



Poverty, Inequality and Global
Climate Change:

CONNECTING THE DISCUSSIONS

18 & 19 September 2018



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& technology

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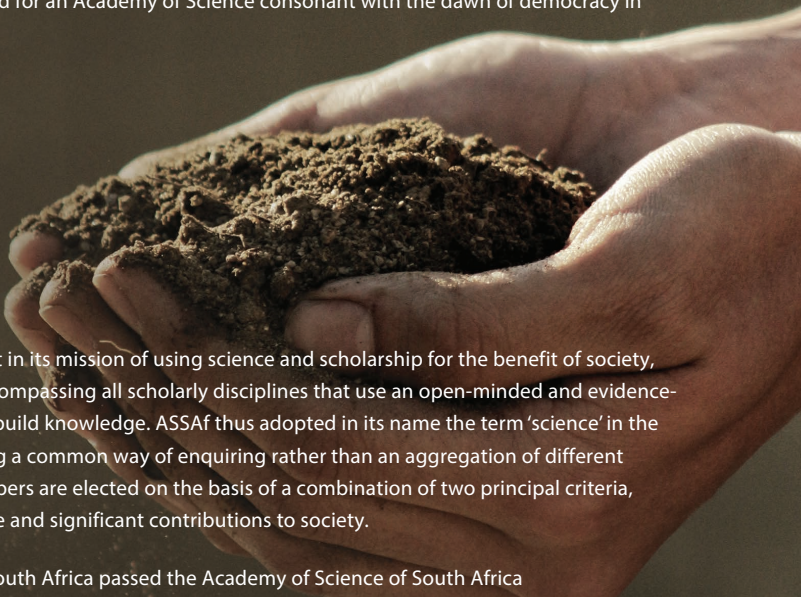
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The Academy of Science of South Africa (ASSAf) was inaugurated in May 1996. It was formed in response to the need for an Academy of Science consonant with the dawn of democracy in



South Africa: activist in its mission of using science and scholarship for the benefit of society, with a mandate encompassing all scholarly disciplines that use an open-minded and evidence-based approach to build knowledge. ASSAf thus adopted in its name the term 'science' in the singular as reflecting a common way of enquiring rather than an aggregation of different disciplines. Its Members are elected on the basis of a combination of two principal criteria, academic excellence and significant contributions to society.

The Parliament of South Africa passed the Academy of Science of South Africa Act (*No 67 of 2001*), which came into force on 15 May 2002. This made ASSAf the only academy of science in South Africa officially recognised by government and representing the country in the international community of science academies and elsewhere.

This report reflects the proceedings of the Poverty, Inequality and Global Climate Change: Connecting the Discussions workshop held from 18 to 19 September 2018 at the Protea Hotel OR Tambo, Gauteng, South Africa, unless otherwise stated.

Views expressed are those of the individuals and not necessarily those of the Academy nor a consensus view of the Academy based on an in-depth evidence-based study.





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A group of African children are gathered in a doorway of a building with red brick walls. One child is holding a baby. The scene is brightly lit from the doorway, creating a strong contrast with the interior. The children are looking towards the camera with various expressions. A white circular graphic element is overlaid on the bottom left of the image, containing text.

OVERVIEW OF THE CONFERENCE¹

The conference was a response to an urgent need to bring together communities of scientists who are exploring matters of poverty, inequality and climate change.

While there are individual cross overs, this is still happening to a limited and in an *ad hoc* manner with a continued lack of an integrated framework to address global concerns reflected in the United Nations (UN) Sustainable Development Goals (SDGs). In particular, there is a need to bring together biophysical and social scientists in a combined effort to jointly address concerns of poverty, inequality and climate change. The conference was a contribution to doing this within the South African context, and was intended as an initiating step towards a process of cross over between traditions and disciplines of research.

DAY ONE

Insights from International Contributors

The conference began with critical perspectives from international participants which emphasised, for example:

- The value of bringing economists into the deliberation.
- The huge differences in capacity between countries in responding to vulnerability and crises but also the differential impacts of shocks on rich and poor households.
- The continuing difficulties in engagement between environmental and social scientists.
- The need to extend the dominant rationalities of sustainability research (for example, the focus on quantitative measurement) to include a sensitive engagement with the multiple dimensions of social life.
- The value of a concept of environmental justice that incorporates, but extends beyond material inequity to include concerns with 'recognition' and 'respect'.
- The importance of bringing the humanities into discussions on climate change to address questions of meaning, for example.

The discussion on the presentations focused around 1) the need to pay more attention to what is happening at sub-city units, such as neighbourhoods, with particular focus on people's lived experiences; and 2) the debates around the relationship between economic growth and environmental impact.

The State of Research in South Africa

The second session of the conference dealt with the state of research in South Africa across the fields of 'poverty', 'inequality' and 'climate science'. The overwhelming impression across these fields is that there is depth and quality to the research, but that the policy and practical impact of the work is lacking.

¹ Overview is not part of the conference proceedings.





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In relation to poverty, there is a broadening away from the earlier one-dimensional focus on measurement. Through working with individuals from various disciplines, poverty researchers are expanding their insights and methodologies. However, measurement remains important, with recent data revealing, for example, a worrying reversal of post-apartheid gains in dealing with poverty.

In relation to inequality, the presentation notes the broadening of poverty research into inequality studies, and the influence of Thomas Piketty in shifting inequality studies from a focus only on income to a consideration of wealth and assets. At the same time there has been a broadening of methodology with a range of disciplines contributing to inequality studies.

The presentation proposed a research agenda that would bring together environmental scientists and economists in addressing the environmental dimensions of equality-enhancing growth, and in so doing explore the use of instruments such as the tax system, state expenditure, grants, and minimum wages.

The presentation on climate change research emphasised, again, previous challenges in working across the biophysical/social science divide but the necessity of doing so. The presentation emphasised the considerable strengths of South African research, including globally recognised work on earth system science (ESS), energy systems modelling, the technical dimensions of vulnerability and water-demand modelling. The gaps in research require interdisciplinary work and include the need to: bring modelling down to lower level spatial units; provide more guidance on local mitigation and building capacities for adaptation; the political, institutional and economic questions around implementing climate science; and co-produced solutions that would allow climate action to impact also on reducing poverty and inequality.

The discussion on the state of research focused largely on: how to incentivise the co-production of knowledge in the academic system; the apparent lack of urgency in the debates; and, the need to bring science more effectively into the realm of implementation.

Roundtables on Cross Overs

Day One of the conference included two roundtables on cross overs between research on poverty, inequality and climate changes. Among the points raised during the roundtables were:

- An acknowledgement that climate change impacts were already being felt and assessed but that adaptation measures were hardly being implemented, and attention to poverty and inequality in these measures was minimal.
- The recognition however that outside of formal systems, local adaptations are taking place

(for example, the shift to keeping goats in increasingly hot and arid areas) and that there is a need for scientists to incorporate local and indigenous knowledge (and also for local government planning and data collection to engage with this).

- A concern, however, that the middle classes are not changing lifestyles in response to climate change.
- The need to bring climate change science more effectively into adaptation policies and planning, and to give more attention to governance and management issues.
- A concern that academics are not engaging sufficiently with policymaking processes.
- The need to strengthen the interface between climate change and policy design/implementation using opportunities provided, for example by South Africa's National Climate Change Monitoring and Evaluation (M&E) systems and the National Climate Mitigation Policy.
- The specific need to bring indicators of poverty and inequality into integrated assessment models of climate change impact.
- The need to bring communities (including the urban/rural poor who are most vulnerable to climate change) into impact assessment processes.
- A concern with possible trade-offs with poverty and inequality with some measures to address climate change (e.g. jobs losses in coal, effects of carbon tax on the poor) and the need for urgent research on this.
- The need to counter the view that climate change science is only biophysical in nature and to acknowledge instances (e.g. the Future Resilience for African Cities and Lands (FRACTAL) project) where natural and social scientists are collaborating (what will it take to replicate this?).
- The continued resistance from the humanities and social sciences to hybridise with natural science, but a concern also with 'conservatism' among natural scientists.
- The need to address the pressures to publish that force researchers into single disciplinary moulds.
- The need to develop common languages/concepts/frameworks for research and reporting on climate change across the disciplinary boundaries.
- The need for hybrid research designs that draw on the approaches of the natural and social sciences (for example, combining the methods of natural science with methods of anthropology to explore local knowledge and adaptation).

Gala Dinner Address

Mr Trevor Manuel provided an engaging but sobering address emphasising a pattern of progress and regression in policy responses to the realities expressed through research and science. Currently, research is gaining little traction in policymaking and the battle is for political will to take research and fashion it into responsive policy. A possible platform for future action has



been provided by the Global Commission on the Economy and Climate which has focused its proposals around clean energy systems, smarter urban development, wise water management and circular economies. Partnerships are necessary to achieve this agenda.

DAY TWO

Day Two began with a reflection on the discussions of the previous day focusing on:

- 'Sobering reminders' (e.g. lost opportunities for policy traction, the anger in communities, the reversal in gains made in policy reduction).
- 'The state of science' with positive stories across the sciences, but a real problem in gaining traction in policy, and in packaging for implementation support.
- 'Underlying tensions' in understanding the relationship between growth and sustainability, and methods and scales of research and policy engagement, etc.
- 'The state of relationships between communities in science' with resistance to engagements from both sides of the divide and continued obstacles to engagement including conceptual framings, methods and practical pressures mitigating against inter-disciplinary research.
- 'Pointers to cross overs' with the possibilities for common data sources, joint conceptual framings, hybrid methods, incentives for cooperation, joint work in accessing local knowledge systems and mobilising inter-disciplinary support to engage with state policymaking and implementation.

Panel on Dealing with Trade-offs and Synergies

The panel discussion was wide-ranging dealing with matters such as:

- The ways in which people are adapting to climate change (with case-studies from Limpopo and KwaZulu-Natal) and the need to research these local coping mechanisms.
- The lack of information on the economics of climate change (although with an appreciation that the costs of inaction exceed the costs of action).
- The value of a socio-ecological systems approach which is able to integrate considerations of human society and biophysical environments.

- A debate over the effect of growing wealth on climate emissions (the Kuznets Curve or not) and how to avoid high-emission development pathways (a compact around 'living well' rather than 'having more').
- Discussion on what it would require to develop a 'radically interdisciplinary theoretical framework'.
- Discussion on what would be required to achieve meaningful co-production of knowledge (with an example provided from Durban on how weather science and local observations are combined with the assistance of simple technologies to provide flood warning systems).
- The role of universities as intermediaries between government and communities (but the need for sustainability once action-related research processes are concluded).
- The need for both social capital and strong local governmental institutions.
- The need to bring health science perspectives into the discussion.
- Discussion on the complex relationships – the synergies and the trade-offs in actions to address poverty, inequality and climate change – with an understanding the trade-offs are unavoidable (e.g. effect of carbon tax on the poor, job losses in coal sector) but that policy may mitigate these.

Brainstorming on the Way Forward

The conference ended with brainstorming on the way forward with suggestions including:

- Engaging with the National Research Foundation (NRF) in incentivising collaborative research across disciplines and with communities, and also the Department of Higher Education and Training (DHET) in the way it recognises research outputs.
- The use of the Academy of Science of South Africa (ASSAf) reporting to Department of Science and Technology (DST) to further the agenda.
- The packaging of science for popular understanding.
- The use of platforms such as the National Planning Commission's Just Society Dialogues.
- The possibility of a more structured ASSAf-led process to develop common conceptual frameworks.
- Synthesising what is already known about inter-disciplinary cross overs within an ASSAf report.
- The need for inter-disciplinary work with city governments in knowledge production, planning, monitoring implementation.
- The need to form alliances and frame issues in relation to currently resonant topics (e.g. land reform).
- An ASSAf-led approach to 'force open' the policy space (e.g. strategic use of opinion pieces).
- Engagement with the financial sector around instruments and resources.

A young girl with dark skin and braided hair, wearing a green and white striped dress, is captured in a joyful dance pose with her arms raised. She is standing on a light-colored, textured floor. In the background, a group of people, including children and adults, are seated at long wooden tables, watching her. The setting appears to be an indoor event space with a simple, rustic feel.

DAY 1:
18 SEPTEMBER 2018

OPENING CEREMONY

Welcome – Prof Roseanne Diab (Academy of Science of South Africa (ASSAf))

Prof Diab welcomed delegates to the workshop and provided a brief introduction to ASSAf, a membership-based organisation, currently comprising 541 members, which provides science advice to government.

Profs Julian May and Philip Harrison, both members of ASSAf's Standing Committee on Science for the Reduction of Poverty and Inequality, were acknowledged for initiating the workshop.

Purpose and Introduction – Prof Philip Harrison (University of the Witwatersrand (Wits))

Prof Harrison welcomed delegates and observed that it was significant that the workshop was taking place in the context of an early spring heat wave, with the highest temperature ever recorded in Johannesburg during September predicted to occur the following day.

The workshop was an opportunity to engage with a community of researchers grappling to respond to the SDGs and the National Development Plan (NDP) which aimed to address the challenges of poverty and inequality.

Several South African scientists were contributing actively to climate change research and policy development. Organisations involved included the DST, Department of Environmental Affairs (DEA), NRF, Council for Scientific and Industrial Research (CSIR), and the South African National Biodiversity Institute (SANBI). At least five universities were leaders in the field. There was therefore a great deal of work that could be built upon.

The UN leadership argued that science, technology and innovation had to be mobilised to support the sustainable development agenda. South African scientists were already involved and committed, so the focus of the workshop was to enhance their influence and effectiveness by connecting members of different research communities.

The idea for the workshop had originated eight months previously when the ASSAf Standing Committee on Science for the Reduction of Poverty and Inequality heard a presentation on a new government policy dealing with climate change. Even though the scope of global change science had broadened to include issues of human vulnerability and the need to adapt, the document had made almost no reference to the challenges of poverty and inequality.

Social scientists focusing on poverty and inequality have also gradually been acknowledging climate change issues and impacts. In fact, climate change may become the great disrupter,





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reversing some of the progress made with poverty reduction, and exacerbating inequality.

There was a lack of a systematic, on-going programmes to bring physical and social scientists together to discuss the challenges of global climate change. There was also no scientific framework that allowed the three issues of poverty, inequality and global climate change to be addressed in an integrated manner.

ASSAf hoped to act as a catalyst to enable the development of a more unified analytical framework, although there was uncertainty as to what this meant. It might be enough at this first workshop to bring scientists from different traditions together so that they could become familiar with the languages, epistemologies and methodologies of different fields.

It was rare for scientists from different traditions to engage in this way. It was hoped that this would be an opportunity to combine strengths, in an integrated way, to support policy and planning processes that relate to climate change, poverty and inequality issues.

It was important for the workshop to include an international perspective and take account of global initiatives, such as the Intergovernmental Panel on Climate Change (IPCC) reports that had started engaging with issues of poverty and inequality, and the UN's World Economic and Social Survey of 2016 titled *Climate Change Resilience: An Opportunity for Reducing Inequality*. This report stated that inequality should be at the forefront of climate change assessments and called for a unifying analytical framework to address the climate change-inequality nexus.

Prof Harrison acknowledged Prof Diab for her leadership, Prof May for his role as Chairperson of the Standing Committee on Science for the Reduction of Poverty and Inequality, and Ms Nadia Algera and her team for organising the workshop.

Keynote Address: A Tale of Two Disasters – Poverty, Inequality and Climate Change – Dr Célestin Monga (African Development Bank)

To illustrate the theme of the workshop, Dr Monga contrasted the economic impact of two environmental disasters that had taken place in September 2018, namely Hurricane Florence in the United States (US) and floods in Kogi State in Nigeria.

Because of significant differences in levels of preparedness, available resources and income, high-income countries were far better able to handle the consequences of natural disasters than low to middle-income countries.

Images shared of the damage caused by Hurricane Florence represented the destruction of symbols of wealth, while the Nigerian floods represented fundamental threats to human survival.

In terms of Hurricane Florence, the response of the US government illustrated levels of preparedness:

- More than 300 federal employees had worked with state and local officials.
- 560 Department of Health and Human Services personnel had been mobilised ahead of Florence to support health and medical needs if requested.
- The US Army Corps of Engineers had deployed Temporary Emergency Power Teams.
- Federal resources had been pre-positioned in the region, including 100 helicopters, more than six million meals, four million litres water, and 730 000 blankets.
- Federal funding in billions of dollars had been made available.

Preparation and reaction were such that victims could expect to be taken care of.

In contrast, the floods in Nigeria had resulted in the inundation of 800 hectares of farmland and 450 communities in nine local government areas. Dozens of people had died within a few hours. Properties worth billions of Naira had been lost in the flood, which had resulted in a humanitarian crisis.

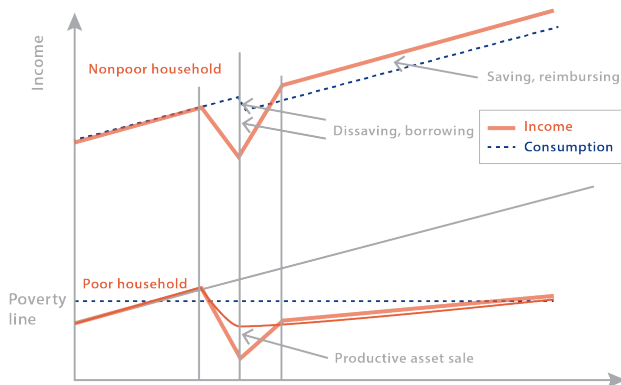


Figure 1: Contrasting micro-economic impacts.

Dr Monga presented a diagram (Fig. 1) that indicated how developed countries were better able to mitigate climate-related shocks. It showed that incomes very quickly returned to normal after a shock because higher-income households were supported by a well-prepared government that

could contribute the necessary resources. People also used their personal wealth (savings, loans or insurance) and returned more or less to business as usual after the event, although levels of consumption might be slightly reduced.

On the other hand, both governments and communities in less-developed countries lacked the means and capacity to respond effectively to these shocks. Individuals lacked personal wealth, such as savings, insurance and access to credit, and often had to sell their remaining productive assets to compensate for the shock. Income after the event did not recover to previous levels.

This analysis also applied at a household level, with higher-income households enjoying the same relative benefits as high-income countries, and households in poor rural areas resembling the Nigerian situation.

Dr Monga commented that:

- Richer nations were better able to protect the environment than poorer ones, as illustrated by the declining percentage of forested areas in Africa compared to the increase in forested area in the European Union (EU).
- The negative reaction to economic growth from some quarters could be counter-productive as there were ways to enable sustainable economic growth. The Chinese government's aggressive environmental protection plans were mentioned.
- Industrialisation was destructive to the environment, but once a certain level of income was reached, this decline reversed. It was hoped that Africa would not have to repeat the mistakes made by the developed world.
- Having worked in the Sahelian region, Dr Monga had observed the close relationship between poverty, unemployment and climate change. Many unskilled and unemployed young people were forced to move from rural areas to cities because of environmental degradation. Without access to jobs, some became migrants and others joined rebel or terrorist groups.

Some lessons

At the micro level:

- In the case of poor people or low-income countries, uninsured

economic risks tended to create poverty traps, which in turn severely limited income generation and development prospects.

- While it might be possible generally to mitigate these risks, risk mitigation itself had a cost and could reduce income in the long run.
- Both these factors were reasons why climate change fuelled insecurity and tended to increase poverty and inequality.

At the macro level:

- Climate change shocks could result in more permanent effects in low-income countries, which initially depleted their international reserves and then had to contract fiscal spending, which in turn resulted in a drop in gross domestic product (GDP).
- Unlike high-income countries, they had limited access to international capital markets.
- The issues were complex and interlinked; tackling them required joint research teams that could work beyond disciplinary boundaries.

INTERNATIONAL PERSPECTIVES

Sustainable and Social: Asserting Public Governance in the Sustainable City – Prof Simon Joss (International Eco-Cities Initiative, United Kingdom (UK))

(Presentation via Skype from Glasgow)

Prof Joss stated that not all is well with the relationship between sustainability and the social, arguing that it was necessary to pay greater attention to the often neglected 'social gap' when considering issues of sustainable urban development.

It was important to move beyond the technical management of sustainable development and towards a normative rights-based agenda and an understanding of governance as active, normative public engagement processes.

Three tendencies were identified, which often acted together to produce a reductionist articulation of 'the social':

- 'The social' was often poorly articulated when compared with the environmental and economic aspects of sustainable development.
- The dominant governance rationality was the 'measurable city'; this quantitative focus impeded a pluralistic, context-rich, sensitive engagement with 'the social'.
- The sustainable development discourse was often perceived as a global elitist discourse, which tended to disenfranchise local communities.

Four dominant paradigms of sustainable urban development

- 1 The low-carbon city:
 - Focused strongly on urban 'hardware', namely energy, transport and waste.
 - Emphasised technological solutions.

- The social dimension was often the missing connection as a narrow focus on carbon-neutral development resulted in missed opportunities.
- 2 The smart city:
 - This was the dominant contemporary paradigm of urban development.
 - It relied on systems-based thinking about the city, enabled and enhanced by information and communications technology (ICT).
 - There was a lack of attention to the social issues of citizenship. People tended to be entrepreneurially co-opted as users and producers of services. The kind of citizenship being promoted should be discussed, as being successful in a smart city required certain levels of education and wealth, and could exclude certain sectors.
 - 3 The resilient city:
 - Focused on protecting the city against external threats and shocks, such as storms and flooding. and
 - Viewed the city as a quasi-ecological system. and
 - The social dimension was characterised by:
 - A community that was expected to be socio-economically self-reliant.
 - A tendency to treat contentious social issues as external threats. and
 - The city turning in on itself and losing wider global solidarity.
 - 4 The sustainable city:
 - This was conceived of under the UN Sustainable Development Agenda, which has evolved since 1987, including the approval of the SDGs, and the New Urban Agenda (Habitat III).
 - The social was most comprehensively articulated, including dimensions such as gender, health, poverty and security.
 - The need to localise the agenda was recognised.
 - There was an increasingly heavy reliance on technical

indicators, standards, benchmarks and accompanying governmentality to achieve the goal of sustainable development.

Reclaiming the social through active public governance

- More space and weight needed to be given to the social.
- The relationship between social, environmental and economic dimensions needed to be more explicitly articulated.
- It was necessary to move beyond technocratic governance, and rediscover the value of strong participatory and integrated planning.
- The global discourse needed to become more locally accountable.

In closing, Prof Joss drew attention to the publication in May 2018 of three short articles in *Imagining Urban Futures*, which informed this presentation:

- I. Federico Caprotti: <https://www.nature.com/articles/s41599-018-0089-5>.
- II. Rob Cowley: <https://www.nature.com/articles/s41599-018-0103-y>.
- III. Simon Joss: <https://www.nature.com/articles/s41599-018-0087-7>.

Prof David Schlosberg (Sydney Environment Institute & University of Sydney, Australia)

(Pre-recorded presentation)


Prof Schlosberg introduced the three parts of his presentation, namely:

- 1 Broadening the concept of environmental and climate justice.
- 2 The relevance of justice claims to emissions and mitigation, as well as to impact, adaptation and resilience.
- 3 The Sydney Environment Institute and opportunities to connect science, social science, the arts, humanities, and the public.

Conceptions of environmental and climate justice

There was a plurality of meanings of environmental and climate justice, beyond poverty and inequality. It was important to understand the reasons for inequity, including issues of recognition, participation, procedural justice, and human capabilities.

- Equity: The earliest academic reflections on environmental justice focused on inequity in the distribution of environmental 'goods, bads and protection'. These concerns were first articulated in the US in the 1980s and motivated the environmental justice movement.
- Recognition: From the outset, activists and scholars were concerned about why certain communities were devalued in this way. Issues of environmental justice and environmental racism have been interchangeable, reflecting a lack of respect for and recognition of certain individuals and communities. Recognition is a basic human need, without which people feel less than human. People have often been disrespected with the intention of harming them.



Some theorists, dissatisfied with an individualist psychological approach, considered a lack of recognition to be based in cultural, social or political institutions. Nancy Fraser, for example, recognised three status-based definitions and processes of misrecognition, namely a general practice of cultural domination; a pattern of non-recognition (rendering people invisible); and outright disrespect (being routinely maligned or disparaged in stereotypical representations).

In practice, people and communities experience both personal and institutional forms of discrimination and disrespect, and both were the focus of recognitional justice. Individually, activists have been represented as being ignorant or hysterical, and dismissed as being incapable of understanding science, the policy process or economic development. This disrespect of people's ability to understand is an area where connections between science and social science communities are relevant.

The same kinds of disrespect may be seen at community and even country levels. Groups are disrespected or derided in order to justify or ignore inequality. Thus, demands for cultural or collective recognition permeate the environmental and climate justice movements; for example, indigenous community responses to the desecration of sacred sites, and climate change undermining the environmental bases of cultural traditions and identity.

- **Participation:** Environmental justice has always been concerned with the political exclusion that comes both with inequity and disrespect, and with the need for participatory and procedural justice. There is a link between a lack of recognition and a lack of valid participation in the political process. Misrecognition due to racism and classism creates structural obstacles to participation. Environmental justice includes demands for individual and community voice and self-empowerment and calls for political participation in decisions affecting communities. This active community participation engages and recognises community knowledge and enables participation of as much diversity as exists in the community.
- **A set of capabilities:** A capabilities approach to justice is not simply about 'having stuff'; it is about enabling people to design and construct the kinds of lives they would like for

themselves. Justice comes with at least a basic threshold of things like food, health, and economic and political rights. Injustice denies these.

Environmental justice advocates have long focused on community health, good jobs, and the basic capabilities necessary for people to live flourishing lives. This is where environmental justice and just sustainability come together. More recently, this is where the connection is evident between environmental and climate justice concerns on the one hand, and the SDGs on the other.

In summary, focusing on inequity alone is inadequate for thinking about justice in the context of climate change. A broader approach to the topic than just a measure of poverty is needed.

Justice and climate change

Environmental justice is addressed in relation to mitigations and emissions on the one hand, and adaptation and resilience on the other. Opportunities exist to connect discussions across disciplines when constructing just adaptation policies.

The idea and reality of inequality has long been applied to global emissions mitigation efforts. There are climate justice arguments about the historical responsibility for emissions, putting more responsibility on richer nations that have emitted for longer. Inequity also demands a development rights focus, in which responsibility for mitigation would not be initiated until a basic development threshold had been met.

Climate justice also focuses on the inequitable impacts of climate change, recognising that it will make the least well-off most vulnerable. The poor are already disproportionately burdened by the effects of climate change. Inequity includes all kinds of differential vulnerability to shock climate events like floods, storms, fires, droughts or heat waves. It involves inequity in relation to the risk of crop failure, food and water security, coastal flooding, threats to homes, and impacts on health.

Ideas about just adaptation have increasingly been framed as a way to attend to social justice for the most vulnerable. Given climate change, most adaptation strategies address questions of climate justice, focusing on building more robust local social systems for more just adaptation.

A climate justice conception of just adaptation means looking beyond distributive conceptions of justice. While inequity is central, an environmental justice focus on adaptation is thoroughly engaged with issues of participation, impacts on culture, and the capabilities communities need to function.

Environmental and climate activists have made recognition and the preservation of culture, including its ties to the functioning of ecological systems, central to responses to environments affected by climate change. Indigenous groups recognise the importance of caring for



country in adapting to climate change. The link is often made between restoring cultural connections to the land, adapting to climate change, and improving the health of disadvantaged indigenous people.

A capabilities approach may be a way in which to encompass the full range of concerns and concepts of justice in a more pluralistic or holistic conception of climate justice and just adaptation.

In discussions about vulnerability to climate change and just adaptation strategies, a range of basic needs can be identified, including health, housing, food security, culture and social cohesion, which are all included in adaptation planning. There is also a concern for the environmental conditions that provide for the full range of human capabilities. Drastic changes in ecological conditions have influenced the linkages between human needs and environmental functioning.

An increasing number of adaptation planning goals are becoming tied to the realisation of the SDGs, which is exactly what a capabilities-based adaptation plan would do.

There are some impressive and productive ways to pull together notions of justice and adaptation planning, and the idea of connecting discussions and disciplines. In the UK, for example, colleagues developed a strategy to combine the science of climate risk and studies of economic vulnerability to design effective policy responses. Researchers gathered a range of information about the scientific community's downscaling of climate risks. They also gathered a range of maps dealing with aspects of economic vulnerability. By combining scientific risk and social vulnerability they could map the worst predicted impacts on the most economically vulnerable populations and show local governments where best to focus their adaptation and resilience efforts. This is what combining climate change discussions across disciplines can do.

Making connections

Part of the academic mission of the Sydney Environment Institute (and one of its performance indicators) is to encourage connections, such as cross-disciplinary collaborations.

It is a premise of the institute that there is no lack of science in relation to climate change. Instead, the real problems are political and cultural in nature. The social sciences, as well as the humanities and the arts need to be engaged to help clarify what the science and climate impacts actually mean in various cultural contexts; for example, what does it mean to lose a species, to have a community destroyed by a bush fire, or to lose connection to the land or access to water?

One recent example of this approach was a 'slam event' on Making Futures at the Melbourne Museum. Thirty thinkers and artists from various parts of the world spent a day exploring stories and objects and reflecting on how their meanings were changing given climate change and the idea of the Anthropocene. Old objects, like a Victorian collection of Australian birds, developed new meanings – and new laments. Their stories were shared at a slam event.

Another example was a theatre production on the impact of heat waves on the poor and elderly in Sydney, based on a range of academic works. Before the performances, audiences were able to listen to interviews with, for example, a physiologist and a sociologist.

The humanities and the arts are not just important interpreters of science; they also impact on public understanding and change the way in which people think and behave.

Discussion Session

Prof Gina Ziervogel (University of Cape Town (UCT)):

The presentation by Prof Joss has focused on the city as the unit of analysis, but a lot more attention has been paid to participatory, bottom-up processes happening in sub-city units, such as neighbourhoods. Of the different approaches presented, what examples of positive engagement have been observed, from local bottom-up to city-scale agendas? Where was this emergence occurring, and how could it connect better with the challenges in these city approaches?

Response – Prof Joss:

One should not focus only at the city level, as rich, contextualised social engagement were typically found at sub-city level in the 'nooks and crannies' of the urban landscape. There is a disconnect between how the city government viewed and operationalised sustainable urban development on the one hand, and people's lived experiences on the other. Connections need to be made as official indicators could only partially represent complex phenomena and might not be relevant to people's actual experience of (un)sustainable development.

A governance mentality sought to measure everything and develop quantifiable indicators, which in turn framed our thinking and writing in ways that did not necessarily reflect actual rich, lived experiences of sustainability.





Dr Cathy Sutherland (University of KwaZulu-Natal (UKZN)):

In relation to participatory engagements at the sub-city level, two challenges include the tendency to measure using indicators at the city level, as well as the academic imperative to create universalising discourses or theories about how cities work. There was a lot of work about the particularities of place and localised changing systems of government, but when one tried to write about these or relate them to existing paradigms or theories, it became challenging. There is a gap between rich experiences on the ground and how academics wrote about them and created theories.

Response – Prof Joss:

There is sometimes an attempt to cling to a culture of public discourse and governance, when instead contentious issues could be brought into the public domain, enabling the development of richer understandings and practices of sustainable living. There has been a tendency, exacerbated by

the Smart City model, of governance of urban sustainability becoming increasingly technocratic, suggesting that issues could easily be resolved through technology. There is a place for both technology and indicators in urban government but the richer and more comprehensive debates, which could help us to make sense of urbanisation and create urban spaces in which we want to live, should not be ignored.

Prof Imraan Valodia (University of the Witwatersrand (Wits)):

The simplicity and power of the model is appreciated but it seems to deal only with the ex-post problem, or how to deal with the after-effects of development. In terms of the ex-ante aspect, how might developing countries reach levels of economic development experienced in the West but do so in sustainable ways? In order to address global inequality, those who had, would need to give something up.

Response – Dr Monga:

In 2018, poor African countries did not have to follow Britain's post-Industrial Revolution growth model. Their development might have nothing to do with 19th and 20th century polluting industries. Industrialisation was now defined more broadly than in the past and included service sectors like ICT and health.

If you lived in an oil-producing African country, as pointed out by the President of Chad, why should you be prevented from exploiting your oil reserves if your citizens were dying in poverty? Although it was possible to shift to green technologies that were less polluting, these were very costly and not feasible for many African countries.

Taking a global, rather than a national perspective, advanced countries that produced more pollution should pay for the transition, as the poor contributed least to pollution but suffered most from its impacts. However, most of the commitments made by rich countries at Conference of the Parties (COP) 21 had not been followed through. A better financial mechanism to support the transition was needed.

China had made many mistakes but was now the world's second-largest economy and would soon be its largest. Dr Monga saw China as a global public good. Their government was very aggressive about correcting their mistakes, and Africa could learn from their example. African countries need to organise study tours for their policymakers to observe how other countries were correcting the mistakes they had made.

To address inequality caused by bad environmental outcomes, it is necessary to find global accountability and enforcement mechanisms that worked.

Mr Richard Worthington (Friedrich Ebert Stiftung):

Dr Monga's comment that rich countries were better at conserving their environment was problematic, as rich countries often caused damage elsewhere. Looking only at the state of the environment within these countries would not result in a fair assessment of their care for the environment. Was Dr Monga suggesting that a higher oil price was contributing to climate change?

In Figure 1, the projection of growth income for poor countries seemed very optimistic. Whose income and what kind of income was illustrated, as shocks sometimes stimulated economic growth?

In relation to the intention to grow the economy, what other indicators could be used other than throughput or GDP?

Response – Dr Monga:

In response to the comment on GDP and growth, GDP was a fallible measure. According to Prof John Kenneth Galbraith, GDP was an unfair system as it only measured things that were commercialised and sold, and ignored much work that was inherently valuable like managing the home. Political will is needed to develop new indicators and make them comparable across countries.

It is important to find sustainable ways to create wealth.



Prof Igile Gledhill (Wits):

Was any work being done on micro-insurance for poor households or macro-insurance for nations or municipalities for climate shocks? This would present opportunities for statistical or actuarial science work.

Response – Dr Monga:

News stories were used as a starting point to reflect on the differential impacts (micro and macro-economic) of environmental shocks on rich and poor households. One aspect was the need for insurance. In a well-organised market, poor households would have access to credible insurance policies. The African Development Bank and the World Bank were working in this area. The Vice-President of the African Development Bank was experimenting with tools.

THE STATE OF RESEARCH IN SOUTH AFRICA**The State of Poverty Research in South Africa – Prof Julian May (University of the Western Cape (UWC))**

The state of poverty research was good, but its impact less so. South Africa had a long track record of researchers arguing that a high proportion of the population was poor and that this was undesirable. Poverty and inequality were closely related, and the history of poverty and poverty measurement in South Africa was tied up with apartheid.

The poverty measurement years

After 1994, for about a decade, the focus of research was poverty measurement, in particular investigating and debating the ‘poverty line’ and what a reasonable poverty line might be.

Around 2008, Cabinet gave Statistics South Africa (Stats SA) the mandate to develop a poverty line.

A range of poverty lines was proposed based on different assumptions:

- Food Poverty Line (FPL): allowing for basic survival based on the minimum cost of calories.
- Lower-bound Poverty Line (LBPL): allowing for additional sub-minimum needs such as clothing, housing and education.

- Upper-bound Poverty Line (UBPL): recognising the aspirations of South Africans, such as the desire for a mobile phone and airtime.

The poverty line was updated annually by the inflation rate and adapted five-yearly based on a review of the basket of goods upon which the line was based. This allowed for a change in what people perceived as important and what they were willing to sacrifice food for.

Poverty researchers and government argued that a poverty line was essential as it allowed government to be held accountable. The government decided to insert the LBPL into the NDP. Having official poverty lines has enabled the tracking of levels of poverty, which was previously not possible.

Poverty line tracking (Table 1) has revealed that:

- the UBPL has declined steadily; but
- the LBPL and FPL have been increasing after an initial decline; this may have to do with high levels of unemployment, as well as inequality. It represents a reversal in the gains made after the end of apartheid and perhaps an increase in absolute poverty.

Table 1: Poverty trends in South Africa, 2006 – 2015

	2006	2009	2011	2015
Percentage UBPL poor	66.6	62.1	53.2	55.5
Number UBPL poor (million annually)	31.6	30.9	27.3	30.4
Percentage LBPL poor	51.0	47.6	36.4	40.0
Number LBPL poor	24.2	23.7	18.7	21.9
% extreme poor (<FPL)	28.4	33.5	21.4	25.2
Number extreme poor	13.4	16.7	11.0	13.8

It was not clear if any of this was driven by climate change, or if it was mainly due to very high levels of unemployment.

It was important to recognise that the poverty line was a monetary metric, which only partially reflected the situation. Stats SA had released a range of documents illustrating different ways in which poverty was being reported, both numerically and subjectively.

Official statistics

Stats SA had been releasing an increasing range of reports dealing with vulnerable groups, such as women, children and the aged. Unfortunately, due to the need for fiscal discipline, Stats SA had stopped releasing these reports and did not know if they could even afford to conduct a poverty survey.

On a more optimistic note, in July 2018 Stats SA (without any publicity) released an update of the National Poverty Lines. This indicated that the release of poverty lines had become routine for Stats SA.

The NDP put poverty and inequality at the centre of what it aimed to achieve. It recognised the LBPL, which meant that targets could be set, and Stats SA could release tables to assess progress. The figures showed that South Africa was making no dent in the target at all. So, while poverty could be analysed, this information was not leading to poverty actually being addressed. Surprisingly, some progress had been made in dealing with inequality.

UCT produced the fifth National Income Dynamic Study (NIDS), sponsored by the Office of the President. This survey tracked households recruited in 2008 and their children to determine how individuals were moving in and out of poverty. The report was well used, including for policy analysis purposes.

The report of the recent Willard Panel on value added tax (VAT) showed that researchers used the data sets that were now available to examine a case for items that should be zero-rated and make statements about other actions needed to address poverty, such as increasing the Child Support Grant.

Reflections

In reflecting on poverty research, Prof May shared a quote from research conducted in 1957 that dealt with concerns about poverty in the 1880s. At that time, the UK was starting to deal with the social impacts of the Industrial Revolution, which had also resulted in many people being dispossessed of their land:

“... social research and social policy derived essentially from professional and middle-class anxieties to maintain the stability of institutions by correcting the measured costs and inefficiencies of social wastage.” (McGregor 1957)

The middle classes and policymakers were asking how to measure the consequences of some becoming wealthy and others not. This question needed to be considered now in the light of climate change. Dr Monga's example of flooding in the US and Nigeria reminded us that the inability to respond is not due to a lack of care, but rather to a lack of resources that enabled a response. It is important, however, to consider what we did to become wealthy, as we want to avoid the negative consequences of unsustainable development paths.

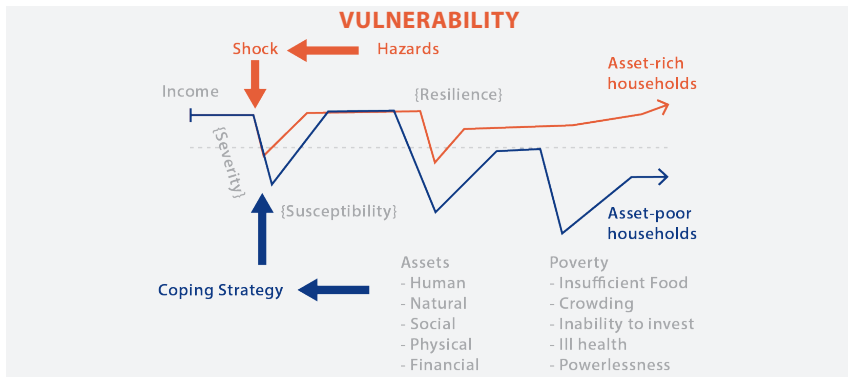


Figure 2: A graph tracking the impact of droughts in the Sahel and showing how shocks play out for the poor and the wealthy. [From research conducted by anthropologist Susanna Davies in 1988.]

According to Figure 2, the point was not simply that the poor were shocked by hazards:

- In relative terms, the poor lost more of their wealth than the wealthy.
- Poor households were susceptible to multiple shocks, each of which further reduced their ability to recover.
- Because of a lack of insurance, they were less resilient, and could not recover to original levels as wealthy households could.

South Africa's previous experience of a major shock affecting human life was the HIV/AIDS crisis. What might be learned from that crisis to help us avoid panic and respond more effectively? A similar logic applied to the current challenges. The nutritionist Marie Oshansky developed the poverty line in the US in 1968. She stressed that it was not the perfection of the measure that mattered but rather how it was used to develop policy responses:

"Unlike some other calculations, those relating to poverty have no intrinsic value of their own. They exist only in order to help us make them disappear from the scene ... With imagination, faith and hope, we might succeed in wiping out the scourge of poverty even if we don't agree on how to measure it." (Oshansky, 1968 quoted in Fisher, 1992).



Prof May expressed the hope that, through pondering about the impact of poverty on climate change and *vice versa*, we could imagine how to cope, how to overcome the scourge, or even how to live better.

Finally, as stated by Prof Schlosberg, it is important to involve the humanities in our collective efforts. Prof May led a research centre that focused on food security. Funding from the Mellon Foundation had allowed the unit to engage with the humanities to develop collaborations including theatre pieces and creative writing. This included a poem about what it meant to eat fish written by the daughter of a fishing family in Gansbaai (See below).

Working with people from diverse fields, including plant sciences, packaging engineering, the humanities, economics and social sciences, had expanded the work of the centre and encouraged a broader appreciation about the viewpoints and responses of specialists from other fields.

The Fish System

Jolyn Phillips

*Step one: my father takes a piece of fish
and hooks it on the line, feeds it to the sea
hoping a twakkie, harder or redroman would bite
as he becomes a piece of poisonous bokkoms
shrivelling in the sun feeding the fish themselves,
trusting they would bite he understands that fish
eat fish that eat the ocean that eats us, and
while my father tricks the fish to eat themselves
we eat ourselves when we eat the fish.*

*Step two: father brings the fish home
we do not cook the head of the twakkie or the harder
there is no brain to chew, it crunches better
when fried in white maize
even the eye chews like a bubblegum
chewed out, out of flavour
when we see it on our plates
we know fish can kill even when they are dead
so we remove the bones*

*we chew cautiously, afraid of the death bone
of the fish flesh, white and soft like fur
we have dry bread on standby if the bone
makes it to your throat and chokes you
inside your throat
even when gargling we instinctively reach for the bread
so it can blanket
the bone, push it down to die in our stomach.*

*Step three: we need money, we need food
we are running out of electricity but we have fire
the winter is not cold enough to freeze the fish
therefore, the fish can only be braaied
can only be frozen in our bodies
cannot be wasted even if the memory of fish and bread
reminds you that yesterday you died
even if you cannot buy life with a fish
even if the rotten fish is the reproach
that my father has failed us
even if the memory of fish and bread
reminds me that I died yesterday
I will put the leftover fish on my bread
and eat it in stages.*



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The State of Inequality Research in South Africa – Prof Imraan Valodia (Wits)

An overview of the history of inequality research in South Africa

It was appropriate to talk about inequality after discussions on poverty research, as inequality research had started towards the end of poverty research work in South Africa, influenced by two factors:

- Policy agenda: Political changes in South Africa influenced policymaking. After 1994, policymakers were concerned about reducing poverty. By the end of the Mbeki years there was an increased focus on policy relating to inequality. More recently the discussion had shifted to concerns about white monopoly capital and the land issue.
- Research data and tools: From a research point of view, much research was driven by what could be extracted from available data, such as household surveys. The early work had allowed households to be tracked over time. A number of poverty researchers had then shifted to inequality research. The NIDS was instrumental in starting a focus on inequality in the economics profession.

The data on inequality showed that South Africa's Gini coefficient (a measure of inequality in society, which ranged from zero, representing complete equality, to one, representing complete

inequality) at around 0.69 was the highest in the world for countries that had data available.

Two issues drove inequality, which had become slightly worse in recent years:

- 1 The level of employment was the most important issue.
- 2 Social issues also played a role, including race, gender, whether urban or rural, location within the city, and access to services.

The current state of inequality research

- **Wealth inequality and new sources of data:** Thomas Piketty's work had been influential in South Africa, resulting in a shift in research debates from the inequality of income to the inequality of wealth. In the past, research had largely been driven by the NIDS; a great deal was known about income inequality but very little about wealth inequality.

Innovative work by National Treasury and the South African Revenue Service (SARS) had allowed researchers to access wealth data from the tax system. Interrogating the issue of wealth inequality had revealed much more stark inequalities than those based on the Gini coefficient, with about 10% of South Africans owning about 95% of assets.

More sources of wealth data were needed, however, as existing wealth inequality assessments were based on pay as you earn (PAYE) data only. Researchers were negotiating with SARS to access estate duty data, which would shed light on intergenerational transfers of wealth.

- **Multi-disciplinary approaches:** While economists had developed tools to measure levels of inequality, they had recognised that it was far more complex to develop policies to help societies change existing patterns of inequality. The need for a deeper understanding of wealth inequality required multi-disciplinary approaches. The Southern Centre for Inequality Studies at Wits had been established to bring together historians, anthropologists, sociologists and natural scientists so that inequality research could benefit from broadening research perspectives and approaches.

Creating a space for conversations about inequality and climate change

Issues of climate change were inextricably linked with issues of inequality. From an ex-post perspective, as illustrated by Dr Monga, managing and adapting to climate change was fundamentally related to global inequality: the wealthier a society, the better it could respond to climate change, and *vice versa*.

From an ex-ante perspective, climate change was related to how people thought about inequality. The climate change issue was related to massive overconsumption in some parts of the world and, on the other hand, a large part of the world's population consuming too little and having incomes that were much too low. In many poor communities where people relied on the environment and natural resources for their livelihoods, environmental degradation was related to inequality.

A suggested research agenda:

- 1 There were two key dimensions to inequality: that within a country, and also between countries. It was not possible to respond to climate change without dealing with global inequality. Both natural and social scientists needed to respond to this issue.
- 2 When the tax system and government expenditure were included, South Africa's Gini coefficient dropped from 0.69 to about 0.59. This represented a massive shift in inequality. The role of the public sector, including public finance, tax and public expenditure, was extremely important in managing inequality and needed to be considered in relation to climate change. The size of the State and tax issues were two very important agenda items. Tax and public finance policies, such as climate change taxes, could be greatly enhanced if there were a stronger overlap between social science and natural science research.
- 3 An important issue in poverty and inequality research was how effective policies like grants and minimum wages were in enabling the poor to adapt to challenges of climate change. There was a lot of evidence that the social grant system was effective at managing issues like schooling, poverty rates and gender transformation, but there had not yet been a study to show that social policies like grants were contributing to climate change adaptability. This was probably due to a lack of interaction between the social and natural sciences.
- 4 The measurement work done by economists would be enhanced by stronger input from natural scientists.
- 5 In economics, the assessment of inequality change had been enhanced by drawing on randomised control trial methods used in the health sciences. Similarly, economists and natural scientists both did modelling, and these models could be more effective were there better understanding of the methods used by different traditions.
- 6 The most effective way to deal with inequality was for economic growth processes to be equality-enhancing. The challenges of economic growth were fundamental and could not be ignored. People who talked about the role of growth seldom thought about the environmental question. Similarly, those involved in climate change research seldom confronted the challenges of economic growth.

The State of Climate Change Research in South Africa – Prof Mark New (African Climate and Development Initiative (ACDI), (UCT))

Prof New commented that he was very grateful for the workshop, as when he had started ACDI seven years before, his attempts to work with social science researchers had failed.

The state of climate change research was much more than climate science; it drew on many disciplines in an attempt to make sense of the problem.

The climate and development problem space-

Figure 3 illustrated that climate change was taking place in the context of development, and that the issues and research overlapped.

There were two broad domains of climate change research:

- Mitigation, which included reducing emissions and avoiding future emissions.
- Adaptation, which involved building climate resilience and reducing impacts.

Two types of development, namely low-carbon development and climate-resilient development, intersected as climate-compatible development.

The current trajectory of South Africa's energy pathways was not climate-compatible as the country was committed to very large coal-fired power producers, which would continue operating long after South Africa's commitment to reducing emissions ended.

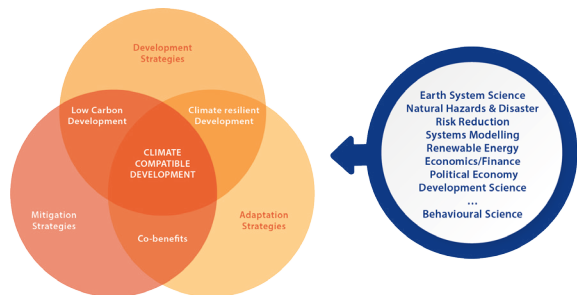


Figure 3: The climate and development problem space.

Many disciplines fed into the climate change space, some of which were foundational, such as earth system science (ESS), natural hazards and disaster risk reduction research, systems modelling, renewable energy, economics and finance, political economy, and general intersections with development science. Having focused on these foundational areas of research, research was now emerging in the problem response space.

Earth system science

- South African research was strong by international standards:
 - Many years of diverse natural science research had formed the building blocks of ESS.
 - There had been at least ten years of integrated ESS research supported through the Global Change Programme funded by the DST through NRF, including a research programme called ACCESS (Applied Centre for Climate and Earth Systems).
 - There were good observing and monitoring systems and access to a wide range of international data.
- Many of the 'first order' ESS questions could be answered and the implications of certain global temperature increases for regional climate over southern Africa could be understood.
- Remaining challenges included:
 - Global earth system feedbacks, including the effects of carbon cycling, clouds and ocean heat uptake, which affected the extent of global warming for a given quantum of atmospheric carbon.
 - Regional responses to global changes needed to be understood, including modes of variability, regional ocean changes and regional atmospheric states.
 - Near-term climate changes that applied beyond the seasonal period but within a decadal time span.
 - Providing impact-relevant information at farm, city and catchment scales, as there was often a mismatch between easily-generated data and the information that was needed.

Energy/mitigation science

- South Africa has had a strong history of energy systems modelling, including:
 - The Long-Term Mitigation Scenarios, which set the agenda for South Africa's mitigation strategy; and the Deep Decarbonisation Pathways Project, which was helping to develop energy scenarios to meet national, provincial and local mitigation targets.
 - The economics and technical feasibility of energy options.
- There had been a great deal of research into alternative energy options like hydrogen fuels, wind and solar energy; the challenge being to find niches to do research within a very competitive global research market.
- There was an emerging research programme in carbon capture and storage, and in terrestrial carbon sources and sinks, contributing to an understanding of the role of land surface and land management in mitigation.
- ESS and climate science had focused on the 'big picture' issues, proving that global

warming was happening, and developing good large-scale modelling and prediction capabilities. It was now necessary to apply this to different sectors in South Africa, such as disaster risk reduction, agriculture and conservation.

- In terms of mitigation, more research and guidance were needed on how energy transitions could also work to reduce poverty and inequality. Currently, low-carbon studies did not generally address who benefited financially, for example, whether a renewable energy plant was owned by a community or by a corporate.

Adaptation: vulnerability and climate impacts

- **Vulnerability:** Technical vulnerability and climate impacts had been well researched. There were three dimensions to vulnerability, namely exposure, sensitivity and adaptive capacity:
 - **Exposure** dealt with where people were situated and what hazards were most likely to affect them. At a macro level this had been well researched both theoretically and empirically, with the South African Risk and Vulnerability Atlas having been produced by the CSIR. Research had been patchy at the micro level; for example, identifying critical hotspots within a municipality. An area of weakness was future exposure; for example, being able to predict how risks and vulnerabilities might change in future as the climate changed.
 - **Sensitivity** described how sensitive a community would be if exposed to a hazard or risk. This had been well researched theoretically, and reasonably well researched empirically through isolated case studies. There had not been a systematic study of this dimension across the country, and knowledge was sketchy at both macro and micro scales.
 - **Adaptive capacity** was the ability to respond and change your sensitivity by developing resilience to expected threats. South Africa drew largely on the international literature for theoretical understanding. A few local studies were starting to assess different dimensions of adaptive

capacity. Little systematic analysis had taken place, and there was a gap in understanding adaptive capacity nationally.

- **Climate impacts:** South Africa had good capacity in modelling climate change impacts. This had developed from work in modelling biophysical impacts, including water resources and flood risks, crop-climate relationships, and climate-ecosystem inter-actions relating to biodiversity shifts and rangeland management.

There was much less capacity in other key impact areas, such as health, marine ecosystems and the built environment.

In terms of integrated assessments and systems modelling, there had been only two studies looking at integrating climate change impact assessments and the adaptation responses across multiple sectors. These included a national study looking at economic impacts across multiple sectors, and a recent study in the Western Cape. These had been relatively simplistic first-order assessments, with many assumptions and uncertainties. There was a capacity gap for integrated modelling in South Africa.

Adaptation

In South Africa, a lot of work on adaptation had been around the 'adaptation deficit' rather than actual climate change adaptation. This referred to the fact that, in many impacted systems, communities were poorly adapted to existing risks, not to mention future climate-related risks. As a result, much research and practice had focused on building capacity to respond to existing risks. The challenge was how to prepare for the risks that would be experienced in future.

There were two types of adaptation research:

- **Technical adaptation solution research:** Agricultural research focused on developing crops and breeding animals that were more climate-resilient, and on conservation agriculture, in which farming practices reduced vulnerability to climate stresses. This research was conducted by the Agricultural Research Council, provincial departments of agriculture and various commodity organisations.

Biodiversity and ecosystems research focused on ecosystem-based adaptation, or making ecosystems more resilient to climate risks, and how to incorporate climate change considerations into spatial planning for conservation, biodiversity corridors and spatial planning. Organisations involved included SANBI and South African National Parks (SANParks).

In the water sector, there was technical research into water demand management, efficiency, exploring new groundwater sources and re-use of water. In the built environment, emerging areas of research included flood management, storm water drainage and building design.

- **Adaptation process research:** This described the processes through which technical solutions were implemented in practice. It was an under-researched but emerging area.

There were three main mechanisms:

- **Post-facto assessment:**

This documented actual practice by an entity in developing an adaptation response plan or responding to a particular event.

- **Consulting and advisory research:**

This might be practitioner or policy-led and occurred when an entity like a municipality or government department put out a consulting call for experts to explore the solution space. This might be written up in parallel as a research output and contribute to the knowledge base.

- **Transdisciplinary/co-productive research:**

This might be researcher-led or jointly between research and external organisations such as a municipality or business. Research questions were co-defined, and research happened in an iterative, parallel process in both policy and practice spaces. UCT was involved in a project called the FRACTAL, investigating how this approach could be implemented in a city context.

Emerging discussions and agendas

Some of the following points are from a study undertaken in collaboration with Wits on behalf of the DEA called Defining South Africa's Climate Change Adaptation Research Agenda:

- **Low carbon, climate-resilient development pathways:**

When the forthcoming IPCC report on the challenge of 1.5-2.0 °C warming was released, it would include a chapter on what kind of development pathways enabled this to occur. In the South African context there was a disconnect between what was discussed in the NDP and a climate-compatible development pathway. There was a political-economic question around the tensions between business-as-usual development and climate compatibility and this needed to be analysed meaningfully.

- **Climate services:** This was the translational work of making climate science research relevant to people responding to climate change challenges. In South Africa, there was an emerging programme of a climate services centre. Work needed to be done to determine what services this



centre should deliver for society. Traditionally these centres had produced climate risk information, like weather forecasting. Much more information was needed, especially around adaptation and responses.

- **Transformative and transformational climate actions:** This went beyond adaptation and mitigation and asked how climate-compatible actions could enable other transformative actions, for example 'gender-transformative adaptation'. This also applied to reducing poverty and inequality.
- **Implementation:** How to implement these policies and strategies was a critical gap in the South African context. The following two approaches held promise:
 - co-production, inclusion/exclusion, and
 - documenting experiential learning and practice.
- **Capacity development:** Research was needed to identify the capacity gaps.
- **Governance and institutions:** It was important to determine what arrangements would work to enable multi-sectoral responses.
- **Economics and financing, especially for adaptation:** It was important to understand the economic impacts of the failure to adapt as well as the economic benefits of adaptation, and to make the financial case for adaptation and mitigation interventions.

Discussion Session

Prof Harald Winkler (UCT): In developing the Long-Term Mitigation Scenarios, a wide range of stakeholders worked together at a national level. Co-production of knowledge had an impact on national policy.

Response – Prof May: It was difficult to introduce co-production into academic research activities because the university incentive system did not support this. Academics were rewarded for publishing articles in high-impact journals, not for co-producing knowledge.

Prof Winkler: Prof Valodia was asked to comment more about innovative ways of thinking about inequality and how this would be done in terms of a broader conception of justice.

Response – Prof Valodia: In response to the question about innovations in inequality research, economists recognised that there was a limit to what could be extracted from household survey data as the panels became less and less useful as households were lost. Furthermore, household surveys did not adequately explain the distribution of wealth. Other sources of data were required, and the release of administrative data presented an interesting new opportunity. Having made progress with anonymising and accessing SARS data, it would be possible to examine intergenerational flows of wealth. Researchers also needed access to administrative data from other institutions like the pensions fund, banking and finance industries.

Issues of climate justice were important. Researchers involved in the Inequality Centre at Wits appreciated that they worked in a society with the constitutional vision and with strong socio-economic rights built into the vision, and yet South Africa was facing problems realising this.

Response – Prof New: In order to scale up innovations that had been field-tested, regulation was needed, for example Key Performance Indicators for municipal employees.

Prof Ben Cousins (UWC): The situation in South Africa was politically unsustainable, with Southern African Labour and Development Research Unit (SALDRU) estimating the Gini coefficient for income at 0.95, and youth unemployment being about 55%. Yet the speakers did not reflect a sense of urgency. There were extreme levels of anger around the country, especially among young people. People were losing faith in the State and starting to help themselves, for example through invading land and stopping construction companies working and demanding that local people were employed. A new economic consensus or framework was needed. Something needed to be done urgently to create jobs and restructure the economy, integrating concerns about poverty, inequality and environmental change.

Prof Valodia was asked which proposal in his ten-point plan was most likely to make the difference over the following five years.

Response – Prof Valodia agreed with Prof Cousins that there was real anger and urgency. His article in the *Business Day*¹ had been an attempt to contribute to the debate.

He suggested two priorities to address:

- In South Africa, the big firms and those with powerful interests were far more dominant than in other societies. In addition to the issue of high wage ranges, there were also concerns about the centralisation of production, which undermined local economic activity. Market structures must be dealt with and the Competition Amendment Bill was starting to address this.
- Dealing with the anger and extreme challenges of the poor was a really important issue that must be dealt with through, for example, policies like a national minimum wage.

Response – Prof New: Prof New cautioned that, in the climate change and development discussion, the climate change tail

¹ <https://www.businesslive.co.za/bd/opinion/2018-09-10-ten-ideas-for-reviving-the-economy-and-reducing-sas-dire-inequality/>

should not wag the dog. Despite the incredible urgency to address climate change, in South Africa there were other critical issues that must also be addressed.

Prof Shankar Aswani (RU): None of the presenters had mentioned population growth, yet this was the elephant in the room when talking about poverty, inequality, sustainability and climate change. Population was always considered in Australasia, but seemed to be taboo in Africa. What was the reason for this?

Response – Prof May: In South Africa, the increase in population was of concern, but this was not driven by a high fertility rate. At 2.3%, the population is simply at replacement levels. The problem originated because nothing was done about population growth 20 to 30 years ago. There is now a large cohort of people of reproductive age who would contribute to the expansion of the population and little could be done about it. South Africa had learnt from the rest of Africa that, in order to address population growth, it is vital to educate both women and men.

Response – Prof New: South Africa, and Africa as a whole, is one of the few regions where population growth was continuing to increase, and most of this was in urban areas. Cities were becoming places of concentrated climate risk as well as concentrated opportunity due to the concentration of people and assets. Urban population growth is a priority area, without forgetting about the rural areas upon which cities depended.

Mr Samuel Chademana (C40 Cities): The biggest problem for practitioners was not the knowledge gap, but rather how to implement policies and strategies. At the centre of this was the need for organisational transformation. Government, the private sector and civil society were not fully transformed for the task. How could practitioners transform institutions so that they could respond to the challenges?

Response – Prof May: Academics were poorly equipped to advise practitioners on implementation as they were poorly informed about the issues affecting implementation.

Response – Prof New: Implementation relied on champions and cities that were prepared to experiment to learn about what worked and did not work. It was essential to build in the capability to fail, but these institutions had low tolerance for failure.

Prof Oliver Mtapuri (UKZN): Equity and justice were emotive issues, yet emotions were not mentioned in any of the presentations. Furthermore, Africans were not theorising enough from an African perspective.

Response – Prof May: In response to the point about theorising, the notion of public goods needed to be better theorised. This kind of analysis had been avoided, and South African academics were not keeping up with work being done elsewhere in the world.

ROUNDTABLE 1: HOW DO WE BUILD POVERTY AND EQUALITY CONCERNS INTO CLIMATE CHANGE? – FACILITATOR: PROF FIONA TREGENNA (UNIVERSITY OF JOHANNESBURG (UJ))

Speaker 1: Prof Rashid Hassan (Centre for Environmental Economics and Policy in Africa (CEEPA), University of Pretoria (UP))

Mitigation strategies and measures

The presentation focused on the attention given to poverty and inequality in climate mitigation science and policy, which focused primarily on inter-generational equity. Mitigation strategies protected the rights of future generations, both rich and poor, to a safe and healthy environment. Inter-generational inequity was dealt with primarily at aggregate macro-economic levels, that is inequality between regions and countries, but not at household levels as there was limited attention to the situation within national boundaries.

Intra-generational equity was also recognised and acknowledged, particularly between countries. This included differences in their responsibility for causing climate change through past and present contributions to greenhouse gas loading; their vulnerability to the impacts of climate change and capacity to cope with challenges; and their power to decide on solutions and actions.

Inequalities between countries were recognised and acknowledged in global conventions and protocols, resulting in the invoking of equity principles in international negotiations. There was a principle of equitable burden-sharing referred to as Common but Differentiated Responsibilities and Respective Capabilities (CBDRRC). Significant progress had been made in promoting cooperation and support, including participation, ratification and voluntary pledges.

Several global climate mitigation initiatives and agreements had been proposed and implemented. It had, however, proven difficult to operationalise and implement mitigation policies. The debate continued in international negotiations around

agreement on more effective and equitable burden-sharing arrangements.

Poverty

The issue of poverty was largely missing from mitigation science and policy analysis. In general, integrated assessment models lacked indicators on poverty and inequality in their criteria for evaluating low-carbon development and climate stabilisation scenarios.

Poverty and inequality in climate mitigation science and policy in South Africa

In South Africa's National Climate Change Response Policy, poverty and inequality featured explicitly in both the objectives and the approach and strategy, which were informed by global and national climate science and policy research.

The national approach to climate mitigation aspired to contribute to global efforts to reduce greenhouse gas emissions and stabilise the climate system; and to address national development and poverty eradication challenges.

Ex-post assessment of impacts

Most of the proposed mitigation measures were in the design phase and not yet implemented. Some exceptions included the Working for Water (WfW) and Working on Fire (WoF) programmes, which had been assessed for impacts focused on employment and job creation.

Regulatory and technological interventions and near-term flagship programmes with components intended to address poverty and inequality concerns of proposed climate mitigation actions included the Expanded Public Works Programmes, including WfW and WoF, among others.

Opportunities for South Africa's National Climate Mitigation Policy

Opportunities existed for both natural and social scientists, particularly those studying poverty and inequality, to research the impacts of climate change.

Opportunities might be found at the interface between climate science and policy design and practice, but two challenges were identified:

- Interdisciplinary research funding was a challenge, as funding for poverty and inequality research came from sources not linked to climate change, and little climate change funding was allocated to poverty and inequality research.
- National statistics data needed to be exploited to find more appropriate indicators and measures of poverty and inequality, especially for within-country assessments and monitoring of impacts. National household surveys needed to be assessed to determine what they currently covered and what was missing to support the analysis of links between climate change and poverty and inequality.



Speaker 2: Mr Hastings Chikoko (Regional Director, C40 Cities)

The C40 Cities Climate Leadership Group was a group of mayors of cities and mega-cities who came together to address issues of climate change. Mr Chikoko was involved in policymaking and ensuring that poverty and inequality were integrated into climate change science. While a great deal of poverty research existed, there was relatively little research on the impact of climate change on poverty, and the challenge was to bridge this gap.

When Pope Francis convened mayors and scientists at the Vatican to discuss climate change, he said that science, when well directed, could be an important means of improving the quality of human life. It was important to ensure that climate change science was well directed and had an impact on addressing poverty and inequality.

"Nihil de nobis, sine nobis" was a Latin saying meaning "Nothing about us without us". There would never be pro-poor climate science without the involvement of the poor. To achieve this, the scientific space needs to be opened to facilitate the involvement of poor and marginalised groups, and those who worked with them implementing policies and programmes.

Economists could tell only one part of the story. Mechanisms are needed to bring other voices into the scientific community, and to unpack the science itself so that it could be understood by the people who need to implement it. C40 Cities was involved in this work.

Academia and research institutions are doing a good job of enabling the voices of the people to inform the research agenda through, for example, the co-production of knowledge, programmes like FRACTAL, and community labs. However, the relationship should not just be extractive, taking people's experiences and producing knowledge. It should also return to communities and have an impact on the ground. Mechanisms and partners are required to break down the science and use it to inform action. C40 made sure that cities and mayors used the best science and data to develop policies and programmes.

It was important to address the fear of intellectualism that existed amongst policymakers and ensure that there was an appetite for science, so that they saw the value of embracing credible science and data in their policies, plans and programmes. This required the transformation of institutions and a change in mindset, with politicians needing to shift from expediency and short-termism to embrace planning that was informed by facts, modelling and scenarios, not just emotions. It was necessary to discuss how to make the existing science relevant so that it could deliver an impact and create change.

Speaker 3: Prof Gina Ziervogel (UCT)

The public tended to think of climate change science as mainly biophysical in nature, but it needed to be seen more broadly. There has been an active focus on integrating poverty and inequality concerns into global change research. This focus on the human dimensions of this work needs to be acknowledged and appreciated.

Increasing interest is being shown in taking a more holistic social, ecological and technological systems view of climate change. This is important because, if climate change is seen to belong solely to the domain of the natural sciences, attempts to mitigate or adapt to climate change would fail.

It is well recognised within the adaptation field that poverty and inequality directly impact on how climate change is experienced. In this field there are significant concerns around social justice, acknowledging that those who have contributed the least GHG emissions often suffer the greatest impacts.

People living in poverty often find it difficult to access information, resources and support. Poor rural households have fewer resources, making it hard to change farming practices and shift to more climate-appropriate crops, for example. In cities, poor people might be unable to move out of a wetland area where their shack was built. However, despite a lack of resources, poor people need to be recognised for their adaptability. Southern Africa had always experienced climate variability and there are many ingenious and new ways of coping with this. For example, a village in Malawi invested in ducks when their chickens kept drowning in floods.

As a social scientist working in the field of climate change, Prof Ziervogel has observed that climate change science is often not the most important factor to consider; rather, other issues might be more critical when adapting to climate risk. For example, in Cape Town where research was conducted on flood risk governance, it was less important to know if the intensity of flood risk was increasing or decreasing as people in informal settlements were not coping with the current flood risk. Understanding the current flood governance regime and acting to reduce flood risk were more important than recalculating the flood line.

In other instances, it is critical to understand how the climate was changing and to plan accordingly. For example, if temperatures are increasing, when building houses that needed to last for at least a century, it is essential to consider insulation and cooling measures.

The FRACTAL project is a good example of climate scientists working directly with social scientists in the context of African cities such as Windhoek, Lusaka and Maputo where levels of poverty and inequality are high. It was vitally important to consider the impacts of climate change on cities as





it affects many aspects, including water availability, flood risks, health risks and investments in infrastructure.

The FRACTAL project has shown that it is difficult to integrate climate change science in decision-making. Climate science had not been well integrated in the past and is available on a different time scale than the current models used for urban decision-making. Decision-makers in cities are aware of climate change but they are also trying to address immediate issues of poverty and inequality. They are, however, starting to recognise that unless they take climate change into account their efforts to reduce poverty and inequality would be undermined. Both current and future concerns need to be addressed at the same time. It is, however, a complex space that required transdisciplinary research and practice, and this takes more time and effort than traditional responses.

Those involved in the social sciences have worked explicitly with the poor in many ways and have emphasised that adaptation should focus on this group. Unfortunately, this has not received enough attention in southern Africa. Despite the rhetoric, the urban poor are not being prioritised in thinking about adaptation and the impacts of climate risk on their livelihoods. More work is needed in this area.

A challenge relating to governance is how climate-related risks that threaten the urban poor could be reduced, given conflictual relations with the State. This clearly had less to do with climate science and more to do with fields and approaches such as political science, sociology and action research. While biophysical science has a critical role to play in climate change work, building stronger relations with those who understand poverty and inequality should be a priority.

Discussion Session

Prof Winkler strongly agreed that, if climate change research were seen to exist wholly within the natural science domain, we would fail to address adaptation and mitigation. While Prof Ziervogel worked in adaptation, Prof Winkler's group worked mainly in mitigation and their focus was usually on policy and implementation. He asked what a framework that integrated both the natural and social sciences might look like, respecting both those disciplines where the subject matter was separate from policy, and those that studied policy.

Response – Prof Ziervogel interpreted the question as how to integrate climate science more in adaptation. In the FRACTAL project, climate scientists had been working closely with a range of stakeholders to develop climate narratives, so that they could present long-term climate scenarios as understandable stories. They had worked with the cities on these stories, thought through the impacts with them, and asked if there were enough mechanisms in place to respond to the impacts.

If not, these are some of the areas in which they needed to focus adaptation.

This related to Mr Chikoko's point: the idea of good adaptation and addressing poverty was about inclusive governance and building relationships. It was hard, and it took time. In a world experiencing a sense of urgency, it was also appreciated that these things were complex. They require the development of trust and relationships; as well as understanding where different stakeholders with different priorities were coming from. Spending time together and understanding areas of contestation are really important. The point about transformation was critical: where could opportunities for social and economic transformation be found which, at the same time, addressed climate risk?

Mr Worthington: Dr Monga had pointed out that he was aware of the shortcomings of GDP as a measure, but how else could the growth of the economy be measured? There was a lot of assessment of climate change and mitigation policies, and the outcomes were generally framed in terms of jobs and GDP. But there appeared to be little insight into the impacts of these climate change response policies on poverty or inequality. Was this information available, or did it need to be brought into the assessment of climate change response policies?

Response – Prof Hassan: There were suggestions from the international community in terms of better measures than GDP, acknowledging that as incomes grew, costs to the environment needed to be considered. There is growing awareness of the need to measure the impacts of climate change.

In terms of the national climate change response strategy, the core elements were the near-term flagship programmes, particularly in terms of shifting to renewable energies and low-carbon options. A few like Working for Water had been implemented and work had been done on their impact on inequality and poverty, but the focus had mainly been on job creation and employment. They did not adequately and comprehensively address the impact on inequality and poverty. Most other programmes were yet to be implemented. This provided an opportunity for communities to participate in terms of doing an ex-ante or ex-post assessment of those programmes. Those mitigation measures had big impacts on the poor. However, no assessment of these programmes on poverty or inequality had been observed.

Response – Mr Chikoko: In response to the question about the impact on inequality, from the work done by C40 Cities on inclusive climate action, more work was needed to define indicators on the impact of inequality. This was raised as a challenge to the group.

Dr Sutherland: Mr Chikoko's point about giving the poor a voice in climate change was critical, especially in the context of cities. One way to do so was to build relationships between citizens





and the local State. Drawing on the experience of C40 Cities, how much hope was there for building a strong compact between citizens and the local State? Were cities open to the urban poor having more of a voice in how cities responded to climate change?

Response – Mr Chikoko: In terms of bringing the voice of the poor into planning, C40 relied on two approaches: first, working with elected officials like ward councillors who represented communities and were empowered to reach the poor; and second, working in partnership with community organisations or non-governmental organisations (NGOs) who worked in these communities.

ROUNDTABLE 2: HOW DO WE BUILD CLIMATE CHANGE CONCERNS INTO SCIENCE ON POVERTY AND EQUALITY? – FACILITATOR: PROF JOHANN

KIRSTEN (BUREAU FOR ECONOMIC RESEARCH, STELLENBOSCH UNIVERSITY (SU))

Speaker 1: Prof Shankar Aswani (Rhodes University (RU))

In both city and rural areas people were struggling to adapt to rapidly changing environments and climates. Local and indigenous knowledge systems were very dynamic and continually in flux. These forms of knowledge were generated through cognition, inheritance of knowledge, and daily practice in the environment, which was rapidly changing.

It was easy to pay lip-service to local and indigenous knowledge, but there were methods that could be used to document, understand and incorporate this knowledge into climate change adaptation plans. Anthropologists used methods such as rapid rural assessment surveys, household questionnaires, life histories and participatory mapping or geographic information systems (GIS) mapping of various kinds of knowledge, including local, indigenous, ecological and agricultural knowledge.

When considering livelihoods or poverty in a place like South Africa, people generally thought about people complementing their livelihoods by foraging for local plants and animals in natural areas close to townships and villages. In a participatory mapping GIS exercise, people in a focus group described how their experiences of their environment had been changing over a period of about 25 years. Different mapping techniques were used to geo-reference the information and create a GIS database, allowing one to display the information in a spatial and temporal format. This provided insights into how people understood their environments and adapted to environmental changes. This included how they detected and responded to change, and whether they saw change as a challenge or opportunity.

Prof Aswani had been involved in participatory mapping in many parts of the developing world, and his research had yielded tremendous insights into local understandings of climate change. This was done not only in a narrative format but also using a hybrid social-natural sciences technique to bring anecdotal knowledge of social and ecological change into a GIS database to spatially represent how people conceptualised the changing world around them.

It was important to recognise that much of this knowledge was rapidly disappearing. Prof Aswani had published a paper in *PLoS One* looking at a global assessment of indigenous knowledge. In this large-scale analysis of all work published to date, about 75% of all literature documented a net loss of indigenous knowledge. Although people were generating knowledge every day, research in the Solomon Islands, where people used mobile technology, revealed that in the last ten years there had been a 25 – 30% reduction in the ability of young people to name fish. When people could not recognise local species, they lost the ability to know what they could exploit and what needed to be conserved.

Speaker 2: Prof Ben Cousins (Programme for Land and Agrarian Studies (PLAAS), UWC)

With respect to the extent to which biophysical and social scientists are addressing the challenges together, most researchers continued to work in disciplinary silos. Some disciplines, such as geographic and environmental sciences, were better able to engage in integrative, cross-disciplinary research than others.

Productive collaborations between biophysical and social scientists in addressing issues such as poverty, inequality and climate change remained rare. Exceptions included:

- Profs Charlie and Sheona Shackleton of RU and UCT respectively, researching the socio-economic and ecological aspects of natural resource use, as well as the impacts of climate change on rural livelihoods.
- Prof Timm Hofmann of the Plant Conservation Unit at UCT.

Engagement of the social sciences with the consequences of climate change

Few social scientists in South Africa had engaged much with climate change, and relatively few engaged in research in rural contexts, where consequences of climate change for livelihoods were clear and immediate. There might be a beginning of renewed interest in the rural roots of structural poverty and inequality, how this manifested in urban poverty, and the interconnections between the two.



Research is needed into:

- the political roots of the mismanagement of scarce water resources by municipalities and water users, and what the long-term consequences of this might be; and
- the missing connections between land, agricultural development and water reform.

Opportunities in the social sciences for better engagement with climate change

In urban areas the impacts of climate change could be less direct and thus more complex. The water supply crises being experienced in cities following prolonged droughts illustrated the complexity of governing resource use in situations of increased climate variability. This was likely to be contested in local politics as well as by civil society groupings actively challenging local government.

Two key issues to explore were:

- governance in an uncertain and changing world; and
- the socially differentiated impacts of environmental change, given massive inequality.

Challenges to strengthening engagement between social and natural scientists

Challenges to confront in researching climate change and society, and attempting to work across disciplines included:

- **Theory and concepts:** It was necessary to find a common language that bridged disciplinary divides and could express useful theories and concepts. Concepts that had proven helpful in research conducted by PLAAS included: multiple livelihoods, common property, farming systems, and multiple scales. Difficulty in developing a common framework often arose in relation to the less 'objective' aspects of society, such as culture, identity, discourse and narrative.
- **Methodology:** Combining quantitative and qualitative data within research designs, or extensive and intensive aspects of research design could be a challenge. Natural scientists tended to discount insights derived from small samples, even though intensive research was often essential for probing complex causalities. Social scientists tended to be poorly trained in quantitative methods.
- **Practical constraints:** Most academics experienced immense pressures to publish and this impacted on the choices they could make in relation to research. Designing research that connected different disciplinary perspectives was demanding, time consuming and expensive, and thus beyond the ability of most researchers to undertake.
- **Political values:** Given the importance of inequality, it was necessary to understand the dynamics underlying massive socio-economic differences. This implied a common stance towards such inequality, but some natural and physical scientists were deeply conservative politically, justifying such differences with reference to the 'natural order'. Political values could be a very real obstacle to inter-disciplinary research.

Suggestions for a tangible connection, format and priorities

Integrative research designs and conceptual frameworks, although challenging to agree upon, could be very productive. Large research programmes that brought together different teams were promising.

A key issue in the rural economy was livestock production systems, as these were the most common form of land use in semi-arid environments. As William Bond (of the South African Environmental Observation Network (SAEON)) and others had suggested, climate change might be enabling large-scale bush encroachment, as atmospheric carbon was fixed by shrubs and trees. Increasingly bushy environments were better for browsing species like goats than for grazers like cattle. Goats also survived droughts better than cattle did; for example, during a drought in the Msinga district, 30% of cattle died but only 6% of goats died.

Indigenous goats were found in large numbers in communal areas and might be increasing on land reform farms as well. They were central to a large and informal ceremonial market in both urban and rural areas. Goats were a potentially lucrative rural enterprise for the rural poor, especially women as they were cheaper to purchase than cattle. They could even supply the export market to the Middle East and elsewhere. Yet very little was known about indigenous goats as they had been ignored by both biophysical and social scientists. This was a major opportunity for interdisciplinary climate change research.

In relation to the land reform debate, 60% of commercial farms needed to be redistributed. This was feasible because the top 20% of farms produced 80% of South Africa's food. The major land use on redistributed farms was likely to be livestock production, in particular small stock like sheep and goats. This work would require social scientists, economists and natural scientists co-researching this issue with farmers. This work was urgent, but the beginnings of a way forward existed.

Speaker 3: Prof Philani Moyo (University of Fort Hare (UFH))

Prof Moyo had been working in the Eastern Cape undertaking baseline research on poverty and inequality in the Alfred Mzo District Municipality, one of the poorest district municipalities in the country. An aspect of the research sought to understand climate vulnerability and adaptation strategies being used by local smallholder farmers. When the report was presented to the four local municipalities a frequent question was, in view of the climate change impacts that we had identified, how could municipalities respond to the impacts in partnership with community members?





Suggestions and recommendations included that one way to address climate change impacts was to build climate change concerns into policy and practice. While implementing strategies that could bring people out of poverty, it was necessary to build capacity to respond to climate change impacts at the same time. If a comprehensive approach was adopted, then climate change could become an integral part of overall sustainable development. It was no longer seen as a separate activity that households must engage in. This was important because if adaptation measures were pursued within a sustainable development framework, they could respond to climate impacts and help to diminish the damage caused by future climate change and climate variability.

The policy proposal was that climate change concerns be built into the Integrated Development Plans (IDPs) at local municipalities.

Prof Moyo shared some ideas that were more broadly relevant than at the municipal level:

- There was a need to mainstream climate issues into local sectoral planning processes. There was hardly any engagement with climate adaptation or climate financing issues in the IDPs in Eastern Cape municipalities; for example, in the Buffalo City Municipality in the 2015/16 and 2016/17 financial years, a climate financing budget had been allocated but not used, so it was withdrawn in 2017/18. Money could not continue to be allocated if it was not used by the officials, who did not see the value in mainstreaming climate financing.
- There was a need to combine sustainable development approaches at a government level with bottom-up approaches rooted in local and regional knowledge because this was where climate change impacts occurred. Local communities needed to be empowered to participate in climate impact assessments so that their local knowledge could feed into climate and poverty data, and this could be used to design sustainable development and poverty reduction strategies.
- There was a need to enhance the integration of climate impacts into macro-economic projections. The rate and pattern of economic growth were critical to poverty eradication and climatic factors could have a powerful bearing. Macro-economic instruments should be key policies for identifying climate change risk and to incorporate risk management strategies to provide sufficient flexibility in the face of climate uncertainty. If there was political instability in a country, this was considered when macro-economic projections were made. There was a need to put more emphasis into integrating climate impacts into macro-economic projections going forward.

Discussion Session

Dr Sutherland: Prof Cousins' story about the goats illustrated that climate change was forcing people to find new ways of being in the world. Looking at things differently sometimes revealed

that some things we thought were negative might become a solution. The fundamental shifts we need to make were sometimes seen as inferior; for example, new technologies like solar energy. How could people be enabled to see these changes as positive?

Response – Prof Cousins: It is the middle classes that need to change: the academics and policymakers. It is not necessary to change the minds of people living in Msinga; it is the outsiders' views that need to change. We are subject to a tremendous amount of prejudice and bias. Rural people have known about these things for a long time, but they have been of no interest to those of us who decide on what knowledge counts. Most agriculturalists thought that farming was large-scale and commercial while most Africans were small-scale farmers. Yet there is very little research or extension for small-scale farmers. There is an inherent prejudice in favour of large-scale farming. Where small-scale farming is concerned, there are no policies. There is also very little data and Stats SA does not collect data. So, in fact, we are the problem. It is our ways of thinking that need to change.

Prof Kingsley Ayisi (University of Limpopo): When poverty was discussed, the issue of job creation came to mind. If you wanted to implement a sustainable development programme but it came at the expense of job creation, how would you go about it? For example, a mining project might provide a lot of jobs but have negative environmental impacts. How would you find the balance?

Response – Prof Aswani: It is also necessary to talk about environmental sustainability. In order to increase people's resilience, viable environments are needed. A very anthropocentric view of natural system often dominated; however, human life would not be safeguarded unless ecosystems are protected.

Prof Ziervogel (UCT): All three speakers have reflected on methodology and the importance of bringing together an understanding of ecological and social aspects, using both quantitative and qualitative methods. How could research in this area influence policy and practice? Because of the sense of urgency, this is really important. For someone working in qualitative research in the social field this is hard to achieve. It might be possible to learn from the economists who seemed to get their voices heard and to share our knowledge in creative ways through the arts.

Response – Prof Hassan had come from the University of California five years before. He had been brought to South Africa to build interdisciplinary programmes but was finding it impossible. South Africa felt 20 years behind California in relation to interdisciplinary approaches. There was tremendous resistance from the humanities and social sciences to hybridise with the natural sciences. Most social science students could not read a graph. In the humanities, there was



profound resistance to engaging with science. The training of students need to change, starting at high school and undergraduate levels.

Response – Prof Cousins: There is a lot to learn. There are new ways of working with practitioners and policymakers that academics need to be open to, even at the expense of publishing a few journal articles. Two examples of this are:

- 1 The Department of Agriculture in KwaZulu-Natal and UKZN were beginning to recognise the importance of small livestock. A very small NGO had been organising field days and having a remarkable impact on reducing kid mortality. They had slowly demonstrated that small livestock were important and that there are ways of improving productivity. As a result, the provincial department had announced a province-wide programme.
- 2 A coalition of activists, rural communities and academics had been involved in litigation against the Communal Land Rights Act of 2004, which had been struck down in 2010. A great deal had been learnt directly from the people concerned. It is important to recognise what people did not know and be open to learning from these coalitions.

Response – Prof Moyo: It is important to consider cultural issues when an adaptation strategy is proposed. In south-western Zimbabwe an attempt to introduce small grains like sorghum was met with resistance because those grains were considered to be poor people's food. In the third season crops failed because people refused to take care of them. It took a lot of effort from the agricultural extension services to change the mindsets of people to accept that the climate was changing and to understand the nutritional benefits of shifting from maize production to small grains production.

Response – Mr Reinhardt Arp (Worldwide Fund for Nature, South Africa (WWF-SA)):

With regard to how academics could increase influence on policy, when the government ran stakeholder engagement sessions, there were usually very few academics present. It is important that academics attend these engagements. Private business interests were strongly represented. It was hard to counter their requests as there were very few representatives from civil society, organised labour or academia present.

Unknown: Two challenges for practitioners working on climate change mitigation and adaptation are the issues of competing needs and attribution. In certain communities, when changes or crises occurred, it is hard to attribute them to climate change. It is difficult to create a clear causal link when trying to explain what had happened, so people find it difficult to adopt climate-related thinking. This problem also relates to a lack of good data that could be used for evidence-based planning and that might help to change people's mindsets.

Prof Kirsten: Had the poverty-research community engaged with the natural science community about climate change? If so, had this affected the understanding of causality between poverty numbers and climate change, climate shocks and climate variability?

Prof May: The focus of poverty researchers at UCT had been on unemployment and how to develop an economy that employed more labour, rather than on climate change issues. There was no evidence that the UCT climate change units had been collaborating with what was probably the strongest quantitative poverty group in South Africa. At UWC there is one of the strongest qualitative groups working on poverty. Collaborations are probably taking place in relation to questions of food security rather than to direct questions about poverty itself.

It is difficult to get social scientists to engage with natural scientists, although engagements in the opposite direction go relatively well. Social scientists tend to feel that natural scientists held the power for many years and that they could afford to show an interest in social scientists now. This might be part of the issue.

After hearing Prof Cousins talk passionately about goats some years ago, a number of projects on goats were funded at UFH. It was shown that goat meat could be as tender as mutton, that it might be even safer than mutton, and that goat hide was less susceptible to sunburn, which would be a benefit as temperatures rose.

Prof New: When talking about reducing poverty and inequality, what was the target? This could mean very different things in terms of strategies, such as which ones were climate-compatible or climate-resilient. Was poverty eradication measured in dollars per day or did it include prosperity and well-being? These would be very different trajectories to aim for.

Prof May: The NDP stated that zero per cent of the population should be living below the LBPL by 2030. This is unrealistic as half of South Africans currently lived below this line. It would be slightly more realistic and certainly desirable to achieve zero per cent below the FPL, beneath which a quarter of South Africans currently lived. It was obscene that in a country as wealthy as South Africa this should be the case. The target is not the eradication of poverty but ensuring that there is mobility across generations or across the life cycle that allowed people to make progress.

Prof Kirsten: From a macro-economic point of view, job creation required growth, and this comes at a cost to the environment. This is incompatible. So, could climate adaptation generate jobs?

Prof New: In terms of climate adaptation work in the vulnerability space, there is a debate as to whether the aim is to prevent increased vulnerability, or to be more proactive and move people forward. Could this be related to poverty and inequality, and could more meaningful adaptation targets be set?



Prof Gledhill encouraged social and natural scientists to invite one another to their conferences, and to trust the power of unintended consequences.

Coming from the Eastern Cape and having seen what goats can do, it was important to involve plant scientists to assess the impact on biological diversity when goats were introduced, especially as they might expand into other parts of the country as the climate changed.

GALA DINNER ADDRESS – MR TREVOR MANUEL (MINISTER IN THE PRESIDENCY)

Having been unable to attend the conference, Mr Manuel acknowledged that his observations might be at odds with some of the evidence-based research. He set out to examine some of the policy issues of the past 20 years.

Excellent research was taking place within the Academy, as well as by the NRF Chairs. But it was of concern that too little was finding traction in responding to the challenge of transformation. Whereas in the mid-1990s there had been extensive debates about what needed to be done to construct policy, very little presented itself currently.

Mr Manuel agreed with Prof Valodia's article in the *Business Day* the previous week in which he had taken issue with the idea of a 'stimulus package'. The problems of the economy were now structural. It was necessary to sift through the key catalytic actions that might affect transformation in the current poorly-structured economy and ask what could be done about some of the key issues.

This was very different thinking from that which said, "We have to be seen to be doing something". It was necessary to look at life differently and arrive at different conclusions, but the problem was that there was no policy space and there was no money to do things either. He hoped that the Academy would discuss what should be done to construct this because that was a precursor to the research undertaken by academics finding resonance across the country.

The key thematic areas of poverty and inequality, and their relationship to climate change, were fundamentally important issues. But it was not clear how the policy room could be constructed when there was a prevailing sense of desperation.

Mr Manuel described himself as a very good soldier for 'Thuma mina' and he was working very hard to help to raise the \$100 billion that the President had set as a target. The key issue was, however, "What did we want the money to do?"

The battle was for political will. The first issue was to take raw research, to fashion it into policy, to test it against the boundaries of what has been obtained at the moment, to design performance metrics, and to implement. That was the necessary transition: to convert the extensive work, modelling, papers and peer-reviewed articles into policy and ensure that these policies were

implemented. This discussion was essential. Some of these issues were very hard because they were the real test of governance.

Part of what was needed was to understand what had happened at various points and take a longitudinal look at the policy discourse.

Abstracting from the wider discourse issues relating to climate revealed a number of areas in which South Africa had once led. There was currently a big campaign to deal with single-use plastic. South Africa was one of the first countries to have issued a levy on single-use plastic bags. But this had not been pursued. Somewhere in government there was a fund that had accumulated a lot of money over the past 18 years, and nothing had been done with it. There was no education about the use of these plastics in the economy.

South Africa tended to take big leaps and then step back. When the Summit on Sustainable Development had been hosted in 2002, South Africa's commitment had been strong, and we had been able to disseminate our ideas across the country. In 2003, the first White Paper on Renewable Energy had been produced. The leadership had been there, but what had happened since?

In 2009 in Copenhagen, President Jacob Zuma had committed to a 34% reduction in GHG emissions by 2020, and a 42% reduction by 2025. Because South Africa was going to host a COP meeting in Durban two years later, the issue was front of mind for everybody at that time.

South Africa needed to translate these ideas informed by science in the same way that Lewis Pugh's long, cold swim had focused attention on the destruction of the oceans. Since his English Channel swim, every schoolchild in the UK was aware about plastics in the ocean and, unlike the situation locally, it was no longer possible to purchase a plastic straw anywhere in the UK. Cultural change happened because the focus was on the behaviour of people.

South Africa had had a chance between the Copenhagen and Durban meetings, but all of that had been overtaken by the horrible patronage of the years that followed Copenhagen. Everybody is aware of what has been happening at the Zondo Commission and what Thuli Madonsela wrote about in the *State of Capture* report. But the issues being discussed in this workshop were not part of public discourse. Until the switch that turned on this interest in society was found, regardless of how many papers were written, researchers would become frustrated that their ideas were not actually gaining currency in society.

In the Copenhagen report, South Africa produced ten metric tons of carbon dioxide (CO₂) emissions per capita; by now it may be 12 tons. It was important to talk about what could be done to reduce this. Ten years ago, it felt like South Africa was part of a global movement. Since then, we had become a complete outsider. That global movement was fundamentally important in the context of climate change because we were able to go forward with others, take decisions with others and access resources.

Ethiopia had taken on issues relating to climate change. Before the most recent drought there had been investment in reforestation, and commitment from the Ethiopian diaspora to invest in building the Grand Ethiopian Renaissance Dam to generate clean hydro-power. Urban development, roads and light rail represented positive moves to transcend the notion of Ethiopia being defined by famine. There had been a severe drought since but, notwithstanding that, the leadership of Ethiopia's government was fundamentally important.

South Africa had a great deal of research and other information available at that time. Mr Manuel had co-chaired the Global Ocean Commission and understood the links between what happened on land and in the ocean. The ocean as a carbon dioxide (CO₂)-absorbing sink had reached saturation, and the heat maps after Hurricane Maria swept through the North Atlantic in 2017 showed how quickly temperature change had taken effect, partly because the ocean was no longer able to deal with the absorption of CO₂.

Coastal communities depended on the ocean for their protein. In large parts of the world, that source had been completely destroyed – fished out and choked with plastic. The impacts of mining the seabed were well known, and yet one goal of the Blue Economy was to strip phosphate from the seabed to produce fertiliser in order to guarantee food security. Ironically, one part of the environment was to be destroyed in order to strengthen another.

These issues needed to be seen together in order to evaluate decisions that impacted on the quality of life of people. There was no doubt that, apart from a few denialists like Donald Trump, the science was incontrovertible. Part of the problem was the way in which we have been conditioned. While most people had followed the track of Hurricane Florence the previous week, few were aware of the decimation of the northern Philippines and the destruction in southern China, or the 100 people who had died in floods in Nigeria. Even our information sources were entirely unbalanced and affected our ability to reflect on and understand what was happening and who was being affected. Looking at the impact on the Carolinas, and every other storm system that had hit the USA, it was clear who had been worst affected in terms of race and class.

In terms of the issues of poverty and inequality, and their relationship to climate change, when people had their assets wiped out in that way they were often unable to recover. Sometimes it happened because we had been careless in how we treated the Earth, and sometimes other things had an impact.

Michael H Miller, one of the editors of the *New York Times*, told the story of how his family had bought a house – their only middle-class asset – in 1992. In 2008, the family had decided to refinance the mortgage to support their son's studies at New York University. As a senior at New York University, he had returned to see the 'For Sale' sign outside the house. The family had been impoverished by their efforts to educate their child. He had carried a sense of guilt and responsibility throughout his life.

While Mr Manuel was a Minister, the Filipino Minister of Finance had told him what happened every year in relation to big weather systems. When the infrastructure was wiped out, the State had to borrow money. In many parts of the country, poor people cultivated crops on marginal

land, and these got wiped out, along with losses of topsoil. People kept being driven back, and the State became less and less capable of providing support.

During the Mandela administration, South Africa had demonstrated a lot of policy and legislative leadership; for example, the National Water Act of 1997. The pollution of the Vaal River system and the situation in Sedibeng illustrated how much ground had been lost since then. Crops were being irrigated with polluted water, and the health system was incapable of dealing with the impacts of this.

Hopes for an inclusive fisheries policy had been dashed. Part of that inclusiveness meant sometimes having to take a hard line if the science indicated that it was necessary to adjust the total allowable catch. Mr Manuel had met someone in the Department of Agriculture, Forestry and Fisheries who had told him the names of the leaders of every coastal community from Port Nolloth to Kosi Bay, and what their relationships were. South Africa no longer had that skill set. It had been destroyed because of people in government bypassing the system and becoming corrupt.


The issue of food security should probably be on the agenda at the conference. In the past, the government had assessed the role of the 36 single-channel marketing councils and decided to get rid of all the separate councils and establish a single agricultural marketing council. Food prices had led inflation down from the high teens to single-digit levels. This was not meant to last forever, but it was important to take a series of policy decisions that allowed government to evaluate and be persuaded by the evidence from time to time.

Part of the reason why government had been unable to resolve the land issue was because they had not considered how to maintain a farming community in the industry of farming and how to address food security. In the mid-1990s, decision-making had been strategic rather than principled, and this had been perpetuated, which was not how policy should function.

South Africa had made a mess of dealing with land and Sections 25 and 26 of the Constitution. Section 26 had been dealt with in the Grootboom matter, because it was about the right to housing. South Africans had been raised on the notion of 'housing, security and comfort'. It was the urban side of land use, which was not the same as "the land shall be shared amongst those who work it." This had found its way into the property clause in Section 25 and was now contributing to the land issue.

In the first 15 years of democracy, the Department of Land Affairs had had the largest roll-overs of budget every year. The government had allowed this, and this situation had also contributed to the current land issue. It was not only important to increase the budget allocation for land reform; it was also necessary to account for the resources provided.

In 1996, a programme of fiscal tightening had been introduced: the Growth, Employment and Redistribution plan (GEAR). Despite this period of fiscal tightening, the government advanced a number of progressive social policies: the Child Support Grant was introduced, pensions



equalised, school nutrition programmes expanded, and free basic water and electricity provided. The footprint of revenue collection had been expanded by base-broadening and increasing what was raised each year.

In 2006/7, a fiscal surplus was embarked upon, partly because policy space was needed for counter-cyclical measures. This was possible only because the call for spending had not been as great as it ought to have been. That policy space stood them in good stead when the 2008 recession hit. But then the President and half of Cabinet were fired on 22 September 2008.

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A colleague in the leadership of the Communist Party had commented that we had thrown out GEAR – the baby, the bathwater and the bath. The economy had been growing at 5% a year, and jobs were being created. But strange things were also done, like the National Treasury being dismantled.

The National Planning Commission seemed to offer hope. Its 15 chapters addressed all the vital issues. Perhaps the last three chapters should have been focused on implementation, namely: a capable and developmental state (South Africa went completely in the opposite direction); fighting corruption (the country befriended it); and transforming society and uniting the country.

Had South Africa just done those three things, a platform would have been built that would have allowed us to deal with all the other issues that remain unattended. The country had fallen far behind in the past six years, but the touch points of the NDP remained as relevant as ever.

A slightly different view on matters was needed. When at COP21, the Paris Accord, had been signed three years previously there had been a sense of joy at how all the issues had come together, and how we had tried to understand the impact: what the global climate fund would do to redistribute money, to draw the links between various aspects of climate and the quality of life of people, and to construct an overall global social compact that recognised that the poorest countries are not the emitting countries. But now that too was in tatters. The battle right now was a battle for purchase – to get an understanding.

Mr Manuel had previously served on the Global Commission on the Economy and Climate. It had just released a report that it would hand over to the United Nations Secretary General, António Guterres, the following week. Mr Manuel had been encouraged to read the report because, by addressing the kinds of issues it raised, we could begin to reconstruct and support public argument with a lot more evidence. It is necessary to create the platform where raw research could become implemented policy.

Five issues identified by the report included:

- 1 **Clean energy systems:** Some work had been done and more was needed. South Africa could try to regain its place within this sector.
- 2 **Smarter urban development:** The opportunity came with the prospect that we could be rational about the urban land debate. There was an idea that you could expropriate land without compensation and place yourself anywhere. Yet nobody wanted to live in a shack without access to services. Because the government was not getting there fast enough, they were allowing people who wanted only to occupy land to hold up the development of the built environment and opportunities to accommodate the construction of communities. This point was fundamentally important.
- 3 **Sustainable land use:** Questions included: what did this entail, what land would we use, and what should go into and come out of the land?
- 4 **Wise water management:** Even in China, the first thing they told me about South Africa was that there was no water in Cape Town. It is important to try to understand the impact of behavioural change on water consumption in Cape Town and work out how to ensure that this kind of spirit is available for other things.
- 5 **Circular industrial policy:** This was similar to the argument against single-use plastics. It was important to understand the skill sets that are available, to harvest existing ideas, and to use this to construct the purchase for the transformation that the country needs, focusing on the links between climate change, poverty and inequality.

How messages were packaged is important. It was necessary to demonstrate that these things were within the realm of what is possible, and to re-engineer the climate debate itself.

Mr Manuel stated that if ideas from the workshop could find their way into a government that desperately needed to demonstrate that it wanted to drive change and build partnerships for change, this could be a watershed moment. Part of the message was that development deferred is development denied, just like justice.

Response: Prof Roseanne Diab

Prof Diab thanked Mr Manuel for a wonderful, wide-ranging talk. She reflected that each person would probably get something different from the presentation. For her the message was that we had taken our eye off the ball. We did good research, had wonderful policies, but had poor implementation. We need to make sure that the ecosystem of research feeds into policy, and that the implementation of that policy is working together in an integrated manner. Then there would be hope for the future.



DAY 2: 19 SEPTEMBER 2018

SUMMARY OF KEY POINTS

DAY 1 – PROF PHILIP HARRISON (WITS)

This session reflected on some of the insights from Day 1, in preparation for discussing possible ways forward.

Sobering reminders

- Lost opportunities: Mr Manuel had spoken of lost opportunities in South Africa, when policy had been formulated linking into the research base, but this had been lost over time.
- The sense of urgency: Prof Cousins had reminded us of the anger in communities and asked if researchers were responding to the urgency of the situation.
- Reversal in the gains made in poverty reduction: Prof May had alerted us to the shocking reality that there had been a reversal in gains made in poverty reduction and that poverty levels continued to rise.
- An analogy had been made between the current challenges and the early stages of the HIV/AIDS epidemic and how researchers had responded at that time.
- Prof Cousins had used the example of goats to highlight the fact that changes were happening that had not yet been detected by scientists, due sometimes to our own 'blind spots'.

The state of science

- There had been positive stories in each field of science, such as:
 - poverty research building on its earlier strength around measurement and moving beyond this;
 - inequality studies being strengthened by the setting up of centres of inequality studies, and shifting the focus from income to assets; and
 - recognition that South Africa was at the forefront of research across a range of areas of climate science.
- The struggle for science was to gain traction in policy. Profs May and New referred to research being in a fairly good state, but that this was not reflected in meaningful impacts. Information that could inform decision-making at appropriate scales was still a challenge.
- Mr Manuel had illustrated how South Africa had been massively diverted from earlier moments of policy promise but that there were also opportunities to regroup, such as around the New Climate Agenda.
- Prof Moyo had spoken of the failure to mainstream climate change at the local level, noting that climate funds remained unused.
- On a more positive note, Prof Ziervogel had spoken of the use of 'climate narratives' as a response, documenting what was happening and working at a local level.
- Pressures and incentives in the academic environment that militated against the co-production of policy had been raised.



- Mr Chikoko had expressed his frustration as a practitioner in the climate change field regarding the need to make the science more accessible for those who need to use it.
- There had been a recognition that questions of adaptive governance and organisation must become recognised as part of climate change science.
- There was a need for 'transformational climate change action' in which climate change action was used to facilitate other developmental responses.

Overall, the challenge was to translate research into policy and implementation.

Some productive underlying tensions

- There had been questions around whether economic growth secured or threatened sustainability. Common ground might be found using terms such as 'quality-enhancing growth', 'climate-compatible development', and 'climate-resilient pathways' but their actual meanings were unclear and still need to be debated. The debate around growth in relation to climate change had been confounded by extremely high levels of unemployment and the desperate need for job-creation.
- Different perspectives had been aired on the relationship between wealth and the environment. On the one hand, the Kuznets Curve suggested that growing income was good for the environment; on the other hand, there was clear evidence that the wasteful, resource-consuming patterns of the wealthy are not sustainable.
- There had been different shades of opinion on the role of measurement. Prof Joss had highlighted measurement as a governmental rationality that impeded engagement with the richness of meaning and contexts. Prof May had spoken of incorporating but going beyond measurement, and there had been other calls for better, more sensitive measurement systems that were informed by other disciplines.
- There had been an interesting discussion around scale, and the continuing disconnection between frameworks and policies on the one hand and lived experiences on the other. Points made had included: "rendering the global discourse more locally accountable," "paying serious attention to the sub-city scale," "getting to the nitty-gritty of local knowledge systems," and "more narrative on local adaptation". But the need to up-scale was also expressed by: "integrating climate



risk into macro-economic projections,” and “addressing differences in inequality between countries”.

The state of relationships between communities in science

- The conference organisers had not recognised a broad enough scope of disciplines when inviting delegates to attend. Participation by researchers in the arts and humanities could have contributed significantly into understanding the meaning of current changes and losses. The health sciences should also have been included.
- There had been a misconception that climate change science was limited to natural science; in fact, there was considerable engagement in climate change science with other dimensions such as human vulnerability and adaptation, social issues and justice.
- There was resistance from social scientists to engage with natural scientists, and a lack of quantitative skills in the social sciences. This barrier needs to be overcome.
- Prof Joss had stated, “Not all is well” in the relationship between sustainability research and the social dimension; he had been concerned that often “a poorly articulated social dimension [was] bolted onto an environmental sustainability discussion.”
- Integrated assessment modelling still said very little if anything about poverty and inequality.
- Obstacles to meaningful collaboration between scientists from different fields included:
 - different conceptual framings and languages,
 - very different methodologies, especially in relation to quantitative and qualitative research, and
 - practical pressures, especially the fact that academic work was not structured to enable cross-boundary engagement.

There was, however, a growing acceptance that different fields could tell only part of the story.

Pointers to crossing communities and more meaningful engagement

- The discourse needed to change, and joint efforts were required.
- Some conceptual linkages and cross over agendas could be found, for example through the capabilities approach, ideas of vulnerability and household shock, and the New Climate Agenda.
- Funding and data sources drove research, and these could be leveraged as instruments to promote cross over, such as looking at common data sources from different perspectives. The question was what it would take to produce joint research teams that cross over diverse fields.
- There were opportunities to draw methods across from one field to another, such as economists learning from modelling in natural sciences, and the use of participatory mapping of local knowledge to detect change and responses to change in climate science.
- Joint work was needed to bring local knowledge and voices into science to “[get] to the nitty gritty of local knowledge systems.”
- Cooperation was indeed possible at the level of implementation, especially in the context of policy engagements. Prof Valodia had specifically mentioned that, if natural and social

scientists worked with economists to develop public finance and tax policies that would support households adapting to climate change, it would enrich the quality of the proposals.

Additional points from participants

Mr Worthington: One of the opportunities for both raising the relevance of academic work and finding common points across disciplines is to find effective ways of speaking truth to power. This required interdisciplinary cooperation.

In 2008, the Long-Term Mitigation Scenarios report tabled in Cabinet had been approved. A key finding had disappeared, which was that we did not have a choice between businesses usual and a responsive approach. The conclusion was that we could not continue with current projections of economic growth and must reach the pathway required by science. It was also acknowledged that we did not know how to achieve this. As work had continued on mitigation and adaptation, the headline finding had been forgotten. Business as usual in many cases, like the 2018 coal strategy of the Minerals Council of South Africa, was suicidal.

The 2018 report, *What Lies Beneath*², presented a scientific framing to the understatement of existential risk. Continuing to avoid the difficult issues resulted in missed opportunities to forge solidarity amongst scientists. Climate change was an existential issue: we would fail, or we would succeed. Focusing on challenges to integration of different fields such as differences in methodologies took our attention away from the really difficult but important opportunity to develop synergies to determine what science could do to keep humanity alive.

This was not the same as the early stages of the HIV/AIDS crisis – this was no longer the early stages. We were not hearing from the scientific community what was not possible. South Africa's development plans, especially encouraging Chinese extractive industries, were simply not feasible as they were condemning future generations to the collapse of society.

Psychology was also needed because we were mired in denial and needed to understand how it operated. The recently-produced

² <http://climateextremes.org.au/wp-content/uploads/2018/08/What-Lies-Beneath-V3-LR-BlankSb15d.pdf>

draft Integrated Resource Plan³ as an exercise in denial: it was utterly indefensible and profoundly flawed. There had been no responses from the scientific community to say that this was the case.

ASSAf is an organisation that could provide a collective identity for individual scientists to issue these warnings without the risk that they would be attacked individually.

The slide showed that growing income was good for the environment was not scientifically robust. This notion needed to be more thoroughly interrogated. It was also important to move away from vague terms like 'economic growth'.

Unknown: Social scientists got frustrated by natural scientists who did not appreciate the basics of social research. Natural scientists should also start learning some of the basics of social science.

Prof Aswani: Natural scientists were more willing to adapt to social scientists than vice versa. The issue was not so much with social science as with the humanities. While some of the language of the humanities is useful, some was like oil and water with science. There were some in the humanities who wanted nothing to do with science; even humanities students did not want to engage in discussions. Finding cross overs in this context was very challenging and needed a lot of attention.

Prof Cousins: Regarding obstacles to co-production, academics were under severe pressure to publish. Things that distracted researchers from that narrow agenda, such as engaging with other disciplines and communities, or speaking truth to power, were time-consuming and not rewarded but punished. It was important to acknowledge that conventional ways of working as academics were part of the problem. The languages of different disciplines made it difficult for people to understand one another and work across the silos. Being an academic in a collapsing society was very challenging. Mr Worthington's sense of urgency and suggestion about forming a coalition to help us get beyond these issues was correct but very difficult to achieve in practice.

Prof Harrison: In addition to talking to government and policymakers, it was also important to talk to the institutions in which academics work to determine how to start reframing incentives.

Prof Gledhill, as a member of the ASSAf panel on collaborative publishing, supports the idea that the incentives drove academics in a certain way. The DHET incentives had raised the publication rate of South Africa but discouraged collaboration because there was a cost and the collaborative overhead was significant. ASSAf has the influence at the science-policy interface to call for incentives for collaboration across disciplines, for example in difficult areas such as co-production.

³ <http://www.energy.gov.za/IRP/irp-update-draft-report2018/IRP-Update-2018-Draft-for-Comments.pdf>

PANEL DISCUSSION: SYNERGIES AND TRADE-OFFS IN ADDRESSING CLIMATE CHANGE MITIGATION AND ADAPTATION, AND THE CHALLENGES OF POVERTY AND INEQUALITY – FACILITATOR: PROF ROSEANNE DIAB (ASSAf)

Speaker 1: Prof Kingsley Ayisi (Risk and Vulnerability Science Centre (RVSC), University of Limpopo (UL))

The RVSC was part of the Global Change Research Group in South Africa, initiated by the DST and the NRF at UL, Walter Sisulu University (WSU) and UFH. The presentation focused on a priority for the Limpopo province, namely food and water security.

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Primary agriculture was a major employer in South Africa. Combined with all the value chain processes, the sector played a significant role in the economy. Productivity had to increase to realise the sector's contribution to the alleviation of poverty and inequality.

Current challenges facing this sector in Limpopo included:

- The increasing occurrence and magnitude of natural disasters such as drought and land degradation.
- The loss of fertile soils and seasonal moisture shortages, and the impact on the nutrient content of crops.
- The loss of ecosystem services.
- Unsustainable farming practices.
- Short-term gains at the expense of long-term sustainability.
- Sub-optimal climate predictions in the short term, especially regarding rainfall predictions.
- Lack of adequate data for crop modeling.
- Low levels of interest in agriculture by the youth.

Socio-economically marginalised communities, including small-holder farmers, bore the brunt of this global challenge due to a number of factors, including low adaptive capacity.

The RVSC had commenced with local adaption strategies with the assistance of university colleagues from the social sciences and psychology, as well as those with technical expertise in agroecology.

They have been working with small-holder farmers to ensure food security, as well as semi-commercial farmers who generally had adequate resources to make an impact in terms of productivity, job creation and poverty alleviation, but who were often not very productive.

The intention was to scale up interventions from demonstration plots to the landscape scale. Technical training was provided to agricultural extension personnel and 'lead farmers' who were important influencers among their peers. RVSC also worked with NGOs and non-profit organisations (NPOs) for scaling up new interventions.

The approach promoted was climate-smart agriculture, particularly conservation agriculture, which was characterised by minimum tillage, maintenance of soil cover, and sustaining agrobiodiversity through crop rotation, intercropping and agroforestry.

It was important to establish good markets to drive agricultural value chain processes and improve gains from the agricultural sector. RVSC therefore worked with existing government initiatives such as conservation agriculture and Agri Parks.

Agriculture needed to become profitable to increase job creation and attract the youth. To this end, high- school projects were encouraged.

Speaker 2: Prof Harald Winkler (UCT)

Inequality and mitigation: inter-national comparisons across countries

Inequality and climate change mitigation were two crises that required urgent responses. In the literature most information on inequality in GHG emissions and poverty was available between countries rather than within countries (Fig. 4). It was clear that poor people used less energy and produced fewer GHG emissions than the wealthy, so the issue was not population per se but the affluent population who were high emitters.

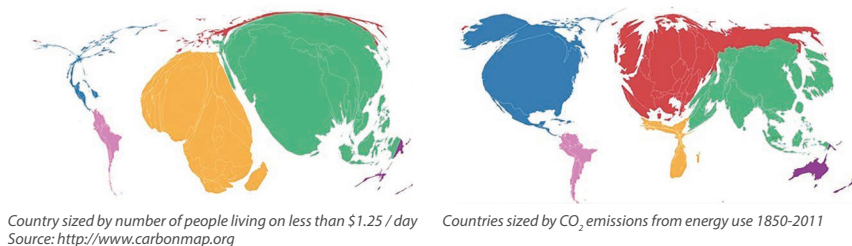


Figure 4: Country sizes as a representation of levels of poverty and CO₂ emissions

Climate action is urgent and so long overdue that action was required by all countries, regardless of their emissions levels. Under the Paris Agreement, 176 countries had made nationally determined contributions. Despite this, it was likely that instead of a one to two-degree increase in global temperatures, a three to four-degree rise was likely.

The challenge for South Africa and other developing countries was how to avoid high-emission development pathways (HEDPs). From the point of view of equity, developed countries and rich people had benefitted from HEDPs, which had resulted in both climate issues and inequality. There was a clear demand for low-emissions development paths (LEDPs), but poor people still needed access to energy services. Four out of five Africans had no access to electricity.

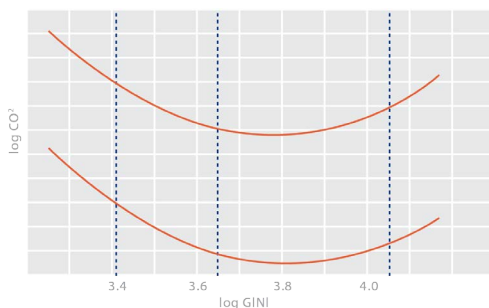
One way to address this imbalance was by financial transfers but there was great resistance to this. Very little was known about the economics of climate change, but the Stern Review on the Economics of Climate Change had made it clear that globally the costs of inaction were very likely to exceed the costs of action.

Inequality and mitigation: the national question

Much less attention had been paid in the climate policy literature to inequality within countries, both socio-economically and environmentally. As shown in Figure 5, up to a point, reducing inequality reduced CO₂ emissions, but after that point, emissions once again increase. The policy issue is how to reduce both inequality and CO₂ emissions after this point.

Recent research had shown that the real driver of emissions growth at a household level across all income groups was expenditure (Fig. 6). The effect of population was relatively small; it was the affluent population that was most significant (Irfany and Klasen 2017⁴).

Lifting the poor out of poverty would not lower the carbon budget. The rich need to learn to live with less and the aspirations of the middle class need to change to living well, rather than having more.



Source: Grunewald et al 2011

Figure 5: Income inequality and per capita CO₂ emissions appear to have a U-shaped relationship (Source: Grunewald et al., 2011⁵)

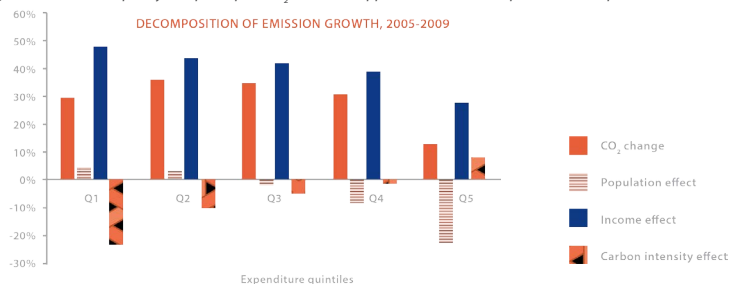


Figure 6: Total expenditure drives income and GHG emissions in Indonesian households (Source: Irfany and Klasen, 2017)

Characteristics of a theoretical framework

- 1 A process was needed to construct a radically interdisciplinary theoretical framework, which was not just cognate (Winskel, 2018⁶).
- 2 Both quantitative and qualitative methods needed to be used and respected.
- 3 Through focusing on innovative development pathways, synergies needed to be found so that both poverty-inequality and emissions were reduced.

⁴ Irfany, MI and Klasen, S. 2017. Affluence and emission tradeoffs: evidence from Indonesian households' carbon footprint. *Environment and Development Economics*. 22(5), 546-570.

⁵ Grunewald, N, Klasen, S, Martinez-Zarzoso, I & Muris, C. 2011. Income inequality and carbon emissions. *Courant Research Centre: Poverty, Equity and Growth - Discussion Papers* 92. Courant Research Centre PEG.

⁶ Winskel, M. 2018. The pursuit of interdisciplinary whole systems energy research: Insights from the UK Energy Research Centre. *Energy Research & Social Science*. 37: 74-84.

- 4 The theoretical framework should include an understanding of how change happened, which could include policy, investment, technology, actors and institutions.
- 5 Systems thinking was very important, including identifying places to intervene in a system (Meadows, 1999⁷).
- 6 It should inform adaptive management, recognising that the process was not linear and that that no-one was in charge (O'Brien and Selboe, 2015⁸).
- 7 A new social contract needed to be considered based on the notion of living well rather than having more (Winkler *et al.*, 2015⁹).
- 8 The co-production of knowledge with stakeholders at local, national and global levels could take us beyond interdisciplinarity to transdisciplinarity.

Speaker 3: Dr Catherine Sutherland (UKZN)

Poverty and inequality and climate change were inextricably linked in multiple ways:

Poverty and inequality with climate change added

The starting point for Dr Sutherland's research was poverty and inequality. The poor experienced multiple inequalities, issues and challenges. Climate change was causing environmental changes and exacerbating the impacts of poverty and inequality on the urban poor.

The relationship between climate science and poverty and inequality could easily be observed at a local scale. Dr Sutherland had been working for five years on an action research project focusing on climate and water governance in the Palmiet River catchment in Durban, and involving the Quarry Road West informal settlement located on a floodplain prone to flash flooding.

Synergies created through integration of different forms of knowledge

A community-based flood risk warning system had been set up, drawing on both 'expert' and civic science in the process. River Watch, a citizen science group in Westville, had been recording rainfall. The informal settlement was at the bottom of the Palmiet River and was prone to flooding. Every time there was a storm in Durban, a member of River Watch would record the amount of rainfall and send Dr Sutherland a WhatsApp message. She would then phone the community. Through civic science they had assumed that it took about 40 minutes for the water to reach the settlement, giving time to warn the community of the impending flood.

Over time, better science-based information became available, such as weather service information from the city, and storm warnings from Disaster Risk Management. But then the group started to get many warnings about severe storm events, which frightened the community members, even though not all the warnings resulted in disasters. It was important not to cause unnecessary fear.

⁷ <http://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/>

⁸ O'Brien, K & Selboe, E (Eds.) 2015. *The adaptive challenge of climate change*. Cambridge: Cambridge University Press.

⁹ Winkler, H, Boyd, A, Torres Gunfaus, M & Raubenheimer, S. 2015. Reconsidering development by reflecting on climate change. *International Environmental Agreements*. 15 (4): 369-385. DOI 10.1007/s10784-015-9304-7



Better science was needed to predict when storm events might affect the settlement. At the same time, the municipality was responding to these challenges. The Coastal and Storm Water Management Department had set up a radar system at UKZN to predict storms more accurately. This enabled flood risk messaging to become more precise. Cell-phone technology also improved and people in the informal settlement were able to become part of WhatsApp groups and start communicating about storm risks.

Dr Sutherland worked with a group from the University of East Anglia who helped them to downscale big climate data predictions for Durban and fine-tune predictions of storm water flow across the city. Combining all this information from local knowledge, science and the municipality resulted in the fine-tuning of risk information that could be communicated to the informal settlement.

There had also been a participatory GIS mapping project in the community, and drones were now being flown over the community to assess the risks more scientifically.

The value of this case study was that it had generated lessons about governance and how to integrate social science, local knowledge and high-level science to overcome the challenges of climate change.

Poverty and inequality and climate change reflect structures of society and human agency

From a political economy or Marxist point of view, both poverty and inequality, and climate change reflected problems with advanced capitalism and the structure of society. At the same time, the power of human agency was revealed. People were adapting to climate change, changing their situations in relation to poverty, and claiming their place in the city.

These three challenges required people to move beyond just building resilience, through the transformative actions of human agents, to the deep structural changes that could transform society. Focusing narrowly on adaptation would result in people continuing to be expected to cope and adapt, without any real change to poverty and inequality; this in turn would result in an ongoing need to keep adapting.

Focus on adaptation, but mitigation requires transformation that re-orientates thinking about addressing poverty and inequality.

Attempts to address poverty and inequality from within the dominant neo-liberal frame have so far been ineffective. Alternatives were needed to pro-growth *versus* environmental sustainability

debates, and climate change would force this to be addressed.

Working in transdisciplinary teams at UKZN, it appeared that most of the work on climate change was influenced by socio-ecological systems thinking. On the other hand, the social science approach drew on socio-ecological relations thinking, which was informed by political ecology and theoretical frames that included issues of power and politics. It was a challenge to encourage scientists who were embedded in socio-ecological systems thinking to embrace socio-ecological relations thinking.

Addressing poverty and inequality could assist with climate change mitigation. In the report *Towards a Low Carbon City: Focus on Durban* produced by ASSAf in 2011, one of the critical mitigation issues mentioned was transport. Durban has changed its approach to informal settlements and was starting to upgrade them and plan for them through the city's Resilience Strategy. Informal settlements located close to the city were contributing to densifying the city. Through their own human agency, the urban poor were doing the very things that needed to be done to mitigate climate change. The city was supporting this by upgrading these settlements rather than following the Reconstruction and Development Programme (RDP) model of developing low-cost housing on the periphery of the city. Looking at the cross overs between poverty, inequality and climate change could initiate a radical transformation and restructuring of the city to address both concerns.

The EPIC Africa programme

In Durban, an exciting educational programme called Epic Africa was being piloted that involved teaching, learning and community-based action research. It was a partnership between the university and the municipality. Students would be doing internships in the municipality and working in the university. They would be involved in building new knowledge at the interface of climate change science and social science.

Mr Reinhardt Arp (WWF-SA)

Can climate change, poverty and inequality be addressed synergistically?

"The real choice is not jobs or environment. It is both or neither." (Kohler, 1996 in ILO, 2010)

Considering the frequent polarisation of the environment and economic development, can sustainable development be achieved, or is there a trade-off between development and sustainability?

Simply put, development was the improvement of human well-being, while ensuring that no





one was worse off than before. On the one hand, one might argue that this had been achieved and that indicators like GDP were used to measure development. But on the other hand, the poor and marginalised were not captured in GDP measures. They often depended on the environment for their well-being and thus the state of environmental health could be considered a measure of the GDP of the poor.

If modern 'development' was contributing to environmental degradation, then this was not development at all; it was perverse. Any kind of development that made certain groups of people worse off was not development. Development, by definition, must be sustainable in nature.

Climate change, poverty and inequality could be addressed synergistically. Addressing social issues by means of development had to be sustainable and address the climate change issue. If not, it was not development and would not reduce poverty and inequality.

The opposite was true as well. Climate change was as much a social issue as it was an environmental issue. The poor and marginalised were most vulnerable to the impacts of climate change, as were those in the lower levels of the middle class who were at risk of falling into poverty.

Climate change impacts like floods and droughts could reduce the natural capital (or environmental GDP) of the poor by destroying income-earning assets and discouraging future investment in income-earning assets. This could impact on health and nutrition, which in turn could impact negatively on educational outcomes and the ability of people to work, all of which negatively influenced income-earning capacity.

Climate change could deepen and broaden poverty, which in turn contributed to inequality. Addressing climate change, through either adaptation or mitigation, could help to avoid this. Climate change policy and action empowered the poor and marginalised with tools to escape poverty instead of relying on the so-call 'trickle-down effect' of neo-liberal capitalism.

However, certain issues and contexts created circumstances in which trade-offs were necessary. Effective policies and policy implementation were needed to reduce these potential trade-offs. There was no need for them to undermine efforts to combat climate change or address poverty and inequality.

There were also contexts in which synergy could easily be achieved and certain aspects of poverty and inequality could be addressed in a sustainable way. An example would be reducing energy poverty with decentralised renewable energy systems. This in turn created another trade-off, with municipalities losing revenue from electricity tariffs.

Existing synergies and trade-offs

Synergies and trade-offs were context-specific and occurred at different spatial and temporal scales. Adaptation tended to be more short term, such as adapting to short-term changes in weather patterns. Adaptation practices needed to be adaptable. Mitigation was more long term.

There were potential trade-offs between short and long-term actions. The carbon tax, for example, had potential negative impacts in the short term, which adversely affected the poor relatively more than the rich. It threatened to increase prices of high-carbon goods, such as electricity, resulting in negative developmental impacts. In theory, in the long term the carbon tax would encourage a shift away from expensive coal-based electricity to cheaper renewable electricity. This trade-off could be managed by using the carbon tax to subsidise electricity prices for the poor until the shift to renewable energy was complete. The tax might also be used to create a 'climate fund' to assist communities affected by climate-related shocks.

This highlighted another trade-off. The transition from fossil fuels to renewable energy threatened jobs in the energy-generation sector. Again, the carbon tax could be used to fund the training of employees for jobs in the renewable energy sector.

In trying to reduce energy poverty, another trade-off existed: supplying more people with electricity increased emissions and therefore contributed to climate change. However, this trade-off could be avoided by improving energy efficiency and supplying all newly-connected homes with renewable energy. This would turn a trade-off into a synergy.

Some trade-offs were not as obvious or easy to address, such as the Clean Development Mechanism (CDM). The goal of the CDM was to reduce emissions in developing countries by enhancing technology transfer from industrialised to developing countries and contributing to sustainable development and the reduction of poverty and inequality. However, the CDM worked as a market mechanism, and developed country partners focused on achieving efficiency gains in the most cost-effective ways to capture the maximum economic value from reducing emissions. The main outcome of the CDM had been projects that involved low-cost emissions reductions rather than social benefits in developing countries. This was because contributions to sustainable development were not valued the same as emissions reductions, which created additional tradeable credits.





How policy and planning can strengthen synergies and avoid trade-offs

The current sectoral approach to policy design and government departments needed to change. The way in which the system was set up currently led to counter-productive actions, as for example the conflict between the coal strategy of the Minerals Council of South Africa and the Climate Change Bill of the Democratic Alliance. Policy needed to speak to both different departments and different resources, such as the food-energy-water nexus to insure integration.

How to build awareness and knowledge in the education system

Recently, at the Rethinking Economics for Africa event at Wits, young students had been debating changes to the Economics curriculum. Most of the discussion had related to social and political economics. There had not been a single session on environmental economics, for example, the effect of the drought

on poverty and inequality. As educators, how could the curriculum be changed to move away from neo-liberal economics, which was mathematically dominated, and towards economics that integrated social, institutional, political and environmental concerns?

Discussion Session

Prof Aswani: Prof Winkler had mentioned a carbon footprint per capita, and that this was much lower in Africa than in the North. The issue was not only about carbon emissions; in a subsistence context the biodiversity reduction footprint was also very important, and here the human population had a tremendous footprint. Coral reefs were being destroyed by dynamiting and widespread deforestation was occurring due to increasing populations. As biodiversity declined, human resilience to climate change shocks was also reduced. It was important to think about other dimensions linked to the issue of climate change.

Response – Prof Winkler agreed about the biodiversity issue. In his presentation he had been reacting to the narrative that blamed all sustainability issues on population growth, rather than the affluent part of the population which he considered the core issue.

In response to Mr Arp's point about synergies, South Africa had just passed a tipping point where renewable energy represented an incremental saving, rather than an incremental cost. This created positive opportunities.

Mr Worthington: The word trade-off could be used as a euphemism. It sounded like both sides were getting something out, but sometimes one party was expected to sacrifice, such as

when a wetland was drained for development. As stated by Mr Arp, the biggest trade-off was temporal: it was between our present comfort and our children's survival in the future.

We did not fully describe what was being traded when we chose short-term gains above sustainability. Furthermore, while the term 'trade-off' might suggest that both parties were able to 'haggle', those whose interests were most compromised were seldom in a position to negotiate on an equal basis.

In response to Prof Ayisi's point about the restoration of soil carbon being a mitigation opportunity that also benefited agriculture, the synergies were a little weak. Better ways were needed to amplify opportunities that addressed poverty, inequality and climate change.

Response – Dr Sutherland: The issue of trade-offs was an important point. Considering where informal settlements were situated in the city, where the urban poor were moving to, and how that was helping mitigation, it was not always a case of trade-offs. If we are clever, many of the poverty and inequality challenges we are trying to address could also benefit climate change. Both these huge challenges required new economic and social systems. It was no longer appropriate to continue making trade-offs between the environment and the economy; they were one and the same – a socio-ecological system working for people and the planet.

Response – Mr Arp agreed that we should not hide behind the word 'trade-off' but stated that it was a term engrained through an education in economics.

Dr Hlekani Kabiti (Walter Sisulu University): Dr Sutherland's presentation was a good example of how science could become relevant to communities and how climate change knowledge could be applied in the process of working with communities. How might communities be prepared to take over a project so that it ran sustainably after the project implementor moved on?

Response – Dr Sutherland was very aware of this issue. The university representatives saw their role as trying to build relationships between citizens and the State. Since the WhatsApp group had been formed, there had been less dependence on her to make the phone calls. Although the university wanted to remain involved, were they to withdraw, stronger and more open relationships had been developed between citizens, the local State, and the university, which had better access to one another. Previously, researchers had needed to visit the settlement with armed undercover bodyguards; now citizens understood the local State and could engage with them to get responses to their concerns. Many of the citizens had visited the university to participate in GIS mapping and the doors of the university would remain open. The relationships that had been established needed to remain in place for this to be sustainable.





Response – Prof Kingsley Ayisi: Regarding a succession plan, UL worked with provincial departments, like the Department of Agriculture, and municipalities. At the beginning of the project, we had workshops at which intentions were clearly conveyed. When we did our field trials, we worked with postgraduate students and members of the community on the experimental protocols. By the time we finished, the farmers and extension officers were knowledgeable. Even though farmers were not initially involved in climate-smart agriculture, after extended periods of drought we observed them implementing the techniques. We reached a stage at which the government extension officers could take over.

Mr Arp: The renewable energy programme had experienced a lot of resistance from the labour unions as they saw it as privatising natural resources, leading to the exclusion of the poor and most vulnerable. It was important to understand the views of diverse groups in society in order to work together towards a common desired future.

Response – Mr Worthington: In response to the point about synergies, renewable energy had passed a tipping point; while it used to represent an incremental cost it now offered an incremental saving. Decentralised systems were needed to enable local ownership.

Mr Samuel Nduma Chademana (C40 Cities): With regard to the point about synergies, how was the idea of social capital relevant, especially at a community level? The attitude of ‘othering’ was another issue that needed to be dealt with, especially in future when there would be scarcity of resources. Considering the inequalities in society, the well-off were always going to survive better than the poor, and attitudes of othering would arise.

From a local government perspective, it was important to create strong institutions at a local level. If possible, the response to issues of climate change and poverty would have to be devolved to the local level, along with the necessary power and resources, because it would never be possible to obtain the necessary trade-offs without strong institutions to manage them.

Response – Dr Sutherland: The question of social capital was very important. It related to governance and whose voices were heard. One concern in the context of climate adaptation work and community-based resilience was the risk that all the responsibility could be passed on to ordinary people or ‘social capital’. People were very resilient, but there was a danger that, if communities were just expected to keep adapting and being resilient, nothing would change structurally. While it was important to draw existing social capital into good governance networks, the local State and the private sector also needed to get involved, make decisions and act. Social capital in its broadest form involved all actors – the private sector, the State and

local citizens – enabled by governance arrangements to work collectively to effect transformation.

Ms Sehulule Moyo (UJ): It was of concern that health sciences were not represented on the programme, despite the impacts of poverty, inequality and climate change on community health. It was recommended that health sciences be incorporated as a priority in future.

Prof Diab: This point was very well taken; it was an oversight of the programme committee.

Response – Prof Kingsley Ayisi: The RVSC was investigating health from the perspective of water quality. It was not just climate change, but global change in general, that affected aquatic ecosystems and had impacts on sediment loads, species and human health. In relation to malaria, they were developing early-warning systems to detect, for example, how increasing temperatures affected the movement of the vector.

Prof Harrison: The workshop had generated some shared understandings of issues and possibilities, which would be summarised in the workshop report. Some practical suggestions and a shared framework regarding the way forward were required.

Mr Jonathan Diederiks (NRF) raised the need to influence the NRF. The NRF was beginning to engage with societal impacts but, because they had operated in an academic environment for so long, their idea of societal impact was limited to making scientific information available. They needed to do much more than this, including addressing the extreme pressure on researchers to publish, which restricted opportunities for engagement and the practical application of science. The NRF could make an impact in this regard because they funded about 40% of MSc and PhD students.

The Global Change, Society and Sustainability Research Programme of the NRF did consider practical aspects of the impact of science, and not just the numbers of postgraduate students. They were investigating how to bridge the gap between science and its impact. While the policy-science interface was good, implementation was very limited. There were many other practical, informal, non-academic ways of implementing science. It might not even be the responsibility of the scientists to do this, but it was important to build specific requirements for this function into project applications. This could involve NGOs and CBOs engaging with researchers to translate the science into practical impact.

The issues were urgent and there was not enough time to wait for iterative change. The NRF was investigating a new research agenda, so it was a good time to engage senior management. If a report from this workshop was sent to the right people, it could influence their understanding of what it



meant for science to have impact. It was important to take the time to engage the NRF, so that this opportunity was not missed.

Prof Diab: Prof Gledhill served on an ASSAf panel on incentives for collaborative research. It was set up due to pressure from physicists who participated in huge collaborative projects. Hundreds of researchers might co-author a single paper, but the DHET gave them no recognition. Considering what is being learnt about the co-production of knowledge and the work of the social sciences, this would be another area to research.

For information, the draft White Paper on Science and Technology in South Africa had just been published and was briefly available for public comment. Social scientists interested in collaborative, transdisciplinary work were urged to comment.

A foresighting exercise was underway, undertaken by the National Advisory Council on Innovation. It was looking at which thematic areas South Africa should be focusing on, and this community was encouraged to comment.

Unknown: The professors of science were asked to generate objectives that were accessible to all, and not just to the scientific world, so that it would be easier to explain to the public the impacts of research.

Dr Sutherland: The type of research conducted by Dr Sutherland was only possible because of the involvement of community researchers. They had been funded through the NRF, but due to the funding structures there were no permanent positions available, despite their experience. They represented an important group of young, emerging or community-based researchers. They were often involved in training PhDs and contributed to capacity building for the future. It was difficult for academics to keep finding other funding streams to keep these critical researchers in the system.

Prof Gledhill: It had recently become apparent how much the science-policy interface was in trouble. At the time when the Foresight documents were produced (1995), the science-policy interface was growing. It was important to pay special attention to this issue:

- ASSAf's science-policy interface strategy needed to be strengthened and resourced in order to make deliberate input.
- Professional science bodies needed to ensure that representatives attended stakeholder engagement sessions and that coherent information was conveyed.

Prof Gledhill had attended a meeting to discuss the reports that ASSAf sent to the DST. The DST representative had indicated that the reports were not used strategically, but simply for project accountability and to justify funding. Other documents would go through with policy inputs, but a more deliberate policy of targeted communications might be needed. These could take different forms, such as spreadsheets, infographics, lobbying information and inputs for white papers. It might be time for a science campaign through the South African Agency for Science and Technology Advancement (SAASTA).

Prof Winkler: Information was needed to help society (including government, business and civil society) to address the two major crises of climate change and poverty and inequality. Thinking about where such a conversation might take place, one possibility was the National Planning Commission's Just Transition to a Low-carbon, Climate-resilient Economy and Society dialogues convened by Tasneem Essop.

Was it possible to work through ASSAf to develop a shared theoretical framework drawing on multiple theories and methods and enabling continued conversations? Was there a structured way to have these conversations so that our complex theoretical frameworks and methods could produce better information? Was there an existing instrument in ASSAf to take this forward?

Prof Diab: The Standing Committee on Science for the Reduction of Poverty and Inequality had called the workshop. At their next meeting they would discuss the outcomes of this workshop and decide how to take some of the items forward.

Prof New: Two possible ways forward included:

- Synthesising what was already known so that it could be used in policy discussions.
- Determining where the knowledge gaps were and what interdisciplinary research questions should be worked on going forward.

Mr Chikoko: Cities provided the ideal environments for transdisciplinary work. Cities should become the centres of delivery of climate change interventions in South Africa.

There was a great need for interdisciplinary work in cities to research aspects like budgeting, planning systems and delivery mechanisms. Cities were developing tools and systems through trial and error, following the praxis method of trying, learning and refining. If academics could collaborate with cities, they would be better able to identify existing information gaps. C40 tried to ensure that their work was evidence-based but had experienced very poor responses to requests for data or studies. The support of academics was needed to generate the necessary information.

Prof Ben Cousins: Beyond the academic community and its partners, it was necessary to think about the wider economy and speaking truth to power. The land sector was highly political. To bring research to bear on big policy questions that were also very political, it was necessary to think carefully about forming alliance partners and how to frame things. There were powerful interests at work, including the mineral-energy complex. It was important to know how to intervene in the real world of politics, and how climate change might create opportunities to respond to real concerns like South Africa's massive unemployment rate. Were there opportunities to engage the unions, and who would be responsible?

Academics were scattered and fragmented across their institutions. In order to respond more effectively to these pressing issues, it was necessary to form some kind of advocacy coalition.

Dr Sutherland: The policy space mentioned by Mr Manuel needed to be forced open. High-level political actors often picked up on ideas if they thought they might benefit them politically. Mr Manuel said that the South African government was desperately looking for something that would bring change. In the past, the environment, and poverty and inequality, had been polarised; however, the workshop had focused on the links between climate change, poverty and inequality and shown that these issues were dialectical, shaping and changing each other. There was an opportunity, either through ASSAf or to write an opinion piece that decision-makers could pick up on as they scanned the media for new ideas. This was the moment to get this perspective into the political space. A group of social and physical scientists under the banner of ASSAf could lead the way in creating the policy space to take these ideas forward.

Mr Worthington: With regard to 'speaking truth to power', big power sat with big money. The policy-science interface was important, but it might be more productive to engage the financial sector and business through organisations like Business Leadership South Africa (BLSA) and Business Unity South Africa (BUSA). ASSAf could challenge business formations to finance a facility to review and evaluate proposed big-picture interventions like the coal strategy. Science had authority and business leaders needed to invest in evaluating which of their proposals lacked a sound basis in science. This was less about advocacy than about

good science adding value to BLSA. An example of this was the gas utilisation master plan that had been promoting gas infrastructure development, based on the assumption that gas was more climate-friendly than coal. This was, however, not well established due to the problem of methane leaks, which contributed significantly to GHG emissions. The Integrated Resource Plan included sizeable investment in gas infrastructure development, which might become a barrier to renewable energy. Had the development of gas infrastructure been scientifically assessed?

Prof Mtapuri: Some fields of research were more quantitative and others more qualitative. One of the critical skills gaps that needed to be addressed was programming. This should become a compulsory skill taught at universities.

Mr Worthington: Poverty tended to be measured in monetary terms but addressing energy poverty and nutritional poverty represented opportunities to address poverty and inequality through climate action. Similarly, those involved in addressing poverty and inequality needed to take a broader view of poverty than simply focusing on market pricing.

Prof Winkler: The issue of gas was complicated. The shale gas assessment had revealed that, while gas burned cleaner than coal, shale gas from fracking might have GHG emissions as high as coal for electricity, if leakage rates of methane were very high. It was important to keep a close eye on developments in this sector. Until the issue of affordable storage of renewably-generated energy was resolved, however, a combination of renewables and gas would be more climate-compatible than extending coal-fired generation.

In terms of employment across all energy sectors, jobs in the coal value chain were in decline in South Africa and elsewhere. Where renewables were concerned, much depended on how the transition to renewables took place. In the early stages of adoption, many small local companies tended to be created; but as the sector developed, more multinational companies got larger shares of the market and these tended to create fewer local jobs. Granular information was needed about the number and types of jobs created during construction and afterwards. This sector did not provide employment for large numbers of unskilled people. The issue of just transitions for workers from coal mines also needed to be considered because South Africa had to transition from coal; this had been part of energy policy since 1998.

An often-forgotten but essential sector in which local jobs could be created was energy efficiency and conservation. Energy service companies trained people to do energy audits and installations of energy efficient technologies. There were opportunities for academics to engage with organisations seeking to create jobs in the renewable energy sector, such as the One Million Climate Jobs Campaign.

Mr Worthington: Other opportunities to engage the financial sector could include the investment community and the banking industry, both of which needed to consider the risk profile of investments.

With regard to shale gas, The Strategic Environmental Assessment (SEA) for Shale Gas Development in the Karoo was a great example of an assessment and of science informing policy; but what had been the impact of the report?

One of the most valuable pieces of energy research was the SEA on renewable resources. It had contributed greatly to knowledge of resources and sustainability, and this knowledge could now be applied to specific contexts. More SEAs were needed.

An opportunity for young scientists to contribute to planning pathways for a just transition was the National Planning Commission engagement on 3 October 2018 in Gauteng, focusing on hearing from the youth.

Prof Cousins: Participants had distinguished between terms such as socio-economic systems and socio-ecological relationships, and interdisciplinarity and transdisciplinary. It was challenging to try to understand these nuanced differences and to work across the boundaries between the natural, physical and social sciences, and the arts and humanities. Geographers were best able to do this, and that discipline might have a key leadership role to play in this area.

Prof New: There was an opportunity to stimulate discussion through an opinion piece on the IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels, launched at the 48th Plenary of the IPCC on 1 October 2018. It looked at the links between climate change targets, adaptation and mitigation, and the sustainable development goals. It did not interpret what that report meant for South Africa and an article might stimulate thinking around this.

Mr Chikoko: Johannesburg, Cape Town and Tshwane were in the process of developing climate action plans and their stakeholder engagement plans required engagement with academia. It was hoped that those present would participate.

CLOSING STATEMENT – PROF PHILIP HARRISON (WITS)

This gathering and ASSAf were uniquely positioned to pull together a combined voice, but how and to what purpose? This might take the form of an advocacy coalition, or entail approaching business to fund a facility that could fund urgent research in this field.

The workshop had been an interesting intellectual experience and had generated some practical opportunities, which needed to be thought through more closely:

- The standing committee and another gathering needed to discuss how to create a joint voice in coalition with others.
- More discussion was needed on how to bring research information to society.
- The standing committee should take aspects of the workshop forward in a more systematic way by, for example, working on a report that dealt with issues like:
 - shared theory,
 - a shared conceptual base,
 - the big research questions, and
 - developing a resource on the extent to which cross overs existed.
- Existing points of influence, such as the NRF, should be followed up. Incentives and different funding structures should be explored that would facilitate cross overs.

VOTE OF THANKS – PROF ROSEANNE DIAB (ASSAf)

Prof Diab thanked the following people and organisations for enabling the workshop to take place:

- The DST for funding provided through a Parliamentary grant that allows ASSAf to convene workshops.
- The Standing Committee on Science for the Reduction of Poverty and Inequality for suggesting this workshop and for the strategic input they provided to ASSAf.
- Prof Philip Harrison for his efforts in planning and convening the workshop and for his summary of discussions on Day 1.
- Ms Nadia Algera for coordinating the logistics of the workshop.
- All ASSAf staff members who had attended the workshop, and the hard-working staff of ASSAf in general.
- All the workshop participants for their contributions.

The report of the workshop would be made available on the ASSAf website, and documents referred to in the workshop would be circulated by Ms Algera.



ACRONYMS

ACCESS	Applied Centre for Climate and Earth Systems
ACDI	African Climate and Development Initiative
ASSAf	Academy of Science of South Africa
BLSA	Business Leadership South Africa
BUSA	Business Unity South Africa
CBDRRC	Common but Differentiated Responsibilities and Respective Capabilities
CDM	Clean Development Mechanism
CEEPA	Centre for Environmental Economics and Policy in Africa
CO2	Carbon dioxide
COP	Conference of the Parties
CSIR	Council for Scientific and Industrial Research
DEA	Department of Environmental Affairs
DHET	Department of Higher Education and Training
DST	Department of Science and Technology
EES	Energy Efficiency Savings
ESS	Earth system science
EU	European Union
FPL	Food Poverty Line
FRACTAL	Future Resilience for African Cities and Lands
GDP	Gross domestic product
GEAR	Growth, Employment and Redistribution
GHG	Greenhouse gas
GIS	Geographic information systems
HEDP	High-Emission Development Pathways
HIV/AIDS	Human immunodeficiency virus/acquired immunodeficiency syndrome
ICT	Information and communications technology
IDP	Integrated Development Plan
IPCC	Intergovernmental Panel on Climate Change
LBPL	Lower-bound Poverty Line

LEDP	Low-Emission Development Pathways
LTMS	Long-Term Mitigation Strategy
MPA	Mitigation Potential Analysis
M&E	Monitoring and evaluation
NGO	Non-governmental organisation
NDP	National Development Plan
NIDS	National Income Dynamic Study
NPO	Non-profit organisation
NRF	National Research Foundation
PAYE	Pay as you earn
PLAAS	Programme for Land and Agrarian Studies
RDP	Reconstruction and Development Programme
REDD	Reduction of Emissions from Deforestation and Degradation
RU	Rhodes University
RVSC	Risk and Vulnerability Science Centre
SAASTA	South African Agency for Science and Technology Advancement
SAEON	South African Environmental Observation Network
SALDRU	Southern African Labour and Development Research Unit
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SARS	South African Revenue Service
SDG	Sustainable Development Goals
SEA	Strategic Environmental Assessment
Stats SA	Statistics South Africa
SU	Stellenbosch University
UBPL	Upper-bound Poverty Line
UCT	University of Cape Town
UFH	University of Fort Hare
UJ	University of Johannesburg
UK	United Kingdom
UKZN	University of KwaZulu-Natal
UL	University of Limpopo
UN	United Nations





UNFCCC	United Nations Framework Convention on Climate Change
UP	University of Pretoria
US	United States
UWC	University of the Western Cape
VAT	Value added tax
WfW	Working for Water
Wits	University of the Witwatersrand
WoF	Working on Fire
WSU	Walter Sisulu University
WWF-SA	Worldwide Fund for Nature, South Africa

