common response amongst South African festivals in 2020. The benefit of online is increased accessibility to festival content with several festival management teams interviewed for this research reporting increased audience reach on the national and international scale. On the local level, festivals that managed to continue with small COVID compliant live and hybrid events have shifted the ways in which they use space, becoming more decentralised and spreading into non-traditional venues within the hosting city/town. This has flipped the traditional festival model on its head as instead of people coming to the festival, the festival has been taken to the people.

THE GEOSPATIAL INFORMATION FRAME (GIF): LESSONS FROM SOUTH AFRICA

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South Africa like many other countries embracing the fourth industrial revolution face many challenges related to the pressing needs for accurate and reliable statistics linked to geographic location as a result of increasing demands for data on indicators. Many of these challenges are rooted in the colonial transition from paper-based mode of statistics production to the digital production operational model. In a bid to revolutionaries the Statistical Value Chain (SVC) by embracing/developing the Generic Statistical Business Process Model (GSBPM) it was integrated with geospatial data in the production of statistics to address these challenges and promote location-based statistics. The purpose of this research was to investigate and provide historical perspective of the transition from paper-based approaches to digital platform through the development of an integrated statistical and geospatial solution powered by geo-coded location data. Using both quantitative and qualitative research approaches inspired by the tradition of participatory research to gather primary and secondary data, this paper discusses how the Geospatial Information Frame (GIF) was created and developed including how it impacted on the organisation production models and structural arrangements. It is argued in the paper that the GIF revolutionarised the SVC and enabled Digital Transition (DT) from paper based operational models and methods of all the surveys and censuses. Reducing time for the production of statistics and optimising the utilisation of resources. Despite these innovative developments, a number of barriers and challenges that include systems, technology, human capital and standards among others require improvements to realise the full potential of the digital transition to facilitate surveys and censuses.

TRACKING MOISTURE SOURCES OF PRECIPITATION IN LESOTHO THROUGH STABLE OXYGEN AND HYDROGEN ISOTOPE ANALYSIS

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The eastern Lesotho Highlands are often referred to as the 'water tower' of southern Africa. The hydroclimate of the region is crucial in supplying water not only to the subsistence farms and urban settlements of Lesotho, but also to the economic hub of adjacent South Africa, through the Lesotho Highlands Water Scheme. The majority of the precipitation in Lesotho falls during the summer months, a feature of convective storms and the tropical temperate trough. However, during winter, the higher altitude regions of Lesotho experience an average of 8-10 snowfall events per year. Palaeoclimate reconstructions suggest that the region may have received considerably more winter precipitation during cold incursions over the past 30kyr, due to a northward displacement of the westerlies. An alternating influence of the easterlies and westerlies should be detectable in stable oxygen ($\delta^{18}O$) and hydrogen (δD) isotope ratios in water molecules in meteoric and surface waters and in snowpacks. We present here the initial findings of an assessment of water samples from a range of sites across the eastern, northern, central, western and southwestern regions of Lesotho, assessing the gradient in stable isotope ratios between sites, and the degree to which these might be considered representative of a signal of differing moisture sources.

RISK IDENTIFICATION AND ANALYSIS IN SUBURBAN AREAS AND ITS POTENTIAL TO INFORM INSURANCE COMPANIES

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Risk analysis allows for the identification of locations that are at increased risk, potentially allowing people to take measures to mitigate this risk. Measuring the liveability of two metropolitan municipalities in Gauteng has been done by using meteorological data such as annual rainfall and sunshine hours, supplied by the South African Weather Service. Remote sensing data and ground-based data has been supplied by risk management company, RiskScape, which allows for location-based analysis, such as distance to schools, shopping centres, police stations and hospitals. With the use of geographic information system (GIS) software, and the analysis of data, evidence suggests that the central, Southwest and Western regions of Tshwane are ideal when looking for access to all schools, however, only the Southwest of Tshwane, near Pretoria provide good access to universities. Similarly, Pretoria and the Southwest regions of Tshwane have better access to hospitals when compared to the Northeast and Eastern territories. Access to parks in Tshwane is only found in the central to Southwest and Western regions of Tshwane, with the Eastern regions having no access to any parks. Retail facilities are scattered throughout Tshwane, however, access to all retail facilities is limited to Pretoria. Online questionnaires have been used to compare the results found through GIS analysis. Questionnaire results indicate that Pretoria East is assumed to be more desirable with a higher level of liveability when compared to the rest of Tshwane. Respondents stated that there is a higher level of service delivery, as well as good access to shops and schools. The outcome of this study can be used to identify locations in Tshwane with a higher level of liveability and potentially less risk, therefore being capable of informing insurance agencies of locations that require policy review.

SEASONAL VULNERABILITIES AND COPYING STRATEGIES AT WEF NEXUS IN HARARE LOW INCOME AREAS: MOVING TOWARDS SUSTAINABLE CITIES

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This paper reveals the vulnerabilities at the intersection of WEF challenging urban residents in low income areas in Harare and the adaptive options used to overcome such challenges. Key informant Interviews and FGDs with urban households were used. Data was also collected from a total of 314 questionnaires administered to urban residential households in low income areas. The major challenges are faced especially in informal settlement which are not connected to network services. In the face of the vulnerabilities, the households used multiple sources of water most which are unsafe to carry out their daily household chores. Numerous energy and food sources were also used. Identifying and acknowledging the seasonal vulnerabilities faced by Harare residents in low income will assist the vulnerable households better cope with urban WEF challenges, as well as inform the service providers on better ways to improve service delivery. This work motivates policy makers to move towards sustainable WEF provisioning and consumption. It is also important to address WEF challenges in an integrated way for sustainable livelihoods.

CONFLICTS AND SYNERGIES BETWEEN CUSTOMARY LAND USE MANAGEMENT AND URBAN PLANNING IN INFORMAL SETTLEMENTS

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The ethnographical study analyses the understated conflict between state-led urban management and community self-regulation in the Global South by way of relating the uneasy relationship between the customary regulation of informal development and urban planning of informal settlements in Cape Town. The combination of zoning bylaws and customary land management systems (CLMS) creates a legal grey zone in the townships with polycentric authority structures and a hybridity of regulatory practices. It delegitimises zoning bylaws, but it also creates a new role for urban planning away from traditional technical management by specialists to a more pragmatic and selective enforcement of zoning by lower-level municipal officials based on common law and substantial relations tests, in close collaboration with local councillors, the police and public representatives linked to CLMS. Although this is by no means without its challenges, such as the disregard of building lines, waste removal challenges and illegal electricity connections, it does, however, strengthen the role of the state as a final and objective authority and benevolent provider of services. Informal settlements, thus have the best of both worlds: a formally planned substructure and an informalised top-structure that provides citizenship and agency to the subaltern.

PRECARISATION, PRECARITY AND PROLETARIANISATION IN THE INFORMAL SECTOR: MODES OF COUNTER-CONDUCT AND CITIZENSHIP DURING THE COVID-19 LOCKDOWN IN SOUTH AFRICA

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The research analyses the social aspects of precarisation and proletarianisation operative within the informal sector and in the global South, where the traditional distinctions between standard and non-standard employment relationships becomes increasingly ambiguous. Rather, it is categorised by bimodality in incomes, and an exclusive set of local citizenships and legal residency practices. On the basis of numerous in-depth interviews three months after the beginning of the initial lockdown with various respondents, the study found that the lockdown and recession led to a new dialectical relationship between proletarianised long-resident South Africans and a new precariat 'underclass' of recent migrants and immigrant workers. The citizened long-resident South Africans became proletarianised through aggregated formal and informal incomes and secondary incomes. These included strategies of adverse incorporation and revanchist conducts to maintain incomes. Precariat workers shifted to modes of counter-conduct, hiding the true nature of the business, and the evasion of strict social conventions on local trade through evasion and new inter-ethnic citizenships based on strategic partnerships. This destabilised the hegemonies in the precariat/proletariat binary.

THE CHANGING NATURE OF NATURE-BASED TOURISM IN SOUTH AFRICA

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Nature-based tourism is, arguably, the most significant and prolific tourism section in Southern Africa. It encompasses a wide range of tourism experiences which are typically associated with the region including coastal tourism, ecotourism, adventure tourism and wildlife tourism. In South Africa, in particular, nature-based tourism has often been an area of great importance but also significant tension, as the majority of nature-tourism spaces were, in one way or another, inaccessible to the predominantly Black population of the country throughout the colonial and apartheid eras. Although nature tourism has been open to all South Africans since the end of apartheid in 1994 many nature-based tourist areas had until recently, remained largely white recreational spaces. This can be attributed to issues around access, affordability, perception, marketing and the nature of the experiences being offered. However, in the past few years, particularly since the onset of the COVID-19 pandemic, there has been a noticeable shift in the demographics of nature-based tourists with much more significant representation from non-white South Africans. Using Mpumalanga as a case study, this paper seeks to examine some of the dynamics involved in these changes by highlighting the perspectives of Black South African nature tourists. A series of interviews were conducted with nature-based tourists in Mpumalanga along the famed Panorama Route to understand the motivations and experiences of Black South Africans engaging in nature-based tourism. The purpose is to provide information on this significant tourism market to better facilitate its growth going forward.

MAPPING PUBLIC ART TO EXPLORE THE AFRICANIZATION OF SPACE IN THE CITY OF DURBAN

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Public art plays a vital role in conveying the culture of a community. This contributes to unity, inclusion, and feelings of belonging to a place. The African city of Durban was colonized for over 180 years. Over this time, the British colonizers' cultural ideologies informed the construct of the urban landscape. Apartheid policies racially zoned spaces within the city such that people of colour were relegated to the margins and excluded from the main urban area. During that time, public art in the city mainly displayed the cultural hegemony of the Europeans and art representing African culture and identity were excluded from the main urban spaces. The new democratic dispensation in South Africa calls for a symbolic redress of the past order and implicitly promotes the need for new public art in the interest of transformation. This study examines if new public art has changed to be representational and inclusive of previously marginalized cultures and identities and whether such change has contributed to the Africanization of the Durban city. To examine this, a photographic survey of public art was conducted in the Durban city. A GPS was used to mark the spatial locations of the public artworks. Semi-structured in-depth interviews conducted with the artists and art associates from Durban city informed the analysis of the study. ArcGIS Story Maps was utilized to map the distribution and significance of artworks, track artists' contributions and explore the meanings behind these artworks. Mapping public art provides a visual and spatial representation of Africanized spaces, making an original contribution to Human Geography. Ultimately, this paper contributes to the decolonization agenda and allows us to appreciate the nature of new public artworks and their role in the Africanization and transformation of urban space in Durban.

TAMING THE WILDS: TACTICAL URBANISM AND CREATIVE PLACEMAKING IN THE REVITALISATION OF A NATURE RESERVE IN JOHANNESBURG, SOUTH AFRICA

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The use of tactical urbanism and creative placemaking in the revitalisation of public space has received growing research interest over the past decade. Indeed, these approaches have been used as a tool to revive public space, promote local economic development and to foster a greater sense of place. In Johannesburg, there is evidence of tactical urbanism and creative placemaking in the revitalisation of The Wilds, a nature reserve located on the edge of the inner-city. The Wilds experienced neglect and decline over the past few decades largely due to increased crime in the inner-city of Johannesburg. By the mid-2010s, a local artist championed the bottom-up revitalisation of The Wilds through routine maintenance, and the introduction of public art and events to activate and promote engagement with the space. This research draws on several methods which include personal communication and semi-structured interviews with key informants and netnography. It was found that the introduction of public art and social media have been used to promote The Wilds in recent years. This is reflected in the increase in visitor numbers and volunteers who have assisted in the maintenance, activation and engagement of space. Since the mid-2010s, the Wilds has been transformed into a popular public

space for residents and tourists. The use of tactical urbanism and creative placemaking, however, has led to some unsanctioned approaches by volunteers that are in conflict with city by-laws and has produced tension and conflict in the co-management and usage of The Wilds.

A SMALL-SCALE COMPONENT MODEL ANALYSIS OF LOW-INCOME HOUSEHOLD HOUSING DEMAND IN CAPE TOWN, SOUTH AFRICA

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Providing households with public and private housing of an appropriate quality is one of the most urgent tasks in large cities around the world. This challenge is enhanced by increasing urbanisation and declining household sizes in developing countries. The South African housing programmes, Breaking New Ground (BNG) and Community Residential Units (CRU), are unable to provide sufficient subsidised housing for all low-income households. One reason for this shortfall in housing supply is that there are no small-scale assessments of affordable housing demand in terms of diverse income categories and housing submarkets. Thus, the study conceptualises and tests the use of an adapted component model to determine the BNG and CRU housing demand amongst low-income households at a lower spatial resolution in Cape Town Metropolitan Municipality, South Africa. To accurately project the number of households based on population characteristics, the housing preferences are modelled with the help of empirically derived quotas, which are able to differentiate the tenure status of the low-income households into home-ownership and renting to align with the housing demand with the two funding programmes. The central methodological feature is the connection of the component model to South Africa's affordable housing subsidy programmes, because these dominate the housing market for low-income households. The calculations showed what influence such a housing funding policy has on the future affordable housing demand, because the inflation-adjusted affordable housing demand is up to two thirds higher than the demand without taking inflation into account. Such information is of crucial importance for the future strategic planning and budgeting of housing subsidy programs, so that in the context of transferring the methodology to other developing countries, it is advisable to calculate similar scenarios.

POLITICS AND THE SMART CITY: GLOBALISATION FROM WITHIN ON SOUTH AFRICA'S WILD COAST?

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In South Africa, smart cities are hailed as key to SDG 11 aims of making cities and human settlements inclusive, safe, resilient and sustainable. Against this backdrop, government officials announced plans in 2021 to build a new smart city on the Eastern Cape's Wild Coast, promising increased employment,

the reversal of apartheid-era spatial planning, and reduced climate-change vulnerability. State assertions that these plans will increase well-being for all are contested by communities who, excluded from planning processes, argue the development will destroy already sustainable livelihoods and entail forced displacement from customary lands. Such concerns are borne out by evidence from across the Global South that smart cities have failed to deliver on goals of inclusivity, climate resilience or sustainability. Through an urban political ecological lens, this article offers an in-depth qualitative study of the political dynamics inherent in smart city development on the Wild Coast, and how this project threatens to undermine, rather than improve residents' well-being. It argues that instead of being based on a desire to transform South Africa's development future, this project has been conceived of as trojan horse for ambitions to introduce contested mining activities and interlinked forms of top-down development, and is being driven by forces of 'globalisation from within'. The author concludes that if the State is genuinely committed to transforming South African society, it should look to and support emergent grassroots efforts at integrating technological with social, economic and ecological innovation.

POTENTIAL IMPACTS OF STRATOSPHERIC AEROSOL INJECTION ON RANGELANDS IN SOUTHERN AFRICA

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In Southern Africa, rangelands constitute a substantial portion of the land area and significantly contribute to economies and quality of life for people. This is derived from the broad array of ecosystem services – tourism, carbon sequestration, regulation of the hydrological cycle etc. – that rangelands offer. As the population exponentially increases, so does the dependence on rangelands and the products and services they provide. This contrasts with the diminishing value or changing of ecosystem services as climate change, degradation, and urbanisation increasingly influence Rangelands. This increases strain on Rangeland communities and others reliant on these services and products. Additionally, this strain disproportionately affects the most vulnerable communities with the least adaptive capacity to climate change leading to an increase in food and water insecurity. Thus, all possible solutions must be considered to decrease this contradiction to ensure a sustainable and equitable future for all. One of these solutions is the geoengineering strategy – Stratospheric aerosol injection (SAI) - which is proposed to be relatively quick and cheap. SAI is the injection of diffusing aerosols into the stratosphere to decrease solar insolation despite carbon dioxide levels rising. This decrease would slow and even halt global warming. Thus, the climate change-related adverse effects on rangelands would ideally cease. However, SAI affects not only temperature but also precipitation, potential evapotranspiration, and drought characteristics. Changes in these climatic variables will have varying influence on the diverse plant life-forms in Rangelands. Thus, to determine how SAI will influence rangelands, the G-Range model will be utilised to simulate three scenarios – present-day, a future with climate change (RCP8.5), and a future with SAI. These will be compared to determine the effect and influence of SAI to inform on the viability of SAI as a climate change rangeland mitigation strategy and solution.

E-WASTE RECYCLING BEHAVIOUR: A CASE STUDY OF THE CITY OF JOHANNESBURG

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This study explores the behaviour of City of Johannesburg (CoJ) residents towards e-waste recycling to determine how households can be encouraged to adopt more responsible e-recycling practices. E-waste is a rapidly growing waste stream that has been prioritised in response to the mass consumption of technology accompanied by the Fourth Industrial Revolution. Furthermore, the hazard of e-waste has triggered serious concern due to its physical, chemical, and toxic nature, leading to environmental damage and impacting human health. The United Nations Organization emphasises the value held by the global e-waste industry to be approximately €55 billion. E-waste has become a prioritised waste stream in South Africa as it can make a significant contribution to the circular economy and job creation. Due to consumer power being central in a successful e-waste recycling industry, this research investigated the challenges and incentives that can be utilised to encourage pro-recycling attitudes and behaviour in the Information and Communication Technology (ICT) e-waste stream. This research used the Theory of Planned behaviour as a theoretical framework along with a mixed-methods approach by blending open and fixed-response questions via an online survey that included 286 participants from varying suburbs in the CoJ. Likert scale questions were analysed through measurements of central tendency while open-ended questions yielding qualitative data made use of thematic analysis to identify common themes. Chi-square test for independence was used to analyse how the demographic variables of age and household income interacted with e-waste recycling behaviour. The findings of this research depict that recycling of WEEE (waste electrical and electronic equipment) is not the first line of disposal due to moral obsolescence. However, increased awareness, accessible WEEE drop-off locations, and positive and negative incentives can motivate consumers to be more responsible for their WEEE, leading to an increase in participation in the recycling of e-waste.

CHAOS THEORY APPROACH TO UNDERSTANDING TOURISTS' BEHAVIOUR DURING THE COVID-19 PANDEMIC

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Crises impact the tourism industry and affect the behaviour of tourists patronizing tourism businesses in many ways. Due to their nature, health crises and pandemics are taken seriously as they pose great risks to tourists and the tourism system. One of the safest ways of preventing the spreading of the COVID-19 virus is through appropriate individual behaviour. Avoidance of places that may increase the probability of contracting or spreading the disease helps to lower the risk of infection. Besides, one of the proven barriers to disease transmission is healthy behaviour. This study investigated the behaviour towards tourism businesses among 408 tourists to Jos in Nigeria during the COVID-19 pandemic health crisis. Chaos theory provides a relevant theoretical foundation for understanding tourist behaviour during a pandemic. The findings indicate that the self-organization component is important in understanding tourists' protective behaviour during a crisis.

ALTERNATIVE RESIDENT-LED GOVERNANCE IN THE HOUSING SECTOR: THE CASE OF RUO EMOH, CAPE TOWN

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Apartheid's segregating housing policy and the socio-economic injustices employed by the regime led to a deficiency in accessible housing for the poorer resident. Despite attempts by the post-apartheid state to address this issue, housing shortages continued to grow. This paper aims to critically examine the alternative resident-led approach to housing provision to address this backlog, using Ruo Emoh in Mitchells Plain as a local case study. 'Our Home' spelt backwards, Ruo Emoh is a medium-density community spanning less than 1 hectare, accommodating 49 households, yet behind it is a 22-year trialing journey to achieve freehold ownership through a resident-led savings scheme initiated in 1995. Together with an overview of urban housing policy and public financing programmes, planning literature will assist in critically examining Ruo Emoh with the aim of identifying lessons learnt and making recommendations for the resident-led approach to housing provision. Thus, the main research question asks: What lessons might be learnt from an in-depth evaluation of the Ruo Emoh case study with regards to the resident-led approach to affordable housing delivery? Additionally, how might these lessons inform future planning policies and housing initiatives? An important principle in this approach is a focus on 'ground-up' processes which may assist the state's housing provision efforts in alignment with, and for, just housing outcomes. The core objective is to provide insight into developing, implementing and maintaining best practice tools between the dynamic of the radical resident, and the state, in achieving housing goals. With this insight resident-led housing initiatives can increase contribution to assist the state in addressing the housing backlog in the fight for socio-economic equity.

TOWARDS A CITIZEN SCIENCE SOLUTION FOR DAILY RAINFALL IN SOUTH AFRICA

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The South African weather station network varies in density among the different provinces, for example, Western Cape has a greater density of weather stations compared to the Northern Cape. As a result, large areas in South Africa are unmonitored resulting in no rainfall data being collected for these areas. To address this problem, a prototype citizen science tool was designed and developed allowing users to register and upload observed daily rainfall at their locations. The data is then stored in a database and visualised on a map along with South African Weather Service (SAWS) daily rainfall data and data from other sources. This allow us to produce a daily rainfall map that is more comprehensive (i.e. covers areas that are not covered by weather stations) than the data available from a single source. Since the tool relies on user input, observed rainfall data can be collected in locations where there are no weather stations therefore, allowing for the accumulation of data in areas where there were previously was no data being recorded. The tool was developed using open source technology and will be published under an open license allowing it to be expanded to cover a larger range of weather phenomenon in the future.

CULTIVATING FOOD JUSTICE: A RE-EXAMINATION OF URBAN COMMUNITY FOOD GARDENS IN CAPE TOWN, SOUTH AFRICA

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The adoption of neoliberal policies has resulted in food systems that promote food injustices, such as unequal access to food and unhealthy food options. Contemporary literature contends that urban food gardens has the potential to promote just food systems at local levels through the provision of alternative food and food decommodification. Nonetheless, most of such studies have focused on global North cities. Through a qualitative research approach, this paper examines how urban food gardens attempt to counter the neoliberal food system in Cape Town, South Africa. The study utilised formal and informal semi-structured interviews with 34 urban community food gardens representatives, state officials, and non-state officials promoting urban agriculture. The findings demonstrate the conscious efforts of urban food gardens to promote food justice through the decommodification of vegetables, improved access to healthy vegetables, and the conscientization of local communities on food rights. Nevertheless, the impact of such efforts remains curtailed because of the unsustainability of community gardens and the limited coordination of activities. As such efforts on food conscientization are likely to be sporadic with marginal effects on the local food system. In conclusion, the paper argues that apart from structural barriers, more coordination is required to create a more effective movement that could have a more impactful and sustained role within these distressed communities.

HOLDING ON: RESIDENT STRATEGIES AGAINST DISPLACEMENT IN A GENTRIFYING NEIGHBOURHOOD

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Having a place to call home is not only one of life's necessities, but research has shown that it is also important for one's dignity and chances in life. However, residents in gentrifying neighbourhoods are finding it increasingly difficult to hold on to their homes and resist displacement due to rising rents and other economic pressures. This paper focuses on the challenges of working-class residents to remain in their homes, in spite of facing pressure to leave. It draws on in-depth interviews with residents from Woodstock, Cape Town where gentrification processes have intensified in recent years.

It explores the various strategies and practices that these residents use to remain in their homes and to keep a foothold in the neighbourhood. While some of these strategies included organised community activism through organisations such as Reclaim the City, some residents described individual everyday acts that they used to prevent themselves from being displaced.

SOCIAL FACILITY PLANNING: COMPARING ACCESSIBILITY IN TSHWANE BASED ON DIFFERENT TRANSPORT NETWORKS

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Spatial analysis is often conducted to determine the geographic accessibility of certain sites such as social facilities to the public. This is, in turn, used for facility planning to ascertain whether an acceptable proportion of the public has access to these social facilities based on their pre-determined standards and rules (Green, 2012). Detailed transport networks providing distance or time measurements are a common way to measure levels of accessibility (Mokgalaka, 2015). An often-overlooked matter is that using a single transport network does not consider how different portions of the population may depend on different modes of transportation. This would mean that the actual accessibility of facilities would be overestimated since one would reasonably believe people travelling from point A to B with a private vehicle in the cities within developing countries like South Africa would take less time and have greater access to facilities than those using public transportation. Accessibility analyses based on social facility standards and guidelines have been conducted in various ways in the past. The Council for Scientific and Industrial Research (CSIR) has published some of these studies on education-, emergency services-, health services- and recreational service facilities amongst many others (Baloyi, Mokgalaka, Green, et al., 2017: 172). A matter to consider is that most accessibility analyses have not focused on classifying the population based on the mode of transport that they would mostly depend on. A tool developed by the CSIR to determine geospatial accessibility will be used to illustrate this. The proposed study compares the spatial accessibility of social facilities based on different modes of transportation (private vehicle; bus; rail). This comparison can then be used as decision support for not only social facility planning, but transport planning as well.

SPATIOTEMPORAL PATTERNS OF HEATWAVES ACROSS THE NORTHERN CAPE PROVINCE, SOUTH AFRICA: 1979-2021

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Across South Africa, the Northern Cape Province (NCP) is expected to have the largest increase in surface air temperature and heatwave characteristics, and this will amplify associated human and environmental implications. Research on heatwave trends has predominantly used station data which does not give a good spatial picture. Thus, this work uses daily maximum and minimum surface air temperature gridded data from 1979-2021 (AgERA5) to identify heatwaves and analyse associated

spatiotemporal patterns. Heatwaves characteristics are identified based on the Expert Team on Sector-Specific Climate Indices. Three heatwave aspects are derived for the summer season (Nov-Mar): the total heatwave days (heatwave frequency; HWF), the average heatwave temperature (heatwave magnitude; HWM) and the number of heatwave events (heatwave number; HWN). To explore central tendency and variability, arithmetic mean and standard deviation are investigated. The Mann-Kendall trend test and Sen's slope values were used to calculate trends and represent the rate of change for all grid cells, respectively. On average the NCP experiences 1.5 heatwave events (HWN), lasting for 7.5 days (HWF), with an average HWM of 4.7 °C2. Generally, the HWN and HWF increased with many observed statistically significant trends, however, decreasing trends were evident. On average there is an annual increase of <0.01 events.year-1, lasting for 0,03 days.year-1 longer and decreases in magnitude with a rate of -0.01 °C2.year-1. Because heatwaves have adverse implications on livestock agriculture, water scarcity and tourism, to name a few, this research should be considered for decision-making regarding mitigation strategies.

HOW DO THE INDIGENOUS ENVIRONMENTAL DEFENDERS RESISTING MINING IN XOLOBENI (UMGUNGUNDLOVU) EXPERIENCE VIOLENCE?

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The indigenous people of Mpondoland, uMgungundlovu on South Africa's Wild Coast region, have resisted efforts to dispossess them of their and resources since colonial times. In recent decades, this resistance has focused on state efforts to impose mining as development in the titanium-rich sand dunes of Xolobeni, and now, against oil and gas giant Shell as it tries to resume seismic testing. Following an historic ruling in the Eastern Cape High Court affirming the community's right to say no to mining on communal land, residents opposed to extractivist development mining hoped that the violence they have been subjected to through years of resistance would recede. This has not been the case however, and this violence now threatens progress the communities had made in developing economically viable, sustainable, land and sea-based livelihoods. In this context, this study applies qualitative study based on fieldwork and documentary analysis explores the varied and interconnected forms of violence experienced by residents, and how it is impacting upon community efforts to forge an alternative, bottom-up development path. Preliminary findings point to a state-led campaign of structural violence, characterised by legal manoeuvring, political exclusion, and discourses of deprivation, that has conclusions point to the central role that if the state in either creating or enabling multiple 'atmospheres of violence' as a means of undermining and subverting genuinely bottom-up grassroots development producing atmospheres of violence', assemblages of actors, institutions, logics and processes characterized by pervasive and persistent forms of violence. As defenders' bodies, cultures, and territories are often under assault from a variety of directions, by both visible and invisible actors. In spite of these constant threats, the indigenous people of Xolobeni continue to fight for their lands and waters, because their struggle is about more than just themselves; it is about the preservation of life for all.

THE PURPOSES AND REQUIREMENTS FOR ADDRESSING, AND CONSIDERATIONS FOR A TRANSFORMATIVE WAY-FORWARD FOR SOUTH AFRICA

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An address is an important identity for a person, and for society as a whole. It is taken for granted that everybody has an address. However, there are people in many parts of the world who struggle to exercise their rights as citizens, and are unable to get deliveries or receive any aid, because they cannot communicate where they live, and are considered as invisible as a result of not having an address. South Africa is no exception, since it does not have complete coverage of addresses in all parts of the country. It has experienced rapid urbanisation, and at the same time rural densification is also prevalent. Many households do not have address such as street name and number that are commonly used. In areas where addresses are available, its quality is questionable. Not having an address has practical implications like loss of public services, denial of financial opportunities, and citizenship rights such as obtaining an Identity Document or registering to vote. An address, therefore, facilitates the delivery of a multitude of services to society. Many of these services are enshrined as citizen's rights in the South African Constitution. Given the current challenges with addressing in South Africa, together with new ways to communicate location that make use of geospatial technologies, the presentation will cover the results of a literature review and interviews with representatives from the geospatial community. This unravels the complexities of the purposes and requirements for addressing, as well as the different ways to communicate location, and explores a transformative way forward for the country.

A SUSTAINABLE LIVELIHOOD FRAMEWORK FOR COMMUNITY-BASED TOURISM IN THE AFRICAN IVORY ROUTE OF LIMPOPO PROVINCE, SOUTH AFRICA

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Statistics show that, although progress has been achieved in reducing rural poverty in most countries over the past years, there is still much to be done in order to arrest the trend. Like most provinces in South Africa, Limpopo is characterised by high poverty rates. The aim of this study was to formulate a Sustainable Livelihood Framework for Community Based Tourism along the African Ivory Route (AIR) of Limpopo Province. This study was conducted in villages situated close to three selected camps of the AIR namely, Fundudzi, Mtomeni and Nthubu which are representative of three district municipalities in the province. The total number of households in these villages was 2044. A mixed method approach was implemented. A 10% representative sample was taken from each of the selected villages located near the three camps. For primary data, a questionnaire survey, focus groups and Key Informant Interviews were conducted. A Sustainable Livelihood Framework for Tourism (SLFT) was formulated for the AIR based on the assets, institutional arrangements, vulnerability context, livelihood strategies and outcomes derived from the results of the study. The conclusion was that cooperation and collaboration among stakeholders was very critical in this case. This led to the development of a Communities, Institutions, Tourism, Environment (CITE) framework. The

recommendation is that this model should be applied to ventures which seek to introduce Community-Based Tourism (CBT) as a source of livelihoods in poor communities.

SOCIAL CAPITAL, COLLABORATIVE GOVERNANCE, AND DROUGHT: A CASE STUDY OF GRAAFF-REINET

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Globally, there is an increase in frequency and severity of disaster events, largely due to anthropogenic climate change. The small town of Graaff-Reinet has seen an increase in frequency and severity of drought events in particular and, as with many small towns in South Africa, a lack of capacity of the recently amalgamated Dr Beyers Naude Municipality has put this town in an increasingly vulnerable state. In both disaster risk and response management, governments and policies play a vital role in ensuring negative impacts are planned for and responded to in a way that most benefits the affected communities. However, local government was slow to respond to economic, environmental, and health pressures present during a recent drought period in Graaff-Reinet. This moved leaders representing different groups within the community to form a non-political collaborative governance regime through a local economic development forum designed to allow partnership and communication with the municipality across social capital network channels in order to address the drought and long-term water security issues. Despite the extensive use of the term 'resilience' evoking valid criticism of its overuse, closely looking at what resilience actually means opened up another important conversation: the role of social organisations, networks and collaborative community action (or cooperation) prior to and post-disaster event. Making use of the theoretical framework for collaborative governance by Emerson, Nabatchi and Balogh (2011), this study observed how social capital networks in Graaff-Reinet acted as a resource in establishing a relatively stable collaboration between civil society and local government using qualitative and observation methods. The results yielded that both intentional and unintentional positive impacts relating to water security resulted from the collaboration between the Graaff-Reinet Economic Development Forum and local government, including impacts that may well positively affect future water security at a national level.

DROUGHT HISTORY AND VEGETATION RESPONSE IN THE ANGOLAN HIGHLANDS

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Drought refers to a prolonged dry period, often resulting in water shortages. This study integrates Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS) and vegetation indices from Moderate Resolution Imaging Spectroradiometer (MODIS) in the first historical assessment of drought in the Angolan Highlands. The Angolan Highlands are an essential source water region for the Okavango Delta, and southern Africa more broadly. Using the Standardised Precipitation Index (SPI), eight distinct drought periods were identified: 1981-1982, 1989-1990, 1994, 1995-1997, 1999-2000, 2014-2016, 2017-2018 and 2018-2020, with the frequency of drought increasing since 1981. The relationship between drought occurrence and El Niño Southern Oscillation (ENSO) is not linear; with two of the eight drought periods occurred exclusively during El Niño years. A strong positive correlation exists between vegetation and precipitation, with a stronger correlation for EVI (0.90, $p < 0.005$) and precipitation than for NDVI (0.75, $p < 0.005$). Valley vegetation phenology is dependent on the seasonal precipitation, and returns a stronger correlation with precipitation than the interfluvial miombo vegetation. The vulnerability of the Angolan Highlands rural communities that are dependent on rain-fed agriculture is a concern due to the prospect of climate change and the trajectory of increasing frequency of droughts in the region.

FACTORS ASSOCIATED WITH NON-PAYMENT FOR SELECTED SERVICES IN SOUTH AFRICAN METROPOLITAN MUNICIPALITIES

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Non-payment for basic services limits municipal provision of services to its residents, forcing municipalities to disconnect services of defaulting households or worse to implement various stages of load shedding. Therefore, the main aim of this study was to investigate the factors associated with non-payment for water, sewerage, refuse removal and electricity provided by South African metropolitan municipalities. The General Household Survey 2018 and Community survey 2016 datasets were analysed using descriptive and multivariate analysis using SAS 7.1. In line with literature, defaulting households blamed poverty, inequality, unemployment and service irregularity for non-payment of municipal services. The goodness-of-fit test showed that population group of the head of the household, dwelling type, household income, household vulnerability status and location were good predictors of municipal service fee status for water, refuse removal and electricity. The logistic model unfortunately did not adequately fit the service fee status for sewerage system suggesting omission of other key variables. Non-payment for water, sewerage system and refuse removal was considerably higher for households headed by Black Africans, unemployed persons, poor households, female headed households and households containing only economically inactive persons. The study was rather inconclusive when it came to the contentions that non-payment amongst Black communities arises because of a “culture of entitlement”. The main cause for non-payment for municipal services was inability to pay and this study reaffirmed this assertion.

GATED COMMUNITIES FOR THE PEOPLE: A CAPE FLATS CASE STUDY

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Gated communities are a global phenomenon that take shape in different forms and contexts. Uniformly defined on the basis of their physical features, security artefacts and codes of conduct, gated communities have received criticism across a number of disciplines yet seen as a rational response to increasing crime rates and considered as a safe haven for their residents. In the global South, more than simple safe havens, gated communities are typically conceived as islands of wealth and privilege in a sea of urban inequality, yet few studies have explored gated communities in and for low-income communities. This study examines an underexplored category of gated communities, namely those located in low-income residential areas, specifically focusing on such developments in Mitchells Plain, Cape Town. Employing qualitative methods using semi-structured interviews with residents of Regent Villas in Mitchells Plain, this study provides insights into the burgeoning number of gated communities in lower income areas, their purpose and function, and particularly what distinguishes this form of gated community from their middle-and upper-income equivalents. As expected, the preliminary findings of the study demonstrate that the low-income gated community differ greatly from their higher income counter-parts. However, a significant observation has been the defiance of tenants against the high levels of regulation in this type of gated community.

COMPETITIVE CITIES: AN EXPLORATION OF LOCATION AND HUMAN CAPITAL IN SOUTH AFRICAN CITIES

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Cities are conduits that drive the economic growth of any country. Most of the world's Gross Domestic Product is generated by cities, because of globalisation and increased urbanisation. The number of people living in cities has increased exponentially in the global south, and the region is the fastest urbanising region in the globe. The ripple effect of this phenomenon is urban poverty, and an increased demand and pressure on urban governance, housing, infrastructure and basic services. However, it is also an opportunity for cities to compete for and attract investment. The change in the global economy has propelled cities to rethink what they can offer, to attract investment. Multinational companies and Foreign Direct Investment are traditionally attracted to cities of good political stability and fiscal policy. Competitiveness is a city's ability to reduce poverty and create jobs, by offering a conducive environment to firms. This paper aims to investigate whether location and human capital can make a city economically competitive. The argument is that well-resourced and skilled cities have a competitive advantage over others. This paper has chosen, Johannesburg, Durban and Gqeberha as case study metropolitan cities. These metropolitans have distinct contexts; however, they all must deal with past spatial injustices and the current realities of urbanisation. A qualitative research methodology, using extensive literature review, reports, books, policy documents and government publications, will be employed in this paper. The expected research outcome might be that an enhancement in location attributes and skills development, may influence a city to be economically competitive. The paper is aimed at policy makers, citizens and urban scholars.

LIVELIHOOD STRATEGIES OF WOMEN LIVING IN NCHECHANE, LIMPOPO

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Peri-urban areas are expanding rapidly due to the increasing rates of urbanisation in South Africa. This rapid expansion in urban areas has resulted in reconfigured peri-urban landscapes with precariously negotiated livelihoods for women in particular. The peri-urban context within which these women find themselves lacks adequate classification thus influencing service delivery and quality of their lives. Despite the visible efforts, achievements and successes of these women, very little change has been made in the lives of peri-urban based women who are often forced to adopt unsustainable strategies to sustain themselves. This study aimed to understand the nature of livelihood strategies adopted by women living in Nchechane which is under the GaMothiba traditional authority. Data collected from 150 interview-based questionnaires was analysed to identify similarities and differences in livelihood strategies adopted amongst the women and their level of vulnerability were assessed. The study identified factors that influence women's vulnerability in terms of social support and services. We conclude with recommendations towards developing sustainable livelihood trajectories as part of the Women's Perceptions and Place Dynamics (WoPedyP) project, to allow for appropriate intervention in peri-urban zones.

THE UNDERGRADUATE MILITARY GEOGRAPHY CURRICULUM AT THE SOUTH AFRICAN MILITARY ACADEMY: 1956 TO 2020

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The history of the South African Military Academy is well articulated by a few scholars of Military History and continues to receive deserved attention in scholarly writings. As much as detailed history of the institution is recorded, limited attention is given on the history of the academic offerings of the institution. This paper aims to breach the gap in the recording of the historical strides made by the subordinate departments within the Faculty of Military Science, with specific reference to those made by the Department of Military Geography. As the Department forms the core of the historical existence of the South African Military Academy, having presented geography to South African armed forces since the establishment of the institution; it is only befitting that its history is preserved accordingly. Due to the vast offerings by the Department of Military Geography, this study exclusively focuses on the academic undergraduate offerings undertaken by the Department under the auspices of Stellenbosch University, as it is the era in which the context of Military Geography in South Africa truly evolved. The study is qualitative in nature, making extensive use of archival sources in order to map out the evolution of the curriculum. The data presentation however fuses qualitative and quantitative means, in order to map out the progress made thus far. The data will be presented using narrated application charts for the decades in which the Department of Military Geography has existed under the Faculty of Military Science of Stellenbosch University. This study successfully proves that the Undergraduate Military Geography Curriculum has evolved at the South African Military Academy since it was presented under Stellenbosch University and explains the factors that influenced/necessitated these changes, in order to meet the changing strategic, operational and tactical needs of the South African National Defence Force.

UNDERSTANDING CRIME IN THE CONTEXT OF COVID-19: THE CASE OF THE WESTERN CAPE PROVINCE OF SOUTH AFRICA

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Crime mapping and the use of a geographic information system (GIS) analysis methods are progressively being used by law enforcement agencies and academics as an important tool for analysing crime. The use of spatial analysis in GIS has enhanced the techniques that are used to track crime incidents, identify hotspots and produce density maps. There are various spatial analysis tools in GIS used for crime analysis. The current study will make use of crime datasets acquired from SAPS Provincial Commissioner for a period of ten years (April 2012 - March 2022), to map and analyse the crime incidents of all the categories of crime, along with all 21 types of crime as reported by the SAPS. To map and analyse each category and type of the crime in Western Cape province of South Africa, this study will make use the Kernel Density Estimation (KDE) and Hotspot Analysis (Getis-Ord Gi*) available in ArcGIS. The results of the analysis will then be compared, firstly, by comparing the crime trends of the year before COVID-19 (2018/19), during COVID-19 (2019/20 & 2020/21) and after the COVID-19 (2021/22). Secondly, the results from the period of April 2019 till April 2022 will then be compared to the with the preceding years of the duration of the study, 2012 till 2022. The results produced by crime mapping and analysis can then be used to communicate the spatial pattern of the categories of crime together with the individual types of crime within the province and provide guidance to law enforcement agencies in allocating resources in areas with high crime incidents.

TOWARDS UNDERSTANDING GEOGRAPHIC ACCESSIBILITY FOR SUSTAINABLE LIVELIHOODS – A CASE STUDY IN MANKWENG AND SURROUNDINGS, LIMPOPO, SOUTH AFRICA

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The move to South Africa's urban areas happens faster than settlements can be planned and provided with infrastructure. This has led to highly dynamic peri-urban areas in which livelihoods are threatened by rapid spatial and social transformations. One such area is Mankweng on the outskirts of Polokwane. In the WoPedyP (Women's perceptions and place dynamics) project, we aim to better understand how women's livelihoods in peri-urban settlements, such as Mankweng, could become more sustainable. As one of the first steps in this endeavour, we assessed geographic accessibility of locations of financial capital (e.g., employers, markets) and social capital (e.g., churches) required for a sustainable livelihood. It will be measured in terms of travel time to the locations where the capitals can be accessed. This is important because it impacts people's livelihoods and can influence their perceptions. OpenStreetMap road data was prepared by aligning it with relevant imagery and converting it into a topologically correct road network. Accessibility was calculated in the Maptitude software's built-in accessibility calculator from two perspectives: How far are people from locations

of financial and social capital? How many people live in the geographical catchment areas around these locations? Maps of the results in selected study sites will be presented, followed by a discussion of how these accessibility results could possibly impact livelihoods and perceptions in Mankweng and surroundings. In future work, we plan to develop a comprehensive accessibility index for use in sustainable livelihood studies. This will incorporate accessibility to other capitals, such as human and natural capitals, and include other types of physical capital, not only the road network.

COMPARATIVE ANALYSIS OF ANALYTICAL NETWORK PROCESS AND ANALYTICAL HIERARCHICAL PROCESS IN MAPPING FLOOD VULNERABILITY USING LOCAL AND INDIGENOUS KNOWLEDGE-BASED INDICATORS

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Locating people vulnerable to floods, especially in informal settlements has been a huge challenge for decision and policymakers. This has necessitated the urgency for techniques that effectively map flood vulnerability at local scales. However, most of these have been 'technical expert' driven and have ignored the experiential knowledge possessed by informal settlement dwellers. The objective of the study was to compare the results of the Analytical Network Process (ANP) and Analytical Hierarchical Process (ANP) in mapping flood vulnerability using community members' local and indigenous knowledge-based indicators in an informal settlement. In particular, Quarry Road West informal settlement in Durban is used in this study. The ANP and AHP were implemented using the Super Decision Software while the mapping of flood vulnerability was done in ArcGIS 2.6 using the weighted sum. The results of the comparative analysis show that both the ANP and AHP effectively mapped flood vulnerability using indicators generated using community members' local and indigenous knowledge in Quarry Road West informal settlement. Both approaches identified that about 23% of the households in the study area were highly vulnerable to flooding. The ANP showed that almost 50% of the households in the informal settlement were moderately vulnerable while the AHP showed that less than 40%. Furthermore, the ANP found that 31% of households were level vulnerable, while the AHP showed that 41% of the household were less vulnerable to flooding. The quantitative and qualitative validation showed that the ANP mapped flood vulnerability in the informal settlement more contextually and effectively. This study shows that community members have rich knowledge of flooding in their settlement which should be considered in mapping flood vulnerability. Using the appropriate technique for mapping flood vulnerability is crucial in effectively identifying the vulnerable in a community as well as devising appropriate interventions to reduce their vulnerability.

EXPLORING THE DYNAMICS OF CULTIVATION PATTERNS

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The nexus between deagrarianization and rural development poses critical concerns which require multi-tiered interventions that will work together to achieve sustainable rural livelihoods. Amidst

competing factors, smallholder production plays a significant role in supporting and improving rural livelihoods, especially in developing countries. Although rural areas of Africa have been associated with agriculture, studies indicate that rural households are diversifying to non-farm activities or shifting from field cultivation to intensive home gardening. During the analysis of these changes and characterization of off-farm employment in sub-Saharan Africa the term deagrarianization was developed. This refers to the declining role of agriculture in the household's income and livelihood strategies. The term does not suggest that agriculture is not present or that people may not be producing a surplus or cultivating gardens or fields. Rather, it emphasizes the increasing importance of remittances and outside forms of income in the overall mix of rural livelihoods. Data was collected through a semi-structured questionnaire administered to 106 household heads from Ambrose Village, Eastern Cape and Maramanzhi village, Limpopo. Questions included both open-ended and close ended questions that relate to land ownership, cultivation patterns and drivers of deagrarianization. The data will be analysed with SPSS and ATLASti to acquire results that highlight cultivation dynamics in the study area. These patterns vary according to class, location and economic conditions of villages. Furthermore, drivers indicate factors that push rural households to change the scale of farming, abandon cultivation or diversify to non-farm activities. These results will provide empirical evidence that informs rural development policies and assist with improving knowledge on deagrarianization.

EXAMINING THE CHALLENGES IN DEVELOPING AN EFFECTIVE WEB SCRAPING TOOL IN AUTOMATING AND ANALYZING TRIPADVISOR REVIEWS

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Climate plays a significant role in determining the viability and competitive advantage of tourism sectors across the world. Climate has a significant impact on a tourist's choice of destination, vacation duration, and holiday activities. Quantifying a tourism sector's dependency on climate, the region's climate change vulnerabilities, and adaptive capacity to climate change is crucial for facilitating effective mitigation of these impacts. To optimize the likelihood of adaptation and mitigation actions being effective, precise information about the climate suitability of regions for tourism today is critical. An analysis of TripAdvisor reviews for South Africa, Lesotho and five Indian Ocean Islands has shown the value of this form of netnographic research in providing an objective measure of tourists' sensitivity to climate, and the meteorological variables of greatest interest. This research, however, has to date relied on the manual reading and coding of thousands of TripAdvisor reviews. Web scraping provides the opportunity for hundreds of thousands of reviews to be coded, allowing for TripAdvisor climate analysis to be conducted across the country, and across all reviews posted through time. This allows for a far more comprehensive database of tourist sensitivity to climate to be compiled, and regional variability to be assessed. This process, however, is not straightforward. This paper explores the processes in developing an effective web scraping tool, the identification of confounding terms in reviews, and the process to compare results with those obtained manually to perform accuracy checks.

THE INFLUENCE OF HUMAN AGENCY ON DEVELOPMENT: THE CASE OF AN AIRPORT IN SOUTH AFRICA

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The concentration of economic activities in the environs of airports is a prominent topic in policy and practice. Despite the growing interest in airport-centric development, there is a paucity of literature that analyses the institutional arrangements that influence the implementation of such development. Using Airport X in South Africa as a case study, the paper analyses the impact of human agency on institutional structures that influence development. The paper is based upon a qualitative case study approach, with the following main sources of information: observation, minutes of meetings, newspaper articles, municipal approvals and the government gazette. A number of complementary analytical approaches are thus used in the paper, namely: conversation, content, ethnographic and narrative analysis. The investigations cover a time frame of 10 years, within which three eras are identifiable: one, an era in which various actors used their agency and power to promote development on the premises of Airport X; two, an era in which a key actor employed human agency to resist development on the airport premises, resulting in a dire structural rupture; and three, an era of reconciliation with signs of recovery from stress of the previous phase. The paper concludes that the potential reasons for the repressive use of human agency included constraints of the organisational hierarchy that the individual was part of.

LONG-TERM TRENDS OF RAINFALL AND TEMPERATURE AND THEIR IMPACTS ON WATER RESOURCES IN THE MAIZE TRIANGLE OF SOUTH AFRICA

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Climate change is projected to alter temperature, precipitation, and evaporation patterns, consequently affecting food, water resources, livelihoods and energy security. Increasing frequency of weather and climate extremes such as floods, droughts and heat waves, result in adverse impacts on the water resources of a water-scarce country like South Africa. Furthermore, the recent unprecedented warming trend, coupled with the occurrence of intense El Nino events has serious implications on evaporation of soil moisture and open water bodies. Therefore, this paper aims to map and quantify the impacts of climate variability and change on water resources and maize yields in the maize triangle of South Africa. Long-term trends of climate data such as precipitation, minimum and maximum temperatures were analysed. To determine their impact, we measured the response of potential evapotranspiration and changes in surface soil moisture water levels, maize yields, and the Normalized Difference Vegetation Index (NDVI). We also investigated the seasonality and spatial

variability of the selected datasets and with the El Niño Southern Oscillation (ENSO) via correlation analysis. We employed the Man-Kendall to test the significance of the trends whilst p-values tested the significance of correlations. The results show robust rising trends in minimum and maximum temperatures over time, which will amplify evaporation rates and pose negative impacts on water availability. Precipitation trends are however neutral and not statistically significant perhaps due to increased frequency of rainfall extremes. Whilst the climate impacts on surface water resources are clearly negative, the long-term trend of maize yields is upward, suggesting technological innovations. Population growth will compound climate impacts and results of this study will inform maize farmers and water resource managers about the effects of climate change on both sectors.

COMMUNITY KNOWLEDGE, ATTITUDES, PERCEPTIONS AND PRACTICES ON SCHISTOSOMIASIS IN HA-NESENGANI, LIMPOPO PROVINCE

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Schistosomiasis, also called bilharzia, is a vector-borne neglected tropical disease prevalent in rural South Africa, with over 25.7 million people at risk and an estimated 4.5 million infected annually. Infection occurs through contact with freshwater sources infested with infected intermediate host snails (vectors) during domestic, occupational and recreational activities, most often in areas with poor access to modern water and sanitation facilities. Climate change will likely shift and/or expand the geographical ranges of schistosomiasis when environmental conditions become more suitable for host snail maturation, putting more communities at risk of infection. There is a need to develop community-centred intervention measures, but their success depends largely on community acceptance, not only on environmental control. Intervention strategies should be developed based on local conditions and cultural realities. In an effort to improve intervention strategies, we investigated community knowledge, attitudes, perceptions and practices regarding schistosomiasis in Ha-Nesengani, an at-risk community in Limpopo Province. An explanatory sequential mixed-method approach was employed, using household surveys and semi-structured in-depth interviews with 342 and 15 participants, respectively. The findings show that the majority of participants had knowledge of schistosomiasis, its symptoms, and treatment. Participants were also aware of the relationship between schistosomiasis and environmental conditions but were unsure how climate change might change the prevalence in their community. The biggest misconceptions identified pertained to the transmission and severity of the disease, a significant barrier to schistosomiasis control in the community. Our findings will be shared with the community to address misconceptions and reduce the risk of infection.

EXPLORING THE ROLE OF CLIMATE ON TEMPORAL SEASONALITY IN THE INCIDENCE OF INFLUENZA AND RESPIRATORY DISEASE HOSPITALISATIONS IN GAUTENG, SOUTH AFRICA

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Global studies have suggested that there is a higher burden of influenza and respiratory-associated severe illness, including death, in Africa. In South Africa, it is estimated from ecological modelling studies that influenza is responsible for approximately 2,500 pneumonia and influenza-associated deaths each year in individuals of all ages. Internationally there has been a distinct seasonality in caseloads that have been reported, which is associated with seasonal changes in climate. Locally, this results in a distinct seasonality in hospitalisation for influenza in Gauteng. Through analysing hospitalisation caseload data from Baragwanath Hospital and claims data from Discovery Medical Scheme, we quantify the timing and severity of the seasonality in respiratory diseases in Johannesburg, and explore the role of meteorological changes. Understanding temporal patterns in epidemiology, and the role of climate in triggering those, is of critical importance in developing preparedness amongst healthcare facilities, and precaution amongst the population and can subsequently lessen the disease load too. It is also of benefit to the medical aid schemes in best planning for surges in claims, thus enhancing their financial sustainability. This is particularly important in the context of climate change.

ASSESSING THE EFFECTS OF CHANGES IN RAINFALL PATTERNS ON COMMERCIAL FARMERS USING REMOTE SENSING AND GIS IN THE EASTERN FREE STATE REGION, SOUTH AFRICA

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In South Africa, commercial farming is crucial for improving economic and social support to the livelihoods of households to alleviate poverty and maintain sustainable livelihoods of the people. However, the contributions of commercial farming to the local communities have been deteriorating mostly due to changes in seasonal precipitation. This paper aims to assess the effects of changes in rainfall patterns on commercial farmers in the Eastern Free State Region, South Africa. The study will employ a mixed-method approach. Data will be collected from Landsat 5 TM for 1992 and 2012, Landsat 7 +ETM for 2002, and 9 OLI for 2022 multispectral images. The rainfall data will be derived from the climate hazards infrared precipitation with station data (CHIRPS). All data will be analyzed using advanced GIS and remote sensing techniques in the google earth engine platform. Since the commercial farmers represent a crucial part of the economy in South Africa's agricultural system, the study findings are imperative to understand climate variability impacts and identify possible adaptation measures to provide relevant information to policymakers on ways to improve the adaptive capacity.

THE AVAILABILITY AND THE USE OF MEDICINAL PLANTS BY TRADITIONAL PRACTITIONERS IN UMKHANYAKUDE DISTRICT MUNICIPALITY

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The medicinal plants play a vital role in the operation of traditional practitioners. The literature reports that more than 95% of traditional medicinal preparations is of plant origin. The medicinal plants have threats which come from expansion of human settlements which encroach the natural environments, medicinal plant trade, invasive species, land degradation and climate change. The study determined the availability and the use of medicinal plants by the traditional practitioners in the study area. The sample consisted of 52 traditional practitioners who participated in the study. Interviews were conducted with the use of the questionnaires in the homes of traditional practitioners. It was found that the majority of traditional practitioners were no longer harvesting the medicinal plants from their surrounding areas. They travelled to other areas to obtain the medicinal plants. The area which was used by the majority of traditional practitioners to harvest medicinal plants was at Sicabazini in the sand forest zone. It was also found that the majority of the traditional practitioners bought some medicinal plant material which was not available in the area. The medicinal plant material was sold in the markets, local centres and pension pay-out points. There were traditional practitioners who travelled to towns far away from the area to obtain the medicinal plant material. The study recommends the conservation of medicinal plants and the introduction of medicinal plant gardens.

USING GEE TO CLASSIFY SENTINEL 2 IMAGERY TO DIFFERENTIATE THE MARULA TREE FROM SURROUNDING LANDCOVER

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Sclerocarya birrea subsp. caffra (Marula) is a widespread species in Sub-Sahara Africa. Where S. birrea grow naturally, majority of the people depend on the fruits, leaves, kernels, bark and wood to meet their daily requirement. In other words, the species provide goods and services of huge cultural, social and economic importance. The dependence on S. birrea comes with the danger that some of these plants may be destroyed hence, constant monitoring of the species is significant. Traditional methods of monitoring plants are field based and time-consuming, however, the increasing demand for information at broader scales has seen the application of remote sensing that is cost-efficient and time-saving in monitoring plants. Although a wealth of research has been undertaken on S. birrea, there is a lack of studies that have used remote sensing to monitor the species. the objective is to evaluate the feasibility of GEE as a free cloud-based platform to separate S. birrea from the surrounding landcover. This objective was achieved by performing a classification of sentinel 2 composites for two different years (2011 and 2021) using random forest classifier. The field data were collected during the summer season when the marula tree is most vigorous. A Global Positioning System (GPS) will be used to collect coordinates for the marula trees and other vegetation species at the site. the following steps were taken for the classification procedure: object-based segmentation and visual validation; Spectral information extraction from delineated tree crowns and spectral band reduction; Tree species identification using the Random Forest; and Accuracy assessment of classifications. Change detection of the two classification results will be done to determine a change in marula spatial distribution over the years.

MAPPING GENDERED SPATIAL DYNAMICS OF ACCESS TO PUBLIC PLACES IN URBAN AREAS

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This study, which is premised on feminist geographical theory, investigates the geo-spatial factors that underpin gendered inequalities in urban areas. It uses gendered and intersectional lens to explore how power manifests through urban public spaces to create discriminatory and exclusionary practices against women and delimit their right to the city. The study draws from findings generated from geographic information systems (GIS) mapping techniques involving a survey questionnaire, in-depth interviews and QGIS analysis among 166 participants from Umlazi, Chatsworth, and Durban Central in South Africa. The study demonstrates how gendered patterns of access to urban public places are shaped by their spatiality and underlying socio- cultural politics within the three urban spatial frameworks. Gendered and spatialized constraints to physical access, safety and security concerns, connectivity, and intersectional hierarchies continue to reinforce gendered spatial exclusions of women, limiting their access to the benefits and opportunities that cities provide. Furthermore, the identification of parks, bus stops, and shopping malls as hotspots for women's exclusion demonstrates how entrenched gendered inequalities continue to characterize urban geographies. The paper concludes that understanding and (re)shaping the dynamics between gender and the spatiality of urban public spaces can promote urban spatial justice and gender inclusive cities.

IMPROVING LANDSLIDE SUSCEPTIBILITY MAPPING USING SPATIAL MODELS, ENSEMBLE LEARNING AND NEURAL NETWORKS

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Landslides caused by extreme rainfall events pose a significant threat to the safety of human life and property. Flooding is a frequent, annual and well-known hazard in South Africa. However, the intensity and frequency of storm systems worldwide are increasing under changing climatic conditions. Statistical models are often used as landslide susceptibility assessment methods to evaluate landslide probability zones and causative factors. However, these global models ignore spatial dependence or autocorrelation characteristics of data between the observations in susceptibility assessments. To effectively assess the probability of landslides within a given area and specified time period, it is essential to understand the spatio-temporal correlations between landslide occurrences and influencing factors. By including spatial relationships, through spatial regression and geographically weighted regression techniques, various studies have shown that the predictive ability of the landslide susceptibility model increases. Spatial regression (SR), geographically weighted (GW) regression (GWR) and GW artificial neural network (GWANN) models are developed for the KwaZulu-Natal flood and subsequent landslides. Geomorphological factors (slope angle, slope aspect, elevation, profile curvature, and plan curvature), hydrological factors (rainfall, drainage density, distance to river, topographic wetness index (TWI), and stream power index (SPI)), geological factors (soil, lithology, and structural buffer), and environmental factors [land use and land cover (LULC), normalised difference vegetation index (NDVI) and road density] as well as triggering factor (precipitation) are included as

landslide influencing factors. To identify high-risk land, vulnerable populations are considered. The proposed models are compared with each other and validated using data captured following the April 2022 flood and landslide. The effect of an ensemble model is also investigated. The generated landslide susceptibility maps are validated using sensitivity, specificity, overall accuracy, Kappa index and area under the curve (AUC) of receiver operating characteristic (ROC) tools to demonstrate that spatially explicit models provide better prediction capabilities.

SOUTH AFRICA AND THE GEOGRAPHY OF CORRUPTION

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There is hardly any debate that South Africa's pandemic of corruption evidenced in its egregious, vulgar incarnation particularly during the period c2007-2018, has now become endemic. Moreover, corruption has, I would argue, mimicked the evolution of a virus. Furthermore, the virus of corruption has a spatial dimension. It is therefore, geographical in form and substance or in a phrase 'geographical in essence'. In this paper, I will attempt to excavate beyond the detritus or excess that corruption leaves in its wake to uncover the geographical structure of corruption in South Africa. I argue that there is an unmistakable class dimension to what may be termed a spatial symphony of corruption. I will attempt to demonstrate how corruption in South Africa is part of an edifice of accumulation and how geographical scale, focusing on decentralization for example was deployed to facilitate 'accumulation through corrupt means. The architecture of corruption in South Africa is indeed complex and attempting to present this architecture in any coherent form, lies beyond the scope of this paper. However, I will demonstrate, using some examples, how ostensibly legal practices are utilised by the corrupt to shield unashamed looting of the public purse. I also demonstrate how governance in the public interest has evolved into governance to facilitate private gain and to entrench political domination. In the concluding sections of the paper I provide suggestions regarding how the virus of corruption may perhaps be controlled, if not eradicated. In order for corruption to be engaged substantively, institutions of governance need to be radically transformed to promote a substantive public participation.

A PUBLIC POLITICAL ECOLOGY AGENDA FOR COLLABORATIVE ANTI-EXTRACTIVIST RESEARCH IN MPONDOLAND AND NORTHERN KWAZULU-NATAL

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The conceptualisation of a "public political ecology" (Osborne, 2017) envisages a praxis through which members of academia and situated local knowledge communities become experienced practitioners of engaged scholarship to decolonizing knowledge production and produce socially relevant research designed to concretely benefit community goals of social transformation. In resource-rich countries like South Africa and Madagascar, natural resources have long been the foundation of processes of primitive accumulation and uneven development, from pre-colonial times to the present-day. Because

of this, extraction and conservation are associated with long and sometimes converging histories of struggle for control of land and resources, rights and recognition, as well as the basic ability of people to have a say in what 'development' means for their lives and futures (Healy, 2022; Huff, 2021; Beinart, 2008). This is certainly the case in Xolobeni, in eastern Mpondoland, and Mpukunyoni in northern Kwazulu-Natal, where struggles over mining and self-determination have garnered national attention, but limited participatory research engagement on the diverse topics they raise. Within this context, this paper seeks to set out what a research agenda for a public political ecology might look like; motivating for participatory research to 'walk with' people's struggles for place and recognition, and to engage how people actively understand, negotiate, engage with and subvert dominant framings of development and enliven alternative livelihoods and visions of the future in these landscapes. In doing so we reflect on the potential, logistics and challenges of public political ecology and its utility for human geography.

THE INFLUENCE OF BUILT ENVIRONMENT CHARACTERISTICS ON NEIGHBOURHOOD CRIME PATTERNS IN SUBSIDISED HOUSING NEIGHBOURHOODS IN CAPE TOWN

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Crime is a central issue in the wellbeing of South African citizens, impacting on the standard of living across the entire socio-economic spectrum of the population with varying abilities to mitigate and adapt to crime incidences. Government subsidised housing projects are specifically targeted at improving the standard of living of beneficiaries. This research investigated the extent to which deliberate spatial planning interventions influencing the characteristics of the built environment impacts on crime patterns within and adjacent to subsidised housing areas. The study firstly analysed the spatial patterns of contact crime and property crime in subsidised housing areas in the city of Cape Town since 2011. Secondly, a Built Environment Risk Index (BERI) to quantify patterns of built environment indicators including Planning (Ex-Ante), Communal/Community (Ex-Post), and Household Passive Detectability and Territoriality variables were also developed. Through spatial analysis it was possible to identify specific built environment characteristics that can be attractors or deterrents of crime (whilst controlling for socio-economic characteristics) in subsidised housing neighbourhoods of Cape Town. These specific crimes and built environment relationships allow for potential direct interventions through urban planning practices such as block sizes, street patterns and configuration of open spaces.

"I FEEL SCARED OF BEING A GIRL": ADOLESCENT GIRLS' CONVERSATIONS ABOUT HETEROPATRIARCHAL SEXUAL VIOLENCE IN SOUTH AFRICAN TOWNSHIPS

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This paper examines the perspectives of black African adolescent girls about heteropatriarchal sexual violence in their resource-poor townships in South Africa. The study was set in a social geographic

area burdened by chronic poverty, high levels of crime, and heteropatriarchal violence. Rape culture – the pervasive norms and ideologies that effectively support or excuse heterosexual violence – framed the study, and qualitative group conversations were used to generate data. Findings point to a culture of heteropatriarchal sexual violence used by men to dominate and control girls' freedom and behaviour across township spaces. Adolescent girls faced widespread violence, a systematic and overlapping feature of their neighbourhoods and households. While girls employed several strategies to insulate themselves from violence, they did so in a context where gender ideologies worked against them. In talking back to their victimization, girls conjured notions of stolen dignity, lost humanity, and diminished existence.

MAPPING THE UNSAFE SCHOOL JOURNEY: RURAL PRIMARY SCHOOL CHILDREN'S PERSPECTIVES ON DANGEROUS SOCIAL GEOGRAPHIES IN SOUTH AFRICA

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We describe a study conducted with 20 primary school children from a resource-poor rural community in South Africa. Using participatory mapping, the school children were asked to draw the paths they walked to school (referred to as child maps), and identify unsafe areas on this journey. The data were analysed using participatory visual analysis techniques by focusing on the children's representations of their school journeys and their perspectives on their vulnerability on these paths. The analysis revealed a plethora of areas that posed a threat to children as they walked to school. Moreover, the findings suggest that children experienced heteropatriarchal violence – male-instigated violence against school children – on their school journeys, which evoked fear and anxiety since children associated this walk with risk. Using participatory mapping offered a unique opportunity to see how school children constructed and navigated the routes they walked to school, and how on these paths, different forms of violence occurred. The children's maps offered an important tool for understanding the significance of space and place on routes to school in rural communities.

IS SEGREGATION A THING OF THE PAST OR IS IT HERE TO STAY: ANALYZING THE DECOLONIZATION PROCESS THROUGH THE SPATIAL TRANSFORMATION OF THE POST-COLONIAL CITY OF BLOEMFONTEIN, SOUTH AFRICA

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The colonial period and later the apartheid era bought about very stringent statutes, especially within the residential spaces. This was first initiated by the Natives land act of 1913 and later reinforced by the Group Areas Act of 1950, which resulted in racial segregation within residential areas. The repeal of these segregationally laws in 1990 brought about much of the long-awaited freedom for the citizens of South Africa. The question now is whether we have achieved decolonization since the repealing of these laws? This study argues that we have not reached the desired form of decolonization because

the urban space still mimics the segregational patterns of the colonial period through the establishments of exclusive gated communities and informal settlements developing at opposite ends of the city. With the gated communities accommodating the wealthy and the poor being found within the informal settlements, therefore segregation is no longer in terms of race but has shifted to class. As Sibley (1997:76) stated, "The built environment is an integral part of the production of social life, conditioning activities and creating opportunities according to the distribution of power in the socio-spatial system." Therefore, if our built environment still resembles the colonial period, it means we are still creating the social conditions that existed back then. The study will conduct a qualitative case study on Bloemfontein, South Africa, analyzing the spatial transformation of the post-colonial city and investigating whether spatial decolonization has been achieved. The results will be informed on the geospatial analysis of the city's urban expansion since 1994, and in-depth interviews will be conducted with Officials from the Provincial CoGTA and DALRRD as well as key informants who have a long history with Bloemfontein and have knowledge of its developments.

AN INSIGHT INTO ENVIRONMENTAL STEWARDSHIP OF STUDENTS AT THE NELSON MANDELA UNIVERSITY

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The concept of environmental stewardship has been studied in a variety of contexts across different types of groups and societies. Literature has indicated multidisciplinary application of the concept in various research fields. There is however a dearth of empirical research on environmental stewardship in the context of water conservation. Different conservation initiatives are driven and controlled by environmental objectives, offering adequate capacity and sufficient motivation for resource users to engage. Although the application has been multidisciplinary, the environmental objectives have remained clear - use, protect, conserve, and manage natural resources sustainably. The engagement of resource users is critical to achieving these environmental objectives. Numerous proposed environmental stewardship frameworks have offered different variables to assess the environmental stewardship of individuals. The aim of this study is to assess the environmental stewardship of Nelson Mandela University students in the context of water conservation. The quantitative data was collected through surveys using a questionnaire based on literature. This study used a random sampling technique to select a hundred participants from students studying at Nelson Mandela University. The results indicate that a significant portion of the sampled population is aware of scarcity and plummeting freshwater reserves. Conversely, their knowledge, attitude, and daily behaviour do not translate into stewardship actions. Additionally, many are unaware of their daily consumption and attributed the drastic decrease in water reserves to wasteful usage, draught, and leaks. Paradoxically, at the height of the drought, 9% believe that water is abundant. Results also showed a strong link between conservation awareness and desired stewardship practices. Lastly, the results show that students, if sufficiently motivated, would engage in stewardship efforts to conserve water.

ESTIMATING ABOVEGROUND NET PRIMARY PRODUCTIVITY OF REFORESTED TREES IN AN URBAN LANDSCAPE USING BIOPHYSICAL VARIABLES AND REMOTELY SENSED DATA

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Recently, urban reforestation programs have emerged as potential carbon sinks and climate mitigates in urban land-scapes. Thus, spatially explicit information on net primary productivity (NPP) of reforested trees in urban environments is central to understanding the value of reforestation initiatives in the global carbon budget and climate regulation potential. To date, numerous studies have mainly focused on natural and commercial forests NPP at a regional scale based on coarse spatial resolution remotely sensed data. Generally, local scale NPP studies based on fine spatial resolution data are limited. Therefore, this study sought to estimate aboveground NPP of an urban reforested landscape using biophysical and Sentinel-2 Multispectral Imager data derived variables. Using the MOD17 model, results showed that mean NPP ranged between 6.24 Mg C ha−1 with high coefficient of determination (R2:0.92) and low RMSE (0.82 Mg ha−1) across all reforested trees within the study area. Results also showed a considerable variation in NPP among the reforested trees, with deciduous Acacia and Dalbergia obovate species showing the highest NPP (7.62 Mg C ha−1 and 7.58 Mg C ha-1, respectively), while the evergreen Syzygium cordatum and shrub Artemisia afra had the lowest NPP (4.54 Mg C ha−1 and 5.26 Mg C ha−1). Furthermore, the multiple linear regression analysis showed that vegetation specific biophysical variables (i.e. leaf area index, Normalized Difference Vegetation Index and Fraction of Photosynthetically Active Radiation) significantly improved the estimation of reforested aboveground NPP at a fine-scale resolution. These findings demonstrate the effectiveness of biophysical and remotely sensed variables in determining NPP (as carbon sequestration surrogate) at fine-scaled reforested urban landscape. Furthermore, the utility of species biometric measurements and MOD17 model offers unprecedented opportunity for improved local scale reforestation assessment and monitoring schedules.

REIMAGINING SOUTH AFRICA'S SOCIAL COHESION IN THE CONTEXT OF BUILT GEOGRAPHICAL ENVIRONMENTS: THE CASE OF DURBAN

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This paper explores geographies of the built environment with the aim of understanding their role as possible conduits of social cohesion in post-apartheid South Africa. As a geographical component, the built environment is constituent of human-made surroundings ranging in scale from buildings to parks, and green space to neighbourhoods and cities. Physical environments can be viewed as geopolitical sites imbued with meaning and arenas of transformation and social change. The paper therefore, focuses on the role of geospatial environments in addressing the political agenda of social cohesion. Spaces and places are not just objects but subjects with the potential to engineer discourses that may cover a wide range of social issues including race, identity and politics. This paper draws on qualitative empirical data from a research conducted in some of the geospatial environments of cultural and historical significance in Durban Central. These places include neighbourhoods and spaces such as public buildings, museum, religious centres, gardens and parks. These facilities are significant as they constitute spaces of human interaction that define social relations and the civic rights of South African

people. In order to achieve the aim of the study, the paper anchors on the theory of social change and highlights the geographical significance of the built environment in advancing political agendas.

BEYOND THE 'HUSTLING': THE EVERYDAY DISCOURSE OF HOPE OF INFORMAL TRADERS IN GHANAIAN CITIES

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Conventional literature on urban studies have often framed informality within the concept of 'hustle' at multiple sites in the city. Such studies usually examine the uncertainties and struggles of informal traders in the realms of city management. This article moves away from the over flocked issues of abuse and suppression to explore the practices of informal traders that produce hope to reflect and recast the uncertainties associated with urban informality. In doing so, we discuss the typologies of the activity and account for knowledge and practices in theorizing urban informality as a space of hope. Drawing from qualitative research conducted with informal traders in urban Ghana, we highlight the everyday practices that shape traders hopes and engagements which lie behind their hustles. Their evidence of a better tomorrow is shaped by the many examples of their colleagues who ones walloped in that livelihood activities but who are now 'counting the money' and controlling the urban businesses in the malls and markets. From the field evidence, we argue that urban informal traders cannot be pigeonholed as mainly hustlers subsisting in the fragile urban economy, rather the notion of hope complements and extends the 'hustling' in the city.

COASTAL TOURISM, CLIMATE CHANGE AND RISK PERCEPTIONS: UNPACKING THE VIEWS OF KEY STAKEHOLDERS ALONG THE GARDEN ROUTE

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Given that coastal tourism represents one of the most dominant segments of South Africa's overall tourism economy, it is recognised that increased research is pivotal in order to better understand the position of key stakeholders and their perceptions of the risks posed by climate change. The focus of the proposed conference paper is to explore the broad issue of climate change and tourism by unpacking the perceptions held by a range of industry stakeholders along the coastline of the Western Cape's Garden Route. Such an undertaking will involve unpacking, inter alia;

• the degree to which key tourism stakeholders have heard of climate change and are able to identify the phenomenon's meaning;
• the general challenges that stakeholders view as being a current or future priority;

• the relative position of climate change when compared to other challenges or priorities facing tourism businesses within the Garden Route

The study methodology made extensive use of the research design and instruments developed by Ruhanen and Shakeela (2013) in Australia, which were then adapted in order to better function within the South African context. Moreover, the qualitative study employed extensive use of a content analysis thematic framework which relied on manual coding techniques to maximise the richness of produced interview texts. The research results of the study reveal a substantial disconnect between the basic recognition and understanding of climate change when compared to interviewees' perceptions surrounding the potential risks associated with the phenomenon. The findings of the study also reveal a range of stakeholders are currently focused on dealing with issues which are perceived as more immediate and tangible than those implications associated with extreme climate change in the future.

MICROPHYSIOGRAPHY AND DRAKENSBERG ALPINE GRASSLAND VEGETATION CHARACTERISTICS AT WITSIESHOEK, SOUTH AFRICA

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Physiographic factors often influence vegetation characteristics. Thus, equator-facing, gentler slopes are generally associated with increased species richness and vascular plant cover. Similarly, a higher number of species are mostly associated with deeper soils, and slope angle, slope aspect and soil depth often have an effect on species composition. These relationships are, however, inconsistent between environments. The alpine grasslands of the Maloti-Drakensberg Mountain Range are characterized by high variability in elevation, climate, geology and topography, making it a suitable environment for studying the relationship between physiography and vegetation characteristics. Here, the effects of slope angle, aspect and soil depth on vascular plant species richness, cover and composition were analysed for the Witsieshoek region of the Drakensberg Mountains, with soil and rock cover additionally included for the models on species composition. Seven 20 m x 8 m grids made up of 1 m x 1 m cells were sampled. The cover of all vascular plant species was estimated and soil depth, slope angle and aspect measurements were taken in each cell. Generalized linear models (GLZs) were used to model the relationship between species richness and vascular plant cover, and physiographic factors, while canonical correspondence analysis (CCA) was used for species composition. Preliminary results suggest that all five physiographic factors affect vegetation characteristics to some extent. More specifically, south facing slopes and deeper soils were associated with higher species richness and cover. Additionally, steeper slopes showed a positive relationship with species richness, while all five factors affected species composition. The results suggest that equator-facing, gentle slopes do not always form improved habitats for plant species, and that many of the Drakensberg species fare better in sun-sheltered microclimates. In addition, these results also highlight the importance of small-scale landscape heterogeneity in providing niche habitats and facilitating the growth of different combinations of species.

THE POLITICISATION OF HOUSING AND SERVICE PROVISION IN THE NEO-APARTHEID CITY: A STUDY FROM LAMONTVILLE TOWNSHIP, KWAZULU-NATAL

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Access to adequate housing remains a huge challenge in South African cities, despite efforts by post-apartheid governments to deliver affordable housing to poor urban households. South Africa's current approach to housing development has focused on eradicating slums by relocating slum dwellers to free formal houses with internal services. Temporary housing provision, referred to as transit camps, are located at the periphery of cities and are used to house slum dwellers while their formal houses are constructed. In this paper I argue that current government housing policy is creating (through unintended processes) a system equally as oppressive as apartheid with respect to enhancing social and class divides, further marginalizing the poor. The paper draws on field work conducted in Lamontville Township, KwaZulu-Natal province in 2018 as part of my PhD studies. Lamontville Township is a multi-ethnic community consisting mainly of Zulu people and Xhosa people who are recent immigrants to KwaZulu-Natal. In this township, 'temporary' transit camps, built from corrugated metal sheets, have taken on the status of permanent settlements due to unfulfilled political promises for new formal houses. The study found that transit camps are densely populated yet lack sufficient basic services and other public amenities. These living conditions pose unequal threats to the health of the urban poor and contributes to the spread of infectious diseases due to poor sanitation. The continued construction of transit camps is a manifestation of the neo-apartheid city in two forms: firstly, unemployed ethnic minority city dwellers are contained in remote poorly resourced areas; secondly, each household receives a government permit allowing them 'temporary' entry into the urban area. Therefore, transit camps are entangled within the politics of belonging; those who do not have the right to be in the neo-apartheid city are marginalized at the level of housing infrastructure.

MAPPING SOUTH AFRICANS OPINIONS ON COVID-19 VACCINES

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Vaccine hesitancy is one of the 10 greatest threats to global health according to the WHO (2019). The uncertainty about vaccines could disrupt efforts to minimise the effect of Covid-19 on people's daily lives. The research on Covid-19 vaccine opinions in South Africa is still limited. Knowing what and where there are vaccine hesitancies will be able to inform focused interventions. Our aim is to investigate and visualise the spatial distribution of vaccine opinions in South Africa through the use of opinion mining. To collect opinions, we designed a survey to collect responses of individuals. The survey was distributed on various social media platforms such as Twitter, Instagram, and Facebook, and Prolific. The opinions were analysed using sentiment analysis and mapped to determine the spatial distribution of these opinions. With over 600 responses across the nine provinces, with the majority being from Gauteng. Opinions regarding the vaccine were both positive and negative. The

results showed that over fifty percent of the respondents have taken the vaccine though some still conveyed concerns about the vaccine. The reasons for the hesitancy ranged from religious and medical reasons to mistrust in the process of creating the vaccine. Positive sentiments included trust in science and the need to protect family members as well as themselves. It is important to understand where there is hesitancy to help create focused interventions to mitigate the potential spread of mutations of the virus.

ASSESSING THE APPLICABILITY OF TOURISM CLIMATE INDICES TO QUANTIFY CLIMATE SUITABILITY AND THE IMPACTS OF CLIMATE CHANGE FOR TOURISM IN RÉUNION ISLAND

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Globally, tourism is dependent on climate, motivating destination choice, tourism activities, seasonality and vacation satisfaction. Climate change poses a threat to tourism destinations, particularly small island states which are considered popular for offering ideals of beach holidays. These island states are highly vulnerable to climate change through sea-level rise and extreme events such as tropical cyclones. A range of tourism climate indices have been developed over the past four decades to evaluate the climatic suitability of destinations for tourism, and the impacts of climate change. Many of these have been developed in the Global North, with inherent assumptions regarding data availability, and the infrastructure at tourism operations. Prior studies in southern Africa have demonstrated limitations in these indices for use in the southern Hemisphere. This study explores the applicability of four tourism climate indices for use in Réunion Island, a French department in the Southwest Indian Ocean. We evaluate the data requirements, assumptions, and usability of the Tourism Climate Index (TCI), the Holiday Climate Index: Beach (HCIBeach), Holiday Climate Index: Urban (HCIUrban), and Camping Climate Index (CCI). This provides a platform against which appropriate indices can be identified, and adapted if needed, for use in the context of small island states in the Southwest Indian Ocean.

ATMOSPHERIC MOISTURE SOURCE AND TRANSPORT LINKED TO APRIL 2022 HEAVY RAINFALL EVENT OVER THE PONGOLA-UMZIMKULU, SOUTH AFRICA

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The Pongola-Umzimkulu Catchment and the greater Kwazulu-Natal Province experienced heavy rainfall in April 2022 due to a cut-off low pressure system. The event caused extensive property and crop damage, as well as loss of life. The Agricultural Research Council (ARC) daily weather stations and the 0.05° gridded Climate Hazards infrared Precipitation with Stations (CHIRPS) data indicated that the 24-hour precipitation on the 12th of April exceeded 200 mm in a number of stations in the catchment. Using the Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model, the atmospheric moisture sources associated with the heavy rainfall during the event were identified in this study. Initial conditions input for HYSPLIT were based on ERA5 (0.25°×0.25°) reanalysis data. The

10-day air parcel backward trajectories were generated over the catchment during the extended wet season (October-April) from 1981 to 2022 to compare the moisture transport and source regions during the event to the climatology. The analysis of relative humidity along the backward trajectories revealed four moisture source regions for the region, including a local continental source, Southwest Indian Ocean and the Mozambique Channel source, Southeast Atlantic Ocean source, and the Southern Ocean. This study further highlights the role of the Southwest Indian Ocean source regions and the occasional moisture contribution of the Southeast Atlantic Ocean during extreme rainfall events.

INSTITUTIONALISING THE CLIMATE CHANGE MITIGATION AGENDA IN LOCAL GOVERNMENT: THE CASE OF THE WEST RAND DISTRICT MUNICIPALITY

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The recent climatic disasters experienced globally are a testament to the need for climate change governance, particularly mitigation, to prevent cumulative impacts of climate change on the environment. Municipalities are directly affected by the ramping consequences of climate change. The translation of climate change legislation to actionable local goals is at a critical juncture in governance. In South Africa, this attention has been focused on large metropolitan municipalities and not peri-urban municipalities. This study explores the West Rand District Municipality's governance obligations to mitigate climate change in light of the main sources of greenhouse gas emissions in the district. Firstly, the study looks into quantifying the West Rand District's greenhouse gas emissions from publicly available data across different sectors. Through a documentary review, the study then analyses local governments' targets and responsibilities in mitigating climate change from the relevant international, national, provincial and local legal instruments and how local governments are responding to their obligations. The total GHG emissions assessed from the West Rand was 6.68 Mtons of CO2-eq, with electricity consumption by the mining sector contributing 64% of the emissions and the residential and mining scope 1 sector accounting the least with 1% each. From the legislative review, the analysis reveals that the South African local government sphere has a prominent role to play in mitigating climate change through legal, planning and programmatic instruments and supporting national and international climate governance efforts. However, there is a lack of documentary evidence on how local municipalities like those in the West Rand District have translated the climate policy framework into action.

CITIZEN SCIENCE AND GIS: MAPPING JACARANDA TREES IN JOHANNESBURG CITY

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Jacaranda Mimosofolia (common name: Jacaranda) is a category 3 alien invasive species, yet a key feature of the Johannesburg suburban landscape. Bright purple Jacaranda blossoms are known to blanket the streets of the northern suburbs during springtime. Citizens are familiar with annual Jacaranda tree flowering, and during the flowering season the trees are easy to identify. However, despite the status as an invasive species, no maps of Jacaranda locations have been produced. Such maps would benefit citizens and tourists who want to enjoy the spectacle of the trees in bloom, and for city managers in monitoring the invasive species. Citizen science has attracted increased attention as an efficient way to collect data at large scales at low-cost, within short time-frames. Mapping methods using Geographical information System (GIS) techniques allow for real-time, dynamic mapping of invasive species. The merge of citizen science capabilities with GIS techniques presents many opportunities for dynamic monitoring and mapping. This study uses a GIS-based approach in citizen science data collection, coupled with researcher-led ground truthing in the field and using Google Street View, to compile the first map of Jacaranda trees in South Africa. The map is coded to reveal confidence and accuracy in geolocations of Jacaranda trees and is coupled with statistical analysis comparing the three data sources.

SOUTH AFRICAN WINTER RAINFALL ZONE SHIFTS: A COMPARISON OF SEASONALITY METRICS FOR CAPE TOWN FROM 1841–1899 AND 1933–2020

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Mounting evidence across South Africa's southwestern winter rainfall zone (WRZ) reflects consistent drying since ~1980, and projected trends suggest this will continue. However, limited evidence exists for changes in the region's rainfall seasonality. To improve our understanding of these WRZ drying trends, especially within the context of Cape Town's 2015–2017 "Day Zero" drought, it is necessary to explore long-term rainfall seasonality trends. Thus, we use the longest WRZ meteorological record from the South African Astronomical Observatory (SAAO) in Cape Town to investigate rainfall seasonality shifts during 1841–2020. Consistent with recorded poleward migrations of the subtropical high-pressure belt and mid-latitude westerlies, known drivers behind the drought and drying trends, calculated trends demonstrate strengthening of WRZ conditions, primarily from a later start-date trend leading to a shorter wet-season. Long-term drying trends are quantified for the wet and dry seasons; however, analysis of trend evolution reveals much variability, reflecting that drying has only persisted since ~ 1892. Comparative analyses of the first and last 59 years of 1841–2020 reveal a rainfall decline of almost 10% across both seasons—highlighting that the extreme "Day Zero" drought was not only driven by wet-season rainfall declines. Results demonstrate that these drying trends were consistently driven by a long-term decline in rain day counts and a more recent decline in average rainfall per rain day. Correspondence between our results and projected rainfall seasonality trends suggests the trends we quantified will likely continue; thus, improvements and continuation of existing water conservation and management strategies are imperative for Cape Town.

THE IMPACT OF DISPLACEMENT ON CHILDREN IN THE INNER CITY OF CAPE TOWN

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The property market continues to create significant uncertainty among Cape Town residents, of which only 5% can afford to buy a home. In this rapidly urbanising and exclusionary context, little is known about how displacement impacts individuals and less about its impacts on adolescents. This study, therefore, interviewed eight dyad-participants comprising adolescents and their parents occupying the Cissie Gool House in Woodstock, Cape Town, to examine their everyday experiences of displacement and understand how it affected their development and future. The study found that the adolescent's experience was driven by internal individual and external environmental factors that, in most cases, either hindered or delayed their adjustment to their new environment, causing the adolescent toxic stress and derailing their development which resulted in individual adverse outcomes. These outcomes included: 1. physical growth and health challenges, 2. cognitive challenges, and 3. social and emotional challenges. In so doing, the study has shown the importance of examining individual outcomes of the truly vulnerable - to understand better how spatial matters manifest in their everyday lives. By empowering vulnerable individuals and providing a platform for their voices and experiences, future work could similarly highlight the need to shift towards a more individual outcomes-based planning approach so that we may realise a more equitable and inclusive form of urban transformation.

USING GROTH'S ALGORITHM AS A POSSIBLE MEANS TO DETECT CHANGES IN PLANTS

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Post-conflict reconstruction includes the removal of landmines and remnants of war. The CSIR conducted field experiments to determine the impact of TNT on plants and hence the feasibility of using changes in plants to detect TNT in the soil. All the readings were done using a spectrometer and a leaf clip to determine reflection and absorption of light at one micrometer intervals between 350 to 2500 micrometer. Laboratory analysis such as UPLC qTOF MS indicated that the TNT does influence the plants. The challenge is to detect these changes through spectral reflectance from the leaves. Several indices such as Modified Red Edge Normalized Difference Vegetation Index (mNDVI705), Red Edge Position (REP) and Moisture Stress Index (MSI) did not show any significant differences between control plants and experimental plants with different TNT concentrations. Groth's pattern matching algorithm is designed to match two different astronomical photographs of the same section of the universe to detect changes using recorded fixed stars. A set of triangles is created from each photograph and matched using an error band. If the selected triangles from the two photographs fit within the error band then they are from the same section of the universe. Bands for the Pléiades instruments were simulated using the data from the spectrometer for each plant. The reflectance value of the band and the normalised midpoint wavelength of each Pléiades band were used to construct the triangles. The control plant triangle is then matched with the experimental plant and if the triangles do not match, then the effect of TNT on the plant is significant. The initial results with the control plants and experimental plants are positive. This is the first stage of the research using leaf clips and it is proposed to test this under field conditions.

CLASSIFICATION OF LAND COVER CHANGES OF NATURAL RESOURCES HARVESTED BY COMMUNITIES SURROUNDING THE GGNHP

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Communities surrounding protected areas play a crucial role in the protection and prolonged existence of these areas. Their interaction with nature, perceptions, livelihoods, values and environmental consciousness are significantly important in determining the long-term presence of conserved areas and biodiversity. Hence, this study aims to classify land cover changes of natural resources in the Golden Gate Highlands National Park (GGHNP) as identified by adjacent rural communities in the Free State Province of South Africa spanning 1963 to 2018. The park is situated at the foothill of the Maloti-Drakensburg mountain, in a grassland biome. Although relatively small in spatial extent, the GGHNP boasts of a diverse social setting of villages, climate, biodiversity, vegetation, and land-uses. QwaQwa is a former homeland described by increasing population, high levels of unemployment, and extreme poverty. The methods used in collecting data were Remote Sensing and Participatory GIS. Four communities participated in the mapping exercise. The results from the PGIS reveal that communities that are closer to the park have more access and harvest mostly medicinal plants, and firewood and use grazing lands for their livestock. While one distant community accesses the park for hunting purposes.

AN EXPLORATION OF THE PERCEPTIONS AND SENSE OF PLACE OF WOMEN LIVING IN PERI-URBAN SETTLEMENTS IN MANKWENG, LIMPOPO PROVINCE.

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The pace at which persons move to South Africa's (peri)urban areas surpasses that at which settlements and infrastructure can be planned and built. Livelihood strategies in these areas are threatened by rapid spatial, ecological and social transformation. For instance, the (in)direct impacts of climate change can – by adversely affecting ecosystems' health – diminish nature's contributions to peri- urban dwellers, including subsistence/smallholder farmers, thereby increasing their vulnerability. Overall, the vulnerability of peri-urban dwellers dependent on land-based livelihoods, and the precarious conditions under which they exist, makes them susceptible to rapid, unexpected changes. This has become more apparent during the COVID-19 pandemic and is particularly true of the women living in peri-urban settlements. Cognizant of the need to consider perceptions (inner dimension) of persons (especially women) in peri-urban communities, rather than just studying infrastructure development and land use change to (1) understand peri-urban development (outer dimension) and (2) come to grips with the complexity of the socio-ecological systems (SESs) within which peri-urban settlements are embedded, a mixed-method sequential strategy was used to explore the factors affecting the perceptions and sense(s) of place of women in four peri-urban areas in and around Mankweng, Limpopo Province. The strategy also surfaced the types of sense of place harboured by women trying to sustain their peri-urban livelihoods. These preliminary findings - per area and across the four areas – shall be presented and discussed. In the final instance, the implications that the findings have for place-making in peri-urban Mankweng and, more specifically, a transition to more transformative, sustainable pathways, shall be briefly outlined.

THE ROLE OF TRADITIONAL LEADERS IN FLOOD DISASTER RISK MANAGEMENT: A CASE STUDY OF TRADITIONAL LEADERS IN THE CUVELAI-ETOSHA BASIN OF NORTHERN NAMIBIA.

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Floods are one of the common disasters that affect many people all over the world. Disaster risk reduction promotes Community Based Disaster Risk Reduction whereby solutions to disasters must come from the affected population themselves. The Sendai Framework for Disaster Risk Reduction advocates for collaborations between local leaders and municipalities as a way to optimize risk reduction initiatives. However, traditional (local) leaders who are supposed to be key stakeholders in these collaborations are mostly sidelined or not recognized. Their contribution to reducing risks is usually passive in most cases. Drawing from the recurring floods (locally known as efundja) of the Cuvelai-Etosha basin of northern Namibia, this article demonstrates the vital role rural traditional leaders play in disaster risk reduction. Using a qualitative approach, the article used secondary and primary sources whereby primary data were collected using face-to-face key-informant interviews. Interviews with 12 traditional leaders of the frequently flooded villages of the Cuvelai-Etosha basin were conducted. The findings reveal that traditional leaders indeed participate in various key activities of disaster risk reduction. They coordinate and encourage their communities to implement various preventative and mitigative strategies. Traditional leaders coordinate preparatory activities such as promoting building concrete foundations rather than clay; building dykes around homesteads, and encouraging people to work hard to improve food security to reduce overall vulnerability. Since preparatory and mitigative measures are not always, feasible, traditional leaders participate in emergency response activities such as temporally relocating residents to higher grounds, distribution, and transportation of relief aid. The article concludes that traditional leaders' participation in all these activities highlights their capacity and ability to run effective DRR initiatives. Though they still require further training and skill development, the results of this study demonstrate that their actions warrant their active participation in flood-risk management strategy development and implementation thereof.

CURRENT AND EMERGING PRACTICES OF SOLID WASTE MANAGEMENT IN ACCRA'S OPEN-AIR MARKETS

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Solid waste management (SWM) remains a major environmental and public health concern of Southern cities as the urban population continues to increase and consumption patterns change. The sorting, storage, collection, transportation, disposal of solid waste and the management of dump grounds are the major defining components of SWM along with solid waste reuse, recycling and recovery. Accra like many cities of the global South is grappling with a challenge that was non-existent about six decades ago. Extant literature reveals Accra as bedevilled with overflowing dumpsites and pollution from uncontrolled discarding of solid waste. The challenge of SWM is compounded in the city's open-air markets (OAMs) given the intense competition for space by traders and investors within the context of limited planning and solid waste infrastructure. Using both qualitative and quantitative methods in the Kaneshie, Kantamanto and Madina OAMs in Accra, the study examined the everyday SWM practices of formal and informal (market and SWM) actors which are relevant in reducing flows of urban market waste (through reuse and recycling), reclaiming the cost of SWM (through PAYD and PAYG) and ensuring efficient SWM service delivery. It highlights how SWM decisions and choices of traders are influenced by local market institutions headed by market and commodity queens or

chairmen. Finally, it calls on authorities to pay attention to the emerging practices of SWM in the marketplace and further offers recommendations for future improvements.

CULTURAL CENTRES AND KNOWLEDGE-SCAPES: COMPREHENDING THE RELATIONSHIP BETWEEN THE BUILT ENVIRONMENT AND CREATIVE ENCOUNTERS

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Cultural centres are vital in the knowledge economy and can play a driving role in the innovation process and production of knowledge. Public spaces at cultural centres are important knowledge and creative hubs and enablers of creativity as well as social well-being through a sense of place and community. Cultural centres, such spaces are catalysts that bring people, ideas and resources together before a creative process can occur. Using the concept of spatial affordances for creativity this study sought to understand patterns of human interactions in cultural centres and how the built environment plays a role in those patterns. For empirical data, the study used semi-open cultural centres ranging from community halls, museums, Islamic centres, art centres, community youth centres, and exhibition centres in Durban Central. Data was collected using Volunteered Geographic Information, using online questionnaires. The survey was designed to empirically record spatial clusters of human perceptions by identifying cultural centres that afford creativity. Creativity is represented h by the act of sharing knowledge and exchanging ideas with others. The study included 150 participants who are cultural centre employees and visitors. Data collection is ongoing. Data analysis will use VGI perceptual data that represent frequencies of usage of semi-open spaces where people share knowledge and exchange ideas. Data will be presented using points signifying cultural centres where people frequent, and heat maps symbolising accessibility of cultural centres in terms of proximity to amenities such as roads and malls.

EXPLORING CLIMATE CHANGE VULNERABILITY OF THE SOUTH AFRICAN TOURISM SECTOR – A HIGH RESOLUTION APPLICATION OF THE CVIT

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The impacts of climate change have begun to be experienced globally and are posited to intensify over coming decades. The tourism sector is an important contributor to the GDP, employment, and socio-economic development of South Africa. The Climate Change Vulnerability Index for Tourism (CVIT) is a multidisciplinary, 27-variable index that was developed to assess the sensitivity of a country's tourism sector to the impacts of climate change. Key indicators of the CVIT include measures and projections of tourism assets, tourism operating costs, tourism demand, host country deterrents, tourism sector adaptive capacity and host country adaptive capacity. To date, it has only been applied at a global scale, compromising on spatial resolution, and blurring heterogeneity in vulnerability at a local scale. This global CVIT assessment (found the South African tourism sector to be moderately vulnerable to climate change. The South African tourism sector, climate, and markers of vulnerability

are, all, particularly heterogenous, with a wide variety of tourism destinations, climates, and socioecological conditions. To account for these local scale differences, this project downscales the CVIT to quantify differential climate change vulnerability for 18 locations distributed across South Africa. Indicator data source options for local application of the CVIT were scoped and refined based on data availability, quality, and spatiotemporal scale. The CVIT scores allow for the identification of locations most vulnerable to climate change and can be compared to current South African climate policy documents and tourism practices to identify gaps and opportunities for improvement.

THE URBAN MATERIALITIES OF DISUSED QUARRIES IN CAPE TOWN

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Quarried stone has a multitude of uses in the built environment. Often old, abandoned quarries near cities have become enveloped by urban expansion. This paper investigates what becomes of disused quarries, specifically in Cape Town. The study is scaffolded by the theoretical underpinnings of urban materiality which, in turn, draws from assemblage theory. It is posited that the urban materialities of quarries, as one-time sites of material extraction, do not cease with closure. The infill, rehabilitation and repurposing of quarries for other uses result in continued contributions of quarries to the urbanscape, in addition to being historical sites of meaning and memory. The location of 77 quarries in Cape Town were mapped using data from various sources. Six quarries are still operational, the balance are in a post-extractive state. Thirty-five per cent of abandoned quarries have not been rehabilitated or altered by human activity after closure. However, they are sites of non-human use. Sixty-five per cent of the post-extractive quarries are sites for housing, commercial and educational activities; for recreational activities; have been infilled; or they store water for agricultural purposes. The reuse of quarries speaks to the creation of new urban materialities by humans and non-humans.

THE SPATIO-TEMPORAL CONTEXT OF MAJOR AFRIKAANS ARTS FESTIVALS IN SOUTH AFRICA

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The historical development of tourism and recreation in South Africa has attracted considerable research attention, resulting in three broad eras being highlighted, i.e. the pre-Mandela era, the Mandela era of national unity and the post-Mandela era. The Mandela period of national unity saw the whole tourism landscape in South Africa being rethought and recalibrated, creating a fertile space for new tourism products to be born and for existing products to undergo significant changes. A case in point is that of Afrikaans arts festivals, most of which originated in the Mandela era and some in the post-Mandela era. Investigation of the historical or temporal development of festivals is therefore important to gain insight into the reasons for the existence of these festivals. Drawing from this background, the objective of this paper is to provide the current and historical context of the major Afrikaans arts festivals in South Africa by presenting a brief historical account of their development. Data were gathered by means documentary review as well as in-depth interviews with primary role-

players in the establishment of the major arts festivals, thereby providing a unique perspective on the early development of the Afrikaans arts festival-scape. Most of the early Afrikaans arts festivals responded to the changing political and cultural environment in the post-apartheid South Africa, having the conservation and development of Afrikaans arts at their core. More recently, commercial interests took centre stage for festivals entering the market while also positioning themselves in proximity to large affluent Afrikaans populations.

A METHODOLOGY FOR ASSESSING THE ACCURACY OF HEIGHTS DERIVED FROM UNMANNED AERIAL VEHICLES

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Currently the UAVs has become an alternative for different engineering applications and environmental monitoring applications. One of these applications is the topographical mapping specifically in DEMs products, but there remain questions about its accuracy and efficiency especially in comparison to traditional terrestrial surveying methods in varying terrain. Thus, the purpose of this thesis is to compare traditional surveying methods for topographical mapping through data obtained by total stations (Trimble M3) and data obtained by a camera mounted on a quadcopter (DJI Phantom 4 Pro UAV). To answer these questions, we obtained both datasets in the same location at the District 6 open field area with undulating terrain. The results were then compared. The drone-based elevations were derived using UAV drone computer vision techniques. In using the UAV drone, the re-constructed camera positions and terrain features were used to derive ultra-high-resolution point clouds, ortho-photos and digital surface models from the multi-view UAV camera photos. Thus, it is evident that several factors including the terrain under investigation, flight configuration, flying height, sensor specifications, ground control distribution etc. have a role to play in the final survey accuracy which can be achieved. In this context, this paper will provide an analysis of the performance of UAV borne aerial photography for different terrains in comparison to traditional terrestrial surveying.

THE IMPACT OF SOCIO-ECONOMIC INEQUALITY ON SPATIAL JUSTICE IN CITIES: THE CASE OF KIMBERLEY, NORTHERN CAPE PROVINCE, REPUBLIC OF SOUTH AFRICA

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The lives of many people in South African urban spaces are defined by impacts with which the spatial imbalances emanating from the past brought along. The spatial configurations in most urban areas are to date characterized by the fragmented spatial distribution resulting from the past. Such imbalances on spatial allocation led to the socio-economic inequality affecting many people to date. Kimberley, the capital city of the Northern Cape Province, being the focus area of the study, is among others, a city with impacts of socio-economic inequality on spatial justice. The purpose of this study was to investigate the impact of socio-economic inequalities on spatial justice in Kimberley. The

impetus for conducting this study was derived from the continuous growing degree of impacts which the socio-economic inequalities has on spatial justice; and the research gap in respect of this topic in the context of South Africa. Ten socio-economic constructs were identified for the purpose of this research, namely: income gaps, rural/urban residence, educational levels, health and welfare, general safety, public services, security of land tenure, poverty, employment trends and spatial freedom. The study was conducted by means of qualitative research using an approach of conducting interviews and questionnaires. The participating respondents were composed of twenty-five individuals from various areas across Kimberley. All the participating respondents were selected randomly using the purposive sampling strategy. Data logging was further employed as a tool of analysing the obtained data. The results disclosed that unequal distribution of societal benefits exerts greater influence on economic deprivation and minimal access to other benefits. Unemployment is taking a toll on the livelihoods of Kimberley residents. Considering such results, conclusions were drawn and various active legislative tools and frameworks were brought forward to address such challenges. These tools are detailed within the context of this study.

INCLUSION OF LOCAL COMMUNITY FARMERS INTO THE LAST MILE LOGISTICS DISTRIBUTION SYSTEMS OF WILDLIFE TOURISM DESTINATIONS

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When tourists visit a wildlife tourism destination, they create a demand for local crafts and fresh produce in the immediate vicinity of the establishment. Through local procurement this demand creates potential opportunities for local communities and the possibility exists that it could stimulate local economic development where communities live. When a wildlife tourism destination is able to establish a working relationship with community farmers it contributes to sustainability as well as green procurement practices (GPP). GPP is a process of locally procuring fresh produce from community farmers considering the social, economic and environmental impacts of the local community. When local communities are included into the last mile distribution of the fruit and vegetable supply chains (SCs) for tourism establishments, it could have significant potential of financial and social benefits for the local communities. Tourism establishments would in turn benefit from a shorter fruit and vegetable SC as well as a possible reduction in distribution costs. Because of a shorter last mile distribution there will less carbon dioxide (CO 2) emissions into the air from a shorter fruit and vegetable SC. Through the materialization of vegetable gardens fresh produce could be sold to both tourism establishments and local communities. The inclusion of local communities into the SCs of wildlife tourism establishments support the sustainable development goals (SDG11, 12 and 17) of the United Nations (UN) 2030 agenda for Sustainable Development. When wildlife tourism establishments support SDGs, it is a progression towards the main objective of sustainable development, that of a higher quality of life for all people. This study attempts through key informant interviews and community member interviews to match fresh produce demand by three luxury wildlife tourism lodges in southern and east Africa to potentially supporting the local community farmers.

CONTESTED HERITAGE - WHOSE HERITAGE DO WE VALUE THE MOST?

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Heritage is a much-contested concept. In South Africa, due to our politically abusive past, some race groups always had their heritage foregrounded or preference was shown in the depiction of heritage in Museums or Monuments. In this paper I juxtapose the Blood River Heritage Site with that of the Ncome Museum in Dundee South Africa, which commemorates the Battle of Blood River (16th December 1838) between the Boers and AmaZulu. Alongside each side of the Ncome River - the events of that fateful night are commemorated from opposing perspectives. Is it right to have separate memorials, based on one particular 'heritage' or should we find the compromise that details history from both perspectives in a more objective manner? This paper uses semi-structured interviews with both Heritage Managers from each respective Museum as well as online questionnaires from Tourists to each place, to ascertain if heritage is being objectively interpreted. South Africa needs to reconcile its differences from the evils of apartheid, surely the heritage tourism sector needs to be transformed in this respect too?

HIGH-RESOLUTION ANALYSIS OF HEATWAVE TRENDS IN THE MALOTI-DRAKENSBERG REGION: 1979-2021

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Changes in climate extremes have far-reaching consequences on ecological processes and hydrological cycles in mountainous regions, such as the montane regions in South Africa. These areas are biologically unique regions, however understudied in reference to extreme climatic changes and the influences thereof. Therefore, regional assessments in various climates and montane regions are needed for understanding the uncertainties of the changing trends of extreme climate events. The objective of this pilot study is to assess the spatial distribution and temporal trends of warm Extreme Temperature Events (ETEs; e.g., heatwaves) in the Maloti-Drakensberg region. Daily gridded data with a 0.1° grid will be used for analysis, from the freely available Copernicus Climate Change Services (CCCS) data sets for the period 1979-2021. Gridded data sets can be useful in higher altitude areas due to limited climate data availability. Temperature indices describing the characteristics of heatwave events e.g., heatwave number, frequency, and magnitude, developed by the World Meteorological Organisation (WMO), Commission for Climatology (CCI), Expert Team on Sector-Specific Climate Indices (ET-SCI) will be used and calculated using RClimPact v2 software. The non-parametric Mann-Kendall test and Sen's Slope will be used to determine the increasing or decreasing trends and magnitude or rate of change of the selected heatwave indices, respectively. The results obtained from this study will contribute to the awareness, incidence, frequency and magnitude of the identified heatwave events in the Maloti-Drakensberg montane region, and the possible impacts that these events may have on the populated and ecoregions.

MACROPLASTIC POLLUTION IN THE JUKSKEI-HENNOPS-CROCODILE RIVER SYSTEM: WHAT TYPE, HOW MUCH AND WHERE DOES IT COME FROM?

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Plastic has changed the world we live in for better and worse, enabling advances in manufacturing, technology, healthcare and packaging. Concurrently there is no environment on Earth free of plastic pollution, nor is there a definitive answer on the long-term effects of plastic within a living organism. Plastic pollution has become a prevalent problem in South Africa, not only along the coastline but also within terrestrial aquatic ecosystems. The Jukskei, Hennops and Crocodile rivers are some of the most polluted within the Gauteng region and there are numerous NGOs working within this system to remove pollution and restore these rivers. Thus, this study aimed to investigate macroplastic pollution and community perceptions within the Jukskei-Hennops-Crocodile River system. Sampling for macroplastic pollution was undertaken quarterly, between 2021 and 2022, across nine sites. Community perceptions were gathered through an online and face-to-face survey. Results reveal that plastic pollution is the most common kind of pollution respondents encountered along the Jukskei, Hennops and Crocodile rivers and most respondents believe that it is a major issue within this system. Respondents believe that plastic pollution poses a threat to the cultural, religious and environmental importance of these rivers. Macroplastic sampling reveals that the Jukskei and Hennops rivers are the primary sources of plastic pollution flowing into the Crocodile River, transporting a daily average of 2176 items/m2 in the Jukskei and 2856 items/m2 in the Hennops. There is a decrease in the size of plastic pollution as these rivers meander towards the Hartbeespoort dam, items of <5 cm increased from an average of 61% at the Jukskei, Hennops and Crocodile headwaters to 95% at their confluences. This study contributes to the limited knowledge on plastic pollution within South Africa's terrestrial aquatic ecosystems, highlighting that macroplastic pollution is abundant and flows throughout the Jukskei, Hennops and Crocodile Rivers.

ROUND NUMBER 2: PUBLIC-PRIVATE PARTNERSHIP AND SERVICE DELIVERY IN SMALL TOWN, FREE STATE

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Service delivery in municipalities seems to be a challenge in South Africa for the past 25 years. Municipalities are not financially self-sufficient and lack the necessary infrastructure and resources to carry out their duties to the larger public. Although, according to the South African Constitution Act No. 108 of 1996, the duties of municipalities are to "structure and manage its administration and budgeting and planning processes to give priority to the basic needs of the community." Some options to improve municipal service delivery is to enrich revenue collection and debt management, as well as enhance internal capacity. Since municipalities have not been able to develop better systems in this regard, it could be an opportunity for the private sector to contribute to the improvement of these small towns. This is why a small rural town in the Free State has become independent on improved service delivery systems through a private consultancy and advanced communication with the municipality. By making use of purposive sampling to include qualitative semi-structured interviews, accurate information about the system can be obtained. How the system operates, which partners are involved and how can other small towns learn from the experience, are some of the aspects that

will be addressed in the discussion. If contingency plans are not put in place promptly, the downfall of small rural towns is inevitable.

IMPACT-BASED SEVERE WEATHER WARNING SERVICE IN SOUTH AFRICA: HOW IT REALLY WORKS AND HOW DO THE PUBLIC RESPOND TO THESE WARNINGS

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Hydrometeorological annually cause havoc around the globe. According to research studies, these events are expected to increase in frequency as well as intensity. Weather warnings should be issued in a timeous manner and reach the most vulnerable ahead of the hazardous weather so that actions mitigating can be taken. In order for these warnings to be acted upon, they need to be understood by the end user. Towards the end of 2020, the South African Weather Service introduced a new early warning system called an impact-based severe weather warning system. This new early warning systems aims at issuing warnings that are easier to understand and therefore prompting action. This paper presents the forecasting process used in this new warning system as well as uses a case study of Tropical Cyclone Eloise to evaluate the public's response to the warning issued, using a survey.

WHERE TO WITH EVOLVING GAY AND LESBIAN TOURISM PRACTICES?

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Over the past three decades, considerable debate has emerged concerning the various relationships between tourism, place, space and sexuality. It has been argued that popular gay travel destinations usually establish themselves in areas where there are permissive or liberal attitudes towards LGBTQ identified travellers, where infrastructure is provided (bars, businesses, restaurants, hotels, nightlife, entertainment, media, organizations, etc.) cognisant of their needs, where the opportunity to socialize with similarly identified individuals exists and where a sense of community is offered. Much of the current body of research explores the development of gay male tourism in various well-known cities with large LGBTQ resident communities. New spatial locations have however, emerged. This paper argues that the connections between place, space, sexuality and tourism that were over the past few decades seen as important, even central, to queer travel appear to be changing in both form and function. Several potential reasons for this shift are considered such as the general greater acceptance of LGBTQIA+ identified people in place and space and the subsequent demise of dedicated broadly-speaking queer spaces and their lure as potential tourist destinations, all of which is compounded by the very significant impact of new and expanding internet-based modalities. The paper reaches beyond, arguing that changes in age demographies in Western contexts is undermining long-held theorisation about the link between queer identities and space.

GENTRIFICATION IN A SOUTH AFRICAN TOWNSHIP: RETHINKING PARTS OF SOWETO

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Over the past five decades there has been the emergence of vast literature relating to gentrification. Evidence of gentrification has been registered in South African cities such as Cape Town and Johannesburg too. This process has been recorded in historically "formally white" neighbourhoods and city districts. The presence of gentrification has not been considered in what is perceived as peripheral formally "black" townships. This investigation aims to address some aspect of that scholarly oversight. The paper is set against the backdrop of what might be considered the iconic representation of the South African black township – Soweto. This township is a "city" within a city and with many parts. The Vilakazi Precinct in Orlando West is argued to be undergoing gentrification. Despite significant physical and symbolic urban transformation in Soweto there is no geographical academic scholarship concerning the topic of gentrification. The purpose of the investigation is to address this omission in the literature and the uniqueness of gentrification in a historic, and iconic, South African township. The findings suggest gentrification has taken place and it has not been beneficial to the majority residents of Orlando West. The investigation unpacks the nature of those experiences with most relating to various forms of economic and social exclusion – both negative and positive. Finally, this unique case study aims to connect global north and south experience of gentrification research, arguing that much common ground is to be found.

INVESTIGATING THE PATTERNS OF SEMIGRATION TO HERMANUS IN THE WESTERN CAPE FROM 2020 TO 2021

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The Covid-19 pandemic has introduced the most substantial changes to societal life as we know it in the 21st century. Not only has it impacted global health at an unprecedented scale, but it also exposed structural weaknesses in South Africa's job market, thus augmenting the severe inequality in society. Conversely, Covid-19 sparked one of the biggest transformations of the South African economic landscape as geographical flexibility in workspaces towards decentralised locations became the norm. Significant growth and improvements in smart office technology made the ability to work remotely infinite. The ability to choose how, where, and when work is done is slowly reshaping South Africa's urban centres as more people have to the ability to migrate from urban cities to smaller towns or suburbs. This trend has been described as an act of semigration, i.e., the act of moving from one to another location within your home country. The aim of this study is to investigate the patterns of semigration to Hermanus, a popular coastal town in the Western Cape from 2020 to 2021. Data was acquired from Lightstone, a leading property intelligence company, indicating various characteristics of this semigration process, e.g., the volume of semigrants, and the town and province from where the semigrant moved, amongst other data. The data will be analysed by creating frequency tables and performing ANOVA analysis to determine if statistically significant changes have occurred in the

semigration patterns from 2020 to 2021. It is anticipated that results will indicate increased patterns semigration to Hermanus, as people prefer decentralised patterns of urban living in relative proximity to the City of Cape Town metropole.

ASSESSING GOVERNANCE CHANGES IN SMALL-SCALE FISHERIES IN SOUTH AFRICA: ANALYSING POLICY, RHETORIC, PERCEPTIONS OF CHANGE AND LIVELIHOOD RESPONSES

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According to the Food and Agricultural Organisation (FAO, 2020), more than 120 million people depend on fisheries for their livelihoods. In developing countries, approximately 90% participate in small-scale fisheries. The value of the small-scale fisheries sector has often gone unnoticed and has not explicitly been accounted for in developing policies or management approaches that govern the sector (Cohen et al., 2019). In South Africa, small-scale fisheries have been marred by various challenges. Post-1994 policy and governance approaches have been at odds with local community ideologies and priorities. This research set out to document and provide insights from small-scale fisheries by analysing how and what change has occurred in the sector. The aim is to demonstrate and explore governance approaches, how this has guided small-scale fishery community behaviour and responses, and the claims people make to gain and maintain access to fisheries resources. The study draws on secondary data and presents outcomes from case study research undertaken on the West coast of South Africa from February to June 2022. This study argues that fisheries management approaches and rhetoric ranging from scientific to local have seen the former take precedence over community responses and practices. This lies at the core of contestations experienced in this sector. It is therefore argued that governance of the sector should include meaningful and deliberate community involvement in management and decision-making approaches as this cannot be overlooked or subjugated. Instead, it should be harnessed as a mechanism for building and working towards sustainable and more just small-scale fishery systems in South Africa.

CUT-OFF LOWS OVER SOUTH AFRICA: AN IN-DEPTH REVIEW

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Every year, cut-off low (COL) pressure systems produce severe weather conditions and heavy rainfall often leading to flooding, devastation and disruption of socio-economic activities in South Africa. As they occur throughout the year, these weather systems are important rainfall producing systems which are also associated with extreme cold conditions and snowfalls. It is very important to study COLs because of their high impacts which occur regularly in some parts of the country affecting lives and livelihoods. Here, we provide a comprehensive review of the literature on COLs over South Africa, whilst also comparing with Southern Hemisphere counterparts occurring in South America and Australia. We focus on the occurrence, development, propagation, dynamical processes and impacts of COLs over South Africa. We also seek to understand stratospheric-tropospheric exchanges resulting

from tropopause folding during the occurrence of COLs. Sometimes COLs extend to the surface, creating conditions conducive for extreme rainfall and high floods over South Africa. Slow propagation of COLs appears to be largely modulated by a quasi-stationary high-pressure system downstream, acting as a blocking system. We also review two severe COL events that occurred over the south and east coasts, and found that in both cases, interactions of the low-level flow with the escarpment enhanced lifting and deep convection. We also determined from the literature that Numerical Weather Prediction models struggle with placement and amounts of rainfall associated with COLs, both near the coast and on the interior. Our study provides a single most comprehensive treatise that deals with COL characteristics affecting the South African domain.

THE ENVIRONMENTAL IMPACTS OF EXTREME WEATHER AND CLIMATE EVENTS: THE CASE OF A SEVERE HAILSTORM IN GOROMONZI DISTRICT, ZIMBABWE

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Abstract

Climate change is projected to result in more frequent and intense extreme weather and climate events in most parts of the world, due to increased global warming. Aim of this study was to explore the environmental impacts of a severe hailstorm that occurred on 28 November 2021 in rural parts of Goromonzi district of Mashonaland East in Zimbabwe. We assessed the adverse environmental impacts of the hailstorm on socio-economic infrastructure, agricultural production, ecosystems, and community wellbeing. Using a stakeholder's analysis approach and a participatory research process, data were gathered through semi-structured household questionnaire surveys, in-depth key informant interviews, direct field observations, focus group discussions, print media and organisational reports. The study revealed that, indeed, a severe hailstorm poses risks to the population, biophysical environment, and socio-economic activities sensitive to the impacts of hail. Although no human or livestock fatalities were recorded, notable were destruction of buildings, property and infrastructure, crop and wild flora damages, livestock and wildlife injuries and the subsequent flooding whose erosional forces defaced the biophysical environment. We determined that a severe hailstorm inflicts significant losses and costs on communities, property owners, and the biophysical environment. The study concluded that the civil protection unit needs to work closely with communities to initiate mitigation and more resilient measures to endure the adverse impacts of extreme weather and climate events whose occurrences have been exacerbated by climate change.