



Wits Inter-faculty Symposium on Climate, Sustainability, and Inequality 2023

Summary Report

Wits University has an exciting range of research and innovation tackling climate change and inequality. The Pro Vice-Chancellor's Office has put together an annual interfaculty symposium on this topic in order to:

- Share research and innovation work on climate, sustainability, and inequality across the university and identify priority research areas.
- Identify opportunities for collaboration between different faculties, other universities, and external partners.
- Encourage interdisciplinary collaboration across the university.
- Support advocacy on both national and international issues.

The symposium, which took place on August 23rd and 24th, 2023, featured presentations from Wits staff, postdoctoral fellows, and PhD students working on climate, sustainability, and inequality. It brought together 52 attendees at the Wits Club, along with 11 people joining online, showcasing 29 presentations from all five faculties at Wits University. This summary report provides an overview of the symposium, with descriptions of each session and highlights of the presentations.

Day 1 – 23 August

Session 1: Health and well-being in the context of climate change

The first session focused on the impact of climate change on health. Prof. Andrew Thatcher discussed the impact of the COVID-19 pandemic on environmental concerns, highlighting the role of mortality salience. The study found that heightened awareness of mortality during the pandemic was linked to health issues and ecological concerns, including concern about the connection between the destruction of nature and COVID-19. This was followed by Nouran Zenelabden's PhD research on energy choices in rural South African households, revealing that using unclean fuels, or a mix of clean and unclean fuels, led to worse self-reported health outcomes, particularly respiratory infections and tuberculosis (TB). There were also notable gender disparities in outcomes.

Dr Darshnika Lakhoo and Dr Nicholas Brink explored the relationship between climate change and infant and maternal health. The first paper they presented was a systematic review of the effect of ambient temperature on infant health, finding that both high, and sometimes low, temperatures were associated with adverse outcomes, including increased mortality. The second paper was also a systematic review, examining the effects of heat exposure in utero on long-term outcomes, including education and behaviour, cardiovascular problems, respiratory problems, growth, mental health, and longevity. Due to concerns about bias within the data, the authors highlighted the importance of understanding



the causal pathways while remaining proactive in addressing climate change. They also stressed the need for further research in underrepresented regions like Africa and Latin America to better understand these relationships.

Session 2: Economic effects of climate change

The second session started with Dineo Mokgehele's PhD research on the impact of climate and weather on South African tourism, comparing two different data collection methods - web scraping and manual data collection - using TripAdvisor. She highlighted the weather's significant influence on tourism choices and demonstrated that web scraping is an efficient method for large-scale climate-related data collection. Matsietso Agnes Matasane followed by presenting research on climate-related financial risks in South African banks. Her work evaluates reporting frameworks, emphasising both negative impacts (e.g., physical and transition risks) and opportunities (e.g., renewable investments). The study discusses financial regulation, green central banking policies, and challenges in balancing prudential objectives with low-carbon investments.

Dr Ismail Fasanya's research explores the effects of non-economic shocks, like climate disasters, on South Africa's sovereign risk using a growth model. It underscores the need for financial adaptation strategies to mitigate the consequences of rising disaster-related default risk in emerging economies. Dr Fasanya was followed by Ariel Prinsloo whose work assessed climate suitability for tourism on Réunion Island, emphasising the importance of considering various climate indices and suggesting strategies for attracting tourists, particularly during slower winter months.

Session 3: Land, inequality, and climate change

Environmental injustice is a major concern for marginalised communities as they are vulnerable to environmental degradation and lack the resources needed for adaptation and recovery. Tackling this issue, this session started with Tendai Ganduri's discussion of the conflict between mining investments, communal land rights, and indigenous climate change risk management in Nharira Hills, Zimbabwe. The study highlighted the material and intangible impacts of land dispossession of a community for the sake of mining, and the problems associated with the existing legal framework. Thandeka Kathi, an attorney at the Centre for Applied Legal Studies (CALS), described their experiences of supporting communities who are fighting for their right to water, in the context of climate change and land inequality in South Africa. This work underlines historical disparities in clean water access and advocates for an expanded interpretation of the right to water to address these issues and align with the sustainable development goals.

Session 4: Water welfare and conservation

The theme of water continued into the fourth session on water welfare and conservation. As water is an essential resource that is finite, it is important to promote efficient use and conservation. Prof. Jennifer Fitchett's research in Lesotho used stable isotopes to understand its moisture sources, emphasising the influence of sea-originated water-forming clouds over mountains, due to mid-latitude cyclones. The study involved collecting surface water samples and tracing airflow origins from the Indian and Atlantic Oceans, Mozambique, and Botswana. This was followed by Prebantha Moodley's study which underscored the importance of considering water quality and quantity in relation to carbon capture technologies in power generation. The research calls for better integration of water concerns in carbon capture studies and discusses water footprinting, monitoring of water withdrawal and returns,



and the Water Stress Index, highlighting potential trade-offs between emissions reduction and increased water usage. Lastly, Prof. Mike Muller's research evaluated South Africa's Free Basic Water (FBW) programme as a tool for addressing inequality. The study delves into the historical context of FBW, as well as the current policy ambiguity and contested outcomes of the programme. He emphasised the role of infrastructure, metering and reporting, while advocating for a sustained welfare approach to ensure equitable water access and address affordability.

Keynote Address: Prof. Sally Archibald

'The ethical challenges of balancing climate advocacy and science'



Prof. Sally Archibald's keynote address provided a thought-provoking proposition to all researchers on the relationship between science and advocacy. She emphasised that scientific research alone is insufficient to address climate change challenges, underscoring the pivotal role of values in tackling these issues while still maintaining credibility as scientists. Prof. Archibald noted a personal shift from a passive to an active role in climate advocacy, and described several examples of how this has played out within her work.

To limit global warming to 1.5 degrees, various carbon dioxide removal methods, including ecosystem-based approaches and direct air capture technologies, have been proposed. However, there is a limited focus on alternative climate solutions beyond market-based approaches, and the funding landscape for this kind of work has changed. There is huge pressure on scientists to show that ecosystems can act as natural carbon sinks and provide financial and environmental benefits. However, when employing nature-based solutions, there is a need to carefully assess their impacts and trade-offs, as there will be winners and losers. Using three examples, Prof. Archibald illustrated the importance of using high-quality data and applying rigorous methods; how values guide the research and allow for differing interpretations of the outcomes; how local communities are incorporated into research, and how their needs are taken into account; the scale at which these projects are rolled out and their associated risks; and the difficulty of commercialising environmental data and engaging with the private sector.

Prof. Archibald proposed a call to action to all scientists to use their voice and conduct objective scientific research, in order to build sustainable ecosystems for future generations, remain honest and



transparent about trade-offs, keep funders honest about their motivations, and challenge narratives reliant on geoengineering solutions as a way out of the current crisis.

Day 2 - 24 August 2023

Panel on Interdisciplinary Research on Climate Change

This panel, facilitated by Prof. Colleen Vogel, presented a diverse set of perspectives on climate change research and collaboration. The panel consisted of Prof. Lucy Allais (in lieu of Prof. Tracy-Lynn Field), from the Department of Philosophy at Wits University, Monde Ngwane from the City of Johannesburg, Memory Reid from Wits University's Global Change Institute (GCI), the Presidential Climate Commission's (PCC) Simphiwe Ngwenya, Programme Manager for Climate Mitigation (in lieu of Steve Nicholls), and Fredson Guilengue, a Wits PhD Candidate and Senior Manager at the Rosa Luxemburg Foundation. During the discussion, participants emphasised the importance of interdisciplinary collaboration, communicating science for policy makers, and a broader perspective on climate knowledge. They discussed the practical implementation of climate action plans, acknowledging that it is not just knowledge that is important, but also how it is mechanised for implementation. The panel highlighted the interdisciplinary nature of academic work, the need to consider different forms of knowledge and the importance of complementarity among different fields of science. Suggestions included fostering stronger networks, addressing gaps in research, taking proactive steps within the university, and crafting a document to present key ideas to university leadership.

Session 1: Just Transition

This session started with Dr Ekeminiabasi Eyita-Onkon's study which explored transitional justice and the just transition in Sub-Saharan Africa, with a focus on climate change's relevance to human security and energy poverty. The research highlighted the complexities of resource-rich countries, the importance of the just transition to address human welfare and development, and the need for policies centred around climate accountability and transitional justice. Prof. Ian Goldman then outlined an initiative to develop a monitoring and evaluation (M&E) process for the Just Energy Transition Investment Plan (JET IP). The initiative seeks to enhance transparency and accountability, improve decision-making, and promote transformational principles in South Africa's energy transition.

Lastly, Prof. Jonathan Klaaren presented the concept of Sustainable Public Procurement (SPP) in South Africa, emphasising its alignment with sustainable development goals and potential impact across sectors. While there are no explicit legal requirements for environmental sustainability in public procurement, the research highlights that there are also no legal barriers and therefore proposes the inclusion of SPP in the Public Procurement Bill, stressing the importance of legal integration and sector-specific strategies.

Session 2: Innovative methods, models, and approaches

This session presented a diverse array of approaches to studying climate change and its impacts. Prof. Francois Engelbrecht's research at the GCI focuses on climate modelling, particularly climate change attribution and regional tipping points. He highlighted key recent events globally, including wildfires and heat waves, and concerns about unprecedented events in South Africa worsened by climate change, such as the Durban floods. There is a new African-based climate attribution modelling system at the GCI which aims to address a number of key research gaps, including what the regional climate change



tipping points in Africa are, and quantifying the role that climate change has played in an extreme event once it has happened.

PhD student Ogone Motlogeloa then presented work on how extreme climate events affect medical health insurance claims for acute respiratory diseases in South Africa, particularly among vulnerable groups. The study analysed the South African flu season, using the Distributed Lag Non-Linear Model (DLNM), showing that as temperature increases, relative risk of respiratory illness decreases, and when temperature decreases and rainfall increases, relative risk increases.

As an Honorary Research Fellow at the GCI, Hannelie Warrington-Coetzee's work focuses on collaborative eco-art interventions to address past societal inequalities and promote a climate culture through Nature-Based Solutions (NBS). She presented work on several eco-art initiatives such as public urinals which allow for urea processing, climate culture projects, urban design which incorporates ecological benefits, and medicinal plant conservation. This work illustrates eco-art's role in connecting people with nature, fostering co-learning, regeneration, and engagement, and addressing climate change and past injustices.

Session 3: Innovations in energy and the circular economy

Energy transition is on everybody's mind with our current energy crisis and the need to reduce carbon emissions. This session discussed innovations in energy generation and opportunities to use coal waste to develop other high-value products. PhD student, Landu, presented his research project which addresses South Africa's opportunities for waste to energy technologies. A Life Cycle Assessment (LCA) approach was employed to assess cost-effectiveness and sustainability of waste to energy technologies, emphasising a comprehensive evaluation framework covering social, environmental, and economic dimensions. The research underscores the significance of informed decision-making and sustainability promotion in South Africa's waste and energy sectors, considering broader societal and environmental factors and raises the question about why waste to energy projects are so few. Dr Shehzaad Kauchali's study addressed the possibility for a 'nitrogen economy' to replace the current 'carbon economy'. Dr Kauchali considers ammonia as an alternative, as the next best energy carrier after fossil fuels, which presents benefits over hydrogen.

This was followed by Orevaoghene Eterigho-Ikelegbe, whose research explores opportunities for innovative coal waste repurposing for job creation and supporting the energy transition. He highlighted global examples of coal industries shifting into other high-value products, including carbon fibre, rare earth elements, and building materials. The study underscores the need for ongoing research and development in these technologies for a just transition.

Prof. Alexander Quandt's presentation traced the history of the development of solar photovoltaic cells, how they work and some of their efficiency challenges. He then continued by presenting some of the latest developments in this technology, including 'stained glass', thermophotovoltaics, hot carrier injections and nighttime photovoltaics, several of which are already being studied at Wits.

Session 4: People's and Workers' Climate Justice Charter - Futures for South Africa

Activist and researcher, Awande Buthelezi, briefly presented a new book titled 'People's and Workers' Climate Justice Charter: Futures for South Africa'. This book is a compilation of essays focusing on



transformative alternatives on the deep just transition, written by representatives from a range of constituencies – communities, workers, academics and activists. Copies of the book were provided to every participant at the symposium.

Conclusion

The final session of the interfaculty symposium was facilitated by Prof. Imraan Valodia. He acknowledged the vast scope and quality of the work already being done, and presented several ways in which the Pro-VC's office is working on promoting and supporting this work:

- Series of high-level lectures
- Interdisciplinary collaborations such as symposia and roundtables, including on renewables and health
- Convening partnerships with other universities, such as Edinburgh University, to collaborate on specific climate change issues
- Establishment of five postdoctoral fellowships
- Development of a transdisciplinary doctoral program
- Support for key institutions in this area, such as the GCI and the Wits Mining Institute
- Upcoming funding opportunities for research groups to develop climate change research agendas
- Engagement with policy-making bodies such as the PCC and the City of Johannesburg to support renewables and other climate-related projects
- Engaging with a number of funders, including the PCC and the African Climate Fund
- Ambitious ideas for the future, including a Green Tech Innovation Hub, Minerals and Decarbonisation Centre, African Synthesis Centre, and a Just Energy Transition Research Centre
- Identification of new professorships

During the discussion, participants raised questions and comments about associating with industry, the academic role of the office, the need for a knowledge repository, and funding challenges and opportunities in the climate research space.

Prof. Valodia expressed his commitment to continuing the symposium as part of the university's long-term programme and encouraged participants to provide feedback for future improvements.



Symposium Programme

Day 1 - 23 August 2023

Time	Activity	Facilitator
9:00 – 9:20	Opening – Deputy Vice-Chancellor Prof. Lynn Morris	Imraan Valodia
9:20 – 11:00	Session 1: Health and well-being in the context of climate change - Dust Deposition Impacts at a Liquidated Gold Mine Village – <i>Raeesa Moolla*</i> - The impact of the COVID-19 pandemic on environmental issues, attitudes and risk perception – <i>Andrew Thatcher</i> - Pathways to clean fuel transition and improving energy use efficiency: evidence from South Africa - <i>Nouran Zenelabden</i> - The effect of high and low ambient temperature on infant health: a systematic review - <i>Darshnika Lakhoo</i> - Systematic Review of Long-Term Impacts of Heat Exposure In-Utero - <i>Nicholas Brink</i> Q&A (25 mins)	Maria Papathanasopoulos
11:00 – 11:20	Tea Break	
11:20 – 12:45	Session 2: Economic effects of climate change - Web Scraping vs Manual Data Collection: A Comparative Analysis of Climate-related Tourism Reviews in South Africa - <i>Dineo Mokgehle</i> - Climate-related financial risks and their implications for financial stability: a new challenge for South African regulators - <i>Matsietso Agnes Matasane</i> - Non-Economic Shocks, Climate Change and Sovereign Risk in South Africa - <i>Ismail Fasanya</i> - Tourism in Réunion Island: Quantifying Climate Suitability using the Holiday Climate Index (HCI) - <i>Ariel Prinsloo</i> Q&A (25 mins)	Volker Schoer
12:45 – 13:45	Lunch	
13:45 – 14:45	Session 3: Land, inequality and climate change	Nicole De Wet-Billings



	- The Conflict between Mining Investments, Communal Land Rights and Indigenous climate change risk management strategies: A Case Study of Nharira Hills, Zimbabwe - <i>Tendai Ganduri</i> - Land Inequality and the Right to Water in South Africa: Constitutional Norms prompt a need for expansion of the right to water to counteract consequences of climate change – <i>Thandeka Kathi</i> - Exploring the Entrepreneurial Journey of the South African Land Reform Beneficiaries – A research Agenda - <i>Mainford Toga* (online)</i> Q&A (15 mins)	
14:45 – 15:00	Break	
15:00 – 16:00	Session 4: Water welfare and conservation - Spatial Variability in Stable Isotopes from Lesotho Surface Waters: Insights into Regional Moisture Transport - <i>Jennifer Fitchett</i> - Understanding the water impact of carbon capture technologies in the power generation industry - <i>Prebantha Moodley</i> - Water and Welfare: Free basic water revisited - <i>Mike Muller</i> Q&A (15 mins)	Martin Ntwaeaborwa
16:00 – 16:30	Break	
16:30 – 18:00	Keynote Address by Prof Sally Archibald - “The ethical challenges of balancing climate advocacy and science”	Imraan Valodia

Day 2 - 24 August 2023

Time	Activity	Facilitator
8:45 – 10:15	Panel on Interdisciplinary Research on Climate Change - Tracy-Lynn Field* (Wits University); Monde Ngwane (City of Johannesburg); Memory Reid (GCI, Wits University); Fredson Guilengue (Wits PhD Student) and Steve Nicholls* (Presidential Climate Commission)	Coleen Vogel
10:15 – 11:15	Session 1: Just Transition	Brett Bowman



	-Transitional energy justice as sustainable resource management: a conceptual exploration - <i>Ekeminiabasi Eyita-Okon</i> - Addressing a just transition through evaluations - <i>Ian Goldman (online)</i> - Sustainable public procurement - <i>Jonathan Klaaren</i> Q&A (15 mins)	
11:15 – 11:30	Tea Break	
11:30 – 12:30	Session 2: Innovative methods, models and approaches - An African-based climate change event-attribution system using a regional climate model - <i>Francois Engelbrecht</i> - The Influence of Weather on Medical Health Insurance Claims for Acute Respiratory Diseases in South Africa: A DLNM Model Analysis - <i>Ogone Motlogelo</i> - Art as resource for sustainable transition – enhancing the reach between science, art, policy, and practice - <i>Hannelie Warrington-Coetzee</i> Q&A (15 mins)	Imraan Valodia
12:30 – 13:30	Lunch	
13:30 – 15:15	Session 3: Innovations in energy and the circular economy - Life Cycle Assessment of Solid Waste to Energy – <i>Landu</i> - It's Rocket Science! Exploring the Viability of Pure Hydrogen as a Commodity: A Case for the Nitrogen Economy in the Decarbonisation of the Energy Sector in South Africa - <i>Shehzaad Kauchali</i> - Innovative options for coal/coal based waste in the circular economy - <i>Orevaoghene Eterigho-Ikelegbe</i> - Emission Reduction Strategy for Internal Combustion Engines - <i>Januario Hossi*</i> - Photovoltaics – History, principles and new trends - <i>Alexander Quandt</i> Q&A (30 mins)	Francois Engelbrecht
15:15 – 15:30	Session 4: People's And Workers' Climate Justice Charter Futures For South Africa - <i>Awande Buthelezi</i>	
15:30 – 16:30	Closing discussion – Imraan Valodia	

**These colleagues were unexpectedly unable to join and therefore their presentations have not been included in this report.*